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National Inventory Report 2016 – Norway

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Annex I: Key Categories

This chapter outlines the Tier 2 methodologies used to find which sources are key categories in the Norwegian greenhouse gas emission inventory.

Two different methods are used for the key category analysis. First, the standard method as described in IPCC Good Practice Guidance (IPCC 2001) is used, both at the Tier 1 level and at the Tier 2 level with uncertainties. Second, a sensitivity analysis may be performed using the specification of the model for the uncertainty analysis, as described in Rypdal and Zhang (2000). The uncertainty model is presented in Annex II. The discussion focuses primarily on the standard method. The sensitivity analysis has not been repeated since the 2000 report.

Key categories are identified as the emission sources that add up to 90 per cent of total uncertainty in level and/or trend. This definition of a key category is according to IPCC Good Practice Guidance (IPCC 2000) which is based on Statistics Norway (2001e). A Tier 2 analysis for the LULUCF sector has also been performed. However, key categories for non-LULUCF sources are based on the analysis without LULUCF.

The key category analysis is performed at the level of IPCC source categories and each GHG from each source category is considered separately with respect to total GWP weighted emissions (HFCs and PFCs are grouped together). The advantage in using a Tier 2 rather than the Tier 1 methodology is that uncertainties are taken into account so the ranking shows where uncertainties can be reduced.

The first step taken to find key categories with respect to level and trend was the determination of uncertainties in input parameters (AD = activity data and EF = emission factors). Uncertainties of activity data and emissions factors were combined to source uncertainty by the error propagation rule $U_{source} = \sqrt{U_{AD}^2 + U_{EF}^2}$ (IPCC 2001, equation 6.4).

The next step was the use of sensitivity analysis to identify the parameters in the inventory that most influence the total GHG emissions in level and in trend. The standard method does not take into account correlations. This has partly been handled by aggregating sources with the same emission factors. However, sources with similar emission factors in stationary combustion, categories 1A1, 1A2, and 1A4, were treated separately as suggested in the 2006 IPCC guidelines. Also, correlations due to common activity data for several pollutants have not been taken into account. This may lead to an underestimation of the uncertainty importance for such sources. In a sensitivity analysis (Rypdal and Zhang 2000), such correlations may be specified in the model. The sensitivity analysis also allows separate treatment of activity data and emission factors.

Compilations of the uncertainty importance elasticity lead to the estimation of uncertainty importance of each input parameter with respect to total level and trend uncertainty. From this we get a ranked list of parameters which add up to 90 per cent of total uncertainty in level and trend. The LULUCF key categories come in addition to this.

A summary of the key categories is given in Table AI-2 for the emissions categories, and a summary for removal key categories is given in Table AI-3. The result in level and trend from the Tier 1 analysis for emissions sources is given in Table AI-1.

In the 2006 IPCC guidelines it is suggested that good practice reporting should include key categories from both the Tier 1 and Tier 2 analyses. The sources listed in Table AI-1 were key categories according to the Tier 1 analysis but not according to the Tier 2 analysis.

Table AI-1. Summary of identified key categories only in the Tier 1 analysis.

	Source category	Gas	Level assessment Tier 1 1990	Level assessment Tier 1 2014	Trend assessment Tier 1
2A1	Cement Production	CO_2	**1.22**	**1.37**	**0.31**
1A	Stationary Fuel	CO_2	**1.64**	**1.28**	**0.79**
2B1	Ammonia Production	CO_2	**0.96**	**0.52**	**0.94**
2B6	Titanium dioxide	CO_2	**0.39**	**0.50**	0.23
1A5b	Mobile	CO_2	**0.77**	**0.45**	**0.69**
2A2	Lime Production	CO_2	0.10	**0.42**	**0.69**
3B1	Cattle	CH_4	**0.50**	**0.42**	0.18
2A4	Other process uses of	CO_2	0.07	0.20	**0.29**
3G	Liming	CO_2	**0.44**	0.17	**0.60**
2D1	Lubricant use	CO_2	0.32	0.09	**0.50**
1A3b	Road Transportation	CH_4	0.16	0.03	**0.29**
2C4	Magnesium	SF_6	**3.94**	.	.

Bold figures indicate whether the source category is a key.

The analyses have been performed for 1990 and 2014 GHG emission data. The main conclusion is that there are few differences in the result for 1990 compared with 2014.

For the *Land use, Land-use Change and Forestry (LULUCF)* sector, Table AI-3 shows the results of the Tier 2 key category analysis performed as described in GPG (2003) . Uncertainties of land use category area and C change estimates are based on standard sampling methodology as detailed in chapters 7.2.3 and 7.2.4. All key categories identified using the Tier 2 method were also identified using the Tier 1 method. In both, Tier 1 and Tier 2 analyses, all three C pools (living biomass, soil and dead organic matter) in the forest land remaining forest land category are among the top key categories.

Table AI-2. Summary of identified emission key categories. Excluding LULUCF.

	Source category	Gas	Level assessment Tier 2 1990	Level assessment Tier 2 2014	Trend assessment Tier 2 1990-2014	Method (Tier) 2014
Tier 2 key categories (large contribution to the total inventory uncertainty)						
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Gaseous Fuels	CO_2	**4.54**	**9.87**	**11.76**	Tier 2
3D11	Synthetic Fertilizers	N_2O	**10.70**	**9.47**	**2.15**	Tier 1
3D12	Organic N fertilizer	N_2O	**6.17**	**6.18**	0.32	Tier 1
2F	Product uses as substitutes for ODS	HFCs	0.00	**5.89**	**12.75**	Tier2
1A3b	Road Transportation	CO_2	**4.61**	**5.83**	**2.86**	Tier 1a
3A	Enteric Fermentation	CH_4	**6.74**	**5.67**	**1.99**	Tier 1/2*
5A1a	Managed Waste Disposal sites. Anaerobic.	CH_4	**7.70**	**4.17**	**7.27**	Tier 2
1B2c	Venting and Flaring	CH_4	**1.43**	**4.17**	**6.01**	Tier 2
1B2a	Oil (incl. oil refineries, gasoline distribution)	CO_2	**4.72**	**3.53**	**2.35**	Tier 2
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Other Fuels	CO_2	**1.01**	**3.48**	**5.40**	Tier 2
3D13	Animal production	N_2O	**4.05**	**3.17**	**1.71**	Tier 2
3D16	Cultivation of Histosols	N_2O	**3.00**	**3.06**	0.27	Tier 1
1A3d	Navigation	CO_2	**3.56**	**2.93**	**1.18**	Tier 2
3D21	Atmospheric Deposition	N_2O	**2.44**	**2.58**	0.42	Tier 1
1A3a	Civil Aviation	CO_2	**1.42**	**2.51**	**2.42**	Tier 2
1A4	Other sectors - Mobile Fuel Combustion	CO_2	**2.29**	**2.29**	0.11	Tier 2
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Liquid Fuels	CO_2	**3.04**	**2.26**	**1.54**	Tier 2
3D22	Nitrogen Leaching and Run-off	N_2O	**2.16**	**1.91**	0.42	Tier 2
2C3	Aluminium production	CO_2	**1.54**	**1.82**	0.70	Tier 2
1B2c	Venting and Flaring	CO2	**1.91**	**1.50**	**0.80**	Tier 2
3D14	Crop Residue	N_2O	**2.19**	**1.39**	**1.64**	Tier 1
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Biomass	CH_4	**1.29**	**1.22**	0.10	Tier 2
1A3d	Navigation	CH_4	0.04	**1.13**	**2.36**	Tier 2
5D	Wastewater treatment and discharge	N_2O	0.87	**1.03**	0.38	Tier 1
1B2a	Oil (incl. oil refineries, gasoline distribution)	CH_4	**0.96**	**0.98**	0.10	Tier 2
3B	Manure Management	N_2O	**0.87**	**0.80**	0.10	Tier 1/2
2C2	Ferroalloys production	CO_2	0.79	**0.77**	0.01	Tier 2
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Gaseous Fuels	CH_4	0.37	**0.77**	**0.88**	Tier 2
1B1a	Coal Mining	CH_4	**1.22**	0.74	**0.98**	Tier 1
5D	Wastewater treatment and discharge	CH_4	**1.25**	0.64	**1.27**	Tier 1
5B	Biological treatment of Solid Waste	CH_4	0.03	0.62	**1.28**	Tier 1
5B	Biological treatment of Solid Waste	N_2O	0.03	0.54	**1.10**	Tier 1
1B2b	Natural Gas	CH_4	0.02	0.38	**0.77**	Tier 2
2C3	Aluminium production	PFCs	**8.16**	0.36	**16.51**	Tier 2
2B2	Nitric Acid Production	N_2O	**1.24**	0.16	**2.27**	Tier 2

2B5	Carbide production	CO_2	0.43	0.05	**0.81**	Tier 2
Tier 1 key categories (large contribution to the total emissions)						
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Solid Fuels	CO_2	0.76	0.58	0.36	Tier 2
3B1	Cattle	CH_4	0.56	0.45	0.20	Tier 2
2B6	Titanium dioxide production	CO_2	0.22	0.27	0.13	Tier 2
1A5b	Mobile	CO_2	0.46	0.26	0.41	Tier 2
2B1	Ammonia Production	CO_2	0.39	0.21	0.38	Tier 2
3G	Liming	CO_2	0.27	0.10	0.35	Tier 2
2D1	Lubricant use	CO_2	0.35	0.09	0.54	Tier 2
1A3b	Road Transportation	CH_4	0.40	0.07	0.70	Tier 1a
2A4	Other process uses of carbonates	CO_2	0.02	0.05	0.08	Tier 1/3
2A1	Cement Production	CO_2	0.05	0.05	0.01	Tier 2
2A2	Lime Production	CO_2	0.00	0.01	0.02	Tier 2
2C4	Magnesium production	SF_6	0.05	.	.	Tier 2
Qualitative key categories						
	Carbon capture and storage	CO_2				CS (Tier 2)

Bold figures indicate whether the source category is key in the tier 2 analysis.

Table AI-3. Summary of identified LULUCF key categories.

	Source category	Gas	Level assessment 1990	Level assessment 2014	Trend assessment 1990-2014	Method (Tier) 2014
Tier 2 key categories (large contribution to the total inventory uncertainty)						
4.A.1	Forest remaining forest - Living biomass	CO_2	**11.08**	**17.70**	**20.09**	Tier 3
4.A.1	Forest remaining forest - Litter + dead wood + Mineral soil	CO_2	**2.90**	**5.42**	**6.52**	Tier 3
4.E.2.1	Forest to Settlement - dead wood	CO_2	0.30	**4.53**	**6.99**	Tier 3
4.B.1	Cropland remaining cropland - Organic soils	CO_2	**3.71**	**2.43**	**1.18**	Tier 1
4.A.1	Forest remaining forest, drained organic soils - Organic soils	CO_2	**2.92**	**2.10**	**1.22**	Tier 1
4.E.2.1	Forest to Settlement - Living biomass	CO_2	**1.77**	**1.69**	**1.40**	Tier 3
4.C.2.1	Forest to Grassland - dead wood	CO_2	0.02	**1.62**	**2.57**	Tier 2
4.A.2.2	Grassland to Forest - Litter + dead wood	CO_2	0.08	**1.48**	**2.30**	Tier 2
4.G	Harvested Wood Products - HWP	CO_2	**3.59**	**1.35**	**4.75**	Tier 2
4.A.2.4	Settlement to Forest - Litter + dead wood	CO_2	0.05	**1.09**	**1.69**	Tier 2
4.B.2.1	Forest to Cropland - dead wood	CO_2	0.03	**1.03**	**1.61**	Tier 2
4(II)	Forest rem forest - Organic soil	N_2O	**1.22**	**0.92**	**0.57**	Tier 1
4.E.2.1	Forest to Settlement - Mineral soils	CO_2	0.05	**0.78**	**1.21**	Tier 2
4.C.2.1	Forest to Grassland - Mineral soils	CO_2	0.01	**0.58**	**0.92**	Tier 2
4.B.2.3	Wetland to Cropland - Organic soils	CO_2	.	**0.53**	.	Tier 1
4.B.2.1	Forest to Cropland - Living biomass	CO_2	0.49	**0.51**	**0.45**	Tier 3
4.E.2.1	Forest to Settlement - Organic soils	CO_2	.	**0.49**	.	Tier 1
4(II)	Forest rem forest - Organic soil	CH_4	**0.60**	**0.44**	0.27	Tier 1

4.B.2.1	Forest to Cropland - Mineral soils	CO_2	0.01	**0.41**	**0.64**	Tier 2
4.E.1	Settlements remaining settlements - Organic soils	CO_2	**0.61**	**0.40**	0.19	Tier 1
4.A.2.1	Cropland to Forest - Litter + dead wood	CO_2	0.03	**0.39**	**0.59**	Tier 2
4(III)	Direct N2O from N mineralization/immobilization - N2O	N_2O	0.02	**0.38**	**0.59**	Tier 1
4.C.1	Grassland remaining grassland - Living biomass	CO_2	**0.62**	**0.38**	0.14	Tier 3
4.A.2.2	Grassland to Forest – Mineral soil	CO_2	0.02	0.34	**0.53**	Tier 2
4.B.2.1	Forest to Cropland – Organic soil	CO_2	0.04	0.33	**0.49**	Tier 1
4.A.2.2	Grassland to Forest – Living biomass	CO_2	0.02	0.27	**0.42**	Tier 3
4.E.2.2	Cropland to Settlement – Mineral soil	CO_2	0.02	0.26	**0.41**	Tier 2
4.C.1	Grassland remaining grassland – Organic soil	CO_2	**0.67**	0.25	0.09	Tier 1
Tier 1 key categories (large contribution to the total emissions)						
No additional categories – all tier 1 key categories were also key at tier 2.						

Bold figures indicate whether the source category is key in the tier 2 analysis.

Table AI-4. Summary of identified key categories Tier 1. Excluding LULUCF. Per cent contribution to the total uncertainty in level and/or trend

	Source category	**Gas**	**Level assessment Tier 1 1990**	**Level assessment Tier 1 2014**	**Trend assessment Tier 1 1990-2014**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Gaseous Fuels	CO_2	**10.46**	**23.26**	**27.38**
1A3b	Road Transportation	CO_2	**14.70**	**19.01**	**9.22**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Liquid Fuels	CO_2	**13.30**	**10.12**	**6.80**
2C2	Ferroalloys production	CO_2	**4.92**	**4.90**	0.04
3A	Enteric Fermentation	CH_4	**4.92**	**4.23**	**1.46**
1A4	Other sectors - Mobile Fuel Combustion	CO_2	**4.08**	**4.17**	0.19
2C3	Aluminium production	CO_2	**2.73**	**3.32**	**1.25**
1A3d	Navigation	CO_2	**3.27**	**2.76**	**1.09**
1B2c	Venting and Flaring	CO_2	**3.30**	**2.65**	**1.40**
1A3a	Civil Aviation	CO_2	**1.31**	**2.36**	**2.25**
2F	Product uses as substitutes for ODS	HFCs	0.00	**2.24**	**4.79**
5A1a	Managed Waste Disposal sites. Anaerobic.	CH_4	**3.97**	**2.20**	**3.79**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Other Fuels	CO_2	**0.62**	**2.17**	**3.33**
1B2a	Oil (incl. oil refineries, gasoline distribution)	CO_2	**2.19**	**1.67**	**1.10**
2A1	Cement Production	CO_2	**1.22**	**1.37**	**0.31**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Solid Fuels	CO_2	**1.64**	**1.28**	**0.79**
1B2c	Venting and Flaring	CH_4	**0.37**	**1.10**	**1.57**
3D11	Synthetic Fertilizers	N_2O	**0.99**	**0.90**	0.20
3D16	Cultivation of Histosols	N_2O	**0.68**	**0.71**	0.06
3D12	Organic N fertilizer	N_2O	**0.57**	**0.58**	0.03

2B1	Ammonia Production	CO_2	**0.96**	**0.52**	**0.94**
2B2	Nitric Acid Production	N_2O	**3.84**	**0.51**	**7.12**
2B6	Titanium dioxide production	CO_2	**0.39**	**0.50**	0.23
1B2a	Oil (incl. oil refineries, gasoline distribution)	CH_4	**0.45**	**0.47**	0.04
1A5b	Mobile	CO_2	**0.77**	**0.45**	**0.69**
2A2	Lime Production	CO_2	0.10	**0.42**	**0.69**
3B1	Cattle	CH_4	**0.50**	**0.42**	0.18
2C3	Aluminium production	PFCs	**7.50**	**0.34**	**15.33**
3D22	Nitrogen Leaching and Run-off	N_2O	0.33	**0.30**	0.06
3D13	Animal production	N_2O	**0.37**	**0.30**	0.16
1A3d	Navigation	CH_4	0.01	0.29	**0.59**
2A4	Other process uses of carbonates	CO_2	0.07	0.20	**0.29**
3G	Liming	CO_2	**0.44**	0.17	**0.60**
2D1	Lubricant use	CO_2	0.32	0.09	**0.50**
2B5	Carbide production	CO_2	**0.77**	0.09	**1.46**
1A3b	Road Transportation	CH_4	0.16	0.03	**0.29**
2C4	Magnesium production	SF_6	**3.94**	.	.

Bold figures indicate whether the source category is key.

Table AI-5. Summary of identified key categories Tier 2. Including LULUCF. Per cent contribution to the total uncertainty in level and/or trend. Categories identified only in the analysis without LULUCF are included.

	Source category	**Gas**	**Level assessment Tier 2 1990**	**Level assessment Tier 2 2014**	**Trend assessment Tier 2 1990-2014**
4.A.1	Forest remaining forest - Living biomass	CO_2	**11.08**	**17.70**	**20.09**
4.A.1	Forest remaining forest - Litter + dead wood + Mineral soil	CO_2	**2.90**	**5.42**	**6.52**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Gaseous Fuels	CO_2	**3.02**	**4.70**	**5.29**
4.E.2.1	Forest to Settlement - dead wood	CO_2	0.30	**4.53**	**6.99**
3D11	Synthetic Fertilizers	N_2O	**7.12**	**4.51**	**2.00**
3D12	Organic N fertilizer	N_2O	**4.11**	**2.95**	**1.70**
2F	Product uses as substitutes for ODS	HFCs	0.00	**2.81**	**4.47**
1A3b	Road Transportation	CO_2	**3.07**	**2.78**	**2.19**
3A	Enteric Fermentation	CH_4	**4.49**	**2.71**	**1.04**
4.B.1	Cropland remaining cropland - Organic soils	CO_2	**3.71**	**2.43**	**1.18**
4.A.1	Forest remaining forest, drained organic soils - Organic soils	CO_2	**2.92**	**2.10**	**1.22**
5A1a	Managed Waste Disposal sites. Anaerobic.	CH_4	**5.13**	**1.99**	**0.57**
1B2c	Venting and Flaring	CH_4	**0.95**	**1.99**	**2.47**
4.E.2.1	Forest to Settlement - Living biomass	CO_2	**1.77**	**1.69**	**1.40**
1B2a	Oil (incl. oil refineries, gasoline distribution)	CO_2	**3.14**	**1.68**	0.39
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Other Fuels	CO_2	**0.67**	**1.66**	**2.15**
4.C.2.1	Forest to Grassland - dead wood	CO_2	0.02	**1.62**	**2.57**
3D13	Animal production	N_2O	**2.70**	**1.51**	**0.44**

4.A.2.2	Grassland to Forest - Litter + dead wood	CO_2	0.08	**1.48**	**2.30**
3D16	Cultivation of Histosols	N_2O	**2.00**	**1.46**	**0.87**
1A3d	Navigation	CO_2	**2.37**	**1.40**	**0.50**
4.G	Harwested Wood Products - HWP	CO_2	**3.59**	**1.35**	**4.75**
3D21	Atmospheric Deposition	N_2O	**1.62**	**1.23**	**0.78**
1A3a	Civil Aviation	CO_2	**0.95**	**1.20**	**1.22**
1A4	Other sectors - Mobile Fuel Combustion	CO_2	**1.52**	**1.09**	**0.63**
4.A.2.4	Settlement to Forest - Litter + dead wood	CO_2	0.05	**1.09**	**1.69**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Liquid Fuels	CO_2	**2.02**	**1.08**	0.24
4.B.2.1	Forest to Cropland - dead wood	CO_2	0.03	**1.03**	**1.61**
4(II)	Forest rem forest - Organic soil	N_2O	**1.22**	**0.92**	**0.57**
3D22	Nitrogen Leaching and Run-off	N_2O	**1.44**	**0.91**	**0.41**
2C3	Aluminium production	CO_2	**1.02**	**0.87**	**0.64**
4.E.2.1	Forest to Settlement - Mineral soils	CO_2	0.05	**0.78**	**1.21**
1B2c	Venting and Flaring	CO_2	**1.27**	**0.72**	0.21
3D14	Crop Residue	N_2O	**1.46**	**0.66**	0.01
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Biomass	CH_4	**0.86**	**0.58**	0.30
4.C.2.1	Forest to Grassland - Mineral soils	CO_2	0.01	**0.58**	**0.92**
1A3d	Navigation	CH_4	0.03	**0.54**	**0.84**
4.B.2.3	Wetland to Cropland - Organic soils	CO_2	.	**0.53**	.
4.B.2.1	Forest to Cropland - Living biomass	CO_2	0.49	**0.51**	**0.45**
5D	Wastewater treatment and discharge	N_2O	**0.58**	**0.49**	0.36
4.E.2.1	Forest to Settlement - Organic soils	CO_2	.	**0.49**	.
1B2a	Oil (incl. oil refineries, gasoline distribution)	CH_4	**0.64**	**0.47**	0.28
4(II)	Forest rem forest - Organic soil	CH_4	**0.60**	**0.44**	0.27
4.B.2.1	Forest to Cropland - Mineral soils	CO_2	0.01	**0.41**	**0.64**
4.E.1	Settlements remaining settlements - Organic soils	CO_2	**0.61**	**0.40**	0.19
4.A.2.1	Cropland to Forest - Litter + dead wood	CO_2	0.03	**0.39**	**0.59**
3B	Manure Management	N_2O	**0.58**	**0.38**	0.19
4(III)	Direct N2O from N mineralization/immobilization - N2O	N_2O	0.02	**0.38**	**0.59**
4.C.1	Grassland remaining grassland - Living biomass	CO_2	**0.62**	**0.38**	0.14
2C2	Ferroalloys production	CO_2	0.53	**0.37**	0.20
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Gaseous Fuels	CH_4	0.24	**0.36**	**0.40**
1B1a	Coal Mining	CH_4	**0.81**	**0.35**	0.03
4.A.2.2	Grassland to Forest - Mineral soils	CO_2	0.02	0.34	**0.53**
4.B.2.1	Forest to Cropland - Organic soils	CO_2	0.04	0.33	**0.49**
5D	Wastewater treatment and discharge	CH_4	**0.83**	0.31	0.12
5B	Biological treatment of Solid Waste	CH_4	0.02	0.30	**0.45**
4.A.2.2	Grassland to Forest - Living biomass	CO_2	0.02	0.27	**0.42**
4.E.2.2	Cropland to Settlement - Mineral soils	CO_2	0.02	0.26	**0.41**
4.C.1	Grassland remaining grassland - Organic soils	CO_2	**0.67**	0.25	0.09
2C3	Aluminium production	PFCs	**5.43**	0.17	**3.68**
2B2	Nitric Acid Production	N_2O	**0.82**	0.08	**0.48**

1A	Stationary Fuel Combustion (1A1-1A2-1A4), Solid Fuels	CO_2	0.51	0.28	0.07
3B1	Cattle	CH_4	0.37	0.22	0.07
2B6	Titanium dioxide production	CO_2	0.14	0.13	0.10
1A5b	Mobile	CO_2	0.31	0.13	0.02
2B1	Ammonia Production	CO_2	0.26	0.10	0.03
3G	Liming	CO_2	0.18	0.05	0.06
2A1	Cement Production	CO_2	0.03	0.02	0.02
2B5	Other Chemical Industry	CO_2	0.29	0.02	0.17
2A2	Lime Production	CO_2	0.00	0.01	0.01
2C4	Magnesium production	SF_6	0.04	.	.

Bold figures indicate whether the source category is key.
Source categories with no bold face data were identified only in the analysis without LULUCF.

Table AI-6. Summary of identified key categories Tier 1. Including LULUCF. Per cent contribution to the total uncertainty in level and/or trend. Categories identified only in the analysis without LULUCF are included.

	Source category	**Gas**	**Level assessment Tier 1 1990**	**Level assessment Tier 1 2014**	**Trend assessment Tier 2 1990-2014**
4.A.1	Forest remaining forest - Living biomass	CO_2	**15.36**	**27.23**	**31.72**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Gaseous Fuels	CO_2	**7.79**	**13.46**	**15.52**
1A3b	Road Transportation	CO_2	**10.94**	**11.00**	**8.89**
4.A.1	Forest remaining forest - Litter + dead wood + Mineral soil	CO_2	**3.17**	**6.59**	**8.12**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Liquid Fuels	CO_2	**9.90**	**5.86**	**1.35**
2C2	Ferroalloys production	CO_2	**3.66**	**2.84**	**1.59**
3A	Enteric Fermentation	CH_4	**3.66**	**2.45**	**0.96**
1A4	Other sectors - Mobile Fuel Combustion	CO_2	**3.04**	**2.41**	**1.42**
2C3	Aluminium production	CO_2	**2.03**	**1.92**	**1.45**
4.B.1	Cropland remaining cropland - Organic soils	CO_2	**2.41**	**1.76**	**0.87**
1A3d	Navigation	CO_2	**2.43**	**1.60**	**0.59**
1B2c	Venting and Flaring	CO_2	**2.46**	**1.53**	**0.46**
1A3a	Civil Aviation	CO_2	**0.97**	**1.37**	**1.42**
2F	Product uses as substitutes for ODS	HFCs	0.00	**1.30**	**2.12**
5A1a	Managed Waste Disposal sites. Anaerobic.	CH_4	**2.96**	**1.27**	**0.37**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Other Fuels	CO_2	**0.46**	**1.26**	**1.67**
4.E.2.1	Forest to Settlement - dead wood	CO_2	0.06	**1.03**	**1.62**
1B2a	Oil (incl. oil refineries, gasoline distribution)	CO_2	**1.63**	**0.97**	**0.23**
2A1	Cement Production	CO_2	**0.91**	**0.79**	**0.54**
4.A.1	Forest remaining forest, drained organic soils - Organic soils	CO_2	**0.95**	**0.76**	**0.45**
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Solid Fuels	CO_2	**1.22**	**0.74**	0.19
1B2c	Venting and Flaring	CH_4	**0.27**	**0.64**	**0.81**
4.E.2.1	Forest to Settlement - Living biomass	CO_2	**0.59**	**0.63**	**0.54**
4.G	Harwested Wood Products - HWP	CO_2	**1.43**	**0.60**	**2.16**

3D11	Synthetic Fertilizers	N_2O	**0.74**	**0.52**	**0.24**
3D16	Cultivation of Histosols	N_2O	**0.51**	**0.41**	**0.25**
3D12	Organic N fertilizer	N_2O	**0.42**	**0.34**	0.20
4(II)	Forest rem forest - Organic soil	N_2O	**0.40**	**0.33**	**0.21**
4.C.2.1	Forest to Grassland - dead wood	CO_2	0.00	**0.33**	**0.53**
2B1	Ammonia Production	CO_2	**0.72**	**0.30**	0.10
2B2	Nitric Acid Production	N_2O	**2.86**	**0.29**	**1.89**
2B6	Titanium dioxide production	CO_2	**0.29**	**0.29**	**0.23**
1B2a	Oil (incl. oil refineries, gasoline distribution)	CH_4	**0.33**	**0.27**	0.17
1A5b	Mobile	CO_2	**0.57**	**0.26**	0.05
2A2	Lime Production	CO_2	0.07	**0.24**	**0.34**
3B1	Cattle	CH_4	**0.37**	**0.24**	0.08
4.A.2.4	Settlement to Forest - Litter + dead wood	CO_2	0.01	**0.23**	**0.37**
4.C.2.1	Forest to Grassland - Mineral soils	CO_2	0.00	**0.20**	**0.33**
2C3	Aluminium production	PFCs	**5.59**	**0.19**	**4.31**
4.E.2.1	Forest to Settlement - Mineral soils	CO_2	0.01	**0.18**	**0.28**
3D22	Nitrogen Leaching and Run-off	N_2O	0.24	**0.17**	0.08
3D13	Animal production	N_2O	**0.28**	**0.17**	0.05
4.B.2.1	Forest to Cropland - dead wood	CO_2	0.01	**0.17**	**0.28**
4.A.2.2	Grassland to Forest - Litter + dead wood	CO_2	0.01	0.17	**0.27**
1A3d	Navigation	CH_4	0.01	0.17	**0.27**
3G	Liming	CO_2	**0.33**	0.10	0.12
2B5	Other Chemical Industry	CO_2	**0.57**	0.05	**0.39**
2C4	Magnesium production	SF_6	**2.93**	.	.

Bold figures indicate whether the source category is key.
Source categories with no bold face data were identified only in the analysis without LULUCF.

Table AI-7. Background data for the key category analyses.

	Category - Fuel	CO_2 Gg		CH_4 Gg CO_2 eq.		N_2O Gg CO_2 eq.		Uncertainty activity 2σ, %	Uncertainty emission factor 2σ, %		
		1990	2014	1990	2014	1990	2014		CO_2	CH_4	N_2O
1A	Stationary Fuel Combustion (1A1-1A2-1A4), Biomass	.	.	159.59	157.67	37.63	41.26	30	.	72	1
	Stationary Fuel Combustion (1A1-1A2-1A4), Gaseous Fuels	5431.47	12367.13	48.87	107.22	2.75	6.43	4	7	72	1
	Stationary Fuel Combustion (1A1-1A2-1A4), Liquid Fuels	6905.10	5380.37	11.88	5.74	21.73	20.42	3	3	72	1
	Stationary Fuel Combustion (1A1-1A2-1A4), Other Fuels	319.75	1155.57	4.68	17.22	7.44	18.25	5	30	72	1
	Stationary Fuel Combustion (1A1-1A2-1A4), Solid Fuels	853.95	678.71	3.21	0.46	3.34	2.45	5	7	72	1
1A3a	Civil Aviation	679.38	1254.94	0.44	0.91	6.43	11.87	20	3	72	1
1A3b	Road Transportation	7630.18	10103.65	85.06	15.16	55.43	68.57	5	3	45	65
1A3c	Railways	96.40	43.58	0.14	0.06	10.84	4.88	5	3	72	1
1A3d	Navigation	1696.41	1465.56	5.32	152.79	10.63	8.98	20	3	72	1
1A4	Other sectors - Mobile Fuel Combustion	2117.04	2215.97	11.62	14.08	17.49	20.08	10	3	72	1
1A5a	Stationary	62.45	11.75	0.21	0.07	0.15	0.19	3	5	72	1
1A5b	Mobile	399.87	239.06	0.42	4.13	3.61	1.99	5	10	72	1
1B1a	Coal Mining	20.43	13.30	163.42	104.16	.	.	3	72	72	.
1B2a	Oil (incl. oil refineries, gasoline distribution)	1134.40	888.26	231.02	247.71	.	.	3	40	40	.
1B2b	Natural Gas	3.10	11.25	3.00	52.78	.	.	3	72	72	.
1B2c	Venting and Flaring	1714.53	1408.42	190.92	584.58	4.98	2.96	4	10	72	1
2A1	Cement Production	634.26	727.23	.	.	.	.	0.444398	0.566764	.	.
2A2	Lime Production	49.85	222.51	.	.	.	.	0.364965	0.482322	.	.
2A3	Glass production	5.58	5.39	.	.	.	.	0.1	5	.	.
2A4	Other process uses of carbonates	34.72	107.17	.	.	.	.	0.1	5	.	.
2B1	Ammonia Production	500.12	278.25	.	.	.	.	3	7	.	.
2B10	Other	.	.	.	.	57.96	97.15	26	.	.	0

2B2	Nitric Acid Production	.	.	.	.	1993.32	270.56	0	.	.	5.987344
2B5	Carbide production	399.59	45.32	8.76	1.88	.	.	3	10	10	.
2B6	Titanium dioxide production	201.10	264.03	.	.	.	.	3	10	.	.
2B8	Petrochemical and carbon black production	87.70	101.61	1.93	15.71	0.02	0.39	9	0.74173	72	0
2C1a	Steel	12.35	27.03	.	.	.	.	1.23	1.2983	.	.
2C2	Ferroalloys production	2553.70	2604.59	1.24	1.40	5.02	4.68	0	3	72	10
2C3	Aluminium production	1419.00	1764.19	.	.	.	.	3	10	.	.
2C4	Magnesium production	127.65	.	.	.	.	.	0	5	.	.
2C6	Zinc production	2.96	3.98	.	.	.	.	5	5	.	.
2C7	Other	51.41	81.42	.	.	.	.	10	10	.	.
2D1	Lubricant use	167.07	46.15	.	.	.	.	0	20	.	.
2D2	Paraffin wax use	6.23	48.94	.	.	.	.	30	10	.	.
2D3	Other	114.15	113.46	.	.	.	.	0	10	.	.
2G3	N2O from product uses	.	.	.	.	34.16	27.10	0	.	.	15
2H1	Pulp and Paper	10.43	8.50	.	.	.	.	0.915625	10	.	.
2H2	Food and beverages industry	20.79	91.39	.	.	.	.	10	10	.	.
3A	Enteric Fermentation	.	.	2552.24	2249.47	.	.	5	.	25	.
3B	Manure Management	.	.	.	.	110.33	106.96	24	.	.	72
3B1	Cattle	.	.	260.73	221.36	.	.	5	.	20	.
3B2	Sheep	.	.	7.35	7.29	.	.	5	.	30	.
3B3	Swine	.	.	48.72	59.87	.	.	5	.	20	.
3B4	Other	.	.	14.12	21.28	.	.	5	.	30	.
3D11	Synthetic Fertilizers	.	.	.	.	515.97	478.24	5	.	.	200
3D12	Organic N fertilizer	.	.	.	.	296.11	310.66	22	.	.	200
3D13	Animal production	.	.	.	.	193.18	158.44	30	.	.	200
3D14	Crop Residue	.	.	.	.	104.67	69.39	30	.	.	200
3D16	Cultivation of Histosols	.	.	.	.	354.73	378.59	72	.	.	38.5
3D21	Atmospheric Deposition	.	.	.	.	58.58	64.93	30	.	.	400
3D22	Nitrogen Leaching and Run-off	.	.	.	.	170.43	158.53	70	.	.	1
3F1	Cereals	.	.	27.15	2.69	8.39	0.83	10	.	72	1
3G	Liming	230.97	88.61	.	.	.	.	5	10	.	.
3H	Urea application	0.55	0.16	.	.	.	.	5	10	.	.

5A1a	Managed Waste Disposal sites. Anaerobic.	.	.	2061.76	1169.91	.	.	20	.	30	.
5B	Biological treatment of Solid Waste	.	.	2.92	61.34	2.61	53.12	20	.	1	1
5C	Incinertion and open burning of waste	0.19	.	0.02	0.03	0.07	0.08	30	30	72	1
5D	Wastewater treatment and discharge	.	.	117.37	62.77	112.57	139.39	25	.	1	70

	Category - Fuel	HFCs Gg CO_2 eq.		PFCs Gg CO_2 eq.		SF6 Gg CO_2 eq.		Uncertainty activity	Uncertainty emission factor 2σ, %		
		1990	2014	1990	2014	1990	2014	2σ, %	HFCs	PFCs	SF_6
2C3	Aluminium production	.	.	3894.80	178.92	.	.	3	.	20	.
2C4	Magnesium production	.	.	.	.	2045.16	.	0	.	.	0.25
2E1	By-product Emissions	.	.	.	.	.	1.14	0	.	.	300
2F	Product uses as substitutes for ODS	0.04	1190.35	.	0.02	.	.	0	50	50	.
2G1	Electrical equiptment	.	.	.	.	51.14	40.53	0	.	.	60
2G2	SF6 and PFCs from other product use	.	.	.	.	2.23	13.07	0	.	.	60

	Category - Fuel	CO_2		CH_4		N_2O		Uncertainty activity	Uncertainty emission factor		
		1990	2014	1990	2014	1990	2014		CO_2	CH_4	N_2O
4(I)	Forest-Direct N2O - Inorganic N	.	.	.	.	0.70	0.18	0	.	.	201
	Forest-Direct N2O - Organic N	.	.	.	.	21.93	20.38	0	.	.	206
	Settlements-Direct N2O - Organic N	.	.	.	.	2.68	5.13	0	.	.	201
4(II)	Cropland - Organic soil	.	.	84.85	90.55	.	.	0	.	75	.
	Forest rem forest - Organic soil	.	.	48.15	52.25	276.84	303.66	0	.	180	64
	Grasland - Organic soil	.	.	8.20	5.75	.	.	0	.	119	.
	Peat extraction - Organic soil	.	.	1.04	1.04	0.11	0.11	0	.	95	124

4(III)	Direct N2O from N mineralization/immobilization - N2O	.	.	.	.	1.42	36.17	0	.	.	224
4(IV)	Indirect N2O from Managed soils - AtmDep	.	.	.	.	0.52	0.52	0	.	.	475
	Indirect N2O from Managed soils - LeachRun	.	.	.	.	6.11	13.94	0	.	.	300
4(V)	Forest land - Biomass burning	.	.	1.33	0.83	0.11	0.06	0	.	75	75
4.A.1	Forest remaining forest - Litter + dead wood + Mineral soil	-2211.59	-6050.29	.	.	.	.	0	19	.	.
	Forest remaining forest - Living biomass	-10710.80	-25013.40	.	.	.	.	0	15	.	.
	Forest remaining forest, drained organic soils - Organic soils	661.21	696.12	.	.	.	.	0	64	.	.
4.A.2.1	Cropland to Forest - Litter + dead wood	-4.36	-71.79	.	.	.	.	0	115	.	.
	Cropland to Forest - Living biomass	-29.66	-32.34	.	.	.	.	0	105	.	.
	Cropland to Forest - Mineral soils	1.83	30.36	.	.	.	.	0	79	.	.
	Cropland to Forest - Organic soils	0.51	10.34	.	.	.	.	0	132	.	.
4.A.2.2	Grassland to Forest - Litter + dead wood	-5.68	-156.53	.	.	.	.	0	201	.	.
	Grassland to Forest - Living biomass	-1.80	-28.89	.	.	.	.	0	201	.	.
	Grassland to Forest - Mineral soils	3.78	104.35	.	.	.	.	0	70	.	.
4.A.2.3	Wetland to Forest - Litter + dead wood	-1.92	-29.58	.	.	.	.	0	124	.	.
	Wetland to Forest - Living biomass	.	-4.99	.	.	.	.	0	106	.	.
	Wetland to Forest - Mineral soils	0.92	14.41	.	.	.	.	0	136	.	.
	Wetland to Forest - Organic soils	0.51	17.53	.	.	.	.	0	102	.	.
4.A.2.4	Settlement to Forest - Litter + dead wood	-6.82	-211.64	.	.	.	.	0	109	.	.
	Settlement to Forest - Living biomass	-7.15	-40.41	.	.	.	.	0	65	.	.
	Settlement to Forest - Mineral soils	-1.25	-39.23	.	.	.	.	0	109	.	.
	Settlement to Forest - Organic soils	.	1.21	.	.	.	.	0	204	.	.
4.A.2.5	Other land to Forest - Litter + dead wood	-0.16	-7.78	.	.	.	.	0	153	.	.
	Other land to Forest - Living biomass	-0.55	-6.60	.	.	.	.	0	133	.	.
	Other land to Forest - Mineral soils	-0.15	-6.71	.	.	.	.	0	153	.	.
4.B.1	Cropland remaining cropland - Living biomass	-15.76	-9.49	.	.	.	.	0	75	.	.
	Cropland remaining cropland - Mineral soils	-5.86	-1.53	.	.	.	.	0	50	.	.
	Cropland remaining cropland - Organic soils	1679.48	1612.67	.	.	.	.	0	32	.	.
4.B.2.1	Forest to Cropland - Living biomass	51.04	77.99	.	.	.	.	0	138	.	.
	Forest to Cropland - Mineral soils	-1.43	-62.37	.	.	.	.	0	139	.	.
	Forest to Cropland - Organic soils	4.80	64.39	.	.	.	.	0	107	.	.

	Forest to Cropland - dead wood	3.63	158.29	.	.	.	.	0	138	.	.
4.B.2.2	Grassland to Cropland - Mineral soils	.	4.58	.	.	.	.	0	150	.	.
	Grassland to Cropland - Organic soils	3.74	11.18	.	.	.	.	0	201	.	.
4.B.2.3	Wetland to Cropland - Organic soils	.	113.04	.	.	.	.	0	100	.	.
4.B.2.4	Forest to Cropland - Living biomass	-2.24	-1.54	.	.	.	.	0	139	.	.
	Settlement to Cropland - Mineral soils	-0.40	-4.47	.	.	.	.	0	161	.	.
4.C.1	Grassland remaining grassland - Living biomass	-39.82	-35.05	.	.	.	.	0	227	.	.
	Grassland remaining grassland - Mineral soils	-26.76	30.27	.	.	.	.	0	92	.	.
	Grassland remaining grassland - Organic soils	99.92	54.41	.	.	.	.	0	97	.	.
4.C.2.1	Forest to Grassland - Living biomass	31.46	45.54	.	.	.	.	0	112	.	.
	Forest to Grassland - Mineral soils	-1.17	-185.53	.	.	.	.	0	66	.	.
	Forest to Grassland - dead wood	1.91	298.65	.	.	.	.	0	115	.	.
4.C.2.3	Wetland to Grassland - Living biomass	.	0.29	.	.	.	.	0	201	.	.
	Wetland to Grassland - Organic soils	.	15.73	.	.	.	.	0	201	.	.
4.C.2.4	Settlement to Grassland - Mineral soils	.	-3.23	.	.	.	.	0	201	.	.
4.D.1.1	Wetland Peat extraction - on+off-site - Organic soils	63.93	73.56	.	.	.	.	0	98	.	.
4.D.1.3	Wetlands remaining wetlands, wooded mires - Living biomass	-71.87	-58.59	.	.	.	.	0	21	.	.
4.D.2.3.1	Forest to Wetland - Living biomass	.	15.66	.	.	.	.	0	201	.	.
	Forest to Wetland - Mineral soils	.	-10.12	.	.	.	.	0	217	.	.
	Forest to Wetland - Organic soils	.	1.72	.	.	.	.	0	148	.	.
	Forest to Wetland - dead wood	.	22.26	.	.	.	.	0	217	.	.
4.E.1	Settlements remaining settlements - Organic soils	134.86	128.04	.	.	.	.	0	66	.	.
4.E.2.1	Forest to Settlement - Living biomass	413.71	578.45	.	.	.	.	0	62	.	.
	Forest to Settlement - Mineral soils	7.37	162.69	.	.	.	.	0	102	.	.
	Forest to Settlement - Organic soils	.	140.98	.	.	.	.	0	73	.	.
	Forest to Settlement - dead wood	42.61	941.82	.	.	.	.	0	102	.	.
4.E.2.2	Cropland to Settlement - Living biomass	12.58	16.17	.	.	.	.	0	88	.	.
	Cropland to Settlement - Mineral soils	2.24	50.97	.	.	.	.	0	110	.	.
4.E.2.3	Grassland to Settlement - Mineral soils	0.40	24.27	.	.	.	.	0	129	.	.

4.E.2.4	Wetland to Settlement - Living biomass	.	0.04	.	.	.	.	0	201	.	.
	Wetland to Settlement - Mineral soils	0.07	2.35	.	.	.	.	0	219	.	.
	Wetland to Settlement - Organic soils	.	6.82	.	.	.	.	0	143	.	.
4.F.2.3	Grassland to Other land - Living biomass	.	-0.04	.	.	.	.	0	201	.	.
	Grassland to Other land - Mineral soils	0.07	0.55	.	.	.	.	0	174	.	.
	Grassland to Other land - Organic soils	.	24.53	.	.	.	.	0	202	.	.
4.G	Harwested Wood Products - HWP	-1000.00	549.00	.	.	.	.	0	52	.	.

Annex II: Tier 2 uncertainty analysis of the Norwegian Greenhouse Gas Emission Inventory

1 Summary

The national greenhouse gas (GHG) emission inventory is compiled from estimates based on emission factors and activity data and direct measurements by plants. All these data and parameters will contribute to the overall inventory uncertainty. The uncertainties and probability distributions of the inventory input parameters have been assessed based on available data and expert judgements. Finally, the level and trend uncertainties of the national GHG emission inventory have been estimated using Monte Carlo simulation. The methods used in the analysis correspond to an IPCC Tier 2 method, as described in (IPCC 2000). Analyses have been made both excluding and including the sector LULUCF (land use, land-use change and forestry).

The report *Uncertainties in the Norwegian Greenhouse Gas Emission Inventory* (Statistics Norway (2000)) includes more detailed documentation of the analysis method used in all analyses. Major updates of the uncertainty data were performed in 2006 and 2011 (Flugsrud & Hoem 2011).

The results show that the uncertainty in the calculated greenhouse gas emissions for 2014 is ±4 per cent. The uncertainty estimate is lower now than earlier analyses have shown. This is partly due to a considerable work made to improve the calculation methodology. It is also partly the uncertainty estimates themselves that have been improved.

Level of the analysis

The uncertainty analysis is for most sources performed at the most detailed level of IPCC source categories (IPCC 2000). For some sources even a more detailed separation is made, e.g. where different pollutants from a source sector have to be connected to different activity measures, for to be able to consider dependencies between only parts of the source groups. Energy carriers have been grouped into five main types; solid, gaseous, liquid, waste and bio energy. The placement into groups has been made using international definitions based on the type of the original energy carrier, *e.g,* refinery gas and fuel gas is placed in “liquid” and CO gas is placed in “solid”.

Implementation of the 2006 IPCC guidelines in the compilation of the inventory have affected the analysis through a higher level of detail in the source categories. Additional splitting of source categories, which has been done in previous analyses, is therefore now in most cases obsolete.

In Table AII- 3, source category level used in the study is listed.

For some emission sources a separation into activity and emission factors is not possible due to lack of information. Examples are estimates based on measurements, emissions reported by plants (in the cases when the plants have only reported emissions and not activity data and emission factor used), and emissions that are aggregated from sources with diverse methods (for example emissions from 2C7 Other metal production). These emissions have been assigned activity equal to 1, and emission factor to be equal to the estimated value. This is possible since the total uncertainty

estimate is independent of scale for activity and emission factor[1]. Emissions from landfills, HFCs and some other sources have been transferred into the form of emission factor multiplied with activity rate, in spite of the fact that the estimates are based on more complex estimation models (e.g. taking time lag into account and using several activity data and emission factors).

Table 6.2 from the IPCC good practice guidance is included in the Annex as Table AII- 4. This is as a response to recommendations in previous ERT review reports. Column G in Table AII- 4 (6.2) is estimated as uncertainty for source category divided by total GHG emissions.

2 Uncertainties in input parameters

2.1.1 Emission estimates

In the analysis emission estimates for the different source categories (Table AII- 3) for the base year and end year are taken from the Norwegian emission inventory.

The emission estimates used in the analysis comes from the national GHG emission inventory and is based on Norwegian measurements, literature data or statistical surveys. Some data are based on expert judgements.

2.1.2 Standard deviation and probability density

The probability densities used in this study have been divided into four types of model shapes:

1. Normal distribution
2. Truncated normal distribution
3. Lognormal distribution
4. Beta distribution

For low uncertainties all the distributions 2-4 above approach the normal distributions. For large uncertainties the normal distribution may lead to negative values. To avoid this, the distributions are when necessary truncated at 0, which means that there is a given probability of the value 0. The lognormal distribution and beta distribution are both asymmetrical distributions, giving a heavier tail of probabilities towards higher values. These two distributions are very similar in shape for low to medium size uncertainties. For higher uncertainties the beta distribution is more flat and the peak in the distribution is more close to the mean value. The beta distribution is, however, only defined for variables taking values between 0 and 1.

The densities were used in the following way: Normal or lognormal distributions were used for most of the categories. Normal distribution was used for uncertainties up to 30 percent, while lognormal distribution was used for higher uncertainties. Normal distribution was also used for carbon balances that were in principle a difference between larger gains and losses that likely were normally distributed with lower uncertainties. These carbon balances might take both positive and negative

1 We may state the activity in any given unit, as long as the emission factor is stated in the corresponding unit. Examples: tonnes and kg/tonne, Gg and kg/Gg, or, as in this case, unit value and total emissions in kg.

values. Beta distribution and truncated normal distribution were used only in a few special cases. Beta distribution was used for N_2O emissions from combustion. Truncated normal distribution was used for CH_4 emissions from stationary combustion of liquid fuels, and from flaring.

The uncertainties and densities given in the following sections are based on information for the end year. However, they were also used for 1990 and for the trend analysis. In reality, due to improved methods, the quality of the end year inventory is higher than that of the 1990 data for several categories. Thus, the analysis may underestimate the uncertainty in 1990 emissions and in the trend. The CO_2 emissions are likely most affected by this problem.

2.1.3 Activity data

The assessed standard deviations and corresponding probability densities are summarised in Table AII- 1

Table AII- 1 Summary of standard deviation and probability density of activity data

IPCC Source category	Pollutant source	Standard deviation (2σ). per cent[1]	Density shape	Source/ comment
1A1, 1A2	Coal/coke – general	5	Normal	Expert judgement industry, Norcem (2006)
1A1B	Coal/coke – petroleum refining	1.1	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2A	Coal/coke - iron and steel	4.1	Normal	Emission trading scheme (Klif 2011), Expert judgement industry, Norcem (2006)
1A2G	Coal/coke - other	0.8	Normal	Emission trading scheme (Klif 2011), Expert judgement industry, Norcem (2006)
1A4B	Coal/coke - residential	20	Normal	Expert judgement, Statistics Norway (2000)
1A4C	Coal/coke - agriculture	30	Normal	Expert judgement, Statistics Norway
1A1, 1A2, 1A4	Wood	30	Lognormal	Expert judgement, Statistics Norway (2000)
1A1A	Gas – public electricity and heat production	0.8	Normal	Emission trading scheme (Klif 2011), Expert judgement, Statistics Norway
1A2	Gas - general	4	Normal	Norwegian Petroleum Directorate, Statistics Norway (2000)
1A1C	Gas - manufacture of solid fuels and other energy industries	0.2	Normal	Emission trading scheme (Klif 2011), NPD (2006)
1A2C	Gas - chemicals	1.7	Normal	Emission trading scheme (Klif 2011), Norwegian Petroleum Directorate, Statistics Norway (2000)
1A2D	Gas - pulp, paper, print	1.7	Normal	Emission trading scheme (Klif 2011), Norwegian Petroleum Directorate, Statistics Norway (2000)

IPCC Source category	Pollutant source	Standard deviation (2σ). per cent[1]	Density shape	Source/ comment
1A4A	Gas - commercial/institutional	10	Normal	Expert judgement, Statistics Norway
1A4B, 1A4C	Gas - residential, agriculture/forestry/fishing	30	Normal	Expert judgement, Statistics Norway
1A1, 1A2	Oil - general	3	Normal	Spread in data, Statistics Norway (2000)
1A1B	Oil - petroleum refining	1.1	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A1C	Oil – manufacture of solid fuels and other energy industries	1.8	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2A	Oil - iron and steel	0.5	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2C	Oil - chemicals	14.4	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2D	Oil – pulp, paper, print	0.7	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2G	Oil - other	2.6	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A4A	Oil - commercial/institutional	20	Normal	Expert judgement, Statistics Norway
1A4B	Oil - residential	9.5	Normal	Emission trading scheme (Klif 2011), Expert judgement, Statistics Norway
1A4C	Oil - agriculture/forestry	10	Normal	Expert judgement, Statistics Norway
1A1, 1A2	Waste – general	5	Normal	Expert judgement, Statistics Norway (2000)
1A2E	Waste – Food processing beverages and tobacco	3		Expert judgement, Statistics Norway
1A2G	Waste - other manufacturing	3.2	Normal	Emission trading scheme (Klif 2011), Expert judgement, Statistics Norway (2000)
1A4A	Waste - commercial/institutional	30	Lognormal	Expert judgement, Statistics Norway (2000)
1A3A, 1A3E	Transport fuel - civil aviation, motorized equipment and pipeline	20	Normal	Expert judgement, Statistics Norway (2000)
1A3B	Transport fuel - road	5	Normal	Expert judgement, Statistics Norway
1A3C	Transport fuel - railway	5	Normal	Expert judgement, Statistics Norway
1A3D	Transport fuel - navigation	20	Normal	Expert judgement, Statistics Norway

IPCC Source category	Pollutant source	Standard deviation (2σ). per cent[1]	Density shape	Source/ comment
1A5A, 1A5B	Military fuel - stationary and mobile	5	Normal	Expert judgement, Statistics Norway
1B1A, 1B2B	Coal mining, extraction of natural gas	3	Normal	Expert judgement, Statistics Norway (2000)
1B2A	Extraction of oil - transport, refining/storage	3	Normal	Expert judgement, Statistics Norway (2000)
1B2A	Extraction of oil - distribution gasoline	5	Normal	Expert judgement, Statistics Norway (2000)
1B2C	Venting	-	-	See emission factor
1B2C	Flaring	1.4	Normal	Emission trading scheme (Klif 2011), Expert judgement, Statistics Norway (2000)
1B2C	Well testing	30	Normal	Expert judgement, Statistics Norway (2000)
2A1	Cement production	0.4	Normal	Emission trading scheme (Klif 2011)
2A2	Lime production	0.4	Normal	Emission trading scheme (Klif 2011)
2A3	Glass production	14.1	Normal	Emission trading scheme (Klif 2011)
2A4	Other mineral production	0.1	Normal	Emission trading scheme (Klif 2011)
2B1	Ammonia production	3	Normal	Expert judgement industry, Yara (2006)
2B2	Nitric acid production	-	-	See emission factor
2B5	Carbide production - SiC	3	Normal	Expert judgement industry, St. Gobain and Orkla Exolon (2006)
2B5	Carbide production - CaC	3	Normal	Expert judgement, Statistics Norway (2000)
2B6	Titanium dioxide production	3		Expert judgement, Statistics Norway
2B8	Methanol and plastic production	9.0	Normal	Emission trading scheme (Klif 2011)
2C1	Iron and steel production	1.2	Normal	Expert judgement industry, Tinfos (2006)
2C2	Ferroalloys production	-	-	See emission factor
2C3	Aluminium production	3	Normal	Expert judgement industry, Norsk Hydro (2006a)
2C4	Mg production	-	-	See emission factor
2C6	Zn production	5	Normal	Expert judgement, Statistics Norway
2C7	Ni production, anode production	10	Normal	Expert judgement, Statistics Norway
2D1	Lubricant use	-	-	See emission factor
2D2	Paraffin wax use	30	Normal	Expert judgement, Statistics Norway
2D3	Other	-	-	See emission factor
2E1	Electronics industry – By-product emissions	-	-	See emission factor
2F	Product uses as substitutes for ODS	-	-	See emission factor
2G1	Electrical equipment	-	-	See emission factor

IPCC Source category	Pollutant source	Standard deviation (2σ). per cent[1]	Density shape	Source/ comment
2G2	SF6 and PFC from other product use	-	-	See emission factor
2G3	N20 from product use	-	-	See emission factor
2H1	Pulp and paper	0.9	Normal	Emission trading sceme (Klif 2011)
2H2	Food and beverage industry	10	Normal	Expert judgement, Statistics Norway
3A	Enteric fermentation	5	Normal	Expert judgement, Statistics Norway (2006a), Division for agricultural statistics
3B1-3B4	Manure management - CH4	5	Normal	Expert judgement, Statistics Norway (2006a), Division for agricultural statistics
3B	Manure management - N2O	24	Normal	Expert judgement2, Statistics Norway (2006a), Statistics Norway (2006b), and Statistics Norway (2006c)
3DA1	Synthetic fertilizer	5	Normal	SFT (1999a)
3DA2	Organic N fertilizer	20	Normal	Statistics Norway (2000)
3DA3	Animal production	30	Lognormal	Expert judgement4, Statistics Norway
3DA4	Crop residue	30	Lognormal	Expert judgement3, Statistics Norway and Statistics Norway (2000)
3DA5	Cultivation of histosols	Fac2	Lognormal	Expert judgement, Statistics Norway
3DB1	Atmospheric deposition	30	Normal	Expert judgement, Statistics Norway
3DB2	Nitrogen leaching and run-off	Fac2	Lognormal	Expert judgement, Statistics Norway
3F1	Forest Land remaining Forest Land, - general	10	Normal	Expert judgement, Statistics Norway
3G	Liming	5	Normal	IPCC (2006)
3H	Urea aplication	5	Normal	IPCC (2006)
4	Land use, land use change and forestry	-	-	Se emission factor
5A	Solid waste disposal	20	Normal	Expert judgement, Statistics Norway
5B1	Composting	20	Normal	Expert judgement, Statistics Norway
5B1.2	Home composting	100	Lognormal	Expert judgement, Statistics Norway
5B2	Anaerobic digestion - Biogas	20	Normal	Expert judgement, Statistics Norway
5C	Waste incineration	30	Normal	Expert judgement, Statistics Norway (2011)
5D1	Domestic wastewater	30	Normal	Expert judgement, Statistics Norway

IPCC Source category	Pollutant source	Standard deviation (2σ). per cent[1]	Density shape	Source/ comment
5D2	Industrial wastewater	100	Lognormal	Expert judgement, Statistics Norway

[1] Strongly skewed distributions are characterised as *fac3* etc, indicating that 2σ is a factor 3 below and above the mean.

[2] Population 5% (Statistics Norway 2006a), Nex 15% (Statistics Norway 2006b), distribution AWMS 10% (Statistics Norway 2006c), distribution pasture/ storage 15% (Statistics Norway 2006b)

[3] N fixation 40% and crop residues 50% (Statistics Norway 2000)

[4] Population 5% (Statistics Norway 2006a), Nex 15% (Statistics Norway 2006b, distribution pasture/ storage 15% (Statistics Norway 2006b)

2.1.4 Emission factors

The assigned values and probability densities are shown in Table AII- 2.

Table AII- 2 Summary of standard deviation and probability density of emission factors

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
1A1, 1A2B, 1A2D, 1A2E, 1A4	Coal/coke - general	CO2	7	Normal	Spread in data, Statistics Norway (2000)
1A1B	Coal/coke – petroleum refining	CO2	0.9	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2A	Coal/coke – iron and steel	CO2	16.0	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2G	Coal/coke - other	CO2	2.0	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2, 1A4	Gas - general	CO2	3.5	Normal	IPCC (2006), expert judgement, Statistics Norway
1A1A	Gas – public electricity and heat prod	CO2	0.6	Normal	Emission trading scheme (Klif 2011), Norwegian Petroleum Directorate, Statistics Norway (2000)
1A1C	Gas – Manufacture of solid fuels and other energy	CO2	2.6	Normal	Emission trading scheme (Klif 2011), Norwegian Petroleum Directorate, Statistics Norway (2000)
1A2C	Gas - Chemicals	CO2	1.6	Normal	Emission trading scheme (Klif 2011), Norwegian Petroleum Directorate, Statistics Norway (2000)
1A1, 1A2, 1A4	Oil - general	CO2	3	Normal	Spread in data, Statistics Norway (2000)
1A1B	Oil – petroleum refining	CO2	0.9	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2C	Oil - Chemicals	CO2	1.1	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A2G	Oil - other	CO2	2.8	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A4B	Oil - residential	CO2	3.4	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A1, 1A4	Waste - general	CO2	30	Normal	Spread in data, Statistics Norway (2000)

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
1A2G	Waste - other	CO2	25.2	Normal	Emission trading scheme (Klif 2011), Spread in data, Statistics Norway (2000)
1A3A, 1A3B, 1A3C, 1A3D	Transport fuel	CO2	3	Normal	Spread in data, Statistics Norway (2000)
1A5A	Military fuel - stationary	CO2	5	Normal	Expert judgement, Statistics Norway
1A5B	Military fuel - mobile	CO2	10	Normal	Expert judgement, Statistics Norway
1A1, 1A2, 1A4	Coal/coke, wood, waste - general	CH4	Fac2	Lognormal	Spread in data, Statistics Norway (2000)
1A1B	Coal/coke – petroleum refining	CH4	Fac2	Lognormal	Spread in data, Statistics Norway (2000)
1A1, 1A2, 1A4, 1A5	Gas – general, military fuel – stationary and mobile	CH4	Fac2	Lognormal	Expert judgement, Statistics Norway
1A1, 1A2, 1A4	Oil - general	CH4	Fac2	Lognormal	Spread in data, Statistics Norway (2000)
1A3A, 1A3C, 1A3D	Transport fuel	CH4	Fac2	Lognormal	Spread in data. Expert judgement, Statistics Norway (2000)
1A3B	Transport fuel	CH4	45	Lognormal	(Gustafsson 2005)
1A1, 1A2, 1A4, 1A5	Coal/coke, wood, gas, waste – general, military fuel – stationary	N2O	Fac3	Beta	Expert judgement, Statistics Norway
1A5	military fuel – mobile	N2O	Fac3	Lognormal	Expert judgement, Statistics Norway
1A1, 1A2, 1A4	Oil - general	N2O	Fac3	Beta	Spread in data. Expert judgement. IPCC (1997), Statistics Norway (2000)
1A1B	Coal/coke – petroleum refining	N2O	Fac3	Beta	Spread in data. Expert judgement. IPCC (1997), Statistics Norway (2000)
1A3A, 1A3C, 1A3D	Transport fuel	N2O	Fac3	Beta	Spread in data. Expert judgement, Statistics Norway (2000)
1A3B	Transport fuel	N2O	65	Lognormal	(Gustafsson 2005)
1B1A, 1B2B	Coal mining, extraction of natural gas	CO2	Fac2	Lognormal	Expert judgement, Statistics Norway
1B2A	Extraction of oil - transport, refining/storage, distribution gasoline	CO2	40	Lognormal	Expert judgement, Statistics Norway
1B2C					
Venting	CO2	Fac2	Truncated N	Expert judgement, Statistics Norway (2000)	

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
1B2C	Flaring	CO2	4.5	Normal	Emission trading scheme (Klif 2011), Statistics Norway (2000)
1B2C	Well testing	CO2	7	Normal	Expert judgement, Statistics Norway (2000)
1B1A, 1B2B, 1B2C	Coal mining, extraction of natural gas, venting	CH4	Fac2	Lognormal	Expert judgement, Statistics Norway (2000)
1B2A	Extraction of oil - transport, refining/storage	CH4	40	Lognormal	Expert judgement, Statistics Norway
1B2C	Flaring, well testing	CH4	Fac2	Truncated N	Expert judgement, Statistics Norway (2000)
1B2C	Flaring, well testing	N2O	Fac3	Beta	Expert judgement, Statistics Norway (2000)
2A1	Cement production	CO2	0.6	Normal	Emission trading scheme (Klif 2011), IPCC (1997)
2A2	Lime production	CO2	0.5	Normal	Emission trading scheme (Klif 2011), Expert judgement, Statistics Norway
2A3	Glass production	CO2	7	Normal	Expert judgement, Statistics Norway
2B1	Ammonia production	CO2	7	Normal	Expert judgement industry, Yara (2006)
2B5	Carbide production	CO2	10	Normal	Spread in data, Statistics Norway (2000)
2B6	Titanium dioxide production	CO2	10	Normal	Expert judgement, Statistics Norway
2B8	Petrochemical and black carbon production	CO2	0,74	Normal	Emission trading scheme (Klif 2011),Expert judgement, Statistics Norway
2B8	Petrochemical and black carbon production	CH4	Fac2	Beta	Expert judgement, Statistics Norway
2B2	Nitric acid production	N2O	7.0	Normal	Expert judgement industry, Yara (2006), Emission trading scheme (Klif 2011)
2C1	Iron and steel production	CO2	1.3	Normal	Emission trading scheme (Klif 2011), Expert judgement industry, Tinfos (2006)
2C2	Ferroalloys production	CO2	3	Normal	Expert judgement, SINTEF (2006)
2C3	Aluminium production	CO2	10	Normal	International Aluminium Institute (IAI), Norsk Hydro (2006a)
2C6	Zn production	CO2	5	Normal	Expert judgement (2006)
2C7	Mg production, Ni production, anodes	CO2	10	Normal	Expert judgement, Statistics Norway

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
2C2	Ferroalloys production	CH4	Fac2	Lognormal	Expert judgement, Statistics Norway
2C2	Ferroalloys production	N2O	10	Normal	Expert judgement, Statistics Norway
2C3	Aluminium production	PFK	20	Normal	Expert judgement industry, Norsk Hydro (2006a)
2C4	SF6 used in Al and Mg foundries	SF6	0.25	Normal	Expert judgement industry, Norsk Hydro (2006b)
2D1	Lubricant use	CO2	20	Normal	IPCC (2006) and expert judgement, Statistics Norway
2D2	Paraffin wax use	CO2	10	Normal	Expert judgement, Statistics Norway
2D3	Non-energy products - other	CO2	10	Normal	Expert judgement, Statistics Norway
2D3	Non-energy products - other	N2O	15	Normal	Expert judgement, Statistics Norway
2E1	Electronics industry – By-products emission	SF6	60	Lognormal	Expert judgement, Statistics Norway
2F	Product uses as substitutes for ODS	HFK/PFK	50	Lognormal	Apply to HFK. Expert judgement, Statistics Norway
2G1	Electrical equipment	SF6	60	Lognormal	Expert judgement, Statistics Norway
2G2	Other product use	SF6	60	Lognormal	Expert judgement, Statistics Norway
2G3	Product use	N2O	15	Normal	Expert judgement, Statistics Norway
2H1	Pulp and paper	CO2	10	Normal	Expert judgement, Statistics Norway
2H2	Food and beverage industry	CO2	10	Normal	Expert judgement, Statistics Norway
3A2, 3A4	Enteric fermentation - sheep and other animal	CH4	40	Normal	Expert judgement, UMB (2006)
3A1, 3A3	Enteric fermentation – cattle and swine	CH4	25	Normal	IPCC (2006)
3B	Manure management – CH4	CH4	25	Normal	IPCC (2006)
3B	Manure management - N2O	N2O	Fac2	Lognormal	IPCC (2006)
3DA1-4	Direct soil emission	N2O	Fac5	Lognormal	IPCC (2006)
3DA5	Direct soil emission – Cultivation of histosols	N2O	Fac2	Truncated N	IPCC (2006)
3DB	Indirect soil emission	N2O	Fac3	Lognormal	IPCC (2006)
3F1	Agricultural residue burning	CH4	Fac2	Lognormal	Expert judgement, Statistics Norway
3F1	Agricultural residue burning	N2O	Fac3	Lognormal	Expert judgement, Statistics Norway
3G	Liming	CO2	10	Normal	IPCC (2006)
3H	Urea application	CO2	10	Normal	IPCC (2006)

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
4(I)	Forest-Direct N2O - Inorganic N	N2O	201	Lognormal	IPCC(2006)
4(I)	Forest-Direct N2O - Organic N	N2O	206	Lognormal	IPCC(2006)
4(I)	Settlements-Direct N2O - Organic N	N2O	201	Lognormal	IPCC(2006)
4(II)	Cropland - Organic soil	CH4	75	Normal	IPCC (2013a)
4(II)	Forest rem forest - Organic soil	CH4	180	Lognormal	IPCC (2013a) and expert judgement, NIBIO
4(II)	Grasland - Organic soil	CH4	119	Lognormal	IPCC (2013a)
4(II)	Peat extraction - Organic soil	CH4	216	Lognormal	IPCC (2013a) and expert judgement, NIBIO
4(II)	Forest rem forest - Organic soil	N2O	65	Normal	IPCC (2013a) and expert judgement, NIBIO
4(II)	Peat extraction - Organic soil	N2O	230	Lognormal	IPCC (2013a) and expert judgement, NIBIO
4(III)	Direct N2O from N mineralization/immobilization - N2O	N2O	223	Lognormal	IPCC(2006), Expert judgement, NIBIO
4(IV)	Indirect N2O from Managed soils - AtmDep	N2O	450	Lognormal	IPCC(2006) and expert judgement, NIBIO
4(IV)	Indirect N2O from Managed soils - LeachRun	N2O	300	Lognormal	IPCC(2006) and expert judgement, NIBIO
4(V)	Forest land - Biomass burning	N2O	75	Normal	Expert judgement, Statistics Norway (2000)
4(V)	Forest land - Biomass burning	CH4	75	Normal	Expert judgement, Statistics Norway (2000)
4A1	Forest remaining forest - Litter + dead wood + Mineral soil	CO2	19	Normal	Expert judgement, NIBIO
4A1	Forest remaining forest - Living biomass	CO2	15	Normal	Sample variance, expert judgement, NIBIO
4A1	Forest remaining forest, drained organic soils - Organic soils	CO2	64	Normal	IPCC(2006) and expert judgement, NIBIO
4A2	Cropland to Forest - Litter + dead wood	CO2	119	Lognormal	Expert judgement, NIBIO
4A2	Grassland to Forest - Litter + dead wood	CO2	201	Lognormal	Expert judgement, NIBIO
4A2	Other land to Forest - Litter + dead wood	CO2	151	Lognormal	Expert judgement, NIBIO
4A2	Settlement to Forest - Litter + dead wood	CO2	108	Lognormal	Expert judgement, NIBIO
4A2	Wetland to Forest - Litter + dead wood	CO2	136	Lognormal	Expert judgement, NIBIO
4A2	Cropland to Forest - Living biomass	CO2	101	Lognormal	Sample variance, expert judgement, NIBIO
4A2	Grassland to Forest - Living biomass	CO2	201	Lognormal	Sample variance, expert judgement, NIBIO

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
4A2	Other land to Forest - Living biomass	CO2	134	Lognormal	Sample variance, expert judgement, NIBIO
4A2	Settlement to Forest - Living biomass	CO2	63	Normal	Sample variance, expert judgement, NIBIO
4A2	Wetland to Forest - Living biomass	CO2	115	Lognormal	Sample variance, expert judgement, NIBIO
4A2	Cropland to Forest - Mineral soils	CO2	81	Normal	Expert judgement, NIBIO
4A2	Grassland to Forest - Mineral soils	CO2	70	Normal	Expert judgement, NIBIO
4A2	Other land to Forest - Mineral soils	CO2	121	Lognormal	Expert judgement, NIBIO
4A2	Settlement to Forest - Mineral soils	CO2	108	Lognormal	Expert judgement, NIBIO
4A2	Wetland to Forest - Mineral soils	CO2	129	Lognormal	Expert judgement, NIBIO
4A2	Cropland to Forest - Organic soils	CO2	114	Lognormal	IPCC (2013a)
4A2	Settlement to Forest - Organic soils	CO2	201	Lognormal	IPCC (2013a)
4A2	Wetland to Forest - Organic soils	CO2	89	Normal	IPCC (2013a)
4B1	Cropland remaining cropland - Living biomass	CO2	75	Normal	IPCC (2013a)
4B1	Cropland remaining cropland - Mineral soils	CO2	51	Normal	IPCC (2006)
4B1	Cropland remaining cropland - Organic soils	CO2	32	Normal	Expert judgement, NIBIO
4B2	Forest to Cropland - dead wood	CO2	138	Lognormal	IPCC (2013a)
4B2	Forest to Cropland - Living biomass	CO2	139	Lognormal	Expert judgement, NIBIO
4B2	Settlement to Cropland - Living biomass	CO2	161	Lognormal	Sample variance, expert judgement, NIBIO
4B2	Forest to Cropland - Mineral soils	CO2	71	Normal	Expert judgement, NIBIO
4B2	Grassland to Cropland - Mineral soils	CO2	158	Lognormal	Expert judgement, NIBIO
4B2	Settlement to Cropland - Mineral soils	CO2	174	Lognormal	Expert judgement, NIBIO
4B2	Forest to Cropland - Organic soils	CO2	108	Lognormal	IPCC (2013a)
4B2	Grassland to Cropland - Organic soils	CO2	201	Lognormal	IPCC (2013a)
4B2	Wetland to Cropland - Organic soils	CO2	100	Lognormal	IPCC (2013a)
4C1	Grassland remaining grassland - Living biomass	CO2	130	Lognormal	Sample variance, expert judgement, NIBIO

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
4C1	Grassland remaining grassland - Mineral soils	CO2	92	Normal	IPCC (2006)
4C1	Grassland remaining grassland - Organic soils	CO2	109	Lognormal	Expert judgement, NIBIO
4C2	Forest to Grassland - dead wood	CO2	114	Lognormal	Expert judgement, NIBIO
4C2	Forest to Grassland - Living biomass	CO2	177	Lognormal	Sample variance, expert judgement, NIBIO
4C2	Wetland to Grassland - Living biomass	CO2	201	Lognormal	Sample variance, expert judgement, NIBIO
4C2	Forest to Grassland - Mineral soils	CO2	64	Normal	Expert judgement, NIBIO
4C2	Settlement to Grassland - Mineral soils	CO2	201	Lognormal	IPCC (2013a) and expert judgement, NIBIO
4C2	Wetland to Grassland - Organic soils	CO2	201	Lognormal	Expert judgment: For mineral soils where reference stocks are NOT available, we assumed 100% uncertainty in the EF.
4D1	Wetlands remaining wetlands, wooded mires - Living biomass	CO2	40	Normal	Sample variance, expert judgement, NIBIO
4D1	Wetland Peat extraction - on+off-site - Organic soils	CO2	118	Lognormal	IPCC (2013a) and expert judgement, NIBIO
4D2	Forest to Wetland - dead wood	CO2	201	Lognormal	Expert judgement, NIBIO
4D2	Forest to Wetland - Living biomass	CO2	201	Lognormal	Sample variance, expert judgement, NIBIO
4D2	Forest to Wetland - Mineral soils	CO2	170	Lognormal	IPCC (2006)
4D2	Other land to Wetland - Mineral soils	CO2	201	Lognormal	Expert judgement, NIBIO
4D2	Forest to Wetland - Organic soils	CO2	148	Lognormal	IPCC (2013a)
4E1	Settlements remaining settlements - Organic soils	CO2	66	Normal	Expert judgement, NIBIO
4E2	Forest to Settlement - dead wood	CO2	102	Lognormal	IPCC (2013a)
4E2	Cropland to Settlement - Living biomass	CO2	88	Normal	Expert judgement, NIBIO
4E2	Forest to Settlement - Living biomass	CO2	55	Normal	Expert judgement, NIBIO
4E2	Grassland to Settlement - Living biomass	CO2	126	Lognormal	Sample variance, expert judgement, NIBIO
4E2	Wetland to Settlement - Living biomass	CO2	201	Lognormal	Sample variance, expert judgement, NIBIO
4E2	Cropland to Settlement - Mineral soils	CO2	110	Lognormal	Expert judgement, NIBIO

IPCC Source category	Pollutant source	Gas	(2σ). per cent[1]	Density shape	Source/ comment
4E2	Forest to Settlement - Mineral soils	CO2	102	Lognormal	Expert judgement, NIBIO
4E2	Grassland to Settlement - Mineral soils	CO2	126	Lognormal	Expert judgement, NIBIO
4E2	Other land to Settlement - Mineral soils	CO2	147	Lognormal	Expert judgement, NIBIO
4E2	Wetland to Settlement - Mineral soils	CO2	176	Lognormal	IPCC (2006)
4E2	Forest to Settlement - Organic soils	CO2	70	Normal	Expert judgement, NIBIO
4E2	Wetland to Settlement - Organic soils	CO2	201	Lognormal	IPCC (2013a)
4F2	Grassland to Other land - Living biomass	CO2	201	Lognormal	Sample variance
4F2	Grassland to Other land - Mineral soils	CO2	201	Lognormal	Sample variance, expert judgement, NIBIO
4F2	Grassland to Other land - Organic soils	CO2	201	Lognormal	Sample variance, expert judgement, NIBIO
4G	Harwested Wood Products - HWP	CO2	52	Normal	IPCC (2013b)
5A	Solid waste disposal	CH4	30	Lognormal	SFT (2006a)
5B1	Composting – municioal solid waste	CH4	Fac3	Lognormal	IPCC(2006)
5B1	Home composting	N2O	Fac3	Lognormal	IPCC(2006)
5B2	Anaerobic digestion at biogas facilities	N2O	Fac5	Lognormal	IPCC (2006)
5C	Waste incineration	CO2	30	Normal	Expert judgement, Statistics Norway
5C	Waste incineration	CH4	Fac2	Lognormal	Expert judgement, Statistics Norway
5C	Waste incineration	N2O	Fac3	Lognormal	Expert judgement, Statistics Norway
5D	Wastewater treatment and discharge	CH4	Fac3	Lognormal	IPCC (2006)
5D	Wastewater treatment and discharge	N2O	Fac3	Lognormal	IPCC (2006)
6C	Waste incineration	N2O	Fac3	Lognormal	Expert judgement, Statistics Norway

[1] Strongly skewed distributions are characterised as *fac2, fac3, fac5 and fac10*, indicating that 2σ is respectively a factor 2, 3, 5 and 10 below and above the mean.

[2] BOD/ person 30%, Bo 30% (IPCC 2000) and MCF 25%. Dependencies between parameters

2.1.5 Dependencies between parameters

Some of the input parameters (emission factors and activity data) are for various reasons not independent, that means that their values are dependent (or correlated). The problem of

dependencies may be solved by appropriate aggregation of the data or explicitly by modelling. In this work we have partly designed the dataset to reduce the problem with dependencies as well as introduced a number of dependence assumptions into the model. The determination of dependencies is sometimes a difficult task and requires some understanding of the data set and the assumptions it is based on. Initial estimates with variable assumptions have shown that the assumptions on dependencies generally have little effect on the final conclusions on uncertainties. The assumptions of dependencies of data between years are, however, crucial for the determination of trend uncertainty (Statistics Norway 2000).

2.1.6 Dependencies between activity data

The activity data are in principle independent. However, the same activity data may be used to estimate more than one source category (e.g. in the agriculture sector). Also the same activity data are used for estimating emissions of more than one pollutant (especially in the case of energy emissions).

The cases when activity data are assumed dependent in the statistical modelling are:

- The consumption of oil products in each sector. The sum of all oil products has a lower uncertainty than the consumption in each sector. In practice, this is treated by assuming that sectors are independent, and then by scaling all uncertainties so that total uncertainty equals a specified value.
- Where the same activity data are used to estimate emissions of more than one pollutant
- The number of domestic animals. The same population data are used for estimation of a) methane from enteric fermentation, b) methane and nitrous oxide from manure management and c) nitrous oxide from agricultural soils
- For estimation of N_2O from manure management, N_2O from manure spreading and N_2O from animal production (pasture) the following dependency estimation has been used for the activity data:
  - 70 % of emissions dependent on cattle population
  - 30 % of emissions dependent on sheep population
- For estimation of N_2O from indirect soil emissions the following dependency estimation has been used for the activity data:
  - 23 % of emissions dependent on cattle population
  - 10 % of emissions dependent on sheep population
  - 67 % of emissions dependent on amount of synthetic fertilizer used

2.1.7 Dependencies between emission factors

Where emission factors have been assumed equal, we have treated them as dependent in the analysis.

The following assumptions have been made:

- The CO_2 emission factors for each fuel type are dependent
- The methane and nitrous oxide emission factors from combustion are dependent where they have been assumed equal in the emission inventory model

- In a few cases the emission factors of different pollutants are correlated. That is in cases when CO_2 is oxidised from methane (oil extraction, loading and coal mining).
- For all direct emissions of N_2O from agricultural soils, except for N_2O from cultivation of organic soil, the same emission factor is being used, and the sources are dependent.
- There is a dependency between the emission factor used for calculating emissions from cropland liming and other liming.

There are also likely dependencies between other sources in LULUCF, but we have no estimates for the uncertainty in activity data, and anyhow the uncertainty in the emission factors is so large that even if the activity data is given an uncertainty it will have a minimal effect on the total uncertainty estimate for the source.

2.1.8 Dependencies between data in base year and end year

The estimates made for the base year and end year will to a large extent be based on the same data and assumptions.

Activity data

The activity data are determined independently in the two years and are in principle not dependent. Correlation could be considered in cases where activity data cannot be updated annually or where updates are based on extrapolations or interpolations of data for another year.

This implies that we have assumed that errors in activity data are random, hence that systematic method errors are insignificant. It is, however, likely that there is a certain correlation between the activity data as they have been determined using the same methods.

Emission factors

Most of the emission factors are assumed unchanged from the base year to the end year. Those that are not are all based on the same assumptions. This implies that all the emission factors are fully correlated between the two years.

This means that we have assumed that the emission factors assumed unchanged actually are unchanged from the base to end year. In reality it is expected that most emission factors are changing, but the degree of change is usually not known.

2.1.9 The statistical modelling

Uncertainty analysis based on probabilistic analysis implies that uncertainties in model inputs are used to propagate uncertainties in model outputs. The result of the uncertainty estimation gives us the range and likelihood of various output values (Cullen and Frey 1999).

Having generated a data set according to the specified parametric simultaneous distribution of the data described in table D1 and table D2, we may calculate any desired output defined as a function of the data. This gives us one simulated random realisation of this output, according to its marginal distribution derived from the underlying simultaneous distribution of the data. Independent repetition of the simulation gives an independent sample of the desired output according to its marginal distribution. The size of the sample is given by the number of repeated simulations, and has

nothing to do with the size of the original data set. Based on such an independent and identically distributed sample, we may use the sample mean as an estimate of the mean of the output; we may also use the sample standard deviation as an estimate of the standard deviation of the output.

2.1.10 Results of the Tier 2 Uncertainty analysis

Results for the uncertainties in the total emissions and trends for the GHG inventory, excluding and including the LULUCF sector are given in Chapter 1.7.

3 Source category level used in the analysis

Source category level used in the analysis is listed in Table AII- 3.

Table AII- 3 Source category level used in the analysis

IPCC	Source Category	Pollutant source
1A1A_VT1	Public electricity and heat prod	Coal/coke combustion
1A1A_VT2	Public electricity and heat prod	Wood combustion
1A1A_VT3	Public electricity and heat prod	Gas combustion
1A1A_VT6	Public electricity and heat prod	Oil combustion
1A1A_VT7	Public electricity and heat prod	Waste combustion
1A1B_VT1	Petroleum refining	Coal/coke combustion
1A1B_VT6	Petroleum refining	Oil combustion
1A1C_VT3	Manufacture of solid fuels and other energy	Gas combustion
1A1C_VT6	Manufacture of solid fuels and other energy	Oil combustion
1A2A_VT1	Iron and steel	Coal/coke combustion
1A2A_VT2	Iron and steel	Wood combustion
1A2A_VT3	Iron and steel	Gas combustion
1A2A_VT6	Iron and steel	Oil combustion
1A2B_VT1	Non-ferrous metal	Coal/coke combustion
1A2B_VT2	Non-ferrous metal	Wood combustion
1A2B_VT3	Non-ferrous metal	Gas combustion
1A2B_VT6	Non-ferrous metal	Oil combustion
1A2C_VT1	Chemicals	Coal/coke combustion
1A2C_VT2	Chemicals	Wood combustion
1A2C_VT3	Chemicals	Gas combustion
1A2C_VT6	Chemicals	Oil combustion
1A2C_VT7	Chemicals	Waste combustion
1A2D_VT1	Pulp, paper, print	Coal/coke combustion
1A2D_VT2	Pulp, paper, print	Wood combustion
1A2D_VT3	Pulp, paper, print	Gas combustion
1A2D_VT6	Pulp, paper, print	Oil combustion
1A2D_VT7	Pulp, paper, print	Waste combustion
1A2E_VT1	Food processing, beverages, tobacco	Coal/coke combustion
1A2E_VT2	Food processing, beverages, tobacco	Wood combustion
1A2E_VT3	Food processing, beverages, tobacco	Gas combustion
1A2E_VT6	Food processing, beverages, tobacco	Oil combustion
1A2E_VT7	Food processing, beverages, tobacco	Waste combustion
1A2G_VT1	Other manufacturing	Coal/coke combustion
1A2G_VT2	Other manufacturing	Wood combustion
1A2G_VT3	Other manufacturing	Gas combustion

IPCC	Source Category	Pollutant source
1A2G_VT6	Other manufacturing	Oil combustion
1A2G_VT7	Other manufacturing	Waste combustion
1A3A	Transport fuel - civil aviation	
1A3B	Transport fuel - road transportation	
1A3C	Transport fuel - railway	
1A3D	Transport fuel - navigation	
1A4A_VT2	Transport fuel - motorized equipment and pipeline	
1A4A_VT3	Commercial/institutional	Wood combustion
1A4A_VT6	Commercial/institutional	Gas combustion
1A4A_VT7	Commercial/institutional	Oil combustion
1A4B_VT1	Commercial/institutional	Waste combustion
1A4B_VT2	Residential	Coal/coke combustion
1A4B_VT3	Residential	Wood combustion
1A4B_VT6	Residential	Gas combustion
1A4C_VT1	Residential	Oil combustion
1A4C_VT2	Agriculture/forestry/fishing	Coal/coke combustion
1A4C_VT3	Agriculture/forestry/fishing	Wood combustion
1A4C_VT6	Agriculture/forestry/fishing	Gas combustion
1A5A	Agriculture/forestry/fishing	Oil combustion
1A5B	Military	Military fuel - stationary
1B1A	Military	Military fuel - mobile
1B2A_x	Coal mining, Extraction of natural gas	
1B2A_y	Extraction of oil - transport	
1B2A_z	Extraction of oil - refining/storage	
1B2B	Extraction of oil - distribution gasoline	
1B2C_x	Coal mining, Extraction of natural gas	
1B2C_y	Venting	
1B2C_z	Well testing	
2A1	Flaring	
2A2	Cement production	
2A3	Lime production	
2A4	Glass production	
2B1	Other mineral production	
2B2	Ammonia production	
2B5	Nitric acid production	
2B6	Silicone and calcium carbide production	
2B8	Titanium dioxide production	
2B10	Petrochemical and black carbon production	

IPCC	Source Category	Pollutant source
2C1	Iron and steel production	
2C2	Ferroalloys production	
2C3	Aluminium production	
2C4	Magnesium production	
2C6	Zinc production	
2C7	Ni production, anodes	
2D1	Lubricant use	
2D2	Paraffin wax use	
2D3	Other non-energy use of energy products	
2E1	Electronics industry – by-product emissions	
2F	Product uses as substitutes for ODS	
2G1	Electrical equipment	
2G2	SF6 from other product use	
2G3	N2O from product uses	
2H1	Pulp and paper	
2H2	Food and beverage industry	
3A1	Enteric fermentation - cattle	
3A2	Enteric fermentation - sheep	
3A3	Enteric fermentation - swine	
3A4	Enteric fermentation - other animal	
3B1	Manure management - CH4 -cattle	
3B2	Manure management - CH4 - sheep	
3B3	Manure management - CH4- swine	
3B4	Manure management - CH4 -other animal	
3B	Manure management - N2O - solid storage	
3D11	Direct soil emission - Inorganic fertilizer	
3D12	Direct soil emission - Organic fertilizer	
3D13	Direct soil emission- Urine and dung by grazing animals	
3D14	Direct soil emission- Crop residue	
3D15	loss/gain soil organic matter	
3D21	Indirect soil emission- Deposition	
3D22	Indirect soil emission - Lekkasje med mer	
3F1	Field Burning of Agricultural Residue - cereals	
3G	Liming	
3H	Urea application	
4(I)	Forest-Direct N2O - Inorganic N	
4(I)	Forest-Direct N2O - Organic N	
4(I)	Settlements-Direct N2O - Organic N	

IPCC	Source Category	Pollutant source
4(II)	Cropland - Organic soil	
4(II)	Forest rem forest - Organic soil	
4(II)	Grasland - Organic soil	
4(II)	Peat extraction - Organic soil	
4(II)	Forest rem forest - Organic soil	
4(II)	Peat extraction - Organic soil	
4(III)	Direct N2O from N mineralization/immobilization - N2O	
4(IV)	Indirect N2O from Managed soils - AtmDep	
4(IV)	Indirect N2O from Managed soils - LeachRun	
4(V)	Forest land - Biomass burning	
4(V)	Forest land - Biomass burning	
4A1	Forest remaining forest - Litter + dead wood + Mineral soil	
4A1	Forest remaining forest - Living biomass	
4A1	Forest remaining forest, drained organic soils - Organic soils	
4A2	Cropland to Forest - Litter + dead wood	
4A2	Grassland to Forest - Litter + dead wood	
4A2	Other land to Forest - Litter + dead wood	
4A2	Settlement to Forest - Litter + dead wood	
4A2	Wetland to Forest - Litter + dead wood	
4A2	Cropland to Forest - Living biomass	
4A2	Grassland to Forest - Living biomass	
4A2	Other land to Forest - Living biomass	
4A2	Settlement to Forest - Living biomass	
4A2	Wetland to Forest - Living biomass	
4A2	Cropland to Forest - Mineral soils	
4A2	Grassland to Forest - Mineral soils	
4A2	Other land to Forest - Mineral soils	
4A2	Settlement to Forest - Mineral soils	
4A2	Wetland to Forest - Mineral soils	
4A2	Cropland to Forest - Organic soils	
4A2	Settlement to Forest - Organic soils	
4A2	Wetland to Forest - Organic soils	
4B1	Cropland remaining cropland - Living biomass	
4B1	Cropland remaining cropland - Mineral soils	
4B1	Cropland remaining cropland - Organic soils	
4B2	Forest to Cropland - dead wood	
4B2	Forest to Cropland - Living biomass	
4B2	Settlement to Cropland - Living biomass	

IPCC	Source Category	Pollutant source
4B2	Forest to Cropland - Mineral soils	
4B2	Grassland to Cropland - Mineral soils	
4B2	Settlement to Cropland - Mineral soils	
4B2	Forest to Cropland - Organic soils	
4B2	Grassland to Cropland - Organic soils	
4B2	Wetland to Cropland - Organic soils	
4C1	Grassland remaining grassland - Living biomass	
4C1	Grassland remaining grassland - Mineral soils	
4C1	Grassland remaining grassland - Organic soils	
4C2	Forest to Grassland - dead wood	
4C2	Forest to Grassland - Living biomass	
4C2	Wetland to Grassland - Living biomass	
4C2	Forest to Grassland - Mineral soils	
4C2	Settlement to Grassland - Mineral soils	
4C2	Wetland to Grassland - Organic soils	
4D1	Wetlands remaining wetlands, wooded mires - Living biomass	
4D1	Wetland Peat extraction - on+off-site - Organic soils	
4D2	Forest to Wetland - dead wood	
4D2	Forest to Wetland - Living biomass	
4D2	Forest to Wetland - Mineral soils	
4D2	Other land to Wetland - Mineral soils	
4D2	Forest to Wetland - Organic soils	
4E1	Settlements remaining settlements - Organic soils	
4E2	Forest to Settlement - dead wood	
4E2	Cropland to Settlement - Living biomass	
4E2	Forest to Settlement - Living biomass	
4E2	Grassland to Settlement - Living biomass	
4E2	Wetland to Settlement - Living biomass	
4E2	Cropland to Settlement - Mineral soils	
4E2	Forest to Settlement - Mineral soils	
4E2	Grassland to Settlement - Mineral soils	
4E2	Other land to Settlement - Mineral soils	
4E2	Wetland to Settlement - Mineral soils	
4E2	Forest to Settlement - Organic soils	
4E2	Wetland to Settlement - Organic soils	
4F2	Grassland to Other land - Living biomass	
4F2	Grassland to Other land - Mineral soils	
5A	Solid waste disposal	

IPCC	Source Category	Pollutant source
5B1a	Composting – municipal solid waste	
5B1b	Home composting	
5B2	Anaerobic digestion at biogas facilities	
5C	Open burning of waste	
5D1	Domestic waste water	

Table AII- 4 Table 6.2 in the GPG. Tier 2 uncertainty reporting.

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		**Gas**	**Base year emissions**	**Year t emissions**	**Uncertainty in year t emissions as % of emissions in the category**		**Uncertainty introduced on national total in year t**	**% change in emissions between year t and base year**	**Range of likely % change between year t and base year**	
Source		**Subcategory**		**Gg CO_2 equivalent**	**Gg CO_2 equivalent**	**% below (2.5 percentile)**	**% above (97.5 percentile)**	**%**	**%**	**Lower % (2.5 percentile)**	**Upper % (97.5 percentile)**
Total	Total			41 364	27 687				33		
1A1A_VT1	General fuel combustion- Coal/coke	Public electricity and heat prod	CO2	205	119	-8	8	0.035	-42	-46	-38
1A1A_VT3	General fuel combustion- Gas	Public electricity and heat prod	CO2	-	489	-1	1	0.019	…	-	-
1A1A_VT6	General fuel combustion- Oil	Public electricity and heat prod	CO2	14	252	-4	4	0.036	1 651	1 583	1 720
1A1A_VT7	General fuel combustion- Waste	Public electricity and heat prod	CO2	188	867	-30	31	0.984	362	328	397
1A1B_VT6	General fuel combustion- Oil	Petroleum refining	CO2	938	915	-3	3	0.102	-2	-4	-1
1A1C_VT3	General fuel combustion- Gas	Manufacture of solid fuels and other energy	CO2	5 431	10 253	-2	3	0.941	89	88	89
1A1C_VT6	General fuel combustion- Oil	Manufacture of solid fuels and other energy	CO2	438	1 378	-3	3	0.167	214	207	222
1A2A_VT1	General fuel combustion- Coal/coke	Iron and steel	CO2	60	52	-8	8	0.015	-13	-18	-8
1A2A_VT3	General fuel combustion- Gas	Iron and steel	CO2	-	3	-5	5	0.000	…	-	-

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A2A_VT6	General fuel combustion- Oil	Iron and steel	CO2	45	16	-3	3	0.002	-64	-64	-63
1A2B_VT1	General fuel combustion- Coal/coke	Non-ferrous metal	CO2	0	-	...	...	-	-100	-100	-100
1A2B_VT3	General fuel combustion- Gas	Non-ferrous metal	CO2	-	86	-5	5	0.016	…	-	-
1A2B_VT6	General fuel combustion- Oil	Non-ferrous metal	CO2	268	54	-4	4	0.008	-80	-80	-79
1A2C_VT1	General fuel combustion- Coal/coke	Chemicals	CO2	133	139	-29	29	0.146	4	-31	59
1A2C_VT3	General fuel combustion- Gas	Chemicals	CO2	-	378	-4	3	0.052	…	-	-
1A2C_VT6	General fuel combustion- Oil	Chemicals	CO2	949	728	-14	14	0.370	-23	-36	-7
1A2C_VT7	General fuel combustion- Waste	Chemicals	CO2	26	67	-30	30	0.074	160	142	179
1A2D_VT1	General fuel combustion- Coal/coke	Pulp, paper, print	CO2	16	-	...	...	-	-100	-100	-100
1A2D_VT3	General fuel combustion- Gas	Pulp, paper, print	CO2	-	20	-4	4	0.003	…	-	-
1A2D_VT6	General fuel combustion- Oil	Pulp, paper, print	CO2	197	63	-3	3	0.007	-68	-68	-68
1A2D_VT7	General fuel combustion- Waste	Pulp, paper, print	CO2	14	44	-30	30	0.050	224	203	246

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A2E_VT1	General fuel combustion- Coal/coke	Food prosessing, beverages, tobacco	CO2	10	-	...	...	-	-100	-100	-100
1A2E_VT3	General fuel combustion- Gas	Food prosessing, beverages, tobacco	CO2	-	133	-4	4	0.019	…	-	-
1A2E_VT6	General fuel combustion- Oil	Food prosessing, beverages, tobacco	CO2	456	205	-4	4	0.030	-55	-57	-53
1A2E_VT7	General fuel combustion- Waste	Food prosessing, beverages, tobacco	CO2	-	3	-4	4	0.000	…	-	-
1A2G_VT1	General fuel combustion- Coal/coke	Other industry	CO2	394	367	-7	6	0.090	-7	-8	-6
1A2G_VT3	General fuel combustion- Gas	Other industry	CO2	-	187	-5	5	0.035	…	-	-
1A2G_VT6	General fuel combustion- Oil	Other industry	CO2	1 338	1 331	-4	4	0.187	-0	-4	3
1A2G_VT7	General fuel combustion- Waste	Other industry	CO2	85	154	-24	24	0.140	80	72	88
1A3A	Transport fuel - civil aviation		CO2	679	1 233	-18	18	0.847	81	42	137
1A3B	Transport fuel - road transportation		CO2	7 630	10 028	-6	5	1.972	31	23	40

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A3C	Transport fuel - railway		CO2	96	47	-5	5	0.009	-51	-54	-48
1A3D	Transport fuel - navigation		CO2	1 696	1 735	-18	18	1.168	2	-21	32
1A4A_VT3	Gas combustion-commercial/institutional	Commercial/institutional	CO2	-	45	-10	10	0.017	…	-	-
1A4A_VT6	General fuel combustion- Oil	Commercial/institutional	CO2	868	1 204	-20	19	0.829	39	7	78
1A4A_VT7	Waste combustion - commercial/institutional	Commercial/institutional	CO2	7	12	-38	51	0.020	67	11	144
1A4B_VT1	Coal/coke combustion-residential	Residential	CO2	24	2	-19	20	0.001	-93	-95	-91
1A4B_VT3	Gas - residential	Residential	CO2	-	9	-31	30	0.010	…	-	-
1A4B_VT6	General fuel combustion- Oil	Residential	CO2	1 543	575	-9	10	0.200	-63	-67	-58
1A4C_VT1	Coal/coke combustion-agriculture	Agriculture/forestry/fishing	CO2	12	-	...	...	-	-100	-100	-100
1A4C_VT3	Gas combustion - agriculture/forestry/fishing	Agriculture/forestry/fishing	CO2	-	36	-30	31	0.041	…	-	-
1A4C_VT6	General fuel combustion- Oil	Agriculture/forestry/fishing	CO2	1 969	1 761	-10	10	0.626	-11	-20	3

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A5A	Totaktsolje og "non-energy use"- stationary	non-energy use	CO2	62	22	-6	6	0.005	-66	-67	-64
1A5B	Totaktsolje og "non-energy use" - mobile	non-energy use	CO2	400	250	-10	11	0.099	-38	-42	-33
1B1A	Coal mining, Extraction of natural gas		CO2	20	14	-52	81	0.034	-33	-36	-31
1B2A_x	Extraction of oil - transport		CO2	274	71	-33	43	0.100	-74	-75	-73
1B2A_y	Extraction of oil - refining/storage		CO2	745	1 084	-35	43	1.562	45	39	52
1B2A_z	Extraction of oil - distribution gasoline		CO2	22	10	-34	47	0.015	-56	-59	-53
1B2B	Coal mining, Extraction of natural gas		CO2	3	12	-52	77	0.029	277	262	294
1B2C_x	venting		CO2	25	91	-60	60	0.206	267	267	267
1B2C_y	flaring oil		CO2	80	16	-5	5	0.003	-81	-81	-80
1B2C_z	flaring gas		CO2	1 610	1 384	-30	32	1.587	-14	-43	29
2A1	Cement production		CO2	634	731	-1	1	0.019	15	15	16
2A2	Lime production		CO2	50	221	-1	1	0.005	343	341	345

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
2A3	Limestone and dolomite use		CO2	6	5	-15	15	0.003	-5	-21	16
2A4	Soda ash production and use		CO2	35	93	-5	5	0.017	168	167	168
2B1	Ammonia production		CO2	500	307	-8	8	0.086	-39	-41	-36
2B5	Other chemical industry		CO2	400	47	-10	10	0.018	-88	-89	-88
2B6	Titanium dioxide		CO2	201	283	-10	11	0.109	41	35	47
2B8	Methanol and plastic production		CO2	88	116	-9	8	0.036	32	17	49
2C1	Iron and steel production		CO2	12	27	-2	2	0.002	116	113	120
2C2	Ferroalloys production		CO2	2 554	2 375	-3	3	0.250	-7	-7	-7
2C3	Aluminium production		CO2	1 419	1 809	-9	10	0.669	28	22	33
2C4	SF6 used in Al and Mg foundries		CO2	128	-	...	...	-	-100	-100	-100
2C6	Zink production		CO2	3	5	-6	7	0.001	76	65	89
2C7	Other		CO2	50	94	-13	14	0.048	89	66	117
2D1	Lubricant use		CO2	167	60	-18	21	0.044	-64	-64	-64
2D2	Paraffin wax use		CO2	6	51	-31	33	0.058	723	448	1 173

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
2D3	Other		CO2	114	108	-9	10	0.039	-5	-5	-5
2H1	Pulp and Paper		CO2	10	10	-10	10	0.004	-5	-7	-4
2H2	Food and beverages industry		CO2	21	91	-14	15	0.047	339	281	404
3G	Liming		CO2	231	69	-11	12	0.027	-70	-72	-68
3H	Urea		CO2	1	0	-10	11	0.000	-71	-73	-69
4E21-DOM	Forest to Settlement - DOM	K11	CO2	43	1 017	-	-	-	2 287	2 287	2 287
4A21-DOM	Cropland to Forest - Litter + DOM	K11	CO2	-4	-1	0	0	-	-82	-82	-82
4A22-DOM	Grassland to Forest - Litter + DOM	K11	CO2	-6	-1	60	-60	0.003	-76	-76	-76
4A25-DOM	Other land to Forest - Litter + DOM	K11	CO2	-0	-7	0	0	-	4 605	4 605	4 605

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4A24-DOM	Settlement to Forest - Litter + DOM	K11	CO2	-7	-216	-	-	-	3 066	3 066	3 066
4A23-DOM	Wetland to Forest - Litter + DOM	K11	CO2	-2	-31	-	-	-	1 522	1 522	1 522
4B21-DOM	Forest to Cropland - DOM	K11	CO2	4	146	0	0	-	3 919	3 919	3 919
4C21-DOM	Forest to Grassland - DOM	K11	CO2	2	294	-	-	-	15 296	15 296	15 296
4D23-DOM	Forest to Wetland - DOM	K11	CO2	-	20	-60	56	0.045	…	-	-
4A1-DOM	Forest remaining forest - Litter + dead wood + Mineral soil	K11	CO2	-2 315	-6 252	18	-18	4.203	170	170	170
4E21-LBM	Forest to Settlement - Living biomass	K11	CO2	414	659	-64	65	1.502	59	59	59
4A1-LBM	Forest remaining forest - Living biomass	K11	CO2	-10 703	-25 563	15	-15	13.594	139	139	139
4A21-LBM	Cropland to Forest - Living biomass	K11	CO2	-30	-43	-0	-0	-	46	46	46

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4A22-LBM	Grassland to Forest - Living biomass	K11	CO2	-2	-13	62	-59	0.029	622	622	622
4A25-LBM	Other land to Forest - Living biomass	K11	CO2	-1	-7	-0	-0	-	1 213	1 213	1 213
4A24-LBM	Settlement to Forest - Living biomass	K11	CO2	-8	-41	63	-67	0.096	400	400	400
4A23-LBM	Wetland to Forest - Living biomass	K11	CO2	-	-6	-0	-0	-	…	-	-
4B1-LBM	Cropland remaining cropland - Living biomass	K11	CO2	-16	-7	69	-76	0.018	-57	-57	-57
4B21-LBM	Forest to Cropland - Living biomass	K11	CO2	51	72	-0	-0	-	40	40	40
4C1-LBM	Grassland remaining grassland - Living biomass	K11	CO2	-	-36	57	-59	0.077	…	-	-
4C21-LBM	Forest to Grassland - Living biomass	K11	CO2	31	133	-	-	-	322	322	322
4C23-LBM	Wetland to Grassland - Living biomass	K11	CO2	-	0	-59	54	0.001	…	-	-

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4D13-LBM	Wetlands remaining wetlands, wooded mires - Living biomass	K11	CO2	-72	-66	20	-21	0.049	-7	-7	-7
4D23-LBM	Forest to Wetland - Living biomass	K11	CO2	-	29	-59	55	0.060	…	-	-
4E24-LBM	Wetland to Settlement - Living biomass	K11	CO2	-	0	-62	60	0.000	…	-	-
4E22-MS	Cropland to Settlement - Mineral soil	K11	CO2	2	51	-58	59	0.116	2 187	2 187	2 187
4E21-MS	Forest to Settlement - Mineral soil	K11	CO2	7	176	-	-	-	2 284	2 284	2 284
4E23-MS	Grassland to Settlement - Mineral soil	K11	CO2	-	22	-0	-0	-	…	-	-
4E24-MS	Wetland to Settlement - Mineral soil	K11	CO2	-	2	-	-	-	…	-	-
4A21-MS	Cropland to Forest - Mineral soil	K11	CO2	2	40	-80	78	0.117	2 096	2 096	2 096
4A22-MS	Grassland to Forest - Mineral soil	K11	CO2	4	111	-70	70	0.286	2 837	2 837	2 837

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4A25-MS	Other land to Forest - Mineral soil	K11	CO2	-0	-6	0	0	-	4 275	4 275	4 275
4A24-MS	Settlement to Forest - Mineral soil	K11	CO2	-1	-40	-0	-0	-	3 109	3 109	3 109
4A23-MS	Wetland to Forest - Mineral soil	K11	CO2	1	15	0	0	-	1 560	1 560	1 560
4B1-MS	Cropland remaining cropland - Mineral soil	K11	CO2	-7	-53	-	-	-	629	629	629
4B21-MS	Forest to Cropland - Mineral soil	K11	CO2	-1	-57	-0	-0	-	3 921	3 921	3 921
4B22-MS	Grassland to Cropland - Mineral soil	K11	CO2	-	4	0	0	-	...	-	-
4B24-MS	Settlement to Cropland - Mineral soil	K11	CO2	-0	-5	-	-	-	1 036	1 036	1 036
4C1-MS	Grassland remaining grassland - Mineral soil	K11	CO2	-27	31	-0	-0	-	-218	-218	-218
4C21-MS	Forest to Grassland - Mineral soil	K11	CO2	-1	-182	64	-61	0.432	15 485	15 485	15 485

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4D231-MS	Forest to Wetland - Mineral soil	K11	CO2	-	-9	63	-56	0.020	…	-	-
4F2-MS	Grassland to Other land - Mineral soil	K11	CO2	0	1	0	0	-	675	675	675
4E1-OS	Settlements remaining settlements - Organic soil	K11	CO2	193	186	-67	70	0.464	-4	-4	-4
4E21-OS	Forest to Settlement - Organic soil	K11	CO2	-	186	-67	70	0.464	…	-	-
4E24-OS	Wetland to Settlement - Organic soil	K11	CO2	1	14	0	0	-	1 668	1 668	1 668
4A1-OS	Forest remaining forest, drained organic soils - Organic soil	K11	CO2	661	695	-64	63	1.591	5	5	5
4A21-OS	Cropland to Forest - Organic soil	K11	CO2	1	6	0	0	-	1 100	1 100	1 100
4A22-OS	Grassland to Forest - Organic soil	K11	CO2	-	8	0	0	-	…	-	-
4A24-OS	Settlement to Forest - Organic soil	K11	CO2	-	1	-60	59	0.002	…	-	-

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4A23-OS	Wetland to Forest - Organic soil	K11	CO2	1	11	-	-	-	2 086	2 086	2 086
4B1-OS	Cropland remaining cropland - Organic soil	K11	CO2	1 601	1 566	-32	31	1.828	-2	-2	-2
4B21-OS	Forest to Cropland - Organic soil	K11	CO2	5	67	0	0	-	1 286	1 286	1 286
4B22-OS	Grassland to Cropland - Organic soil	K11	CO2	4	15	-59	59	0.033	299	299	299
4B23-OS	Wetland to Cropland - Organic soil	K11	CO2	-	107	-101	100	0.387	…	-	-
4C1-OS	Grassland remaining grassland - Organic soil	K11	CO2	160	62	-92	93	0.212	-61	-61	-61
4C23-OS	Wetland to Grassland - Organic soil	K11	CO2	-	15	-56	58	0.030	…	-	-
4D11-OS	Wetland Peat extraction - on+off-site - Organic soil	K11	CO2	65	60	-95	94	0.213	-7	-7	-7
4D23-OS	Forest to Wetland - Organic soil	K11	CO2	-	2	-	-	-	…	-	-

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4F2-OS	Grassland to Other land - Organic soil	K11	CO2	4	25	-61	60	0.055	597	597	597
4G	Harwested Wood Products - HWP	K11	CO2	-1 000	407	-49	51	0.765	-141	-141	-141
5D_x	Incinertion and open burning of waste		CO2	0	-	...	...	-	-100	-100	-100
1A1A_VT1	General fuel combustion- Coal/coke	Public electricity and heat prod	CH4	0	0	-50	95	0.000	-43	-46	-39
1A1A_VT2	General fuel combustion- Wood	Public electricity and heat prod	CH4	0	4	-59	94	0.013	2 792	1 783	4 192
1A1A_VT3	General fuel combustion- Gas	Public electricity and heat prod	CH4	-	0	-55	91	0.001	…	-	-
1A1A_VT6	General fuel combustion- Oil	Public electricity and heat prod	CH4	0	0	-53	80	0.000	246	232	259
1A1A_VT7	General fuel combustion- Waste	Public electricity and heat prod	CH4	3	14	-53	86	0.035	309	279	340
1A1B_VT6	General fuel combustion- Oil	Petroleum refining	CH4	1	0	-54	82	0.001	-18	-19	-17
1A1C_VT3	General fuel combustion- Gas	Manufacture of solid fuels and other energy	CH4	49	87	-52	90	0.229	77	77	78

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A1C_VT6	General fuel combustion- Oil	Manufacture of solid fuels and other energy	CH4	0	0	-53	81	0.001	-51	-52	-49
1A2A_VT1	General fuel combustion- Coal/coke	Iron and steel	CH4	0	0	-50	86	0.000	50	42	59
1A2A_VT2	General fuel combustion- Wood	Iron and steel	CH4	0	0	-59	94	0.001	7 274	4 725	11 036
1A2A_VT3	General fuel combustion- Gas	Iron and steel	CH4	-	0	-50	90	0.000	…	-	-
1A2A_VT6	General fuel combustion- Oil	Iron and steel	CH4	0	0	-53	82	0.000	-76	-76	-76
1A2B_VT1	General fuel combustion- Coal/coke	Non-ferrous metal	CH4	0	-	...	...	-	-100	-100	-100
1A2B_VT2	General fuel combustion- Wood	Non-ferrous metal	CH4	-	0	-57	98	0.000	…	-	-
1A2B_VT3	General fuel combustion- Gas	Non-ferrous metal	CH4	-	0	-50	90	0.000	…	-	-
1A2B_VT6	General fuel combustion- Oil	Non-ferrous metal	CH4	0	0	-53	82	0.000	-88	-89	-88
1A2C_VT1	General fuel combustion- Coal/coke	Chemicals	CH4	0	0	-56	94	0.000	37	-10	109

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A2C_VT2	General fuel combustion- Wood	Chemicals	CH4	0	4	-56	93	0.011	3 130	2 007	4 893
1A2C_VT3	General fuel combustion- Gas	Chemicals	CH4	-	0	-53	82	0.000	…	-	-
1A2C_VT6	General fuel combustion- Oil	Chemicals	CH4	1	0	-55	82	0.001	-29	-41	-14
1A2C_VT7	General fuel combustion- Waste	Chemicals	CH4	0	1	-51	91	0.002	189	169	210
1A2D_VT1	General fuel combustion- Coal/coke	Pulp, paper, print	CH4	0	-	...	...	-	-100	-100	-100
1A2D_VT2	General fuel combustion- Wood	Pulp, paper, print	CH4	2	3	-57	92	0.008	13	-24	69
1A2D_VT3	General fuel combustion- Gas	Pulp, paper, print	CH4	-	0	-54	100	0.000	…	-	-
1A2D_VT6	General fuel combustion- Oil	Pulp, paper, print	CH4	0	0	-53	82	0.000	-69	-69	-69
1A2D_VT7	General fuel combustion- Waste	Pulp, paper, print	CH4	0	0	-52	87	0.001	224	203	246
1A2E_VT1	General fuel combustion- Coal/coke	Food prosessing, beverages, tobacco	CH4	0	-	...	...	-	-100	-100	-100
1A2E_VT2	General fuel combustion- Wood	Food prosessing, beverages, tobacco	CH4	0	0	-59	93	0.000	137	53	260

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A2E_VT3	General fuel combustion- Gas	Food prosessing, beverages, tobacco	CH4	-	0	-53	88	0.000	…	-	-
1A2E_VT6	General fuel combustion- Oil	Food prosessing, beverages, tobacco	CH4	0	0	-54	81	0.000	-64	-65	-63
1A2E_VT7	General fuel combustion- Waste	Food prosessing, beverages, tobacco	CH4	-	0	-52	88	0.000	…	-	-
1A2G_VT1	General fuel combustion- Coal/coke	Other industry	CH4	0	0	-50	94	0.000	-1	-2	0
1A2G_VT2	General fuel combustion- Wood	Other industry	CH4	3	3	-58	97	0.008	-17	-45	24
1A2G_VT3	General fuel combustion- Gas	Other industry	CH4	-	0	-54	80	0.000	…	-	-
1A2G_VT6	General fuel combustion- Oil	Other industry	CH4	2	2	-54	82	0.005	5	1	9
1A2G_VT7	General fuel combustion- Waste	Other industry	CH4	1	3	-51	90	0.008	236	222	251
1A3A	Transport fuel - civil aviation		CH4	0	1	-52	93	0.002	104	59	165
1A3B	Transport fuel - road transportation		CH4	85	16	-36	47	0.026	-81	-82	-79

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A3C	Transport fuel - railway		CH4	0	0	-49	85	0.000	-51	-54	-48
1A3D	Transport fuel - navigation		CH4	5	132	-55	89	0.362	2 371	1 815	3 083
1A4A_VT2	General fuel combustion-Wood	Commercial/institutional	CH4	0	0	-59	98	0.001	10 841	7 225	16 431
1A4A_VT3	Gas combustion-commercial/institutional	Commercial/institutional	CH4	-	0	-52	89	0.000	…	-	-
1A4A_VT6	General fuel combustion- Oil	Commercial/institutional	CH4	3	3	-51	76	0.007	-1	-24	28
1A4A_VT7	Waste combustion - commercial/institutional	Commercial/institutional	CH4	0	0	-53	89	0.000	-20	-47	16
1A4B_VT1	Coal/coke combustion-residential	Residential	CH4	2	0	-54	101	0.000	-94	-95	-91
1A4B_VT2	General fuel combustion-Wood	Residential	CH4	153	165	-56	99	0.486	8	-29	61
1A4B_VT3	Gas - residential	Residential	CH4	-	0	-57	83	0.000	…	-	-
1A4B_VT6	General fuel combustion- Oil	Residential	CH4	12	12	-51	80	0.028	-3	-15	9

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A4C_VT1	Coal/coke combustion-agriculture	Agriculture/forestry/fishing	CH4	1	-	...	...	-	-100	-100	-100
1A4C_VT2	General fuel combustion-Wood	Agriculture/forestry/fishing	CH4	-	0	-55	93	0.000	...	-	-
1A4C_VT3	Gas combustion - agriculture/forestry/fishing	Agriculture/forestry/fishing	CH4	-	0	-54	99	0.000	...	-	-
1A4C_VT6	General fuel combustion- Oil	Agriculture/forestry/fishing	CH4	5	3	-51	77	0.008	-25	-33	-14
1A5A	Totaktsolje og "non-energy use"- stationary	non-energy use	CH4	0	0	-50	99	0.000	-44	-46	-41
1A5B	Totaktsolje og "non-energy use" - mobile	non-energy use	CH4	0	3	-52	74	0.008	656	605	715
1B1A	Coal mining, Extraction of natural gas		CH4	163	106	-52	81	0.263	-35	-38	-32
1B2A_x	Extraction of oil - transport		CH4	156	179	-33	43	0.254	15	10	20
1B2A_y	Extraction of oil - refining/storage		CH4	75	120	-35	48	0.180	59	53	66
1B2B	Coal mining, Extraction of natural gas		CH4	3	53	-53	87	0.144	1 663	1 593	1 741

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1B2C_x	venting		CH4	170	399	-60	60	0.899	134	134	134
1B2C_y	flaring oil		CH4	0	0	-51	87	0.000	-81	-81	-80
1B2C_z	flaring gas		CH4	20	38	-57	93	0.104	87	23	180
2B5	Other chemical industry		CH4	9	2	-10	10	0.001	-80	-80	-79
2B8	Methanol and plastic production		CH4	2	16	-85	42	0.043	739	642	847
2C2	Ferroalloys production		CH4	1	1	-53	85	0.003	3	3	3
3A1	Enteric fermentation - cattle		CH4	2 140	1 721	-23	25	1.534	-20	-25	-14
3A2	Enteric fermentation - sheep		CH4	513	540	-39	40	0.781	5	-1	13
3A3	Enteric fermentation - swine		CH4	19	21	-26	24	0.020	9	1	16
3A44	Enteric fermentation - goat		CH4	28	19	-40	37	0.027	-31	-36	-26
3A45	Enteric fermentation - horse		CH4	14	35	-40	40	0.051	145	127	162
3A47	Enteric fermentation - poultry		CH4	2	2	-36	38	0.003	52	42	64

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	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
3A48	Enteric fermentation - other animal		CH4	85	91	-40	40	0.136	6	-1	14
3B1	Manure management - CH4 - cattle		CH4	261	234	-24	25	0.214	-10	-16	-4
3B2	Manure management - CH4 - sheep		CH4	7	7	-25	27	0.007	-3	-8	3
3B3	Manure management - CH4- swine		CH4	49	59	-25	26	0.056	22	14	31
3B44	Manure management - CH4 - goat		CH4	0	0	-26	25	0.000	-31	-36	-26
3B45	Manure management - CH4- horse		CH4	2	6	-25	24	0.005	145	129	162
3B47	Manure management - CH4- poultry		CH4	6	10	-24	26	0.009	50	39	60
3B48	Manure management - CH4 - other animal		CH4	5	6	-26	24	0.005	15	7	24
3F1	Field Burning of Agricultural Residue - cereals		CH4	27	2	-54	89	0.006	-92	-93	-91
4(V)-F-CH4	Forest land - Biomass burning	K12	CH4	1	0	-54	88	0.000	-95	-95	-95

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	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4(II)-C-CH4	Cropland - Organic soil	K12	CH4	68	74	-72	75	0.201	9	9	9
4(II)-F-CH4	Forest rem forest - Organic soil	K12	CH4	41	44	-	-	-	8	8	8
4(II)-G-CH4	Grasland - Organic soil	K12	CH4	11	5	-	-	-	-52	-52	-52
4(II)-W-CH4	Peat extraction - Organic soil	K12	CH4	0	0	-63	116	0.001	-	-	-
5A	Solid Waste Disposal		CH4	2 062	1 199	-29	36	1.518	-42	-57	-23
5B_x	Composting		CH4	2	33	-70	150	0.139	1 448	1 074	1 928
5B_y	Home composting		CH4	1	1	-70	132	0.005	61	61	61
5B_z	Biogas		CH4	-	2	-88	96	0.007	…	-	-
5D_x	Incinertion and open burning of waste		CH4	0	0	-55	91	0.000	134	50	261
5D_y	Domestic Wastewater		CH4	28	30	-73	163	0.139	8	-32	79
5C	Industrial Wastewater		CH4	90	37	-69	149	0.164	-59	-59	-59
1A1A_VT1	General fuel combustion-Coal/coke	Public electricity and heat prod	N2O	1	1	-72	124	0.002	-43	-46	-39
1A1A_VT2	General fuel combustion-Wood	Public electricity and heat prod	N2O	1	6	-72	134	0.024	1 089	674	1 664

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A1A_VT3	General fuel combustion- Gas	Public electricity and heat prod	N2O	-	0	-73	125	0.001	…	-	-
1A1A_VT6	General fuel combustion- Oil	Public electricity and heat prod	N2O	0	0	-73	122	0.001	488	465	511
1A1A_VT7	General fuel combustion- Waste	Public electricity and heat prod	N2O	5	12	-69	125	0.045	131	114	149
1A1B_VT1	General fuel combustion- Gas	Petroleum refining	N2O	0	0	-73	115	0.000	73	70	75
1A1B_VT6	General fuel combustion- Oil	Petroleum refining	N2O	3	1	-73	122	0.002	-82	-82	-82
1A1C_VT3	General fuel combustion- Gas	Manufacture of solid fuels and other energy	N2O	3	5	-74	119	0.019	92	92	93
1A1C_VT6	General fuel combustion- Oil	Manufacture of solid fuels and other energy	N2O	1	3	-73	120	0.012	215	208	222
1A2A_VT1	General fuel combustion- Coal/coke	Iron and steel	N2O	0	0	-74	110	0.001	48	40	56
1A2A_VT2	General fuel combustion- Wood	Iron and steel	N2O	0	0	-73	139	0.000	1 025	636	1 599
1A2A_VT3	General fuel combustion- Gas	Iron and steel	N2O	-	0	-71	124	0.000	…	-	-
1A2A_VT6	General fuel combustion- Oil	Iron and steel	N2O	0	0	-73	120	0.000	-77	-77	-77

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	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A2B_VT1	General fuel combustion-Coal/coke	Non-ferrous metal	N2O	0	-	...	...	-	-100	-100	-100
1A2B_VT2	General fuel combustion-Wood	Non-ferrous metal	N2O	-	0	-76	131	0.000	…	-	-
1A2B_VT3	General fuel combustion- Gas	Non-ferrous metal	N2O	-	0	-73	115	0.000	…	-	-
1A2B_VT6	General fuel combustion- Oil	Non-ferrous metal	N2O	1	0	-73	122	0.000	-91	-91	-90
1A2C_VT1	General fuel combustion-Coal/coke	Chemicals	N2O	0	0	-73	141	0.000	37	-10	109
1A2C_VT2	General fuel combustion-Wood	Chemicals	N2O	0	2	-73	122	0.006	879	539	1 413
1A2C_VT3	General fuel combustion- Gas	Chemicals	N2O	-	0	-74	110	0.001	…	-	-
1A2C_VT6	General fuel combustion- Oil	Chemicals	N2O	1	1	-73	120	0.005	118	82	163
1A2C_VT7	General fuel combustion-Waste	Chemicals	N2O	0	1	-74	119	0.004	188	169	209
1A2D_VT1	General fuel combustion-Coal/coke	Pulp, paper, print	N2O	0	-	...	...	-	-100	-100	-100

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A2D_VT2	General fuel combustion- Wood	Pulp, paper, print	N2O	7	6	-74	122	0.021	-21	-47	18
1A2D_VT3	General fuel combustion- Gas	Pulp, paper, print	N2O	-	0	-72	114	0.000	…	-	-
1A2D_VT6	General fuel combustion- Oil	Pulp, paper, print	N2O	0	0	-73	120	0.000	-69	-70	-69
1A2D_VT7	General fuel combustion- Waste	Pulp, paper, print	N2O	0	1	-76	120	0.003	224	203	246
1A2E_VT1	General fuel combustion- Coal/coke	Food prosessing, beverages, tobacco	N2O	0	-	...	...	-	-100	-100	-100
1A2E_VT2	General fuel combustion- Wood	Food prosessing, beverages, tobacco	N2O	0	0	-74	122	0.000	137	53	260
1A2E_VT3	General fuel combustion- Gas	Food prosessing, beverages, tobacco	N2O	-	0	-73	118	0.000	…	-	-
1A2E_VT6	General fuel combustion- Oil	Food prosessing, beverages, tobacco	N2O	1	0	-73	120	0.001	-67	-69	-66
1A2E_VT7	General fuel combustion- Waste	Food prosessing, beverages, tobacco	N2O	-	0	-70	108	0.000	…	-	-
1A2G_VT1	General fuel combustion- Coal/coke	Other industry	N2O	2	2	-72	127	0.006	-16	-16	-15

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A2G_VT2	General fuel combustion- Wood	Other industry	N2O	5	5	-74	135	0.018	-15	-44	27
1A2G_VT3	General fuel combustion- Gas	Other industry	N2O	-	0	-74	112	0.000	…	-	-
1A2G_VT6	General fuel combustion- Oil	Other industry	N2O	9	14	-73	119	0.051	46	41	51
1A2G_VT7	General fuel combustion- Waste	Other industry	N2O	1	4	-72	115	0.016	236	222	251
1A3A	Transport fuel - civil aviation		N2O	6	12	-73	111	0.041	81	42	137
1A3B	Transport fuel - road transportation		N2O	55	67	-50	75	0.155	21	13	29
1A3C	Transport fuel - railway		N2O	11	5	-83	107	0.019	-51	-54	-48
1A3D	Transport fuel - navigation		N2O	11	10	-76	128	0.039	-1	-24	27
1A4A_VT2	General fuel combustion- Wood	Commercial/institutional	N2O	0	1	-74	128	0.003	10 322	6 877	15 647
1A4A_VT3	Gas combustion- commercial/institutional	Commercial/institutional	N2O	-	0	-72	117	0.000	…	-	-
1A4A_VT6	General fuel combustion- Oil	Commercial/institutional	N2O	3	9	-74	135	0.036	241	162	339
1A4A_VT7	Waste combustion - commercial/institutional	Commercial/institutional	N2O	0	0	-74	110	0.001	-20	-47	16

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1A4B_VT1	Coal/coke combustion-residential	Residential	N2O	0	0	-75	130	0.000	-94	-95	-91
1A4B_VT2	General fuel combustion-Wood	Residential	N2O	24	26	-75	131	0.099	8	-29	61
1A4B_VT3	Gas - residential	Residential	N2O	-	0	-73	123	0.000	…	-	-
1A4B_VT6	General fuel combustion- Oil	Residential	N2O	4	2	-73	121	0.006	-58	-63	-53
1A4C_VT1	Coal/coke combustion-agriculture	Agriculture/forestry/fishing	N2O	0	-	...	...	-	-100	-100	-100
1A4C_VT2	General fuel combustion-Wood	Agriculture/forestry/fishing	N2O	-	0	-75	140	0.001	…	-	-
1A4C_VT3	Gas combustion - agriculture/forestry/fishing	Agriculture/forestry/fishing	N2O	-	0	-74	124	0.000	…	-	-
1A4C_VT6	General fuel combustion- Oil	Agriculture/forestry/fishing	N2O	16	15	-73	123	0.056	-8	-18	6
1A5A	Totaktsolje og "non-energy use"- stationary	non-energy use	N2O	0	0	-74	123	0.001	77	71	85
1A5B	Totaktsolje og "non-energy use" - mobile	non-energy use	N2O	4	2	-79	78	0.006	-42	-45	-37
1B2C_y	flaring oil		N2O	0	0	-79	81	0.000	-81	-81	-80

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
1B2C_z	flaring gas		N2O	5	3	-77	120	0.012	-32	-55	1
2B1	Ammonia production		N2O	58	128	-3	3	0.014	120	111	130
2B2	Nitric acid production		N2O	1 993	262	-7	6	0.065	-87	-87	-87
2B8	Methanol and plastic production		N2O	0	0	-9	8	0.000	1 833	1 608	2 080
2C2	Ferroalloys production		N2O	5	4	-10	9	0.001	-19	-19	-19
2G3	N2O from product uses		N2O	34	30	-15	15	0.016	-12	-12	-12
3B_x	Manure management - N2O - solid storage		N2O	76	72	-52	93	0.193	-6	-11	-0
3DA1	Direct soil emission - Inorganic fertilizer		N2O	511	447	-79	229	2.586	-12	-18	-6
3DA2	Direct soil emission - Organic fertilizer		N2O	243	258	-79	234	1.501	6	1	12
3DA3	Direct soil emission- Urine and dung by grazing animals		N2O	193	164	-84	234	1.465	-15	-67	116
3DA4	Direct soil emission- Crop residue		N2O	105	60	-83	234	0.359	-43	-75	40
3DA5	loss/gain soil organic matter		N2O	382	390	-60	64	0.866	2	-3	8

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	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
3DB1	Indirect soil emission-Deposition		N2O	79	95	-69	160	0.403	20	14	26
3DB2	Indirect soil emission - Lekkasje med mer		N2O	170	154	-68	143	0.616	-9	-14	-5
3F1	Field Burning of Agricultural Residue - cereals		N2O	8	1	-72	150	0.003	-92	-93	-91
4(V)-F-N2O	Forest land - Biomass burning	K13	N2O	0	0	-56	93	0.000	-94	-94	-94
4(I)-FI	Forest-Direct N2O - Inorganic N	K13	N2O	1	1	-53	98	0.001	-28	-28	-28
4(I)-FO	Forest-Direct N2O - Organic N	K13	N2O	23	21	-51	78	0.051	-8	-8	-8
4(I)-SO	Settlements-Direct N2O - Organic N	K13	N2O	3	6	-53	87	0.017	100	100	100
4(II)-F-N2O	Forest rem forest - Organic soil	K13	N2O	183	205	-64	60	0.469	12	12	12
4(II)-W-N2O	Peat extraction - Organic soil	K13	N2O	0	0	-	-	-	-	-	-
4(III)	Direct N2O from N mineralization/immobilization - N2O	K13	N2O	1	40	-52	81	0.100	2 678	2 678	2 678

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	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
4(IV)_x	Indirect N2O from Managed soils - AtmDep	K13	N2O	1	1	-	-	-	6	6	6
4(IV)_y	Indirect N2O from Managed soils - LeachRun	K13	N2O	6	15	-70	149	0.066	142	142	142
5B_x	Composting		N2O	2	29	-69	146	0.121	1 448	1 074	1 928
5B_y	Home composting		N2O	1	1	-70	142	0.005	61	61	61
5D_x	Incinertion and open burning of waste		N2O	0	0	-70	176	0.000	4	-33	60
5D_y	Domestic Wastewater		N2O	113	137	-71	139	0.562	21	-24	101
5C	Industrial Wastewater		N2O	3	8	-69	170	0.035	130	130	130
2F	Product uses as substitutes for ODS		HFK	0	1 155	-41	54	2.126	2 631 313	2 631 313	2 631 313
2C3	Aluminium production		PFK	3 895	182	-21	21	0.140	-95	-96	-95
2F	Product uses as substitutes for ODS		PFK	-	0	-50	46	0.000	…	-	-
2C4	SF6 used in Al and Mg foundries		SF6	2 045	-	...	...	-	-100	-100	-100
2E1	By product emissions		SF6	-	1	-61	58	0.003	…	-	-

	A	A*	B	C	D	E	F	G	H	I	J
	IPCC Source category		Gas	Base year emissions	Year t emissions	Uncertainty in year t emissions as % of emissions in the category		Uncertainty introduced on national total in year t	% change in emissions between year t and base year	Range of likely % change between year t and base year	
Source		Subcategory		Gg CO_2 equivalent	Gg CO_2 equivalent	% below (2.5 percentile)	% above (97.5 percentile)	%	%	Lower % (2.5 percentile)	Upper % (97.5 percentile)
2G1	Electrical equiptment		SF6	51	47	-58	60	0.104	-9	-9	-9
2G2	SF6 and PFCs from other product use		SF6	2	13	-55	59	0.027	473	473	473

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Annex III: Energy Balance Sheets 1990 - 2014

This annex is subdivided into two parts. Part 1 presents the energy balance sheets for the years 1990-2014 in a regular format. Part 2 contains energy balance sheets for the years 2008-2014 with more detailed energy products than in Part 1. In the first page of Part 2 footnotes to Part 2 is given. The table below together with the footnotes explains the connection between energy products in the two parts.

Part 1 of the energy balance *Regular format of energy products*		**Part 2 of EB** *More detailed energy products*	
Total		**Total**	
Coal	Solid	Coal	
Coke	Solid	Coke	
	Solid	Blast furnace gas	
Petrol coke	Liquid	Petrol coke	
Fuel wood, black liquor, garbage	Biomass	Fuel wood	
	Biomass	Wood waste, black liquor, biogas, biofuels, pellets, etcetera	Biogas incl. Landfill gas
	Other	Waste included hazardous waste	
Crude oil	Liquid	Crude oil	
Petrol	Liquid	Petrol	
Kerosene	Liquid	Kerosene	
Middle distillates	Liquid	Middle distillates	
Heavy fuel oil included hazardous waste	Liquid	Heavy fuel oil	
LPG	Liquid	LPG	
	Liquid	Fuel gas	
	Liquid	Refinery gas	
Natural gas	Gaseous	Natural gas	
Other gases			
Waterfall energy and wind power	Not in CRF	Waterfall energy and wind power	
Electricity	Not in CRF	Electricity	
District heating	Not in CRF	District heating	

Part 1: Energy balance sheets 1990-2014

Energy balance	**1990**										
PJ											
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petroleum products	Natural gas and other gases	Waterfall energy	Electricity	District heating
1.1.1 Production of primary energy bearers	4931.45	8.51	0.00	0.00	37.49	3411.87	49.62	986.99	436.97	0.00	0.00
1.1.2 Production of natural gas that is flared off	20.55	0.00	0.00	0.00	0.00	0.00	0.00	20.55	0.00	0.00	0.00
2. Imports	257.78	20.04	15.21	12.84	0.01	68.66	139.82	0.00	0.00	1.20	0.00
3. Exports	4265.55	7.15	0.13	3.99	0.00	2897.27	373.46	925.09	0.00	58.47	0.00
4.1 Bunkering	19.42	0.00	0.00	0.00	0.00	0.00	19.42	0.00	0.00	0.00	0.00
4.2 Foreign aviation	8.48	0.00	0.00	0.00	0.00	0.00	8.48	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-63.93	-0.37	0.00	-0.62	0.00	-62.31	-0.63	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	852.41	21.03	15.08	8.23	37.50	520.95	-212.55	82.45	436.97	-57.27	0.00
8. Energy converted	1017.15	0.58	1.36	0.00	2.11	538.98	35.83	0.01	436.97	1.32	0.00
8.1. In blast furnaces	1.36	0.00	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	574.65	0.00	0.00	0.00	0.00	538.98	35.67	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.01	0.00	0.00	0.00	0.94	0.00	0.07	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	1.08	0.58	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants											
8.6. In hydropow er plants	2.07	0.00	0.00	0.00	0.67	0.00	0.08	0.01	0.00	1.32	0.00
8.7. Other conversion											
1.2. Production of derived energy bearers	1034.56	0.00	0.00	5.65	0.00	0.00	542.15	43.02	0.00	438.65	5.09
9. Consumption by energy sector	140.74	0.00	0.00	0.00	0.00	0.00	3.88	129.83	0.00	7.03	0.00
9.1.1 Crude petroleum and natural gas production											
9.1.2 Natural gas w hich is flared off on oil fields											
9.2. Coal mines											
9.3. Petroleum refineries											
9.4. Pumping storage pow er plants											
9.5. Hydro electric pow er plants											
9.6. Thermal pow er plants											
9.7. Combined heat and pow er plants											
9.8. District heating plants											
9.9. Gas supply											
10. Losses in transport and distribution	28.91	0.00	0.00	0.00	0.00	0.00	0.00	2.19	0.00	24.75	1.97
11. Statistical differences (7-8+1.2-9-10-13.1)	-27.97	-0.75	0.77	0.34	-0.07	-18.03	11.67	-21.69	0.00	-0.22	0.00
	-27.97	-0.75	0.77	0.34	-0.07	-18.03	11.67	-21.69	0.00	-0.22	0.00
13.1 Net domestic consumption including non-energy use	728.13	21.20	12.95	13.54	35.46	0.00	278.23	15.13	0.00	348.51	3.12
13. Net domestic consumption	681.33	21.20	0.00	13.31	35.46	0.00	244.60	15.13	0.00	348.51	3.12
14. Manufacturing, mining and quarrying	260.31	20.87	0.00	13.26	15.04	0.00	32.60	15.12	0.00	162.76	0.68
14.1. Mining and quarrying	4.45	0.00	0.00	0.00	0.00	0.00	1.90	0.00	0.00	2.55	0.00
14.2. Manufacture of paper and paper products	36.96	0.18	0.00	0.00	10.29	0.00	2.62	0.00	0.00	23.86	0.00
14.3. Manufacture of industrial chemicals	38.83	0.00	0.00	1.28	0.15	0.00	4.52	13.97	0.00	18.61	0.30
14.4. Manufacture of iron, steel and ferro alloys	55.28	13.57	0.00	10.90	0.01	0.00	1.10	0.44	0.00	29.25	0.02
14.5. Manufacture of aluminium and other non-ferrous metals	64.78	0.00	0.00	0.41	0.00	0.00	3.11	0.72	0.00	60.54	0.00
14.6. Other manufacturing industries	60.01	7.11	0.00	0.68	4.59	0.00	19.34	0.00	0.00	27.94	0.35
15. Transport	147.97	0.00	0.00	0.00	0.00	0.00	145.63	0.00	0.00	2.35	0.00
15.1. Railw ays and subw ays	3.14	0.00	0.00	0.00	0.00	0.00	1.37	0.00	0.00	1.77	0.00
15.2. Air transport	9.30	0.00	0.00	0.00	0.00	0.00	9.30	0.00	0.00	0.00	0.00
15.3. Road transport	108.62	0.00	0.00	0.00	0.00	0.00	108.04	0.00	0.00	0.58	0.00
15.4. Coastal shipping	26.92	0.00	0.00	0.00	0.00	0.00	26.92	0.00	0.00	0.00	0.00
16. Other sectors	273.05	0.33	0.00	0.05	20.42	0.00	66.38	0.00	0.00	183.41	2.44
16.1. Fishing	18.71	0.00	0.00	0.00	0.00	0.00	18.71	0.00	0.00	0.00	0.00
16.2. Agriculture	10.53	0.13	0.00	0.00	0.00	0.00	7.93	0.00	0.00	2.45	0.02
16.3. Households	149.48	0.20	0.00	0.05	20.42	0.00	18.70	0.00	0.00	109.08	1.03
16.4. Other consumers	88.32	0.00	0.00	0.00	0.00	0.00	16.95	0.00	0.00	69.97	1.39
16.5 Construction	6.00	0.00	0.00	0.00	0.00	0.00	4.09	0.00	0.00	1.91	0.00
12. Consumption for non-energy purposes	46.80	0.00	0.00	13.18	0.00	0.00	33.62	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals											
12.2 Other manufacturing											

Energy balance	**1991**										
PJ											
	Total	Coal	Coke	Petrol coke	Fuel wood, black liquor, waste	Crude oil	Petroleum products	Natural gas and other gases	Waterfall energy	Electricity	District heating
1.1.1 Production of primary energy bearers	5 405.29	9.27	-	-	35.57	3 899.13	49.23	1 014.00	398.09	-	-
1.1.2 Production of natural gas that is flared off	13.45	-	-	-	-	-	-	13.45	-	-	-
2. Imports	251.15	16.89	13.82	12.02	0.01	68.57	128.04	-	-	11.79	-
3. Exports	4 757.17	7.61	0.16	3.06	0.01	3 459.16	332.90	932.49	-	21.78	-
4.1 Bunkering	16.40	-	-	-	-	-	16.40	-	-	-	-
4.2 Foreign aviation	7.66	-	-	-	-	-	7.66	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	14.26	0.59	-0.00	-0.08	-	9.95	3.80	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	902.93	19.13	13.66	8.88	35.58	518.49	-175.88	94.97	398.09	-9.99	-
8. Energy converted	949.38	0.75	1.52	-	2.12	510.22	35.29	0.07	398.09	1.32	-
8.1. In blast furnaces	1.52	-	1.52	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	545.26	-	-	-	-	510.22	35.04	-	-	-	-
8.3. In thermal power plants	1.01	-	-	-	0.94	-	0.07	-	-	-	-
8.4. In dual purpose power plants	1.25	0.75	-	-	0.50	-	-	-	-	-	-
8.5. In district heating plants	2.25	-	-	-	0.67	-	0.19	0.07	-	1.32	-
8.6. In hydropower plants	398.09	-	-	-	-	-	-	-	398.09	-	-
8.7. Other conversion	-	-	-	-	-	-	-	-	-	-	-
1.2. Production of derived energy bearers	978.09	-	-	4.99	-	-	527.35	40.55	-	399.63	5.56
9. Consumption by energy sector	138.30	-	-	-	-	-	4.41	126.10	-	7.79	-
9.1.1 Crude petroleum and natural gas production											
9.1.2 Natural gas which is flared off on oil fields											
9.2. Coal mines											
9.3. Petroleum refineries											
9.4. Pumping storage power plants											
9.5. Hydro electric power plants											
9.6. Thermal power plants											
9.7. Combined heat and power plants											
9.8. District heating plants											
9.9. Gas supply											
10. Losses in transport and distribution	28.26	-	-	-	-	-	-	2.22	-	24.13	1.91
11. Statistical differences (7-8+1.2-9-10-13.1)	48.52	0.09	0.03	0.36	-	8.26	47.62	-7.84	-	-0.01	-0.00
13.1 Net domestic consumption including non-energy use	716.56	18.30	12.10	13.51	33.46	-	264.15	14.97	-	356.42	3.66
13. Net domestic consumption	675.87	18.30	12.10	0.19	33.46	-	236.77	14.97	-	356.42	3.66
14. Manufacturing, mining and quarrying	254.68	17.96	12.07	0.19	15.07	-	32.53	14.96	-	161.12	0.78
14.1. Mining and quarrying	4.52	-	-	-	-	-	1.88	-	-	2.65	-
14.2. Manufacture of paper and paper products	37.49	0.42	-	-	10.42	-	3.13	-	-	23.50	0.00
14.3. Manufacture of industrial chemicals	39.56	-	-	1.06	0.14	-	7.02	13.87	-	17.17	0.29
14.4. Manufacture of iron, steel and ferro alloys	49.50	11.30	-	10.45	0.01	-	0.53	0.42	-	26.76	0.03
14.5. Manufacture of aluminium and other non-ferrous metals	65.62	-	-	0.30	-	-	3.13	0.67	-	61.52	-
14.6. Other manufacturing industries	57.99	6.24	-	0.45	4.50	-	16.84	-	-	29.51	0.45
15. Transport	146.72	-	-	-	-	-	144.42	-	-	2.29	-
15.1. Railways and subways	3.11	-	-	-	-	-	1.35	-	-	1.76	-
15.2. Air transport	9.54	-	-	-	-	-	9.54	-	-	-	-
15.3. Road transport	107.44	-	-	-	-	-	106.91	-	-	0.53	-
15.4. Coastal shipping	26.62	-	-	-	-	-	26.62	-	-	-	-
16. Other sectors	274.47	0.34	0.03	-	18.39	-	59.82	0.01	-	193.01	2.88
16.1. Fishing	17.30	-	-	-	-	-	17.24	-	-	-	0.06
16.2. Agriculture	9.96	0.15	-	-	-	-	7.41	-	-	2.38	0.02
16.3. Households	153.48	0.18	-	0.03	18.39	-	16.40	-	-	117.41	1.06
16.4. Other consumers	87.98	0.00	-	-	0.00	-	14.93	0.01	-	71.30	1.74
16.5 Construction	5.75	-	-	-	-	-	3.84	-	-	1.91	-
12. Consumption for non-energy purposes	40.70	-	-	13.31	-	-	27.38	-	-	-	-
12.1 Manufacture of industrial chemicals											
12.2 Other manufacturing											

Energy balance	**1992**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	6038.07	10.08	0.00	0.00	37.18	4472.98	9.31	0.00	0.00	0.00	43.86	1043.22	0.00	421.43	0.00	0.00
1.1.2 Production of natural gas that is flared off	11.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.57	0.00	0.00	0.00	0.00
2. Imports	215.02	17.35	13.38	11.15	0.05	47.40	17.12	6.48	26.31	25.96	44.86	0.00	0.00	0.00	4.97	0.00
3. Exports	5324.13	4.72	0.00	3.88	0.00	3915.64	125.20	14.87	165.44	58.62	54.43	944.92	0.00	0.00	36.39	0.00
4.1 Bunkering	20.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.12	11.36	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	8.25	0.00	0.00	0.00	0.00	0.00	0.00	8.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-29.15	-4.36	0.42	0.02	0.00	-25.15	0.87	-0.55	-0.12	0.02	-0.30	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	882.65	18.35	13.80	7.30	37.23	579.58	-97.90	-17.20	-148.38	-44.01	33.99	109.88	0.00	421.43	-31.43	0.00
8. Energy converted	1045.08	0.75	1.33	0.00	5.23	571.87	9.55	1.58	2.66	29.01	0.25	0.00	0.05	421.43	1.38	0.00
8.1. In blast furnaces	1.33	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	614.79	0.00	0.00	0.00	0.00	571.87	9.55	1.58	2.55	28.99	0.25	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.04	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	2.69	0.75	0.00	0.00	1.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	3.81	0.00	0.00	0.00	2.32	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.05	0.00	1.38	0.00
8.6. In hydropow er plants	421.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	421.43	0.00	0.00
8.7. Other conversion																
1.2. Production of derived energy bearers	1063.95	0.00	0.00	5.79	0.00	0.00	185.85	45.15	274.82	67.56	10.25	0.00	45.93	0.00	423.02	5.58
9. Consumption by energy sector	147.73	0.00	0.00	0.00	0.00	0.00	0.16	0.01	3.65	0.23	0.00	106.74	29.04	0.00	7.91	0.00
9.1.1 Crude petroleum and natural gas production	99.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.28	0.08	0.00	95.17	0.00	0.00	0.51	0.00
9.1.2 Natural gas w hich is flared off on oil fields	11.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.57	0.00	0.00	0.00	0.00
9.2. Coal mines	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.08	0.00
9.3. Petroleum refineries	30.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.15	0.00	0.00	29.04	0.00	1.70	0.00
9.4. Pumping storage pow er plants	2.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.01	0.00
9.5. Hydro electric pow er plants	3.65	0.00	0.00	0.00	0.00	0.00	0.15	0.01	0.11	0.00	0.00	0.00	0.00	0.00	3.38	0.00
9.6. Thermal pow er plants	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00
9.7. Combined heat and pow er plants	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00
9.8. District heating plants	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
9.9. Gas supply	28.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.61	0.00	24.53	1.74
10. Losses in transport and distribution																
11. Statistical differences (7-8+1.2-9-10-13.1)	10.11	-0.85	0.37	-0.35	0.00	7.72	3.81	6.67	-3.19	-17.74	10.53	3.14	0.00	0.00	0.00	0.00
	10.11	-0.85	0.37	-0.35	0.00	7.72	3.81	6.67	-3.19	-17.74	10.53	3.14	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	714.80	18.45	12.10	13.44	32.00	0.00	74.43	19.69	123.31	12.05	33.47	0.00	14.24	0.00	357.78	3.85
13. Net domestic consumption	672.77	18.45	12.10	0.26	32.00	0.00	74.43	19.69	123.31	12.05	4.62	0.00	14.24	0.00	357.78	3.85
14. Manufacturing, mining and quarrying	248.08	18.21	12.06	0.26	13.97	0.00	0.00	0.04	13.62	10.73	4.45	0.00	14.18	0.00	159.76	0.79
14.1. Mining and quarrying	4.08	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.88	0.76	0.01	0.00	0.00	0.00	2.42	0.00
14.2. Manufacture of paper and paper products	34.93	0.24	0.00	0.00	9.64	0.00	0.00	0.00	0.18	2.36	0.01	0.00	0.00	0.00	22.51	0.00
14.3. Manufacture of industrial chemicals	35.50	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.13	1.61	2.16	0.00	13.16	0.00	17.08	0.32
14.4. Manufacture of iron, steel and ferro alloys	49.06	11.71	10.35	0.00	0.00	0.00	0.00	0.00	0.20	0.50	0.00	0.00	0.36	0.00	25.92	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	62.80	0.00	0.41	0.00	0.00	0.00	0.00	0.00	1.64	0.69	0.29	0.00	0.66	0.00	59.12	0.00
14.6. Other manufacturing industries	61.71	6.26	0.26	0.26	4.33	0.00	0.00	0.01	10.60	4.82	1.98	0.00	0.00	0.00	32.71	0.46
15. Transport	150.79	0.00	0.00	0.00	0.00	0.00	73.47	9.72	64.10	1.08	0.00	0.00	0.00	0.00	2.41	0.00
15.1. Railw ays and subw ays	3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.43	0.00	0.00	0.00	0.00	0.00	2.41	0.00
15.2. Air transport	9.84	0.00	0.00	0.00	0.00	0.00	0.12	9.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	108.91	0.00	0.00	0.00	0.00	0.00	71.63	0.00	37.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.4. Coastal shipping	28.20	0.00	0.00	0.00	0.00	0.00	1.72	0.00	25.39	1.08	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	273.89	0.23	0.04	0.00	18.03	0.00	0.95	9.93	45.58	0.24	0.17	0.00	0.06	0.00	195.61	3.05
16.1. Fishing	16.24	0.00	0.00	0.00	0.00	0.00	0.16	0.01	15.92	0.11	0.00	0.00	0.00	0.00	0.00	0.04
16.2. Agriculture	9.72	0.10	0.00	0.00	0.00	0.00	0.07	0.04	7.01	0.05	0.00	0.00	0.00	0.00	2.44	0.02
16.3. Households	150.66	0.13	0.04	0.00	18.03	0.00	0.72	6.03	7.06	0.01	0.12	0.00	0.00	0.00	117.54	0.98
16.4. Other consumers	91.73	0.00	0.00	0.00	0.00	0.00	0.00	3.82	11.64	0.07	0.05	0.00	0.06	0.00	74.08	2.01
16.5 Construction	5.55	0.00	0.00	0.00	0.00	0.00	0.01	0.03	3.96	0.00	0.00	0.00	0.00	0.00	1.55	0.00
12. Consumption for non-energy purposes	42.03	0.00	0.00	13.18	0.00	0.00	0.00	0.00	0.00	0.00	28.85	0.00	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	32.91	0.00	0.00	4.06	0.00	0.00	0.00	0.00	0.00	0.00	28.85	0.00	0.00	0.00	0.00	0.00
12.2 Other manufacturing	9.12	0.00	0.00	9.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**1993**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	6325.12	7.52	0.00	0.00	40.88	4747.17	24.67	0.00	0.00	0.00	62.05	1012.17	0.00	430.66	0.00	0.00
1.1.2 Production of natural gas that is flared off	13.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.42	0.00	0.00	0.00	0.00
2. Imports	228.69	20.13	13.21	12.09	0.04	56.36	18.86	2.62	22.28	35.35	45.65	0.00	0.00	0.00	2.11	0.00
3. Exports	5598.63	6.39	0.06	4.80	0.03	4212.32	132.76	17.30	160.78	59.74	65.78	908.14	0.00	0.00	30.55	0.00
4.1 Bunkering	21.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.92	12.02	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	8.69	0.00	0.00	0.00	0.00	0.00	0.00	8.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-33.25	1.85	-0.68	0.62	0.00	-30.60	-5.30	-2.83	3.01	1.05	-0.37	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	904.73	23.11	12.47	7.92	40.89	560.61	-94.54	-26.20	-145.41	-35.35	41.55	117.45	0.00	430.66	-28.44	0.00
8. Energy converted	1051.48	0.71	1.33	0.00	4.58	569.80	6.79	2.15	5.90	26.85	1.36	0.00	0.05	430.66	1.30	0.00
8.1. In blast furnaces	1.33	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	612.75	0.00	0.00	0.00	0.00	569.80	6.79	2.15	5.81	26.84	1.36	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	2.89	0.71	0.00	0.00	2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	3.78	0.00	0.00	0.00	2.40	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.05	0.00	1.30	0.00
8.6. In hydropow er plants	430.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	430.66	0.00	0.00
8.7. Other conversion																
1.2. Production of derived energy bearers	1078.26	0.00	0.00	6.94	0.00	0.00	179.95	46.15	281.90	65.52	11.97	0.00	47.69	0.00	432.34	5.79
9. Consumption by energy sector	155.52	0.00	0.00	0.00	0.00	0.00	0.17	0.01	3.89	0.15	0.48	113.70	29.33	0.00	7.79	0.00
9.1.1 Crude petroleum and natural gas production	104.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.59	0.12	0.00	100.28	0.00	0.00	0.68	0.00
9.1.2 Natural gas w hich is flared off on oil fields	13.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.42	0.00	0.00	0.00	0.00
9.2. Coal mines	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.07	0.00
9.3. Petroleum refineries	31.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.48	0.00	29.33	0.00	1.84	0.00
9.4. Pumping storage pow er plants	2.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.05	0.00
9.5. Hydro electric pow er plants	3.25	0.00	0.00	0.00	0.00	0.00	0.16	0.01	0.13	0.00	0.00	0.00	0.00	0.00	2.95	0.00
9.6. Thermal pow er plants	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00
9.7. Combined heat and pow er plants	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00
9.8. District heating plants	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.08	0.00
9.9. Gas supply	33.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	28.71	1.76
10. Losses in transport and distribution																
11. Statistical differences (7-8+1.2-9-10-13.1)	2.17	1.64	-1.11	0.94	1.04	-9.18	4.17	-0.92	-5.19	-8.82	12.65	3.76	0.00	0.00	3.18	0.00
	2.17	1.64	-1.11	0.94	1.04	-9.18	4.17	-0.92	-5.19	-8.82	12.65	3.76	0.00	0.00	3.18	0.00
13.1 Net domestic consumption including non-energy use	740.57	20.75	12.26	13.92	35.26	0.00	74.28	18.71	131.90	11.98	39.03	0.00	15.53	0.00	362.93	4.03
13. Net domestic consumption	690.28	18.52	12.26	0.33	35.26	0.00	74.27	18.50	131.78	11.37	5.51	0.00	15.53	0.00	362.93	4.03
14. Manufacturing, mining and quarrying	255.33	18.33	12.21	0.33	14.65	0.00	0.00	0.05	13.73	10.67	5.30	0.00	15.46	0.00	163.75	0.85
14.1. Mining and quarrying	4.21	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.94	0.76	0.01	0.00	0.00	0.00	2.48	0.00
14.2. Manufacture of paper and paper products	38.53	0.21	0.00	0.00	9.78	0.00	0.00	0.00	0.14	2.95	0.01	0.00	0.00	0.00	25.44	0.00
14.3. Manufacture of industrial chemicals	46.92	4.49	1.74	0.00	0.00	0.00	0.00	0.00	0.62	1.55	2.65	0.00	14.39	0.00	21.03	0.47
14.4. Manufacture of iron, steel and ferro alloys	40.98	8.56	9.90	0.00	0.00	0.00	0.00	0.00	0.20	0.44	0.00	0.00	0.34	0.00	21.53	0.00
14.5. Manufacture of aluminium and other non-ferrous metals	64.19	0.00	0.31	0.00	0.00	0.00	0.00	0.00	1.52	0.82	0.36	0.00	0.73	0.00	60.45	0.00
14.6. Other manufacturing industries	60.50	5.08	0.26	0.33	4.87	0.00	0.00	0.03	10.31	4.16	2.27	0.00	0.00	0.00	32.81	0.38
15. Transport	159.82	0.00	0.00	0.00	0.00	0.00	73.32	9.68	74.08	0.52	0.00	0.00	0.00	0.00	2.21	0.00
15.1. Railw ays and subw ays	3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.00	0.00	0.00	0.00	0.00	2.21	0.00
15.2. Air transport	9.79	0.00	0.00	0.00	0.00	0.00	0.11	9.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	114.93	0.00	0.00	0.00	0.00	0.00	71.49	0.00	43.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.4. Coastal shipping	31.43	0.00	0.00	0.00	0.00	0.00	1.72	0.00	29.18	0.52	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	275.14	0.19	0.04	0.00	20.61	0.00	0.95	8.77	43.97	0.17	0.21	0.00	0.07	0.00	196.98	3.18
16.1. Fishing	16.18	0.00	0.00	0.00	0.00	0.00	0.16	0.01	15.73	0.04	0.00	0.00	0.00	0.00	0.24	0.00
16.2. Agriculture	12.51	0.06	0.00	0.00	0.00	0.00	0.06	0.04	6.88	0.06	0.00	0.00	0.00	0.00	5.41	0.00
16.3. Households	153.27	0.12	0.04	0.00	20.61	0.00	0.72	6.12	6.42	0.02	0.14	0.00	0.00	0.00	118.03	1.04
16.4. Other consumers	88.35	0.00	0.00	0.00	0.00	0.00	0.00	2.57	11.55	0.05	0.07	0.00	0.07	0.00	71.90	2.14
16.5 Construction	4.83	0.00	0.00	0.00	0.00	0.00	0.01	0.02	3.40	0.00	0.00	0.00	0.00	0.00	1.40	0.00
12. Consumption for non-energy purposes	50.29	2.23	0.00	13.59	0.00	0.00	0.01	0.21	0.11	0.61	33.53	0.00	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	37.60	0.00	0.00	4.07	0.00	0.00	0.00	0.00	0.00	0.00	33.53	0.00	0.00	0.00	0.00	0.00
12.2 Other manufacturing	12.69	2.23	0.00	9.53	0.00	0.00	0.01	0.21	0.11	0.61	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**1994**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	7017.97	8.46	0.00	0.00	43.25	5250.83	88.94	0.00	0.00	0.00	105.42	1115.40	0.00	405.67	0.00	0.00
1.1.2 Production of natural gas that is flared off	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00	0.00
2. Imports	249.43	22.35	15.44	11.80	0.09	44.62	25.72	6.06	21.33	39.38	45.25	0.00	0.00	0.00	17.41	0.00
3. Exports	6286.92	5.02	0.00	4.37	0.00	4709.50	177.55	17.80	179.69	52.93	102.42	1019.75	0.00	0.00	17.88	0.00
4.1 Bunkering	24.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.73	13.41	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	8.44	0.00	0.00	0.00	0.00	0.00	0.00	8.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-19.01	-0.12	0.23	-0.38	0.00	-10.76	3.33	0.01	-10.40	-1.20	0.29	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	943.20	25.67	15.67	7.06	43.34	575.18	-59.56	-20.17	-179.49	-28.16	48.53	109.95	0.00	405.67	-0.48	0.00
8. Energy converted	1048.31	0.80	1.60	0.00	5.83	593.15	6.41	2.55	2.05	28.55	0.56	0.00	0.12	405.67	1.02	0.00
8.1. In blast furnaces	1.60	0.00	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	633.22	0.00	0.00	0.00	0.00	593.15	6.41	2.55	2.00	28.55	0.56	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.25	0.00	0.00	0.00	1.20	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	2.96	0.80	0.00	0.00	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	3.62	0.00	0.00	0.00	2.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	1.02	0.00
8.6. In hydropow er plants	405.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	405.67	0.00	0.00
8.7. Other conversion																
1.2. Production of derived energy bearers	1077.42	0.00	0.00	7.15	0.00	0.00	182.08	50.44	294.30	70.23	14.28	0.00	45.58	0.00	407.57	5.80
9. Consumption by energy sector	170.05	0.00	0.00	0.00	0.00	0.00	0.13	0.00	5.29	0.09	0.80	123.95	28.74	0.00	11.04	0.00
9.1.1 Crude petroleum and natural gas production	115.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98	0.06	0.00	109.66	0.00	0.00	1.01	0.00
9.1.2 Natural gas w hich is flared off on oil fields	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00	0.00
9.2. Coal mines	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.08	0.00
9.3. Petroleum refineries	31.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.80	0.00	28.74	0.00	1.86	0.00
9.4. Pumping storage pow er plants	5.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.31	0.00
9.5. Hydro electric pow er plants	2.97	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.16	0.01	0.00	0.00	0.00	0.00	2.68	0.00
9.6. Thermal pow er plants	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
9.7. Combined heat and pow er plants	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00
9.8. District heating plants	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
9.9. Gas supply	32.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.90	0.00	28.36	1.58
10. Losses in transport and distribution																
11. Statistical differences (7-8+1.2-9-10-13.1)	9.33	0.92	0.80	-1.11	0.00	-17.96	41.86	5.12	-23.64	-4.14	21.28	-14.12	0.00	0.00	0.18	0.15
	9.33	0.92	0.80	-1.11	0.00	-17.96	41.86	5.12	-23.64	-4.14	21.28	-14.12	0.00	0.00	0.18	0.15
13.1 Net domestic consumption including non-energy use	760.09	23.95	13.27	15.31	37.51	0.00	74.11	22.60	131.11	17.56	40.17	0.12	13.82	0.00	366.49	4.07
13. Net domestic consumption	708.17	21.57	13.27	0.17	37.51	0.00	74.10	22.39	131.01	17.03	6.62	0.12	13.82	0.00	366.49	4.07
14. Manufacturing, mining and quarrying	268.39	21.39	13.23	0.17	15.50	0.00	0.00	0.05	15.64	16.40	6.39	0.11	13.74	0.00	164.48	1.27
14.1. Mining and quarrying	4.39	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.19	0.81	0.01	0.00	0.00	0.00	2.36	0.00
14.2. Manufacture of paper and paper products	41.62	0.32	0.00	0.00	10.53	0.00	0.00	0.00	0.29	7.45	0.08	0.00	0.00	0.00	22.95	0.00
14.3. Manufacture of industrial chemicals	46.69	5.01	1.55	0.00	0.00	0.00	0.00	0.00	0.75	2.48	3.06	0.01	12.67	0.00	20.83	0.32
14.4. Manufacture of iron, steel and ferro alloys	47.03	10.46	11.09	0.00	0.00	0.00	0.00	0.00	0.21	0.33	0.00	0.00	0.49	0.00	24.45	0.00
14.5. Manufacture of aluminium and other non-ferrous metals	65.41	0.00	0.29	0.00	0.00	0.00	0.00	0.01	1.56	0.90	0.36	0.10	0.58	0.00	61.61	0.00
14.6. Other manufacturing industries	63.25	5.60	0.30	0.17	4.98	0.00	0.00	0.02	11.64	4.42	2.88	0.00	0.00	0.00	32.28	0.95
15. Transport	156.22	0.00	0.00	0.00	0.00	0.00	73.16	10.84	69.68	0.36	0.00	0.00	0.00	0.00	2.18	0.00
15.1. Railw ays and subw ays	3.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.56	0.00	0.00	0.00	0.00	0.00	2.18	0.00
15.2. Air transport	10.95	0.00	0.00	0.00	0.00	0.00	0.11	10.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	111.89	0.00	0.00	0.00	0.00	0.00	71.33	0.00	40.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.4. Coastal shipping	29.64	0.00	0.00	0.00	0.00	0.00	1.72	0.00	27.56	0.36	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	283.56	0.18	0.04	0.00	22.00	0.00	0.94	11.50	45.68	0.27	0.22	0.00	0.07	0.00	199.84	2.80
16.1. Fishing	16.99	0.00	0.00	0.00	0.00	0.00	0.16	0.01	16.52	0.04	0.00	0.00	0.00	0.00	0.26	0.00
16.2. Agriculture	12.52	0.05	0.00	0.00	0.00	0.00	0.05	0.05	6.77	0.06	0.00	0.00	0.00	0.00	5.54	0.01
16.3. Households	158.72	0.12	0.04	0.00	22.00	0.00	0.72	6.63	5.67	0.01	0.14	0.00	0.00	0.00	122.45	0.94
16.4. Other consumers	89.67	0.00	0.00	0.00	0.00	0.00	0.00	4.79	12.68	0.16	0.09	0.00	0.07	0.00	70.02	1.86
16.5 Construction	5.67	0.00	0.00	0.00	0.00	0.00	0.01	0.03	4.05	0.00	0.00	0.00	0.00	0.00	1.57	0.00
12. Consumption for non-energy purposes	51.92	2.38	0.00	15.14	0.00	0.00	0.01	0.20	0.10	0.53	33.56	0.00	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	38.10	0.00	0.00	4.54	0.00	0.00	0.00	0.00	0.00	0.00	33.56	0.00	0.00	0.00	0.00	0.00
12.2 Other manufacturing	13.82	2.38	0.00	10.60	0.00	0.00	0.01	0.20	0.10	0.53	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**1995**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	7524.60	8.21	0.00	0.00	43.92	5635.74	113.55	0.00	0.00	0.00	125.71	1156.48	0.00	440.99	0.00	0.00
1.1.2 Production of natural gas that is flared off	15.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.85	0.00	0.00	0.00	0.00
2. Imports	260.12	26.13	14.87	14.23	0.09	59.50	34.68	4.01	28.20	27.47	42.66	0.00	0.00	0.00	8.28	0.00
3. Exports	6767.68	5.07	0.00	4.47	0.00	5154.68	183.68	14.16	154.11	53.05	127.92	1038.28	0.00	0.00	32.26	0.00
4.1 Bunkering	29.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.88	15.67	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	8.01	0.00	0.00	0.00	0.00	0.00	0.00	8.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-2.97	-0.67	-0.62	0.68	0.00	-9.65	-1.86	8.32	7.02	1.50	-7.70	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	992.36	28.60	14.25	10.43	44.00	530.91	-37.30	-9.84	-132.76	-39.75	32.76	134.05	0.00	440.99	-23.98	0.00
8. Energy converted	1034.59	0.83	1.54	0.16	6.22	541.86	8.66	3.01	9.10	20.18	0.54	0.00	0.11	440.99	1.38	0.00
8.1. In blast furnaces	1.54	0.00	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	583.19	0.00	0.00	0.16	0.00	541.86	8.66	3.01	8.79	20.18	0.54	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.35	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	3.17	0.83	0.00	0.00	2.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	4.35	0.00	0.00	0.00	2.58	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.11	0.00	1.38	0.00
8.6. In hydropow er plants	440.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	440.99	0.00	0.00
8.7. Other conversion																
1.2. Production of derived energy bearers	1051.76	0.00	0.00	5.80	0.00	0.00	160.79	45.65	266.67	71.91	13.58	0.00	38.57	0.00	442.84	5.95
9. Consumption by energy sector	167.43	0.00	0.00	0.00	0.00	0.00	0.14	0.00	5.35	0.09	0.00	126.70	25.11	0.00	10.03	0.00
9.1.1 Crude petroleum and natural gas production	117.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.06	0.06	0.00	110.85	0.00	0.00	1.06	0.00
9.1.2 Natural gas w hich is flared off on oil fields	15.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.85	0.00	0.00	0.00	0.00
9.2. Coal mines	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.09	0.00
9.3. Petroleum refineries	26.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	25.11	0.00	1.76	0.00
9.4. Pumping storage pow er plants	4.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.92	0.00
9.5. Hydro electric pow er plants	2.35	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.11	0.00	0.00	0.00	0.00	0.00	2.11	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.8. District heating plants	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00
9.9. Gas supply	30.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.54	0.00	26.15	1.54
10. Losses in transport and distribution																
11. Statistical differences (7-8+1.2-9-10-13.1)	40.42	1.20	-1.35	0.21	0.00	-10.95	41.56	10.06	-15.83	-2.60	3.83	6.56	0.00	0.00	7.74	0.00
	40.42	1.20	-1.35	0.21	0.00	-10.95	41.56	10.06	-15.83	-2.60	3.83	6.56	0.00	0.00	7.74	0.00
13.1 Net domestic consumption including non-energy use	771.44	26.57	14.06	15.86	37.78	0.00	73.13	22.75	135.29	14.48	41.97	0.79	10.80	0.00	373.56	4.41
13. Net domestic consumption	718.45	23.48	14.06	0.31	37.78	0.00	73.12	22.51	135.18	13.91	8.55	0.79	10.80	0.00	373.56	4.41
14. Manufacturing, mining and quarrying	272.79	23.34	14.02	0.31	16.22	0.00	0.00	0.06	14.86	13.30	7.76	0.78	10.67	0.00	170.01	1.45
14.1. Mining and quarrying	3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.31	0.53	0.01	0.00	0.00	0.00	1.81	0.00
14.2. Manufacture of paper and paper products	42.85	0.29	0.00	0.00	11.13	0.00	0.00	0.00	0.33	6.14	0.15	0.00	0.00	0.00	24.81	0.00
14.3. Manufacture of industrial chemicals	45.09	5.18	1.66	0.00	0.00	0.00	0.00	0.00	0.82	1.70	3.87	0.17	9.52	0.00	21.89	0.29
14.4. Manufacture of iron, steel and ferro alloys	50.90	12.25	11.61	0.00	0.00	0.00	0.00	0.00	0.11	0.18	0.00	0.00	0.63	0.00	26.10	0.00
14.5. Manufacture of aluminium and other non-ferrous metals	65.96	0.00	0.36	0.00	0.00	0.00	0.00	0.01	1.44	0.87	0.32	0.54	0.52	0.00	61.90	0.00
14.6. Other manufacturing industries	64.31	5.62	0.38	0.31	5.10	0.00	0.00	0.03	10.85	3.88	3.42	0.07	0.00	0.00	33.49	1.16
15. Transport	161.06	0.00	0.00	0.00	0.00	0.00	72.17	11.67	74.40	0.51	0.00	0.00	0.00	0.00	2.31	0.00
15.1. Railw ays and subw ays	3.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	0.00	0.00	0.00	0.00	0.00	2.31	0.00
15.2. Air transport	11.77	0.00	0.00	0.00	0.00	0.00	0.10	11.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	114.93	0.00	0.00	0.00	0.00	0.00	70.35	0.00	44.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.4. Coastal shipping	30.57	0.00	0.00	0.00	0.00	0.00	1.72	0.00	28.34	0.51	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	284.60	0.14	0.04	0.00	21.56	0.00	0.95	10.78	45.92	0.11	0.78	0.00	0.12	0.00	201.24	2.96
16.1. Fishing	17.28	0.00	0.00	0.00	0.00	0.00	0.16	0.01	16.76	0.03	0.00	0.00	0.00	0.00	0.32	0.00
16.2. Agriculture	11.70	0.02	0.00	0.00	0.00	0.00	0.05	0.05	6.66	0.04	0.00	0.00	0.00	0.00	4.85	0.02
16.3. Households	160.69	0.12	0.04	0.00	21.44	0.00	0.72	6.39	6.13	0.01	0.14	0.00	0.00	0.00	124.66	1.04
16.4. Other consumers	88.52	0.00	0.00	0.00	0.00	0.00	0.00	4.29	12.27	0.02	0.10	0.00	0.12	0.00	69.81	1.89
16.5 Construction	6.42	0.00	0.00	0.00	0.11	0.00	0.01	0.05	4.10	0.00	0.54	0.00	0.00	0.00	1.61	0.00
12. Consumption for non-energy purposes	52.99	3.09	0.00	15.55	0.00	0.00	0.01	0.24	0.11	0.57	33.42	0.00	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	37.96	0.00	0.00	4.54	0.00	0.00	0.00	0.00	0.00	0.00	33.42	0.00	0.00	0.00	0.00	0.00
12.2 Other manufacturing	15.03	3.09	0.00	11.01	0.00	0.00	0.01	0.24	0.11	0.57	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**1996**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8534.00	6.45	0.00	0.00	45.20	6322.88	133.69	0.00	0.00	0.00	137.42	1513.39	0.00	374.97	0.00	0.00
1.1.2 Production of natural gas that is flared off	18.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.16	0.00	0.00	0.00	0.00
2. Imports	290.86	23.38	17.01	12.96	0.09	56.38	21.41	5.49	25.93	40.18	40.47	0.00	0.00	0.00	47.56	0.00
3. Exports	7814.24	4.39	0.27	4.51	0.00	5786.63	221.79	19.24	151.78	59.93	137.66	1412.78	0.00	0.00	15.25	0.00
4.1 Bunkering	32.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.90	17.56	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	9.46	0.00	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-35.91	0.80	-0.92	-0.86	0.00	-27.19	-1.75	-7.59	-7.43	-0.60	9.62	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	950.94	26.25	15.82	7.60	45.29	565.43	-68.44	-30.80	-148.17	-37.92	49.85	118.76	0.00	374.97	32.31	0.00
8. Energy converted	1033.65	0.78	1.50	0.00	6.06	601.25	5.07	3.79	11.95	26.51	1.18	0.00	0.05	374.97	0.53	0.00
8.1. In blast furnaces	1.50	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	648.01	0.00	0.00	0.00	0.00	601.25	5.07	3.79	10.21	26.51	1.18	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.27	0.00	0.00	0.00	1.21	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	2.94	0.78	0.00	0.00	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	4.96	0.00	0.00	0.00	2.70	0.00	0.00	0.00	1.68	0.00	0.00	0.00	0.05	0.00	0.53	0.00
8.6. In hydropow er plants	374.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	374.97	0.00	0.00
8.7. Other conversion																
1.2. Production of derived energy bearers	1060.75	0.00	0.00	7.33	0.00	0.00	176.81	58.98	298.41	76.87	15.27	0.00	43.85	0.00	376.96	6.28
9. Consumption by energy sector	178.80	0.00	0.00	0.00	0.00	0.00	0.10	0.01	5.92	0.04	0.00	135.97	29.04	0.00	7.72	0.00
9.1.1 Crude petroleum and natural gas production	125.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.69	0.00	0.00	117.81	0.00	0.00	2.16	0.00
9.1.2 Natural gas w hich is flared off on oil fields	18.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.16	0.00	0.00	0.00	0.00
9.2. Coal mines	0.17	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.07	0.00
9.3. Petroleum refineries	30.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.00	29.04	0.00	1.80	0.00
9.4. Pumping storage pow er plants	1.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.47	0.00
9.5. Hydro electric pow er plants	2.36	0.00	0.00	0.00	0.00	0.00	0.09	0.01	0.13	0.00	0.00	0.00	0.00	0.00	2.14	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.8. District heating plants	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00
9.9. Gas supply																
10. Losses in transport and distribution	30.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.98	0.00	26.48	1.46
11. Statistical differences (7-8+1.2-9-10-13.1)	-27.86	-0.63	0.01	-0.67	0.00	-35.82	28.95	0.02	-20.21	-6.26	21.82	-18.29	0.00	0.00	3.22	0.00
	-27.86	-0.63	0.01	-0.67	0.00	-35.82	28.95	0.02	-20.21	-6.26	21.82	-18.29	0.00	0.00	3.22	0.00
13.1 Net domestic consumption including non-energy use	796.19	26.10	14.32	15.60	39.23	0.00	74.25	24.36	152.57	18.66	42.11	1.08	11.78	0.00	371.32	4.82
13. Net domestic consumption	743.28	23.48	14.32	0.24	39.23	0.00	74.24	24.13	152.45	18.04	8.17	1.08	11.78	0.00	371.32	4.82
14. Manufacturing, mining and quarrying	268.79	23.38	14.27	0.24	16.27	0.00	0.00	0.10	17.56	17.38	7.34	1.08	11.63	0.00	158.37	1.17
14.1. Mining and quarrying	3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.96	0.59	0.00	0.00	0.00	0.00	2.03	0.00
14.2. Manufacture of paper and paper products	44.65	0.34	0.00	0.00	10.51	0.00	0.00	0.00	0.83	8.71	0.27	0.00	0.00	0.00	23.97	0.00
14.3. Manufacture of industrial chemicals	46.60	5.19	1.63	0.00	0.01	0.00	0.00	0.00	1.02	2.09	3.99	0.16	10.56	0.00	21.68	0.28
14.4. Manufacture of iron, steel and ferro alloys	49.69	12.31	11.92	0.00	0.00	0.00	0.00	0.00	0.25	0.34	0.00	0.00	0.40	0.00	24.46	0.00
14.5. Manufacture of aluminium and other non-ferrous metals	61.12	0.00	0.31	0.01	0.00	0.00	0.00	0.01	1.32	0.95	0.53	0.68	0.60	0.00	56.70	0.00
14.6. Other manufacturing industries	63.14	5.54	0.42	0.23	5.75	0.00	0.00	0.08	13.18	4.69	2.53	0.23	0.08	0.00	29.52	0.88
15. Transport	168.99	0.00	0.00	0.00	0.00	0.00	73.30	12.97	80.05	0.44	0.00	0.00	0.00	0.00	2.23	0.00
15.1. Railw ays and subw ays	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	0.00	0.00	0.00	0.00	0.00	2.23	0.00
15.2. Air transport	13.08	0.00	0.00	0.00	0.00	0.00	0.10	12.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	121.11	0.00	0.00	0.00	0.00	0.00	71.47	0.00	49.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.4. Coastal shipping	31.50	0.00	0.00	0.00	0.00	0.00	1.72	0.00	29.34	0.44	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	305.49	0.10	0.04	0.00	22.96	0.00	0.94	11.05	54.84	0.22	0.82	0.00	0.14	0.00	210.72	3.65
16.1. Fishing	19.25	0.00	0.00	0.00	0.00	0.00	0.16	0.01	18.66	0.10	0.00	0.00	0.00	0.00	0.32	0.00
16.2. Agriculture	11.63	0.01	0.00	0.00	0.00	0.00	0.04	0.06	7.20	0.11	0.00	0.00	0.00	0.00	4.17	0.03
16.3. Households	167.86	0.08	0.04	0.00	22.84	0.00	0.72	7.54	8.29	0.00	0.16	0.00	0.00	0.00	127.04	1.15
16.4. Other consumers	99.30	0.00	0.00	0.00	0.00	0.00	0.00	3.39	16.51	0.01	0.11	0.00	0.14	0.00	76.66	2.46
16.5 Construction	7.45	0.00	0.00	0.00	0.12	0.00	0.01	0.05	4.18	0.00	0.56	0.00	0.00	0.00	2.53	0.00
12. Consumption for non-energy purposes	52.91	2.62	0.00	15.36	0.00	0.00	0.01	0.24	0.12	0.62	33.95	0.00	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	38.76	0.00	0.00	4.82	0.00	0.00	0.00	0.00	0.00	0.00	33.95	0.00	0.00	0.00	0.00	0.00
12.2 Other manufacturing	14.15	2.62	0.00	10.54	0.00	0.00	0.01	0.23	0.12	0.62	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**1997**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8811.32	10.86	0.00	0.00	47.55	6329.40	186.79	0.00	0.00	0.00	138.23	1699.12	0.00	399.38	0.00	0.00
1.1.2 Production of natural gas that is flared off	16.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.26	0.00	0.00	0.00	0.00
2. Imports	299.09	24.19	14.33	12.84	0.12	65.97	28.16	5.58	23.09	51.88	41.64	0.00	0.00	0.00	31.29	0.00
3. Exports	8059.25	5.16	0.12	3.22	0.00	5818.29	279.53	13.16	158.64	66.45	144.41	1552.73	0.00	0.00	17.55	0.00
4.1 Bunkering	39.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.94	19.48	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	10.55	0.00	0.00	0.00	0.00	0.00	0.00	10.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	0.91	-1.88	0.90	-0.34	0.00	13.99	0.52	-3.48	-5.31	-0.22	-3.26	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1018.36	28.01	15.11	9.28	47.67	591.09	-64.07	-21.61	-160.81	-34.27	32.19	162.65	0.00	399.38	13.75	0.00
8. Energy converted	1064.89	0.69	1.75	0.00	6.05	596.94	1.37	3.43	10.83	43.07	0.78	0.00	0.01	399.38	0.60	0.00
8.1. In blast furnaces	1.75	0.00	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	655.29	0.00	0.00	0.00	0.00	596.94	1.37	3.43	9.71	43.07	0.78	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.02	0.00	0.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	2.83	0.69	0.00	0.00	2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants																
8.6. In hydropow er plants	4.62	0.00	0.00	0.00	2.90	0.00	0.00	0.00	1.11	0.00	0.00	0.00	0.01	0.00	0.60	0.00
8.7. Other conversion	399.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	399.38	0.00	0.00
1.2. Production of derived energy bearers	1086.58	0.00	0.00	6.89	0.00	0.00	177.25	45.75	309.45	76.77	16.51	0.00	46.42	0.00	401.11	6.43
9. Consumption by energy sector	188.37	0.00	0.00	0.00	0.00	0.00	0.09	0.00	6.65	0.04	0.00	138.03	30.17	0.00	13.38	0.00
9.1.1 Crude petroleum and natural gas production	131.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	0.00	0.00	121.77	0.00	0.00	3.34	0.00
9.1.2 Natural gas w hich is flared off on oil fields	16.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.26	0.00	0.00	0.00	0.00
9.2. Coal mines	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.04	0.00
9.3. Petroleum refineries	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	30.17	0.00	1.78	0.00
9.4. Pumping storage pow er plants	5.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.98	0.00
9.5. Hydro electric pow er plants	2.35	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.10	0.00	0.00	0.00	0.00	0.00	2.16	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.8. District heating plants	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00
9.9. Gas supply																
10. Losses in transport and distribution	31.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	3.04	0.00	26.83	1.67
11. Statistical differences (7-8+1.2-9-10-13.1)	10.87	1.47	-0.90	0.25	0.00	-5.86	38.66	-3.38	-17.46	-17.69	4.47	11.28	0.01	0.00	0.02	0.00
	10.87	1.47	-0.90	0.25	0.00	-5.86	38.66	-3.38	-17.46	-17.69	4.47	11.28	0.01	0.00	0.02	0.00
13.1 Net domestic consumption including non-energy use	809.01	25.85	14.26	15.92	41.62	0.00	73.06	24.09	148.62	17.08	43.46	13.08	13.18	0.00	374.03	4.76
13. Net domestic consumption	745.13	22.92	14.26	0.24	41.62	0.00	73.05	23.80	148.49	16.43	7.45	4.90	13.18	0.00	374.03	4.76
14. Manufacturing, mining and quarrying	273.45	22.80	14.22	0.24	17.71	0.00	0.00	0.07	14.76	15.55	6.52	4.89	13.08	0.00	162.69	0.92
14.1. Mining and quarrying	2.92	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.90	0.24	0.00	0.00	0.00	0.00	1.75	0.00
14.2. Manufacture of paper and paper products	42.15	0.26	0.00	0.00	11.39	0.00	0.00	0.00	0.26	6.77	0.11	0.00	0.00	0.00	23.36	0.00
14.3. Manufacture of industrial chemicals	51.20	5.01	1.65	0.00	0.01	0.00	0.00	0.00	0.58	3.29	2.96	3.87	11.66	0.00	21.85	0.31
14.4. Manufacture of iron, steel and ferro alloys	48.47	11.47	11.84	0.00	0.00	0.00	0.00	0.00	0.20	0.18	0.01	0.00	0.64	0.00	24.13	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	65.80	0.00	0.34	0.01	0.00	0.00	0.00	0.01	1.11	0.58	0.96	0.64	0.64	0.00	61.48	0.02
14.6. Other manufacturing industries	62.90	6.06	0.39	0.23	6.31	0.00	0.00	0.04	11.71	4.49	2.47	0.38	0.14	0.00	30.11	0.58
15. Transport	171.91	0.00	0.00	0.00	0.00	0.00	72.10	13.33	83.52	0.76	0.00	0.01	0.00	0.00	2.20	0.00
15.1. Railw ays and subw ays	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	0.00	0.00	0.00	0.00	0.00	2.20	0.00
15.2. Air transport	13.44	0.00	0.00	0.00	0.00	0.00	0.10	13.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	120.61	0.00	0.00	0.00	0.00	0.00	70.27	0.00	50.33	0.00	0.00	0.01	0.00	0.00	0.00	0.00
15.4. Coastal shipping	34.55	0.00	0.00	0.00	0.00	0.00	1.72	0.00	32.07	0.76	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	299.76	0.12	0.04	0.00	23.91	0.00	0.95	10.40	50.22	0.12	0.93	0.01	0.10	0.00	209.14	3.84
16.1. Fishing	20.29	0.00	0.00	0.00	0.00	0.00	0.18	0.01	19.67	0.02	0.00	0.00	0.00	0.00	0.41	0.00
16.2. Agriculture	10.46	0.02	0.00	0.00	0.00	0.00	0.04	0.05	6.29	0.09	0.00	0.00	0.00	0.00	3.91	0.06
16.3. Households	161.31	0.10	0.04	0.00	23.78	0.00	0.72	6.86	6.30	0.00	0.20	0.00	0.00	0.00	122.32	0.99
16.4. Other consumers	100.09	0.00	0.00	0.00	0.00	0.00	0.00	3.45	13.39	0.01	0.11	0.01	0.10	0.00	80.24	2.78
16.5 Construction	7.62	0.00	0.00	0.00	0.13	0.00	0.01	0.04	4.58	0.00	0.61	0.00	0.00	0.00	2.25	0.00
12. Consumption for non-energy purposes	63.88	2.93	0.00	15.68	0.00	0.00	0.01	0.29	0.13	0.65	36.01	8.18	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	48.78	0.00	0.00	4.59	0.00	0.00	0.00	0.00	0.00	0.00	36.01	8.18	0.00	0.00	0.00	0.00
12.2 Other manufacturing	15.10	2.93	0.00	11.09	0.00	0.00	0.01	0.29	0.13	0.65	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**1998**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8561.89	9.22	0.00	0.00	44.44	6052.69	175.08	0.00	0.00	0.00	135.59	1726.22	0.00	418.65	0.00	0.00
1.1.2 Production of natural gas that is flared off	16.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.85	0.00	0.00	0.00	0.00
2. Imports	282.24	27.18	16.43	13.04	0.25	81.29	21.47	10.57	21.17	40.10	21.77	0.00	0.00	0.00	28.97	0.00
3. Exports	7742.44	8.19	0.30	3.01	0.00	5552.66	269.09	9.65	162.04	57.97	108.49	1555.15	0.00	0.00	15.88	0.00
4.1 Bunkering	37.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	17.00	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	11.24	0.00	0.00	0.00	0.00	0.00	0.00	11.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	25.81	0.52	-0.04	-0.40	0.00	23.20	0.88	1.27	-0.06	1.99	-1.57	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1095.37	28.74	16.10	9.63	44.69	604.53	-71.66	-9.05	-161.67	-32.88	47.29	187.92	0.00	418.65	13.08	0.00
8. Energy converted	1070.82	0.69	2.12	0.00	6.40	598.24	2.28	1.68	5.63	33.35	1.10	0.04	0.03	418.65	0.62	0.00
8.1. In blast furnaces	2.12	0.00	2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	640.84	0.00	0.00	0.00	0.00	598.24	2.28	1.68	4.20	33.34	1.10	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.13	0.00	0.00	0.00	1.12	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	2.97	0.69	0.00	0.00	2.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	5.11	0.00	0.00	0.00	2.99	0.00	0.00	0.00	1.43	0.00	0.00	0.04	0.03	0.00	0.62	0.00
8.6. In hydropow er plants	418.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	418.65	0.00	0.00
8.7. Other conversion																
1.2. Production of derived energy bearers	1078.58	0.00	0.00	6.58	0.00	0.00	173.59	35.93	302.96	71.28	15.12	0.00	45.27	0.00	421.21	6.64
9. Consumption by energy sector	179.38	0.00	0.00	0.00	0.00	0.00	0.08	0.00	6.51	0.08	0.88	132.26	28.62	0.00	10.95	0.00
9.1.1 Crude petroleum and natural gas production	125.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.23	0.00	0.00	115.41	0.00	0.00	3.53	0.00
9.1.2 Natural gas w hich is flared off on oil fields	16.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.85	0.00	0.00	0.00	0.00
9.2. Coal mines	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.04	0.00
9.3. Petroleum refineries	31.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.88	0.00	28.62	0.00	1.86	0.00
9.4. Pumping storage pow er plants	2.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.97	0.00
9.5. Hydro electric pow er plants	2.63	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.04	0.00	0.00	0.00	0.00	2.44	0.00
9.6. Thermal pow er plants	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
9.7. Combined heat and pow er plants	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.8. District heating plants	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.06	0.00
9.9. Gas supply																
10. Losses in transport and distribution	33.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	3.48	0.00	27.95	1.55
11. Statistical differences (7-8+1.2-9-10-13.1)	51.20	-0.52	-0.96	2.07	0.00	6.29	25.70	2.19	-24.69	-12.49	19.86	33.75	0.00	0.00	0.00	0.00
	51.20	-0.52	-0.96	2.07	0.00	6.29	25.70	2.19	-24.69	-12.49	19.86	33.75	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	838.76	28.57	14.93	14.15	38.29	0.00	73.88	23.01	153.83	17.47	40.57	21.06	13.15	0.00	394.77	5.09
13. Net domestic consumption	771.17	24.53	14.93	0.27	38.29	0.00	73.86	22.73	153.70	16.82	7.23	5.80	13.15	0.00	394.77	5.09
14. Manufacturing, mining and quarrying	288.47	24.42	14.89	0.27	15.46	0.00	0.00	0.04	16.26	15.87	6.17	5.77	13.00	0.00	175.47	0.85
14.1. Mining and quarrying	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.26	0.19	0.00	0.00	0.00	0.00	1.84	0.00
14.2. Manufacture of paper and paper products	40.85	0.15	0.00	0.00	10.90	0.00	0.00	0.00	0.27	6.54	0.21	0.00	0.00	0.00	22.78	0.00
14.3. Manufacture of industrial chemicals	54.12	5.79	1.45	0.00	0.12	0.00	0.00	0.00	0.45	3.35	2.40	4.70	11.43	0.00	24.14	0.29
14.4. Manufacture of iron, steel and ferro alloys	54.35	12.82	12.55	0.00	0.00	0.00	0.00	0.00	0.29	0.09	0.01	0.00	0.75	0.00	27.82	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	72.02	0.00	0.44	0.00	0.00	0.00	0.00	0.01	1.25	0.54	0.84	0.55	0.67	0.00	67.71	0.02
14.6. Other manufacturing industries	63.82	5.65	0.44	0.27	4.44	0.00	0.00	0.03	12.74	5.15	2.71	0.51	0.16	0.00	31.19	0.53
15. Transport	175.33	0.00	0.00	0.00	0.00	0.00	72.92	13.66	85.71	0.73	0.00	0.01	0.00	0.00	2.30	0.00
15.1. Railw ays and subw ays	3.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.00	0.00	0.00	2.30	0.00
15.2. Air transport	13.76	0.00	0.00	0.00	0.00	0.00	0.10	13.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	120.79	0.00	0.00	0.00	0.00	0.00	71.10	0.00	49.68	0.00	0.00	0.01	0.00	0.00	0.00	0.00
15.4. Coastal shipping	37.59	0.00	0.00	0.00	0.00	0.00	1.72	0.00	35.14	0.73	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	307.37	0.11	0.04	0.00	22.84	0.00	0.94	9.02	51.73	0.22	1.05	0.02	0.15	0.00	217.00	4.24
16.1. Fishing	20.95	0.00	0.00	0.00	0.00	0.00	0.17	0.01	20.28	0.00	0.00	0.00	0.00	0.00	0.49	0.00
16.2. Agriculture	13.70	0.00	0.00	0.00	0.07	0.00	0.03	0.04	6.70	0.16	0.11	0.00	0.00	0.00	6.54	0.04
16.3. Households	164.44	0.11	0.04	0.00	22.63	0.00	0.72	6.27	7.21	0.04	0.17	0.00	0.00	0.00	126.17	1.07
16.4. Other consumers	100.51	0.00	0.00	0.00	0.00	0.00	0.00	2.66	12.66	0.02	0.12	0.02	0.15	0.00	81.75	3.13
16.5 Construction	7.77	0.00	0.00	0.00	0.14	0.00	0.01	0.05	4.88	0.00	0.65	0.00	0.00	0.00	2.05	0.00
12. Consumption for non-energy purposes	67.59	4.04	0.00	13.88	0.00	0.00	0.01	0.28	0.13	0.65	33.34	15.26	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	53.59	0.00	0.00	4.99	0.00	0.00	0.00	0.00	0.00	0.00	33.34	15.26	0.00	0.00	0.00	0.00
12.2 Other manufacturing	14.00	4.04	0.00	8.89	0.00	0.00	0.01	0.28	0.13	0.65	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**1999**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8697.00	11.35	0.00	0.00	46.67	6000.62	181.31	0.00	0.00	0.00	161.76	1856.42	0.00	438.87	0.00	0.00
1.1.2 Production of natural gas that is flared off	24.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.73	0.00	0.00	0.00	0.00
2. Imports	283.76	25.70	14.94	13.70	0.44	88.83	17.82	12.15	16.76	47.21	21.54	0.00	0.00	0.00	24.68	0.00
3. Exports	7794.89	8.08	0.18	1.53	0.00	5435.82	288.52	8.61	150.20	66.51	108.85	1694.99	0.00	0.00	31.59	0.00
4.1 Bunkering	35.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.11	15.21	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	12.88	0.00	0.00	0.00	0.00	0.00	0.00	12.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-0.29	0.53	0.21	0.26	0.00	0.63	-7.63	-1.42	6.57	-1.06	1.62	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1162.11	29.49	14.97	12.43	47.10	654.26	-97.02	-10.77	-146.97	-35.58	76.07	186.16	0.00	438.87	-6.91	0.00
8. Energy converted	1108.39	0.70	1.70	0.00	6.66	606.55	4.63	2.86	2.98	41.82	1.09	0.10	0.04	438.87	0.41	0.00
8.1. In blast furnaces	1.70	0.00	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	658.05	0.00	0.00	0.00	0.00	606.55	4.63	2.86	1.13	41.81	1.09	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.35	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	3.08	0.70	0.00	0.00	2.37	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	5.33	0.00	0.00	0.00	3.03	0.00	0.00	0.00	1.76	0.00	0.00	0.10	0.04	0.00	0.41	0.00
8.6. In hydropow er plants	438.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	438.87	0.00	0.00
8.7. Other conversion																
1.2. Production of derived energy bearers	1131.21	0.00	0.00	7.25	0.00	0.00	183.63	34.36	321.03	74.42	14.82	0.00	46.37	0.00	442.20	7.13
9. Consumption by energy sector	181.23	0.00	0.00	0.00	0.00	0.00	0.06	0.00	6.91	0.07	0.99	130.87	30.13	0.00	12.18	0.02
9.1.1 Crude petroleum and natural gas production	117.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.72	0.00	0.00	106.13	0.00	0.00	4.44	0.00
9.1.2 Natural gas w hich is flared off on oil fields	24.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.73	0.00	0.00	0.00	0.00
9.2. Coal mines	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.02
9.3. Petroleum refineries	33.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.99	0.00	30.13	0.00	1.83	0.00
9.4. Pumping storage pow er plants	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.21	0.00
9.5. Hydro electric pow er plants	3.69	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06	0.02	0.00	0.00	0.00	0.00	3.54	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.8. District heating plants	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.08	0.00
9.9. Gas supply																
10. Losses in transport and distribution	33.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	3.95	0.00	26.84	1.55
11. Statistical differences (7-8+1.2-9-10-13.1)	125.56	1.28	0.01	5.25	0.00	47.71	8.53	-4.83	3.48	-18.45	51.98	30.59	0.00	0.00	0.00	0.00
	125.56	1.28	0.01	5.25	0.00	47.71	8.53	-4.83	3.48	-18.45	51.98	30.59	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	845.11	27.51	13.26	14.43	40.44	0.00	73.39	25.56	160.69	15.40	36.82	23.93	12.25	0.00	395.86	5.56
13. Net domestic consumption	779.55	24.81	13.26	0.43	40.44	0.00	73.38	25.27	160.57	14.78	5.78	7.17	12.25	0.00	395.86	5.56
14. Manufacturing, mining and quarrying	285.03	24.72	13.22	0.43	17.09	0.00	0.00	0.04	14.54	14.17	4.70	7.11	12.05	0.00	176.12	0.84
14.1. Mining and quarrying	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23	0.17	0.00	0.00	0.00	0.00	1.60	0.00
14.2. Manufacture of paper and paper products	41.70	0.00	0.00	0.00	12.13	0.00	0.00	0.00	0.21	5.79	0.18	0.00	0.00	0.00	23.38	0.00
14.3. Manufacture of industrial chemicals	52.37	6.10	1.01	0.00	0.00	0.00	0.00	0.00	0.41	3.48	0.95	6.18	10.79	0.00	23.16	0.28
14.4. Manufacture of iron, steel and ferro alloys	53.34	13.40	11.37	0.00	0.00	0.00	0.00	0.00	0.35	0.02	0.04	0.00	0.62	0.00	27.55	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	72.40	0.06	0.45	0.00	0.00	0.00	0.00	0.00	1.14	0.92	0.80	0.54	0.51	0.00	67.97	0.00
14.6. Other manufacturing industries	62.21	5.15	0.39	0.43	4.96	0.00	0.00	0.04	11.20	3.79	2.73	0.39	0.13	0.00	32.45	0.55
15. Transport	183.79	0.00	0.00	0.00	0.00	0.00	72.44	15.70	93.01	0.50	0.00	0.01	0.00	0.00	2.12	0.00
15.1. Railw ays and subw ays	2.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00	2.12	0.00
15.2. Air transport	15.81	0.00	0.00	0.00	0.00	0.00	0.11	15.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	123.83	0.00	0.00	0.00	0.00	0.00	70.60	0.00	53.21	0.00	0.00	0.01	0.00	0.00	0.00	0.00
15.4. Coastal shipping	41.18	0.00	0.00	0.00	0.00	0.00	1.72	0.00	38.95	0.50	0.00	0.00	0.00	0.00	0.00	0.00
16. Other sectors	310.73	0.09	0.04	0.00	23.35	0.00	0.94	9.54	53.02	0.10	1.08	0.05	0.19	0.00	217.62	4.72
16.1. Fishing	20.78	0.00	0.00	0.00	0.00	0.00	0.17	0.02	20.09	0.00	0.00	0.00	0.00	0.00	0.50	0.00
16.2. Agriculture	13.48	0.00	0.00	0.00	0.07	0.00	0.03	0.05	6.54	0.08	0.12	0.00	0.00	0.00	6.57	0.02
16.3. Households	165.33	0.08	0.04	0.00	23.14	0.00	0.72	6.20	7.63	0.00	0.18	0.00	0.00	0.00	126.17	1.17
16.4. Other consumers	103.41	0.00	0.00	0.00	0.00	0.00	0.00	3.23	13.91	0.02	0.13	0.05	0.19	0.00	82.35	3.53
16.5 Construction	7.73	0.00	0.00	0.00	0.14	0.00	0.01	0.04	4.85	0.00	0.65	0.00	0.00	0.00	2.03	0.00
12. Consumption for non-energy purposes	65.56	2.71	0.00	14.00	0.00	0.00	0.02	0.29	0.13	0.62	31.04	16.76	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	52.01	0.00	0.00	4.21	0.00	0.00	0.00	0.00	0.00	0.00	31.04	16.76	0.00	0.00	0.00	0.00
12.2 Other manufacturing	13.55	2.71	0.00	9.79	0.00	0.00	0.02	0.29	0.13	0.62	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2000**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9321.99	17.76	0.00	0.00	45.76	6481.06	168.54	0.00	0.00	0.00	158.80	1937.72	0.00	512.35	0.00	0.00
1.1.2 Production of natural gas that is flared off	25.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	0.00	0.00	0.00	0.00
2. Imports	235.02	25.84	15.47	13.33	0.21	42.51	19.85	9.01	27.99	52.03	23.48	0.00	0.00	0.00	5.31	0.00
3. Exports	8244.60	16.12	0.07	0.87	0.00	5822.03	270.65	8.90	149.15	62.65	76.06	1764.21	0.00	0.00	73.90	0.00
4.1 Bunkering	34.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.83	14.51	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	12.49	0.00	0.00	0.00	0.00	0.00	0.00	12.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-27.67	0.62	0.53	0.85	0.00	-34.97	0.26	1.90	3.61	2.13	-2.60	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1263.87	28.09	15.94	13.31	45.97	666.57	-82.00	-10.48	-137.38	-23.00	103.62	199.48	0.00	512.35	-68.60	0.00
8. Energy converted	1189.60	0.65	1.88	0.00	6.55	580.25	32.48	1.11	1.09	39.93	11.66	0.10	0.04	512.35	1.51	0.00
8.1. In blast furnaces	1.88	0.00	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	655.58	0.00	0.00	0.00	0.00	580.25	32.48	1.11	0.31	39.91	1.52	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.29	0.00	0.00	0.00	1.17	0.00	0.00	0.00	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	3.04	0.65	0.00	0.00	2.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	5.34	0.00	0.00	0.00	2.99	0.00	0.00	0.00	0.67	0.01	0.01	0.10	0.04	0.00	1.51	0.00
8.6. In hydropow er plants	512.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	512.35	0.00	0.00
8.7. Other conversion	10.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.13	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1190.79	0.00	0.00	7.37	0.00	0.00	192.40	33.56	308.44	66.88	15.09	0.00	44.77	0.00	515.42	6.86
9. Consumption by energy sector	198.59	0.00	0.00	0.00	0.00	0.00	0.07	0.00	6.54	0.33	1.47	150.08	28.81	0.00	11.27	0.02
9.1.1 Crude petroleum and natural gas production	134.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.35	0.00	0.00	124.12	0.00	0.00	4.46	0.00
9.1.2 Natural gas w hich is flared off on oil fields	25.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	0.00	0.00	0.00	0.00
9.2. Coal mines	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.02	0.02
9.3. Petroleum refineries	32.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	1.47	0.00	28.81	0.00	1.84	0.00
9.4. Pumping storage pow er plants	2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.42	0.00
9.5. Hydro electric pow er plants	2.58	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.00	2.43	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.8. District heating plants	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.07	0.00
9.9. Gas supply																
10. Losses in transport and distribution	42.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	3.49	0.00	36.27	1.47
11. Statistical differences (7-8+1.2-9-10-13.1)	201.25	0.30	-0.66	7.02	0.00	86.32	6.69	1.85	19.13	-8.08	65.57	23.12	0.00	0.00	0.00	0.00
	201.25	0.30	-0.66	7.02	0.00	86.32	6.69	1.85	19.13	-8.08	65.57	23.12	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	822.63	27.14	14.72	13.66	39.43	0.00	71.16	20.12	144.29	11.69	40.01	24.83	12.43	0.00	397.78	5.37
13. Net domestic consumption	755.80	24.20	14.72	0.42	39.43	0.00	71.14	19.85	144.17	11.08	7.83	7.38	12.43	0.00	397.78	5.37
14. Manufacturing, mining and quarrying	290.20	24.12	14.69	0.42	15.41	0.00	0.00	0.04	14.29	10.42	6.63	7.26	12.27	0.00	183.85	0.81
14.1. Mining and quarrying	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.20	0.00	0.00	0.00	0.00	1.82	0.00
14.2. Manufacture of paper and paper products	42.04	0.00	0.00	0.00	11.57	0.00	0.00	0.00	0.19	3.97	0.08	0.05	0.00	0.00	26.17	0.00
14.3. Manufacture of industrial chemicals	55.62	6.28	1.04	0.00	0.00	0.00	0.00	0.00	0.63	2.30	2.71	6.06	10.95	0.00	25.39	0.28
14.4. Manufacture of iron, steel and ferro alloys	55.10	13.12	12.77	0.00	0.00	0.00	0.00	0.00	0.49	0.03	0.07	0.00	0.61	0.00	27.99	0.02
14.5. Manufacture of aluminium and other non-ferrous metals	73.96	0.06	0.47	0.00	0.00	0.00	0.00	0.00	1.21	0.88	0.92	0.72	0.58	0.00	69.14	0.00
14.6. Other manufacturing industries	60.17	4.67	0.40	0.42	3.83	0.00	0.00	0.04	10.50	3.05	2.84	0.44	0.14	0.00	33.33	0.51
15. Transport	172.70	0.00	0.00	0.00	0.00	0.00	70.21	14.35	85.22	0.61	0.00	0.07	0.00	0.00	2.25	0.00
15.1. Railw ays and subw ays	2.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.00	0.00	2.25	0.00
15.2. Air transport	14.46	0.00	0.00	0.00	0.00	0.00	0.11	14.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	118.49	0.00	0.00	0.00	0.00	0.00	68.37	0.00	50.09	0.00	0.00	0.02	0.00	0.00	0.00	0.00
15.4. Coastal shipping	36.78	0.00	0.00	0.00	0.00	0.00	1.72	0.00	34.40	0.61	0.00	0.05	0.00	0.00	0.00	0.00
16. Other sectors	292.90	0.08	0.03	0.00	24.02	0.00	0.93	5.46	44.66	0.05	1.21	0.05	0.16	0.00	211.68	4.56
16.1. Fishing	19.38	0.00	0.00	0.00	0.00	0.00	0.17	0.02	18.70	0.00	0.00	0.00	0.00	0.00	0.49	0.00
16.2. Agriculture	13.19	0.01	0.00	0.00	0.07	0.00	0.02	0.03	5.77	0.02	0.13	0.00	0.00	0.00	7.11	0.03
16.3. Households	160.04	0.07	0.03	0.00	23.81	0.00	0.72	4.72	4.87	0.00	0.29	0.00	0.00	0.00	124.66	0.86
16.4. Other consumers	92.54	0.00	0.00	0.00	0.00	0.00	0.00	0.67	10.53	0.03	0.13	0.04	0.16	0.00	77.29	3.67
16.5 Construction	7.75	0.00	0.00	0.00	0.14	0.00	0.01	0.02	4.79	0.00	0.65	0.00	0.00	0.00	2.13	0.00
12. Consumption for non-energy purposes	66.84	2.94	0.00	13.24	0.00	0.00	0.02	0.27	0.13	0.61	32.18	17.45	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	53.87	0.00	0.00	4.24	0.00	0.00	0.00	0.00	0.00	0.00	32.18	17.45	0.00	0.00	0.00	0.00
12.2 Other manufacturing	12.96	2.94	0.00	9.00	0.00	0.00	0.02	0.27	0.13	0.61	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2001**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9523.79	50.24	0.00	0.00	48.63	6461.23	211.25	0.00	0.00	0.00	230.37	2086.28	0.00	435.79	0.00	0.00
1.1.2 Production of natural gas that is flared off	20.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.69	0.00	0.00	0.00	0.00
2. Imports	262.03	23.18	13.68	13.61	0.53	41.42	21.89	10.02	39.60	46.06	13.34	0.00	0.00	0.00	38.68	0.00
3. Exports	8597.60	42.08	0.05	0.35	0.00	6005.76	352.37	4.24	129.51	49.13	159.98	1828.31	0.00	0.00	25.83	0.00
4.1 Bunkering	34.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.76	14.46	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	11.43	0.00	0.00	0.00	0.00	0.00	0.00	11.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	66.21	-5.65	0.20	0.59	0.00	60.14	2.32	3.50	1.89	2.29	0.93	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1229.46	25.70	13.84	13.85	49.16	557.03	-116.91	-2.15	-107.78	-15.24	84.67	278.66	0.00	435.79	12.85	0.00
8. Energy converted	1075.26	0.72	1.32	0.00	7.07	538.32	30.48	0.74	3.82	41.61	13.14	0.08	0.03	435.79	2.14	0.01
8.1. In blast furnaces	1.32	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	615.68	0.00	0.00	0.00	0.00	538.32	30.48	0.74	2.75	41.61	1.77	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.51	0.00	0.00	0.00	1.23	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	2.88	0.72	0.00	0.00	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	6.75	0.00	0.00	0.00	3.67	0.00	0.00	0.00	0.78	0.00	0.03	0.08	0.03	0.00	2.14	0.01
8.6. In hydropow er plants	435.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	435.79	0.00	0.00
8.7. Other conversion	11.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.33	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1074.34	0.00	0.00	7.38	0.00	0.00	192.76	26.56	280.59	64.01	13.26	0.00	42.37	0.00	439.14	8.26
9. Consumption by energy sector	202.38	0.00	0.00	0.00	0.00	0.00	0.07	0.00	6.63	0.13	1.39	157.38	25.34	0.00	11.42	0.02
9.1.1 Crude petroleum and natural gas production	147.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.44	0.00	0.00	136.69	0.00	0.00	4.35	0.00
9.1.2 Natural gas w hich is flared off on oil fields	20.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.69	0.00	0.00	0.00	0.00
9.2. Coal mines	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.01
9.3. Petroleum refineries	28.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.13	1.39	0.00	25.34	0.00	1.55	0.00
9.4. Pumping storage pow er plants	2.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.90	0.00
9.5. Hydro electric pow er plants	2.54	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.00	2.41	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.8. District heating plants	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.11	0.01
9.9. Gas supply																
10. Losses in transport and distribution	41.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	3.69	0.00	35.88	1.48
11. Statistical differences (7-8+1.2-9-10-13.1)	126.34	0.96	-0.69	8.46	0.00	18.70	-28.51	2.44	12.70	-6.57	26.40	92.34	0.06	0.00	0.00	0.03
	126.33	0.96	-0.69	8.46	0.00	18.70	-28.51	2.44	12.70	-6.57	26.40	92.34	0.05	0.00	0.00	0.03
13.1 Net domestic consumption including non-energy use	858.27	24.02	13.21	12.77	42.10	0.00	73.82	21.23	149.67	13.59	56.99	28.35	13.25	0.00	402.55	6.73
13. Net domestic consumption	772.51	21.39	13.21	0.20	42.10	0.00	73.81	20.97	149.55	13.03	8.21	7.53	13.25	0.00	402.55	6.73
14. Manufacturing, mining and quarrying	281.05	21.34	13.17	0.20	17.03	0.00	0.00	0.03	13.71	12.63	6.98	7.16	12.97	0.00	175.07	0.76
14.1. Mining and quarrying	3.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.76	0.19	0.03	0.00	0.00	0.00	1.71	0.00
14.2. Manufacture of paper and paper products	42.35	0.00	0.00	0.00	12.88	0.00	0.00	0.00	0.31	5.81	0.07	0.41	0.00	0.00	22.89	0.00
14.3. Manufacture of industrial chemicals	54.93	5.76	1.19	0.00	0.00	0.00	0.00	0.00	0.60	2.28	3.16	5.28	11.95	0.00	24.43	0.28
14.4. Manufacture of iron, steel and ferro alloys	48.53	10.94	11.13	0.00	0.15	0.00	0.00	0.00	0.63	0.00	0.03	0.00	0.32	0.00	25.31	0.02
14.5. Manufacture of aluminium and other non-ferrous metals	73.57	0.06	0.46	0.00	0.00	0.00	0.00	0.00	0.88	0.88	0.83	1.06	0.63	0.00	68.77	0.00
14.6. Other manufacturing industries	57.99	4.58	0.38	0.20	4.00	0.00	0.00	0.03	9.54	3.49	2.87	0.41	0.07	0.00	31.96	0.46
15. Transport	176.20	0.00	0.00	0.00	0.00	0.00	72.86	14.44	86.26	0.25	0.00	0.10	0.00	0.00	2.29	0.00
15.1. Railw ays and subw ays	3.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	0.00	2.29	0.00
15.2. Air transport	14.55	0.00	0.00	0.00	0.00	0.00	0.11	14.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	126.37	0.00	0.00	0.00	0.00	0.00	71.03	0.00	55.29	0.00	0.00	0.05	0.00	0.00	0.00	0.00
15.4. Coastal shipping	32.28	0.00	0.00	0.00	0.00	0.00	1.72	0.00	30.25	0.25	0.00	0.05	0.00	0.00	0.00	0.00
16. Other sectors	315.26	0.05	0.04	0.00	25.07	0.00	0.95	6.50	49.58	0.14	1.23	0.27	0.28	0.00	225.19	5.97
16.1. Fishing	20.14	0.00	0.00	0.00	0.00	0.00	0.19	0.03	19.43	0.00	0.00	0.00	0.00	0.00	0.49	0.00
16.2. Agriculture	14.52	0.02	0.00	0.00	0.07	0.00	0.02	0.03	6.65	0.01	0.14	0.00	0.00	0.00	7.55	0.03
16.3. Households	167.76	0.03	0.04	0.00	24.86	0.00	0.72	5.25	6.15	0.00	0.31	0.09	0.00	0.00	129.15	1.17
16.4. Other consumers	104.33	0.00	0.00	0.00	0.00	0.00	0.00	1.17	12.64	0.13	0.14	0.18	0.28	0.00	85.02	4.76
16.5 Construction	8.51	0.00	0.00	0.00	0.14	0.00	0.01	0.02	4.71	0.00	0.64	0.00	0.00	0.00	2.98	0.00
12. Consumption for non-energy purposes	85.76	2.63	0.00	12.57	0.00	0.00	0.02	0.26	0.12	0.57	48.78	20.82	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	73.87	0.00	0.00	4.27	0.00	0.00	0.00	0.00	0.00	0.00	48.78	20.82	0.00	0.00	0.00	0.00
12.2 Other manufacturing	11.89	2.63	0.00	8.30	0.00	0.00	0.02	0.26	0.12	0.57	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2002**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9785.49	59.90	0.00	0.00	50.51	6197.18	268.10	0.00	0.00	0.00	245.23	2496.88	0.00	467.68	0.00	0.00
1.1.2 Production of natural gas that is flared off	15.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.97	0.00	0.00	0.00	0.00
2. Imports	223.27	18.44	10.55	16.22	1.23	26.83	21.31	12.64	36.35	43.22	17.29	0.00	0.00	0.00	19.20	0.00
3. Exports	8876.79	57.64	0.00	1.82	0.00	5733.45	354.00	5.04	105.26	62.76	184.24	2318.40	0.00	0.00	54.17	0.00
4.1 Bunkering	27.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.00	9.45	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	10.12	0.00	0.00	0.00	0.00	0.00	0.00	10.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-2.10	2.27	0.54	-0.35	0.00	-4.53	-1.74	1.04	1.82	-2.18	1.04	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1108.28	22.97	11.08	14.05	51.73	486.02	-66.32	-1.49	-85.09	-31.17	79.32	194.45	0.00	467.68	-34.96	0.00
8. Energy converted	1070.49	0.69	1.20	0.00	7.07	501.55	37.41	1.69	5.19	32.36	13.82	0.08	0.02	467.68	1.73	0.01
8.1. In blast furnaces	1.20	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	578.96	0.00	0.00	0.00	0.00	501.55	37.41	1.69	3.57	32.25	2.48	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.27	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	3.09	0.69	0.00	0.00	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	6.98	0.00	0.00	0.00	3.68	0.00	0.00	0.00	1.33	0.11	0.03	0.08	0.02	0.00	1.72	0.01
8.6. In hydropow er plants	467.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	467.68	0.00	0.00
8.7. Other conversion	11.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.30	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1080.25	0.00	0.00	6.93	0.00	0.00	187.54	28.90	257.07	63.54	13.65	0.00	43.05	0.00	470.69	8.87
9. Consumption by energy sector	201.72	0.00	0.00	0.00	0.00	0.00	0.04	0.00	5.27	0.14	0.91	158.04	26.57	0.00	10.71	0.02
9.1.1 Crude petroleum and natural gas production	151.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.12	0.00	0.00	142.07	0.00	0.00	4.46	0.00
9.1.2 Natural gas w hich is flared off on oil fields	15.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.97	0.00	0.00	0.00	0.00
9.2. Coal mines	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.01
9.3. Petroleum refineries	29.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.14	0.91	0.00	26.57	0.00	1.53	0.00
9.4. Pumping storage pow er plants	2.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.39	0.00
9.5. Hydro electric pow er plants	2.21	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.06	0.00	0.00	0.00	0.00	0.00	2.10	0.00
9.6. Thermal pow er plants	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
9.7. Combined heat and pow er plants	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00
9.8. District heating plants	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.06	0.01
9.9. Gas supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	38.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	3.26	0.00	33.62	1.60
11. Statistical differences (7-8+1.2-9-10-13.1)	38.35	0.99	-1.09	7.39	0.00	-15.53	10.42	3.44	9.45	-12.09	20.64	14.73	0.00	0.00	0.00	0.00
	38.35	0.99	-1.09	7.39	0.00	-15.53	10.42	3.44	9.45	-12.09	20.64	14.73	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	839.09	21.28	10.98	13.59	44.66	0.00	73.35	22.28	152.07	11.97	57.59	21.19	13.20	0.00	389.67	7.24
13. Net domestic consumption	757.06	18.75	10.98	0.21	44.66	0.00	73.35	22.28	151.58	11.05	8.33	5.77	13.20	0.00	389.67	7.24
14. Manufacturing, mining and quarrying	264.96	18.70	10.90	0.21	16.10	0.00	0.00	0.03	14.03	10.82	6.87	5.35	12.69	0.00	168.28	0.98
14.1. Mining and quarrying	3.59	0.00	0.00	0.00	0.01	0.00	0.00	0.02	1.71	0.20	0.03	0.01	0.00	0.00	1.62	0.00
14.2. Manufacture of paper and paper products	40.93	0.00	0.00	0.00	11.75	0.00	0.00	0.00	0.43	5.44	0.08	0.25	0.00	0.00	22.98	0.00
14.3. Manufacture of industrial chemicals	48.86	4.51	1.01	0.00	0.00	0.00	0.00	0.00	0.57	1.98	2.43	3.63	12.30	0.00	22.13	0.29
14.4. Manufacture of iron, steel and ferro alloys	42.79	9.61	9.38	0.00	0.19	0.00	0.00	0.00	0.60	0.01	0.09	0.00	0.23	0.00	22.66	0.02
14.5. Manufacture of aluminium and other non-ferrous metals	70.70	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.74	0.00	1.18	1.03	0.00	0.00	67.71	0.00
14.6. Other manufacturing industries	58.09	4.58	0.48	0.21	4.15	0.00	0.00	0.01	9.99	3.18	3.06	0.42	0.15	0.00	31.18	0.68
15. Transport	174.59	0.00	0.00	0.00	0.00	0.00	72.40	12.32	87.24	0.13	0.11	0.13	0.00	0.00	2.27	0.00
15.1. Railw ays and subw ays	2.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	2.27	0.00
15.2. Air transport	12.50	0.00	0.00	0.00	0.00	0.00	0.18	12.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	127.63	0.00	0.00	0.00	0.00	0.00	70.50	0.00	56.95	0.00	0.11	0.07	0.00	0.00	0.00	0.00
15.4. Coastal shipping	31.56	0.00	0.00	0.00	0.00	0.00	1.72	0.00	29.66	0.13	0.00	0.05	0.00	0.00	0.00	0.00
16. Other sectors	317.51	0.05	0.08	0.00	28.56	0.00	0.95	9.93	50.31	0.10	1.35	0.29	0.52	0.00	219.13	6.25
16.1. Fishing	21.02	0.00	0.00	0.00	0.00	0.00	0.20	0.02	20.28	0.04	0.00	0.00	0.00	0.00	0.49	0.00
16.2. Agriculture	13.46	0.00	0.00	0.00	0.07	0.00	0.02	0.03	6.00	0.04	0.15	0.00	0.00	0.00	7.13	0.03
16.3. Households	167.78	0.04	0.08	0.00	28.36	0.00	0.72	5.11	7.03	0.00	0.43	0.08	0.00	0.00	124.73	1.20
16.4. Other consumers	107.16	0.00	0.00	0.00	0.00	0.00	0.00	4.75	12.53	0.00	0.15	0.21	0.52	0.00	83.99	5.02
16.5 Construction	8.08	0.00	0.00	0.00	0.13	0.00	0.01	0.02	4.47	0.03	0.63	0.00	0.00	0.00	2.79	0.00
12. Consumption for non-energy purposes	82.02	2.54	0.00	13.39	0.00	0.00	0.00	0.00	0.49	0.92	49.26	15.43	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	68.20	0.00	0.00	3.21	0.00	0.00	0.00	0.00	0.30	0.00	49.26	15.43	0.00	0.00	0.00	0.00
12.2 Other manufacturing	13.82	2.54	0.00	10.17	0.00	0.00	0.00	0.00	0.19	0.92	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2003**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9845.65	82.71	0.00	0.00	51.60	5905.06	366.38	0.00	0.00	0.00	271.86	2785.35	0.00	382.69	0.00	0.00
1.1.2 Production of natural gas that is flared off	16.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.21	0.00	0.00	0.00	0.00
2. Imports	259.68	18.89	10.88	12.79	2.37	26.40	17.57	12.33	33.45	58.33	18.35	0.00	0.00	0.00	48.32	0.00
3. Exports	8911.56	75.76	0.00	3.15	0.01	5372.46	478.37	4.38	117.25	73.35	198.78	2568.07	0.00	0.00	19.97	0.00
4.1 Bunkering	27.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.28	9.97	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	10.23	0.00	0.00	0.00	0.00	0.00	0.00	10.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-38.60	-2.98	-0.67	-0.12	0.00	-28.03	-0.20	-0.25	-2.58	0.84	-4.62	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1133.92	22.86	10.21	9.52	53.97	530.98	-94.62	-2.53	-103.66	-24.15	86.81	233.50	0.00	382.69	28.34	0.00
8. Energy converted	1054.00	0.57	1.14	0.00	8.99	560.17	36.49	1.08	5.89	41.67	14.10	0.27	0.01	382.69	0.91	0.01
8.1. In blast furnaces	1.14	0.00	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	645.05	0.00	0.00	0.00	0.00	560.17	36.49	1.08	3.30	41.56	2.45	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.64	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.37	0.00	0.00	0.02	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	4.08	0.57	0.00	0.00	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	7.89	0.00	0.00	0.00	4.24	0.00	0.00	0.00	2.22	0.11	0.14	0.25	0.01	0.00	0.91	0.01
8.6. In hydropow er plants	382.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	382.69	0.00	0.00
8.7. Other conversion	11.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.52	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1066.02	0.00	0.00	7.83	0.00	0.00	206.84	31.92	279.02	82.35	16.29	0.00	45.32	0.00	386.39	10.07
9. Consumption by energy sector	214.31	0.00	0.00	0.00	0.00	0.00	0.04	0.00	5.04	0.05	0.56	166.99	29.40	0.00	12.21	0.02
9.1.1 Crude petroleum and natural gas production	160.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.84	0.00	0.00	150.76	0.00	0.00	5.18	0.00
9.1.2 Natural gas w hich is flared off on oil fields	16.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.21	0.00	0.00	0.00	0.00
9.2. Coal mines	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00
9.3. Petroleum refineries	32.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.05	0.56	0.00	29.40	0.00	1.95	0.00
9.4. Pumping storage pow er plants	3.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.11	0.00
9.5. Hydro electric pow er plants	1.76	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.06	0.00	0.00	0.00	0.00	0.00	1.66	0.00
9.6. Thermal pow er plants	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
9.7. Combined heat and pow er plants	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.00
9.8. District heating plants	0.10	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.01
9.9. Gas supply	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	33.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	2.32	0.00	28.62	2.24
11. Statistical differences (7-8+1.2-9-10-13.1)	58.48	1.61	-1.74	4.61	0.00	-29.19	3.17	8.65	6.58	0.34	27.89	36.57	0.00	0.00	0.00	0.00
	58.48	1.61	-1.74	4.61	0.00	-29.19	3.17	8.65	6.58	0.34	27.89	36.57	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	839.49	20.68	10.82	12.74	44.98	0.00	72.52	19.66	157.85	16.14	60.54	29.19	13.59	0.00	372.99	7.80
13. Net domestic consumption	749.84	18.44	10.82	0.17	44.98	0.00	72.52	19.66	157.36	15.22	8.67	7.63	13.59	0.00	372.99	7.80
14. Manufacturing, mining and quarrying	270.98	18.40	10.76	0.17	16.42	0.00	0.00	0.01	15.90	11.44	7.10	7.07	13.08	0.00	169.58	1.03
14.1. Mining and quarrying	3.81	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.88	0.20	0.05	0.01	0.00	0.00	1.66	0.00
14.2. Manufacture of paper and paper products	40.62	0.00	0.00	0.00	12.04	0.00	0.00	0.00	0.67	5.63	0.33	0.23	0.00	0.00	21.72	0.00
14.3. Manufacture of industrial chemicals	52.42	4.92	1.06	0.00	0.01	0.00	0.00	0.00	0.62	2.18	2.41	5.47	12.97	0.00	22.44	0.34
14.4. Manufacture of iron, steel and ferro alloys	39.79	8.69	9.24	0.00	0.20	0.00	0.00	0.00	0.81	0.02	0.07	0.00	0.06	0.00	20.68	0.02
14.5. Manufacture of aluminium and other non-ferrous metals	77.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	0.00	1.20	1.08	0.00	0.00	74.16	0.00
14.6. Other manufacturing industries	56.81	4.80	0.46	0.17	4.17	0.00	0.00	0.01	10.82	3.42	3.04	0.28	0.04	0.00	28.92	0.68
15. Transport	178.82	0.00	0.00	0.00	0.00	0.00	71.58	12.91	88.43	3.32	0.07	0.28	0.00	0.00	2.23	0.00
15.1. Railw ays and subw ays	2.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	2.23	0.00
15.2. Air transport	13.06	0.00	0.00	0.00	0.00	0.00	0.15	12.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	130.62	0.00	0.00	0.00	0.00	0.00	69.71	0.00	60.73	0.00	0.07	0.10	0.00	0.00	0.00	0.00
15.4. Coastal shipping	32.31	0.00	0.00	0.00	0.00	0.00	1.72	0.00	27.09	3.32	0.00	0.18	0.00	0.00	0.00	0.00
16. Other sectors	300.03	0.04	0.05	0.00	28.55	0.00	0.93	6.73	53.03	0.46	1.50	0.28	0.51	0.00	201.18	6.77
16.1. Fishing	20.39	0.00	0.00	0.00	0.00	0.00	0.19	0.01	19.57	0.14	0.00	0.00	0.00	0.00	0.49	0.00
16.2. Agriculture	13.16	0.00	0.00	0.00	0.07	0.00	0.01	0.03	6.38	0.05	0.17	0.01	0.00	0.00	6.40	0.03
16.3. Households	159.71	0.03	0.05	0.00	28.18	0.00	0.72	5.88	7.58	0.00	0.55	0.08	0.00	0.00	115.28	1.35
16.4. Other consumers	99.29	0.00	0.00	0.00	0.17	0.00	0.00	0.79	15.17	0.26	0.15	0.19	0.51	0.00	76.64	5.39
16.5 Construction	7.49	0.00	0.00	0.00	0.13	0.00	0.01	0.02	4.32	0.01	0.62	0.00	0.00	0.00	2.37	0.00
12. Consumption for non-energy purposes	89.66	2.24	0.00	12.57	0.00	0.00	0.00	0.00	0.49	0.92	51.87	21.56	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	75.91	0.00	0.00	2.18	0.00	0.00	0.00	0.00	0.30	0.00	51.87	21.56	0.00	0.00	0.00	0.00
12.2 Other manufacturing	13.74	2.24	0.00	10.39	0.00	0.00	0.00	0.00	0.19	0.92	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2004**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9905.26	81.61	0.00	0.00	50.60	5842.64	331.67	0.00	0.00	0.00	280.22	2924.18	0.00	394.35	0.00	0.00
1.1.2 Production of natural gas that is flared off	18.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.47	0.00	0.00	0.00	0.00
2. Imports	268.47	21.52	13.03	12.35	1.36	21.17	24.17	11.40	34.70	57.72	15.93	0.00	0.00	0.00	55.11	0.00
3. Exports	8907.26	77.03	0.01	0.65	0.01	5261.42	420.22	3.82	117.76	70.71	186.86	2754.90	0.00	0.00	13.87	0.00
4.1 Bunkering	26.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.83	10.21	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	11.59	0.00	0.00	0.00	0.00	0.00	0.00	11.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	15.23	-0.43	0.12	0.37	0.00	6.41	4.57	-0.81	2.81	0.64	1.54	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1262.54	25.68	13.15	12.07	51.94	608.80	-59.82	-4.82	-96.08	-22.55	110.83	187.74	0.00	394.35	41.24	0.00
8. Energy converted	1039.60	0.76	1.85	0.00	9.30	532.57	34.96	0.82	4.99	44.03	13.43	0.31	0.02	394.35	2.19	0.01
8.1. In blast furnaces	1.85	0.00	1.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	618.50	0.00	0.00	0.00	0.00	532.57	34.96	0.82	3.83	43.99	2.33	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.72	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.33	0.00	0.00	0.12	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	4.25	0.76	0.00	0.00	3.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	7.88	0.00	0.00	0.00	4.54	0.00	0.00	0.00	0.84	0.04	0.06	0.19	0.02	0.00	2.19	0.01
8.6. In hydropow er plants	394.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	394.35	0.00	0.00
8.7. Other conversion	11.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.04	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1057.21	0.00	0.00	6.05	0.00	0.00	202.91	28.88	272.80	78.16	15.41	0.00	44.07	0.00	398.33	10.61
9. Consumption by energy sector	222.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	5.26	0.07	0.50	175.98	27.71	0.00	12.43	0.02
9.1.1 Crude petroleum and natural gas production	168.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.08	0.00	0.00	157.47	0.00	0.00	5.67	0.00
9.1.2 Natural gas w hich is flared off on oil fields	18.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.47	0.00	0.00	0.00	0.00
9.2. Coal mines	0.14	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00
9.3. Petroleum refineries	30.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.07	0.50	0.00	27.71	0.00	1.89	0.00
9.4. Pumping storage pow er plants	2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.62	0.00
9.5. Hydro electric pow er plants	2.04	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.06	0.00	0.00	0.00	0.00	0.00	1.94	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.09	0.00
9.8. District heating plants	0.10	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.08	0.01
9.9. Gas supply	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	2.72	0.00	33.60	2.19
11. Statistical differences (7-8+1.2-9-10-13.1)	166.47	1.90	-1.26	5.82	0.00	76.23	35.96	2.41	11.10	-4.19	61.27	-22.76	0.00	0.00	0.00	0.00
	166.47	1.90	-1.26	5.82	0.00	76.23	35.96	2.41	11.10	-4.19	61.27	-22.76	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	852.68	23.01	12.57	12.30	42.65	0.00	72.13	20.83	155.37	15.70	51.04	33.72	13.62	0.00	391.35	8.40
13. Net domestic consumption	770.52	20.71	12.57	0.06	42.65	0.00	72.13	20.83	154.88	14.78	9.64	8.92	13.62	0.00	391.35	8.40
14. Manufacturing, mining and quarrying	285.51	20.65	12.55	0.06	15.70	0.00	0.00	0.01	13.31	10.76	7.90	7.93	13.13	0.00	182.48	1.03
14.1. Mining and quarrying	4.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.21	0.13	0.03	0.10	0.04	0.00	1.71	0.00
14.2. Manufacture of paper and paper products	41.00	0.00	0.00	0.00	11.30	0.00	0.00	0.00	0.51	5.76	0.25	0.38	0.00	0.00	22.80	0.00
14.3. Manufacture of industrial chemicals	54.28	5.88	1.09	0.00	0.01	0.00	0.00	0.00	0.49	1.91	3.46	5.32	12.46	0.00	23.33	0.32
14.4. Manufacture of iron, steel and ferro alloys	47.06	10.75	10.94	0.00	0.21	0.00	0.00	0.00	0.49	0.00	0.06	0.04	0.45	0.00	24.09	0.02
14.5. Manufacture of aluminium and other non-ferrous metals	83.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.00	1.04	1.14	0.00	0.00	80.70	0.00
14.6. Other manufacturing industries	55.35	4.02	0.51	0.06	4.18	0.00	0.00	0.01	8.89	2.95	3.05	0.97	0.18	0.00	29.84	0.69
15. Transport	183.88	0.00	0.00	0.00	0.00	0.00	71.19	12.76	93.77	3.57	0.08	0.38	0.00	0.00	2.13	0.00
15.1. Railw ays and subw ays	2.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	2.13	0.00
15.2. Air transport	12.94	0.00	0.00	0.00	0.00	0.00	0.18	12.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	135.46	0.00	0.00	0.00	0.00	0.00	69.29	0.00	65.99	0.00	0.08	0.10	0.00	0.00	0.00	0.00
15.4. Coastal shipping	32.72	0.00	0.00	0.00	0.00	0.00	1.72	0.00	27.14	3.57	0.00	0.28	0.00	0.00	0.00	0.00
16. Other sectors	301.13	0.06	0.02	0.00	26.94	0.00	0.94	8.06	47.79	0.45	1.66	0.61	0.49	0.00	206.74	7.37
16.1. Fishing	19.94	0.00	0.00	0.00	0.00	0.00	0.19	0.00	19.08	0.18	0.00	0.00	0.00	0.00	0.49	0.00
16.2. Agriculture	13.94	0.00	0.00	0.00	0.07	0.00	0.01	0.03	6.28	0.06	0.18	0.24	0.00	0.00	7.05	0.01
16.3. Households	156.68	0.06	0.02	0.00	26.49	0.00	0.72	5.02	5.47	0.00	0.62	0.12	0.00	0.00	116.66	1.50
16.4. Other consumers	103.25	0.00	0.00	0.00	0.24	0.00	0.00	2.99	12.46	0.19	0.21	0.25	0.49	0.00	80.57	5.85
16.5 Construction	7.31	0.00	0.00	0.00	0.14	0.00	0.01	0.02	4.51	0.02	0.65	0.00	0.00	0.00	1.98	0.00
12. Consumption for non-energy purposes	82.16	2.30	0.00	12.25	0.00	0.00	0.00	0.00	0.49	0.92	41.40	24.80	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	68.15	0.00	0.00	1.65	0.00	0.00	0.00	0.00	0.30	0.00	41.40	24.80	0.00	0.00	0.00	0.00
12.2 Other manufacturing	14.01	2.30	0.00	10.59	0.00	0.00	0.00	0.00	0.19	0.92	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2005**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9674.92	41.33	0.00	0.00	54.99	5319.74	340.48	0.00	0.00	0.00	289.58	3135.78	0.00	493.02	0.00	0.00
1.1.2 Production of natural gas that is flared off	16.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.91	0.00	0.00	0.00	0.00
2. Imports	235.99	18.75	10.88	12.64	0.88	45.19	22.01	7.02	24.93	69.28	11.26	0.00	0.00	0.00	13.15	0.00
3. Exports	8642.39	46.81	0.07	0.23	0.01	4730.04	430.83	6.57	106.05	70.16	223.77	2971.34	0.00	0.00	56.50	0.00
4.1 Bunkering	29.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.66	12.24	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	14.78	0.00	0.00	0.00	0.00	0.00	0.00	14.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-18.21	9.07	-0.67	-0.17	0.00	-16.67	-3.05	0.20	-4.76	-1.75	-0.41	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1222.54	22.34	10.14	12.23	55.86	618.21	-71.38	-14.12	-103.54	-14.88	76.66	181.35	0.00	493.02	-43.35	0.00
8. Energy converted	1200.18	0.71	1.46	0.00	9.47	565.35	53.55	0.36	5.46	55.16	12.52	0.54	0.03	493.02	2.52	0.02
8.1. In blast furnaces	1.46	0.00	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	680.83	0.00	0.00	0.00	0.00	565.35	53.55	0.36	4.63	55.16	1.78	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.96	0.00	0.00	0.00	1.41	0.00	0.00	0.00	0.29	0.00	0.00	0.25	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	4.15	0.71	0.00	0.00	3.43	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	8.05	0.00	0.00	0.00	4.62	0.00	0.00	0.00	0.53	0.00	0.03	0.29	0.03	0.00	2.52	0.02
8.6. In hydropow er plants	493.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	493.02	0.00	0.00
8.7. Other conversion	10.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.71	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1221.08	0.00	0.00	7.92	0.00	0.00	239.25	34.32	299.24	68.84	17.71	0.00	45.92	0.00	496.82	11.07
9. Consumption by energy sector	222.98	0.00	0.00	0.00	0.00	0.00	0.07	0.00	4.76	0.00	0.00	170.99	30.82	0.00	16.34	0.01
9.1.1 Crude petroleum and natural gas production	166.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.55	0.00	0.00	154.02	0.00	0.00	7.92	0.00
9.1.2 Natural gas w hich is flared off on oil fields	16.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.91	0.00	0.00	0.00	0.00
9.2. Coal mines	0.13	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00
9.3. Petroleum refineries	32.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	30.82	0.00	2.02	0.00
9.4. Pumping storage pow er plants	3.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.93	0.00
9.5. Hydro electric pow er plants	2.26	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.07	0.00	0.00	0.00	0.00	0.00	2.15	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.12	0.00
9.8. District heating plants	0.11	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.08	0.01
9.9. Gas supply	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	40.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	1.84	0.00	35.98	2.21
11. Statistical differences (7-8+1.2-9-10-13.1)	129.33	2.08	-2.16	6.78	0.00	52.85	44.78	1.72	29.24	-15.48	31.03	-21.52	0.00	0.00	0.00	0.00
	129.33	2.08	-2.16	6.78	0.00	52.85	44.78	1.72	29.24	-15.48	31.03	-21.52	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	850.76	19.55	10.83	13.37	46.39	0.00	69.48	18.12	156.25	14.28	50.82	31.00	13.23	0.00	398.62	8.83
13. Net domestic consumption	769.72	17.18	10.83	0.05	46.39	0.00	69.48	18.12	155.75	13.36	8.66	9.23	13.23	0.00	398.62	8.83
14. Manufacturing, mining and quarrying	281.21	17.17	10.80	0.05	17.61	0.00	0.00	0.03	12.17	10.49	6.87	7.67	12.53	0.00	184.75	1.08
14.1. Mining and quarrying	4.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	2.03	0.06	0.06	0.18	0.06	0.00	1.64	0.00
14.2. Manufacture of paper and paper products	40.82	0.00	0.00	0.00	11.81	0.00	0.00	0.00	0.22	5.31	0.15	0.30	0.00	0.00	23.03	0.00
14.3. Manufacture of industrial chemicals	53.40	5.20	1.03	0.00	0.47	0.00	0.00	0.00	0.48	2.28	2.42	4.14	12.02	0.00	25.01	0.33
14.4. Manufacture of iron, steel and ferro alloys	38.48	8.70	9.27	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.02	0.07	0.31	0.00	19.61	0.03
14.5. Manufacture of aluminium and other non-ferrous metals	88.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.99	1.65	0.00	0.00	85.53	0.01
14.6. Other manufacturing industries	55.77	3.27	0.51	0.05	5.33	0.00	0.00	0.02	8.43	2.83	3.23	1.33	0.13	0.00	29.93	0.70
15. Transport	184.59	0.00	0.00	0.00	0.00	0.00	68.54	10.78	100.31	2.32	0.08	0.41	0.00	0.00	2.16	0.00
15.1. Railw ays and subw ays	2.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	2.16	0.00
15.2. Air transport	10.88	0.00	0.00	0.00	0.00	0.00	0.10	10.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	135.95	0.00	0.00	0.00	0.00	0.00	66.71	0.00	69.09	0.00	0.08	0.07	0.00	0.00	0.00	0.00
15.4. Coastal shipping	34.98	0.00	0.00	0.00	0.00	0.00	1.72	0.00	30.60	2.32	0.00	0.34	0.00	0.00	0.00	0.00
16. Other sectors	303.92	0.01	0.03	0.00	28.78	0.00	0.94	7.32	43.28	0.54	1.71	1.16	0.70	0.00	211.71	7.75
16.1. Fishing	19.19	0.00	0.00	0.00	0.00	0.00	0.19	0.00	18.27	0.16	0.00	0.00	0.00	0.00	0.56	0.00
16.2. Agriculture	14.43	0.00	0.00	0.00	0.07	0.00	0.01	0.02	6.26	0.05	0.20	0.66	0.00	0.00	7.15	0.00
16.3. Households	162.27	0.01	0.03	0.00	28.35	0.00	0.72	4.29	4.07	0.00	0.62	0.22	0.00	0.00	122.42	1.54
16.4. Other consumers	99.89	0.00	0.00	0.00	0.22	0.00	0.00	2.98	9.94	0.32	0.21	0.27	0.70	0.00	79.04	6.21
16.5 Construction	8.15	0.00	0.00	0.00	0.14	0.00	0.01	0.01	4.74	0.00	0.68	0.01	0.00	0.00	2.55	0.00
12. Consumption for non-energy purposes	81.04	2.37	0.00	13.32	0.00	0.00	0.00	0.00	0.49	0.92	42.16	21.77	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	65.96	0.00	0.00	1.73	0.00	0.00	0.00	0.00	0.30	0.00	42.16	21.77	0.00	0.00	0.00	0.00
12.2 Other manufacturing	15.08	2.37	0.00	11.60	0.00	0.00	0.00	0.00	0.19	0.92	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2006**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9323.01	67.30	0.00	0.00	52.84	4935.95	351.80	0.00	0.00	0.00	266.52	3215.28	0.00	433.31	0.00	0.00
1.1.2 Production of natural gas that is flared off	15.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.60	0.00	0.00	0.00	0.00
2. Imports	240.32	14.85	11.15	13.27	1.56	16.24	14.92	10.48	39.56	71.86	11.15	0.00	0.00	0.00	35.29	0.00
3. Exports	8274.30	63.68	0.00	0.35	0.06	4231.47	439.42	10.27	127.65	88.49	245.70	3035.00	0.00	0.00	32.21	0.00
4.1 Bunkering	29.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.88	12.98	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	17.02	0.00	0.00	0.00	0.00	0.00	0.00	17.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-17.80	-0.56	0.82	0.37	0.00	-11.82	-2.84	0.36	-2.38	2.03	-3.77	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1239.95	17.91	11.96	13.28	54.34	708.91	-75.55	-16.46	-107.35	-27.58	28.20	195.88	0.00	433.31	3.08	0.00
8. Energy converted	1181.21	0.69	1.83	0.00	9.84	598.64	56.97	0.23	4.96	56.82	14.93	0.74	0.02	433.31	2.22	0.00
8.1. In blast furnaces	1.83	0.00	1.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	717.87	0.00	0.00	0.00	0.00	598.64	56.97	0.23	3.83	56.82	1.36	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	1.96	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.34	0.00	0.00	0.29	0.00	0.00	0.00	0.00
8.4. In dual purpose pow er plants	4.11	0.69	0.00	0.00	3.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	8.70	0.00	0.00	0.00	5.08	0.00	0.00	0.00	0.79	0.00	0.14	0.44	0.02	0.00	2.22	0.00
8.6. In hydropow er plants	433.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	433.31	0.00	0.00
8.7. Other conversion	13.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.43	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1203.15	0.00	0.00	7.39	0.00	0.00	246.26	38.00	310.21	82.73	19.18	0.00	50.13	0.00	437.54	11.71
9. Consumption by energy sector	226.60	0.00	0.00	0.00	0.00	0.00	0.06	0.00	5.40	0.00	0.00	174.15	31.55	0.00	15.43	0.02
9.1.1 Crude petroleum and natural gas production	173.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.24	0.00	0.00	158.54	0.00	0.00	9.51	0.00
9.1.2 Natural gas w hich is flared off on oil fields	15.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.60	0.00	0.00	0.00	0.00
9.2. Coal mines	0.15	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00
9.3. Petroleum refineries	33.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	31.55	0.00	1.78	0.00
9.4. Pumping storage pow er plants	1.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85	0.00
9.5. Hydro electric pow er plants	2.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.04	0.00	0.00	0.00	0.00	0.00	1.94	0.00
9.6. Thermal pow er plants	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.09	0.00
9.8. District heating plants	0.15	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.12	0.02
9.9. Gas supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	41.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	2.07	0.00	36.26	2.27
11. Statistical differences (7-8+1.2-9-10-13.1)	146.77	0.61	0.68	6.36	0.00	110.27	46.85	2.60	27.45	-18.25	-18.14	-11.65	0.00	0.00	0.00	0.00
	146.77	0.61	0.68	6.36	0.00	110.27	46.85	2.60	27.45	-18.25	-18.14	-11.65	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	847.51	16.61	9.46	14.31	44.50	0.00	66.84	18.71	165.06	16.58	50.58	32.24	16.49	0.00	386.70	9.42
13. Net domestic consumption	766.21	14.55	9.46	0.06	44.50	0.00	66.84	18.71	164.56	15.66	9.30	9.95	16.49	0.00	386.70	9.42
14. Manufacturing, mining and quarrying	274.81	14.53	9.45	0.06	17.19	0.00	0.00	0.02	12.70	11.14	7.44	8.24	15.86	0.00	177.12	1.08
14.1. Mining and quarrying	4.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.17	0.06	0.06	0.19	0.13	0.00	1.61	0.00
14.2. Manufacture of paper and paper products	39.03	0.00	0.00	0.00	11.38	0.00	0.00	0.00	0.22	6.01	0.20	0.34	0.00	0.00	20.87	0.00
14.3. Manufacture of industrial chemicals	53.93	3.20	0.92	0.00	0.47	0.00	0.00	0.00	0.38	2.14	2.55	4.16	15.14	0.00	24.66	0.32
14.4. Manufacture of iron, steel and ferro alloys	31.25	7.72	8.01	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.01	0.10	0.42	0.00	14.57	0.04
14.5. Manufacture of aluminium and other non-ferrous metals	88.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	1.02	1.91	0.00	0.00	85.00	0.02
14.6. Other manufacturing industries	58.03	3.61	0.52	0.06	5.34	0.00	0.00	0.01	9.13	2.94	3.60	1.54	0.18	0.00	30.41	0.69
15. Transport	193.04	0.00	0.00	0.00	0.21	0.00	65.90	11.69	108.68	3.70	0.08	0.44	0.00	0.00	2.34	0.00
15.1. Railw ays and subw ays	2.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	2.34	0.00
15.2. Air transport	11.77	0.00	0.00	0.00	0.00	0.00	0.08	11.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	142.48	0.00	0.00	0.00	0.21	0.00	64.09	0.00	77.98	0.00	0.08	0.11	0.00	0.00	0.00	0.00
15.4. Coastal shipping	35.86	0.00	0.00	0.00	0.00	0.00	1.72	0.00	30.10	3.70	0.00	0.33	0.00	0.00	0.00	0.00
16. Other sectors	298.36	0.02	0.02	0.00	27.10	0.00	0.94	7.00	43.19	0.82	1.78	1.27	0.63	0.00	207.25	8.35
16.1. Fishing	18.12	0.00	0.00	0.00	0.00	0.00	0.19	0.00	17.09	0.29	0.00	0.00	0.00	0.00	0.54	0.00
16.2. Agriculture	14.05	0.00	0.00	0.00	0.07	0.00	0.01	0.02	6.13	0.08	0.24	0.66	0.00	0.00	6.84	0.01
16.3. Households	159.75	0.01	0.02	0.00	26.55	0.00	0.72	4.29	4.47	0.00	0.62	0.14	0.00	0.00	121.13	1.81
16.4. Other consumers	98.09	0.00	0.00	0.00	0.33	0.00	0.00	2.67	10.61	0.45	0.21	0.47	0.63	0.00	76.17	6.54
16.5 Construction	8.35	0.00	0.00	0.00	0.15	0.00	0.01	0.01	4.89	0.00	0.70	0.01	0.00	0.00	2.57	0.00
12. Consumption for non-energy purposes	81.30	2.06	0.00	14.25	0.00	0.00	0.00	0.00	0.49	0.92	41.28	22.29	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	64.96	0.00	0.00	1.09	0.00	0.00	0.00	0.00	0.30	0.00	41.28	22.29	0.00	0.00	0.00	0.00
12.2 Other manufacturing	16.34	2.06	0.00	13.17	0.00	0.00	0.00	0.00	0.19	0.92	0.00	0.00	0.00	0.00	0.00	0.00

Energy balance	**2007**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8997.74	114.46	0.00	0.00	53.93	4603.83	181.02	0.00	0.00	0.00	285.50	3270.73	0.00	488.26	0.00	0.00
1.1.2 Production of natural gas that is flared off	37.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.44	0.00	0.00	0.00	0.00
2. Imports	256.89	17.14	12.59	12.68	2.64	61.20	15.20	8.42	35.48	67.58	4.92	0.00	0.00	0.00	19.02	0.00
3. Exports	8131.44	94.72	0.00	1.24	0.03	4116.98	340.02	9.54	120.84	88.63	238.82	3065.47	0.00	0.00	55.15	0.00
4.1 Bunkering	27.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.51	10.95	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	15.85	0.00	0.00	0.00	0.00	0.00	0.00	15.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	19.86	-15.61	-0.14	0.13	0.00	36.90	0.00	-0.90	-0.28	-0.93	0.68	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1137.19	21.27	12.46	11.58	56.54	584.96	-143.80	-17.86	-102.15	-32.93	52.29	242.70	0.00	488.26	-36.13	0.00
8. Energy converted	1235.76	0.75	2.19	0.00	10.75	602.47	48.01	2.02	6.46	53.90	12.43	5.28	0.59	488.26	2.64	0.00
8.1. In blast furnaces	2.19	0.00	2.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	713.10	0.00	0.00	0.00	0.00	602.47	48.01	2.02	5.45	53.90	1.24	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	7.11	0.00	0.00	0.00	1.60	0.00	0.00	0.00	0.17	0.00	0.00	4.77	0.57	0.00	0.00	0.00
8.4. In dual purpose pow er plants	4.58	0.75	0.00	0.00	3.82	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.5. In district heating plants	9.43	0.00	0.00	0.00	5.33	0.00	0.00	0.00	0.83	0.00	0.09	0.51	0.02	0.00	2.64	0.00
8.6. In hydropow er plants	488.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	488.26	0.00	0.00
8.7. Other conversion	11.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.10	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1253.37	0.00	0.00	7.30	0.00	0.00	248.57	36.55	300.77	87.28	19.33	0.00	46.88	0.00	493.79	12.89
9. Consumption by energy sector	255.40	0.00	0.00	0.00	0.00	0.00	0.04	0.00	7.44	0.00	0.00	196.93	30.55	0.00	20.40	0.04
9.1.1 Crude petroleum and natural gas production	176.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.90	0.00	0.00	159.49	0.00	0.00	10.53	0.00
9.1.2 Natural gas w hich is flared off on oil fields	37.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.44	0.00	0.00	0.00	0.00
9.2. Coal mines	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.15	0.00
9.3. Petroleum refineries	32.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	30.55	0.00	2.09	0.00
9.4. Pumping storage pow er plants	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.55	0.00
9.5. Hydro electric pow er plants	2.05	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.12	0.00	0.00	0.00	0.00	0.00	1.90	0.00
9.6. Thermal pow er plants	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.09	0.00
9.8. District heating plants	0.13	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.07	0.04
9.9. Gas supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	42.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94	2.91	0.00	36.28	2.46
11. Statistical differences (7-8+1.2-9-10-13.1)	-6.30	2.31	-0.20	5.43	0.00	-17.51	-6.68	-2.31	14.52	-14.67	2.23	10.57	0.00	0.00	0.00	0.00
	-6.30	2.31	-0.20	5.43	0.00	-17.51	-6.68	-2.31	14.52	-14.67	2.23	10.57	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	863.09	18.21	10.47	13.45	45.79	0.00	63.40	18.97	170.20	15.11	56.95	28.97	12.84	0.00	398.34	10.39
13. Net domestic consumption	780.12	15.83	10.47	0.30	45.79	0.00	63.40	18.97	169.70	14.20	9.17	10.72	12.84	0.00	398.34	10.39
14. Manufacturing, mining and quarrying	268.00	15.82	10.42	0.30	17.87	0.00	0.00	0.02	10.94	8.69	7.16	7.54	12.09	0.00	176.03	1.12
14.1. Mining and quarrying	4.23	0.00	0.00	0.00	0.00	0.00	0.00	0.02	2.20	0.05	0.04	0.18	0.06	0.00	1.68	0.00
14.2. Manufacture of paper and paper products	37.92	0.00	0.00	0.00	12.02	0.00	0.00	0.00	0.20	4.40	0.12	0.16	0.03	0.00	20.99	0.00
14.3. Manufacture of industrial chemicals	52.71	5.34	2.59	0.00	0.77	0.00	0.00	0.00	0.44	1.60	2.32	2.97	11.42	0.00	24.82	0.44
14.4. Manufacture of iron, steel and ferro alloys	32.27	6.87	7.24	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.04	0.07	0.40	0.00	17.26	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	85.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.01	1.04	2.12	0.00	0.00	82.14	0.06
14.6. Other manufacturing industries	55.09	3.61	0.59	0.30	5.08	0.00	0.00	0.00	7.29	2.64	3.61	2.04	0.18	0.00	29.14	0.61
15. Transport	203.08	0.00	0.00	0.00	1.19	0.00	62.44	13.59	116.97	4.83	0.08	1.69	0.00	0.00	2.29	0.00
15.1. Railw ays and subw ays	2.91	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	2.29	0.00
15.2. Air transport	13.66	0.00	0.00	0.00	0.00	0.00	0.07	13.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	148.34	0.00	0.00	0.00	1.18	0.00	60.65	0.00	86.32	0.00	0.08	0.11	0.00	0.00	0.00	0.00
15.4. Coastal shipping	38.18	0.00	0.00	0.00	0.00	0.00	1.72	0.00	30.04	4.83	0.00	1.59	0.00	0.00	0.00	0.00
16. Other sectors	309.04	0.01	0.06	0.00	26.73	0.00	0.96	5.36	41.79	0.67	1.92	1.49	0.74	0.00	220.02	9.27
16.1. Fishing	17.48	0.00	0.00	0.00	0.00	0.00	0.21	0.00	16.57	0.18	0.00	0.00	0.00	0.00	0.53	0.00
16.2. Agriculture	14.03	0.00	0.00	0.00	0.05	0.00	0.01	0.02	6.04	0.07	0.24	0.61	0.00	0.00	6.97	0.01
16.3. Households	162.53	0.01	0.01	0.00	26.09	0.00	0.72	3.35	3.81	0.00	0.54	0.15	0.00	0.00	125.81	2.05
16.4. Other consumers	105.71	0.00	0.05	0.00	0.40	0.00	0.01	1.98	9.89	0.41	0.33	0.71	0.74	0.00	83.97	7.21
16.5 Construction	9.28	0.00	0.00	0.00	0.20	0.00	0.02	0.01	5.49	0.01	0.81	0.01	0.00	0.00	2.74	0.00
12. Consumption for non-energy purposes	82.97	2.38	0.00	13.15	0.00	0.00	0.00	0.00	0.49	0.92	47.78	18.25	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	65.53	0.00	0.00	1.03	0.00	0.00	0.00	0.00	0.25	0.00	46.00	18.25	0.00	0.00	0.00	0.00
12.2 Other manufacturing	17.44	2.38	0.00	12.11	0.00	0.00	0.00	0.00	0.25	0.92	1.78	0.00	0.00	0.00	0.00	0.00

Energy balance	**2008**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9184.29	96.39	0.00	0.00	54.80	4383.35	211.12	0.00	0.00	0.00	279.59	3651.82	0.00	507.22	0.00	0.00
1.1.2 Production of natural gas that is flared off	33.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.21	0.00	0.00	0.00	0.00
2. Imports	240.27	18.10	12.98	17.47	4.71	35.05	19.57	10.89	40.70	60.26	8.24	0.00	0.00	0.00	12.28	0.00
3. Exports	8162.64	94.10	0.00	0.25	0.02	3770.69	310.50	12.06	105.11	110.87	258.83	3438.01	0.00	0.00	62.19	0.00
4.1 Bunkering	27.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.17	11.32	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	15.74	0.00	0.00	0.00	0.00	0.00	0.00	15.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-15.63	2.85	-0.20	-0.32	0.00	-16.58	-0.63	-1.13	0.65	-1.11	0.85	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1236.27	23.24	12.78	16.90	59.49	631.14	-80.45	-18.04	-79.93	-63.04	29.85	247.03	0.00	507.22	-49.91	0.00
8. Energy converted	1200.02	0.63	2.02	0.00	11.62	551.10	44.19	0.34	16.50	47.40	12.75	3.17	0.65	507.22	2.42	0.01
8.1. In blast furnaces	2.02	0.00	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	660.15	0.00	0.00	0.00	0.00	551.10	44.19	0.34	15.81	47.40	1.30	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	4.85	0.00	0.00	0.00	1.63	0.00	0.00	0.00	0.09	0.00	0.00	2.51	0.63	0.00	0.00	0.00
8.4. In dual purpose pow er plants	4.83	0.63	0.00	0.00	4.15	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.00
8.5. In district heating plants	9.69	0.00	0.00	0.00	5.85	0.00	0.00	0.00	0.54	0.00	0.19	0.67	0.02	0.00	2.41	0.01
8.6. In hydropow er plants	507.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	507.22	0.00	0.00
8.7. Other conversion	11.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.26	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1218.15	0.00	0.00	6.29	0.00	0.00	207.99	39.85	279.35	99.50	16.31	0.00	43.60	0.00	511.59	13.68
9. Consumption by energy sector	256.41	0.00	0.00	0.00	0.00	0.00	0.04	0.00	7.51	0.00	0.00	200.74	26.93	0.00	21.15	0.04
9.1.1 Crude petroleum and natural gas production	186.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.87	0.00	0.00	167.53	0.00	0.00	11.72	0.00
9.1.2 Natural gas w hich is flared off on oil fields	33.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.21	0.00	0.00	0.00	0.00
9.2. Coal mines	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.14	0.00
9.3. Petroleum refineries	28.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	26.93	0.00	1.90	0.00
9.4. Pumping storage pow er plants	4.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.82	0.00
9.5. Hydro electric pow er plants	2.26	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.00	0.00	0.00	0.00	2.19	0.00
9.6. Thermal pow er plants	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.02	0.00
9.7. Combined heat and pow er plants	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.09	0.00
9.8. District heating plants	0.33	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.04
9.9. Gas supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	40.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	2.97	0.00	34.84	2.62
11. Statistical differences (7-8+1.2-9-10-13.1)	89.25	3.61	0.22	2.90	0.00	80.04	23.91	3.31	10.02	-25.32	-16.42	6.98	0.00	0.00	0.00	0.00
	89.25	3.61	0.22	2.90	0.00	80.04	23.91	3.31	10.02	-25.32	-16.42	6.98	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	867.86	19.01	10.54	20.29	47.86	0.00	59.40	18.16	165.39	14.37	49.83	35.68	13.05	0.00	403.28	11.02
13. Net domestic consumption	780.81	16.55	10.54	0.39	47.86	0.00	59.40	18.15	164.90	13.45	9.79	12.43	13.05	0.00	403.28	11.02
14. Manufacturing, mining and quarrying	272.61	16.54	10.48	0.39	18.01	0.00	0.00	0.07	10.52	8.04	7.67	8.77	12.35	0.00	178.62	1.14
14.1. Mining and quarrying	4.96	0.00	0.00	0.00	0.00	0.00	0.00	0.03	2.72	0.06	0.04	0.19	0.13	0.00	1.79	0.01
14.2. Manufacture of paper and paper products	36.93	0.00	0.00	0.00	12.77	0.00	0.00	0.00	0.15	4.03	0.11	0.12	0.14	0.00	19.61	0.00
14.3. Manufacture of industrial chemicals	55.87	5.80	2.63	0.00	0.58	0.00	0.00	0.00	0.38	1.19	2.55	3.50	11.63	0.00	27.07	0.54
14.4. Manufacture of iron, steel and ferro alloys	33.63	7.39	7.30	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.05	0.07	0.31	0.00	18.02	0.00
14.5. Manufacture of aluminium and other non-ferrous metals	86.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00	1.03	2.01	0.00	0.00	82.55	0.05
14.6. Other manufacturing industries	55.09	3.35	0.55	0.39	4.66	0.00	0.00	0.05	6.32	2.75	3.89	2.87	0.14	0.00	29.58	0.54
15. Transport	198.00	0.00	0.00	0.00	3.30	0.00	58.44	14.12	112.91	4.68	0.08	2.01	0.00	0.00	2.46	0.00
15.1. Railw ays and subw ays	3.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	2.46	0.00
15.2. Air transport	14.20	0.00	0.00	0.00	0.00	0.00	0.08	14.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	146.24	0.00	0.00	0.00	3.28	0.00	56.64	0.00	86.10	0.00	0.08	0.14	0.00	0.00	0.00	0.00
15.4. Coastal shipping	34.48	0.00	0.00	0.00	0.00	0.00	1.72	0.00	26.20	4.68	0.00	1.87	0.00	0.00	0.00	0.00
16. Other sectors	310.21	0.01	0.06	0.00	26.55	0.00	0.96	3.96	41.46	0.74	2.04	1.65	0.70	0.00	222.20	9.88
16.1. Fishing	17.19	0.00	0.00	0.00	0.00	0.00	0.21	0.00	16.16	0.14	0.00	0.04	0.00	0.00	0.64	0.00
16.2. Agriculture	14.00	0.00	0.00	0.00	0.05	0.00	0.01	0.01	5.92	0.04	0.27	0.63	0.00	0.00	7.05	0.01
16.3. Households	161.29	0.01	0.01	0.00	25.92	0.00	0.72	2.42	3.29	0.05	0.55	0.13	0.00	0.00	125.60	2.59
16.4. Other consumers	107.31	0.00	0.05	0.00	0.33	0.00	0.01	1.51	10.53	0.50	0.38	0.83	0.70	0.00	85.17	7.28
16.5 Construction	10.43	0.00	0.00	0.00	0.25	0.00	0.02	0.01	5.56	0.00	0.83	0.02	0.00	0.00	3.74	0.00
12. Consumption for non-energy purposes	87.04	2.45	0.00	19.89	0.00	0.00	0.00	0.00	0.49	0.92	40.04	23.25	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	62.98	0.00	0.00	1.23	0.00	0.00	0.00	0.00	0.25	0.00	38.26	23.25	0.00	0.00	0.00	0.00
12.2 Other manufacturing	24.06	2.45	0.00	18.66	0.00	0.00	0.00	0.00	0.25	0.92	1.78	0.00	0.00	0.00	0.00	0.00

Energy balance	**2009**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9047.59	74.20	0.00	0.00	53.71	4146.54	237.54	0.00	0.00	0.00	274.08	3804.12	0.00	457.39	0.00	0.00
1.1.2 Production of natural gas that is flared off	17.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.98	0.00	0.00	0.00	0.00
2. Imports	280.26	11.83	7.94	13.30	4.96	51.84	16.55	8.65	73.58	59.29	12.00	0.00	0.00	0.00	20.34	0.00
3. Exports	8187.11	67.35	0.00	0.05	0.07	3645.00	366.74	6.00	97.92	84.55	269.18	3597.57	0.00	0.00	52.68	0.00
4.1 Bunkering	23.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.35	8.94	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	14.96	0.00	0.00	0.00	0.00	0.00	0.00	14.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	23.95	-3.64	0.43	0.34	0.00	22.80	-0.32	0.38	2.17	-1.30	3.09	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1144.40	15.04	8.37	13.58	58.60	576.17	-112.97	-11.93	-36.52	-35.51	19.99	224.53	0.00	457.39	-32.34	0.00
8. Energy converted	1175.65	0.74	1.50	0.00	11.98	547.70	46.48	1.08	14.97	54.82	11.57	23.72	0.55	457.39	3.12	0.02
8.1. In blast furnaces	1.50	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	665.01	0.00	0.00	0.00	0.00	547.70	46.48	1.08	13.73	54.82	1.19	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	24.66	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.14	0.00	0.00	23.15	0.52	0.00	0.00	0.00
8.4. In dual purpose pow er plants	5.66	0.74	0.00	0.00	4.76	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.07	0.00
8.5. In district heating plants	11.38	0.00	0.00	0.00	6.36	0.00	0.00	0.00	1.00	0.00	0.34	0.57	0.03	0.00	3.06	0.02
8.6. In hydropow er plants	457.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	457.39	0.00	0.00
8.7. Other conversion	10.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.04	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1188.68	0.00	0.00	5.30	0.00	0.00	232.31	34.52	278.90	85.22	19.83	0.00	42.53	0.00	474.38	15.70
9. Consumption by energy sector	240.11	0.00	0.00	0.00	0.00	0.00	0.02	0.01	8.75	0.00	0.14	177.71	27.95	0.00	25.49	0.03
9.1.1 Crude petroleum and natural gas production	184.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.31	0.00	0.00	159.73	0.00	0.00	16.78	0.00
9.1.2 Natural gas w hich is flared off on oil fields	17.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.98	0.00	0.00	0.00	0.00
9.2. Coal mines	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.14	0.00
9.3. Petroleum refineries	30.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.14	0.00	27.95	0.00	2.06	0.00
9.4. Pumping storage pow er plants	4.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.09	0.00
9.5. Hydro electric pow er plants	2.31	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.05	0.00	0.00	0.00	0.00	0.00	2.24	0.00
9.6. Thermal pow er plants	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.08	0.00
9.7. Combined heat and pow er plants	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00
9.8. District heating plants	0.08	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03
9.9. Gas supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	37.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	2.72	0.00	31.06	3.22
11. Statistical differences (7-8+1.2-9-10-13.1)	54.40	0.31	-0.01	2.98	0.00	28.47	17.07	3.17	49.22	-17.81	-19.63	-9.39	0.00	0.00	0.00	0.00
	54.40	0.31	-0.01	2.98	0.00	28.47	17.07	3.17	49.22	-17.81	-19.63	-9.39	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	825.23	14.00	6.88	15.89	46.62	0.00	55.76	18.32	169.43	12.71	47.73	31.80	11.30	0.00	382.36	12.43
13. Net domestic consumption	749.25	12.31	6.88	0.34	46.62	0.00	55.76	18.32	168.94	11.79	9.00	13.21	11.30	0.00	382.36	12.43
14. Manufacturing, mining and quarrying	223.91	12.30	6.87	0.29	15.14	0.00	0.00	0.05	8.84	7.31	6.94	9.24	10.89	0.00	144.77	1.28
14.1. Mining and quarrying	3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.86	0.03	0.04	0.15	0.03	0.00	1.57	0.01
14.2. Manufacture of paper and paper products	30.62	0.00	0.00	0.00	9.68	0.00	0.00	0.00	0.39	3.65	0.13	0.03	0.12	0.00	16.62	0.00
14.3. Manufacture of industrial chemicals	48.25	3.80	1.45	0.00	0.52	0.00	0.00	0.00	0.63	1.23	3.00	4.50	10.33	0.00	22.32	0.47
14.4. Manufacture of iron, steel and ferro alloys	23.49	5.06	4.95	0.00	0.03	0.00	0.00	0.00	0.47	0.00	0.04	0.05	0.24	0.00	12.64	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	71.88	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.32	0.00	0.88	1.87	0.00	0.00	68.71	0.03
14.6. Other manufacturing industries	45.95	3.44	0.46	0.20	4.91	0.00	0.00	0.03	5.18	2.40	2.85	2.64	0.17	0.00	22.91	0.77
15. Transport	197.20	0.00	0.00	0.00	3.90	0.00	54.77	14.57	115.51	3.87	0.08	2.14	0.00	0.00	2.37	0.00
15.1. Railw ays and subw ays	2.99	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	2.37	0.00
15.2. Air transport	14.65	0.00	0.00	0.00	0.00	0.00	0.08	14.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	144.38	0.00	0.00	0.00	3.87	0.00	52.97	0.00	87.31	0.00	0.08	0.14	0.00	0.00	0.00	0.00
15.4. Coastal shipping	35.19	0.00	0.00	0.00	0.00	0.00	1.72	0.00	27.60	3.87	0.00	1.99	0.00	0.00	0.00	0.00
16. Other sectors	328.14	0.01	0.01	0.04	27.58	0.00	0.99	3.70	44.60	0.61	1.98	1.83	0.41	0.00	235.23	11.16
16.1. Fishing	19.63	0.00	0.00	0.00	0.00	0.00	0.22	0.01	18.57	0.11	0.00	0.00	0.00	0.00	0.72	0.00
16.2. Agriculture	13.85	0.00	0.00	0.00	0.15	0.00	0.01	0.01	5.75	0.00	0.28	0.69	0.00	0.00	6.96	0.02
16.3. Households	167.24	0.01	0.01	0.00	26.64	0.00	0.72	2.16	3.58	0.01	0.54	0.15	0.00	0.00	130.73	2.70
16.4. Other consumers	116.99	0.00	0.00	0.04	0.54	0.00	0.03	1.51	11.23	0.50	0.37	0.96	0.41	0.00	92.96	8.44
16.5 Construction	10.43	0.00	0.00	0.00	0.25	0.00	0.02	0.01	5.47	0.00	0.79	0.04	0.00	0.00	3.86	0.00
12. Consumption for non-energy purposes	75.98	1.69	0.00	15.55	0.00	0.00	0.00	0.00	0.49	0.92	38.73	18.59	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	56.56	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.25	0.00	36.95	18.59	0.00	0.00	0.00	0.00
12.2 Other manufacturing	19.42	1.69	0.00	14.78	0.00	0.00	0.00	0.00	0.25	0.92	1.78	0.00	0.00	0.00	0.00	0.00

Energy balance	**2010**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8720.82	54.37	0.00	0.00	62.84	3744.29	225.85	0.00	0.00	0.00	264.32	3944.24	0.00	424.91	0.00	0.00
1.1.2 Production of natural gas that is flared off	17.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.50	0.00	0.00	0.00	0.00
2. Imports	320.83	19.21	12.37	14.44	6.76	42.22	17.08	17.47	51.21	71.93	15.32	0.00	0.00	0.00	52.82	0.00
3. Exports	7759.76	47.53	0.10	0.69	0.28	3288.84	316.20	7.58	90.06	72.99	244.48	3665.37	0.00	0.00	25.64	0.00
4.1 Bunkering	19.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.75	7.67	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	17.20	0.00	0.00	0.00	0.00	0.00	0.00	17.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	9.43	-6.23	-0.13	0.14	0.00	2.13	8.45	-0.05	7.00	0.79	-2.67	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1272.21	19.83	12.14	13.89	69.33	499.80	-64.83	-7.35	-43.60	-7.94	32.49	296.37	0.00	424.91	27.18	0.00
8. Energy converted	1126.35	0.74	2.63	0.00	15.41	504.53	46.85	3.87	15.38	62.29	12.67	33.05	0.96	424.91	3.04	0.02
8.1. In blast furnaces	2.63	0.00	2.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	631.01	0.00	0.00	0.00	0.00	504.53	46.85	3.87	12.44	62.29	1.04	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	34.25	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.14	0.00	0.00	32.37	0.46	0.00	0.00	0.00
8.4. In dual purpose pow er plants	7.63	0.74	0.00	0.00	6.33	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.42	0.00	0.05	0.00
8.5. In district heating plants	14.84	0.00	0.00	0.00	7.81	0.00	0.00	0.00	2.72	0.00	0.54	0.68	0.08	0.00	2.99	0.02
8.6. In hydropow er plants	424.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	424.91	0.00	0.00
8.7. Other conversion	11.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.09	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1130.86	0.00	0.00	5.69	0.00	0.00	220.46	32.31	264.20	79.46	19.24	0.00	44.38	0.00	445.07	20.05
9. Consumption by energy sector	232.33	0.00	0.00	0.00	0.00	0.00	0.02	0.00	9.19	0.05	0.23	170.80	26.21	0.00	25.55	0.28
9.1.1 Crude petroleum and natural gas production	181.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.76	0.00	0.00	153.09	0.00	0.00	19.46	0.00
9.1.2 Natural gas w hich is flared off on oil fields	17.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.50	0.00	0.00	0.00	0.00
9.2. Coal mines	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.12	0.00
9.3. Petroleum refineries	28.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.23	0.00	26.21	0.00	1.84	0.25
9.4. Pumping storage pow er plants	2.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.07	0.00
9.5. Hydro electric pow er plants	1.96	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.05	0.00	0.00	0.00	0.00	0.00	1.89	0.00
9.6. Thermal pow er plants	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.09	0.00
9.7. Combined heat and pow er plants	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.04	0.00
9.8. District heating plants	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.03
9.9. Gas supply	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	42.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	4.20	0.00	34.16	3.67
11. Statistical differences (7-8+1.2-9-10-13.1)	116.13	0.71	1.05	2.86	0.00	-4.73	56.25	1.36	11.31	-1.27	-10.29	58.88	0.00	0.00	0.00	0.00
	116.13	0.71	1.05	2.86	0.00	-4.73	56.25	1.36	11.31	-1.27	-10.29	58.88	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	885.68	18.39	8.45	16.72	53.92	0.00	52.52	19.73	184.73	10.45	49.12	33.09	13.00	0.00	409.49	16.08
13. Net domestic consumption	808.39	16.19	8.45	0.69	53.92	0.00	52.52	19.73	184.73	10.45	9.50	13.65	13.00	0.00	409.49	16.08
14. Manufacturing, mining and quarrying	249.24	16.18	8.44	0.62	18.02	0.00	0.00	0.03	11.33	7.81	7.37	9.21	12.49	0.00	156.15	1.59
14.1. Mining and quarrying	4.76	0.00	0.00	0.00	0.00	0.00	0.00	0.02	2.42	0.03	0.05	0.17	0.04	0.00	2.01	0.01
14.2. Manufacture of paper and paper products	33.88	0.00	0.00	0.00	11.70	0.00	0.00	0.00	0.15	4.21	0.15	0.03	0.09	0.00	17.54	0.00
14.3. Manufacture of industrial chemicals	56.65	5.87	2.30	0.03	1.02	0.00	0.00	0.00	1.46	0.93	2.52	3.64	11.47	0.00	26.86	0.55
14.4. Manufacture of iron, steel and ferro alloys	30.31	7.02	5.70	0.06	0.08	0.00	0.00	0.00	0.30	0.00	0.05	0.05	0.70	0.00	16.35	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	72.09	0.00	0.00	0.10	0.01	0.00	0.00	0.00	0.48	0.00	1.17	3.13	0.00	0.00	67.16	0.04
14.6. Other manufacturing industries	51.56	3.29	0.45	0.43	5.20	0.00	0.00	0.01	6.51	2.63	3.43	2.19	0.19	0.00	26.22	0.99
15. Transport	205.03	0.00	0.00	0.00	4.76	0.00	51.52	15.42	125.96	2.46	0.08	2.36	0.00	0.00	2.47	0.00
15.1. Railw ays and subw ays	3.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	2.47	0.00
15.2. Air transport	15.50	0.00	0.00	0.00	0.00	0.00	0.08	15.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	150.18	0.00	0.00	0.00	4.18	0.00	49.72	0.00	96.00	0.00	0.08	0.19	0.00	0.00	0.00	0.00
15.4. Coastal shipping	36.33	0.00	0.00	0.00	0.55	0.00	1.72	0.00	29.43	2.46	0.00	2.17	0.00	0.00	0.00	0.00
16. Other sectors	354.12	0.01	0.01	0.07	31.14	0.00	0.99	4.28	47.44	0.19	2.05	2.08	0.51	0.00	250.87	14.49
16.1. Fishing	20.39	0.00	0.00	0.00	0.00	0.00	0.22	0.01	19.35	0.09	0.00	0.00	0.00	0.00	0.72	0.00
16.2. Agriculture	14.32	0.00	0.00	0.00	0.18	0.00	0.01	0.02	5.75	0.00	0.30	0.82	0.00	0.00	7.23	0.01
16.3. Households	185.28	0.01	0.01	0.00	29.80	0.00	0.72	2.66	4.34	0.01	0.57	0.17	0.00	0.00	143.11	3.90
16.4. Other consumers	123.37	0.00	0.00	0.07	0.90	0.00	0.02	1.59	12.54	0.09	0.39	1.08	0.51	0.00	95.59	10.58
16.5 Construction	10.76	0.00	0.00	0.00	0.26	0.00	0.02	0.01	5.45	0.00	0.80	0.02	0.00	0.00	4.21	0.00
12. Consumption for non-energy purposes	77.28	2.19	0.00	16.03	0.00	0.00	0.00	0.00	0.00	0.00	39.62	19.44	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	60.17	0.00	0.00	1.17	0.00	0.00	0.00	0.00	0.00	0.00	39.56	19.44	0.00	0.00	0.00	0.00
12.2 Other manufacturing	17.12	2.19	0.00	14.86	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00

Energy balance	**2011**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8328.15	38.96	0.00	0.00	66.31	3490.87	212.24	0.00	0.00	0.00	310.35	3767.21	0.00	442.21	0.00	0.00
1.1.2 Production of natural gas that is flared off	17.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.17	0.00	0.00	0.00	0.00
2. Imports	295.96	19.91	13.02	12.92	7.42	48.20	15.78	19.19	52.20	55.71	11.02	0.05	0.00	0.00	40.52	0.00
3. Exports	7429.18	42.26	0.00	1.06	3.78	2907.29	373.90	10.00	129.03	76.10	259.23	3574.94	0.00	0.00	51.58	0.00
4.1 Bunkering	20.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.66	8.52	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	16.04	0.00	0.00	0.00	0.00	0.00	0.00	16.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-20.82	5.24	0.55	-1.80	0.00	-19.03	1.43	-0.09	-10.27	2.50	0.66	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1155.05	21.85	13.57	10.06	69.95	612.75	-144.45	-6.95	-98.76	-26.41	62.81	209.48	0.00	442.21	-11.07	0.00
8. Energy converted	1212.66	1.82	2.71	0.00	17.61	563.27	50.20	8.74	28.61	52.48	12.29	26.56	3.59	442.21	2.53	0.04
8.1. In blast furnaces	3.82	1.11	2.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	702.55	0.00	0.00	0.00	0.00	563.27	50.20	8.74	26.95	52.48	0.90	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	27.92	0.00	0.00	0.00	1.29	0.00	0.00	0.00	0.13	0.00	0.00	25.89	0.61	0.00	0.00	0.00
8.4. In dual purpose pow er plants	12.40	0.71	0.00	0.00	8.63	0.00	0.00	0.00	0.14	0.00	0.00	0.00	2.88	0.00	0.04	0.00
8.5. In district heating plants	12.65	0.00	0.00	0.00	7.70	0.00	0.00	0.00	1.39	0.00	0.28	0.66	0.09	0.00	2.49	0.04
8.6. In hydropow er plants	442.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	442.21	0.00	0.00
8.7. Other conversion	11.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.10	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1215.29	0.00	0.00	7.48	0.00	0.00	239.44	36.52	313.29	74.83	19.85	0.00	44.74	0.00	459.47	19.68
9. Consumption by energy sector	229.56	0.00	0.00	0.00	0.00	0.00	0.02	0.00	9.69	0.00	0.14	165.05	23.69	0.00	30.15	0.82
9.1.1 Crude petroleum and natural gas production	176.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.27	0.00	0.00	147.89	0.00	0.00	19.47	0.00
9.1.2 Natural gas w hich is flared off on oil fields	17.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.17	0.00	0.00	0.00	0.00
9.2. Coal mines	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.13	0.00
9.3. Petroleum refineries	26.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.14	0.00	23.69	0.00	1.98	0.78
9.4. Pumping storage pow er plants	6.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.51	0.00
9.5. Hydro electric pow er plants	1.85	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.00	0.00	0.00	1.77	0.00
9.6. Thermal pow er plants	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00
9.7. Combined heat and pow er plants	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.12	0.00
9.8. District heating plants	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.04
9.9. Gas supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	34.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	3.25	0.00	26.15	4.74
11. Statistical differences (7-8+1.2-9-10-13.1)	34.62	1.81	2.37	0.47	0.00	49.48	-3.21	1.03	-8.69	-13.03	22.16	-17.76	0.00	0.00	0.00	0.00
	34.62	1.81	2.37	0.47	0.00	49.48	-3.21	1.03	-8.69	-13.03	22.16	-17.76	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	858.85	18.23	8.50	17.08	52.34	0.00	47.98	19.79	184.92	8.96	48.07	35.10	14.22	0.00	389.57	14.08
13. Net domestic consumption	780.34	16.04	8.50	0.59	52.34	0.00	47.98	19.79	184.92	8.96	9.30	14.03	14.22	0.00	389.57	14.08
14. Manufacturing, mining and quarrying	249.51	16.03	8.40	0.59	19.94	0.00	0.00	0.03	10.87	6.47	7.23	9.73	13.72	0.00	155.10	1.41
14.1. Mining and quarrying	5.35	0.00	0.00	0.00	0.02	0.00	0.00	0.02	2.82	0.00	0.10	0.18	0.00	0.00	2.19	0.00
14.2. Manufacture of paper and paper products	32.44	0.00	0.00	0.00	13.37	0.00	0.00	0.00	0.13	2.95	0.10	0.09	0.12	0.00	15.67	0.00
14.3. Manufacture of industrial chemicals	56.79	6.29	2.04	0.07	0.89	0.00	0.00	0.00	1.62	0.91	2.66	3.66	11.67	0.00	26.51	0.48
14.4. Manufacture of iron, steel and ferro alloys	32.86	6.53	5.95	0.12	0.11	0.00	0.00	0.00	0.26	0.00	0.07	0.04	1.72	0.00	18.05	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	70.76	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.33	0.00	0.84	1.92	0.00	0.00	67.57	0.03
14.6. Other manufacturing industries	51.31	3.21	0.42	0.35	5.53	0.00	0.00	0.01	5.71	2.60	3.45	3.83	0.20	0.00	25.10	0.89
15. Transport	205.50	0.00	0.00	0.00	4.72	0.00	46.98	16.34	129.90	2.30	0.08	2.69	0.03	0.00	2.46	0.00
15.1. Railw ays and subw ays	2.98	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	2.46	0.00
15.2. Air transport	16.42	0.00	0.00	0.00	0.00	0.00	0.08	16.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	148.70	0.00	0.00	0.00	4.70	0.00	45.18	0.00	98.50	0.00	0.08	0.21	0.03	0.00	0.00	0.00
15.4. Coastal shipping	37.40	0.00	0.00	0.00	0.00	0.00	1.72	0.00	30.90	2.30	0.00	2.48	0.00	0.00	0.00	0.00
16. Other sectors	325.33	0.01	0.10	0.00	27.67	0.00	1.00	3.42	44.15	0.20	1.99	1.62	0.47	0.00	232.01	12.67
16.1. Fishing	20.86	0.00	0.00	0.00	0.00	0.00	0.23	0.01	19.79	0.11	0.00	0.00	0.00	0.00	0.72	0.00
16.2. Agriculture	13.32	0.00	0.00	0.00	0.18	0.00	0.01	0.01	5.77	0.00	0.24	0.61	0.00	0.00	6.49	0.01
16.3. Households	165.41	0.01	0.01	0.00	26.31	0.00	0.72	1.89	3.14	0.00	0.57	0.14	0.00	0.00	129.78	2.84
16.4. Other consumers	115.19	0.00	0.09	0.00	0.93	0.00	0.03	1.51	10.05	0.09	0.36	0.85	0.47	0.00	90.99	9.82
16.5 Construction	10.54	0.00	0.00	0.00	0.26	0.00	0.02	0.01	5.39	0.00	0.82	0.03	0.00	0.00	4.02	0.00
12. Consumption for non-energy purposes	78.51	2.19	0.00	16.49	0.00	0.00	0.00	0.00	0.00	0.00	38.77	21.07	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	60.85	0.00	0.00	1.07	0.00	0.00	0.00	0.00	0.00	0.00	38.71	21.07	0.00	0.00	0.00	0.00
12.2 Other manufacturing	17.66	2.19	0.00	15.41	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00

Energy balance	**2012**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8586.94	34.53	0.00	0.00	65.61	3186.16	218.78	0.00	0.00	0.00	335.98	4226.19	0.00	519.69	0.00	0.00
1.1.2 Production of natural gas that is flared off	16.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.41	0.00	0.00	0.00	0.00
2. Imports	282.38	20.32	13.37	13.24	7.08	49.42	19.17	21.68	63.13	48.84	11.02	0.02	0.00	0.00	15.09	0.00
3. Exports	7673.77	35.78	0.05	0.80	3.44	2671.97	371.43	14.99	108.89	67.18	292.03	4027.99	0.00	0.00	79.22	0.00
4.1 Bunkering	19.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.62	6.87	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Foreign aviation	18.86	0.00	0.00	0.00	0.00	0.00	0.00	18.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Changes in stocks (+ net decrease, - net increase)	-12.32	2.13	-0.23	0.69	0.00	-3.93	-6.71	0.82	-3.81	0.65	-1.93	0.00	0.00	0.00	0.00	0.00
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1161.28	21.21	13.09	13.13	69.24	559.68	-140.19	-11.35	-62.19	-24.57	53.04	214.63	0.00	519.69	-64.14	0.00
8. Energy converted	1275.77	1.61	2.62	0.00	20.22	551.62	60.47	9.05	24.16	50.51	10.67	17.21	4.53	519.69	3.37	0.03
8.1. In blast furnaces	3.62	1.00	2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.2. In crude petroleum refineries	695.53	0.00	0.00	0.00	0.00	551.62	60.47	9.05	23.34	50.51	0.55	0.00	0.00	0.00	0.00	0.00
8.3. In thermal pow er plants	18.47	0.00	0.00	0.00	0.91	0.00	0.00	0.00	0.16	0.00	0.00	16.59	0.81	0.00	0.00	0.00
8.4. In dual purpose pow er plants	14.40	0.61	0.00	0.00	9.98	0.00	0.00	0.00	0.12	0.00	0.00	0.00	3.66	0.00	0.02	0.00
8.5. In district heating plants	14.22	0.00	0.00	0.00	9.33	0.00	0.00	0.00	0.54	0.00	0.28	0.62	0.06	0.00	3.36	0.03
8.6. In hydropow er plants	519.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	519.69	0.00	0.00
8.7. Other conversion	9.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.84	0.00	0.00	0.00	0.00	0.00
1.2. Production of derived energy bearers	1274.12	0.00	0.00	5.42	0.00	0.00	250.43	40.48	294.79	67.07	20.48	0.00	43.26	0.00	531.78	20.43
9. Consumption by energy sector	233.67	0.00	0.00	0.00	0.00	0.00	0.01	0.00	9.27	0.00	0.12	167.90	23.04	0.00	33.02	0.31
9.1.1 Crude petroleum and natural gas production	183.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.95	0.00	0.00	151.49	0.00	0.00	23.23	0.00
9.1.2 Natural gas w hich is flared off on oil fields	16.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.41	0.00	0.00	0.00	0.00
9.2. Coal mines	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.14	0.00
9.3. Petroleum refineries	25.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.12	0.00	23.04	0.00	1.93	0.26
9.4. Pumping storage pow er plants	5.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.53	0.00
9.5. Hydro electric pow er plants	1.89	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	1.84	0.00
9.6. Thermal pow er plants	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
9.7. Combined heat and pow er plants	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00
9.8. District heating plants	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.05
9.9. Gas supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Losses in transport and distribution	40.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	2.55	0.00	32.75	4.27
11. Statistical differences (7-8+1.2-9-10-13.1)	22.16	0.26	2.01	0.70	0.00	8.06	4.98	0.31	10.21	-15.63	17.69	-6.44	0.00	0.00	0.00	0.00
	22.16	0.26	2.01	0.70	0.00	8.06	4.98	0.31	10.21	-15.63	17.69	-6.44	0.00	0.00	0.00	0.00
13.1 Net domestic consumption including non-energy use	863.37	19.34	8.46	17.85	49.02	0.00	44.77	19.77	188.96	7.62	45.04	35.09	13.13	0.00	398.50	15.82
13. Net domestic consumption	789.03	16.94	8.46	0.87	49.02	0.00	44.77	19.77	188.96	7.62	8.30	16.87	13.13	0.00	398.50	15.82
14. Manufacturing, mining and quarrying	238.93	16.93	8.45	0.73	14.73	0.00	0.00	0.03	8.49	5.24	6.37	11.50	12.69	0.00	152.11	1.66
14.1. Mining and quarrying	4.99	0.00	0.00	0.00	0.04	0.00	0.00	0.02	2.60	0.00	0.09	0.17	0.00	0.00	2.07	0.01
14.2. Manufacture of paper and paper products	24.55	0.00	0.00	0.00	7.70	0.00	0.00	0.00	0.08	2.08	0.02	0.23	0.17	0.00	14.27	0.00
14.3. Manufacture of industrial chemicals	54.75	7.33	1.99	0.14	1.49	0.00	0.00	0.00	0.56	0.44	2.71	4.16	10.61	0.00	24.89	0.42
14.4. Manufacture of iron, steel and ferro alloys	32.47	6.39	6.05	0.16	0.11	0.00	0.00	0.00	0.26	0.00	0.04	0.04	1.70	0.00	17.70	0.01
14.5. Manufacture of aluminium and other non-ferrous metals	71.10	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.27	0.00	0.64	1.61	0.00	0.00	68.47	0.06
14.6. Other manufacturing industries	51.07	3.20	0.40	0.39	5.38	0.00	0.00	0.01	4.73	2.72	2.88	5.27	0.21	0.00	24.72	1.16
15. Transport	209.05	0.00	0.00	0.00	5.43	0.00	43.75	16.73	135.17	1.76	0.08	3.66	0.04	0.00	2.44	0.00
15.1. Railw ays and subw ays	3.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.00	2.44	0.00
15.2. Air transport	16.80	0.00	0.00	0.00	0.00	0.00	0.07	16.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.3. Road transport	152.17	0.00	0.00	0.00	5.40	0.00	41.96	0.00	104.21	0.00	0.08	0.48	0.04	0.00	0.00	0.00
15.4. Coastal shipping	37.08	0.00	0.00	0.00	0.00	0.00	1.72	0.00	30.42	1.76	0.00	3.17	0.00	0.00	0.00	0.00
16. Other sectors	341.05	0.01	0.01	0.13	28.87	0.00	1.02	3.01	45.30	0.62	1.85	1.72	0.40	0.00	243.95	14.16
16.1. Fishing	22.35	0.00	0.00	0.00	0.00	0.00	0.25	0.01	20.91	0.46	0.00	0.00	0.00	0.00	0.72	0.00
16.2. Agriculture	13.56	0.00	0.00	0.00	0.20	0.00	0.01	0.01	5.67	0.00	0.21	0.65	0.00	0.00	6.80	0.02
16.3. Households	173.91	0.01	0.01	0.00	27.38	0.00	0.72	1.30	2.78	0.00	0.42	0.15	0.00	0.00	137.72	3.42
16.4. Other consumers	119.78	0.00	0.00	0.13	1.01	0.00	0.03	1.67	10.14	0.16	0.36	0.89	0.40	0.00	94.26	10.72
16.5 Construction	11.45	0.00	0.00	0.00	0.28	0.00	0.02	0.01	5.80	0.00	0.86	0.04	0.00	0.00	4.45	0.00
12. Consumption for non-energy purposes	74.34	2.40	0.00	16.98	0.00	0.00	0.00	0.00	0.00	0.00	36.74	18.22	0.00	0.00	0.00	0.00
12.1 Manufacture of industrial chemicals	55.56	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	36.68	18.22	0.00	0.00	0.00	0.00
12.2 Other manufacturing	18.77	2.40	0.00	16.32	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00

Energy balance	**2013**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8 153	52	-	-	59	3 024	200	-	-	-	339	4 009	-	470	-	-
1.1.2 Production of natural gas that is flared off	18	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-
2. Imports	347	18	12	13	7	77	11	25	55	81	11	-	-	-	36	-
3. Exports	7 250	58	0	2	2	2 516	340	16	115	78	299	3 770	-	-	55	-
4.1 Bunkering	19	-	-	-	-	-	-	-	10	9	-	-	-	-	-	-
4.2 Foreign aviation	21	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	4	8	0	1	-	-4	-1	-1	-1	0	1	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 232	20	12	12	65	580	-129	-12	-71	-6	52	256	-	470	-18	-
8. Energy converted	1 257	2	3	-	21	566	54	5	29	72	12	16	5	470	4	0
8.1. In blast furnaces	4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	725	-	-	-	-	566	54	5	28	72	1	-	-	-	-	-
8.3. In thermal pow er plants	17	-	-	-	1	-	-	-	0	-	-	15	1	-	-	-
8.4. In dual purpose pow er plants	15	1	-	-	11	-	-	-	0	-	0	0	4	-	0	-
8.5. In district heating plants	14	-	-	-	9	-	-	-	1	-	0	1	0	-	4	0
8.6. In hydropow er plants	470	-	-	-	-	-	-	-	-	-	-	-	-	470	-	-
8.7. Other conversion	11	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-
1.2. Production of derived energy bearers	1 272	-	-	7	-	-	256	39	318	72	25	-	50	-	482	22
9. Consumption by energy sector	237	-	-	-	-	-	0	-	12	-	0	167	28	-	30	0
9.1.1 Crude petroleum and natural gas production	183	-	-	-	-	-	-	-	12	-	-	149	-	-	22	-
9.1.2 Natural gas w hich is flared off on oil fields	18	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-
9.2. Coal mines	0	-	-	-	-	-	-	-	0	-	-	-	-	-	0	-
9.3. Petroleum refineries	30	-	-	-	-	-	0	-	0	-	0	-	28	-	2	-
9.4. Pumping storage pow er plants	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	0	-	0	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	0	-	-	-	-	0	-	-	0	-
9.8. District heating plants	0	-	-	-	-	-	0	-	0	-	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	36	-	-	-	-	-	-	-	-	-	-	1	2	-	29	5
11. Statistical differences (7-8+1.2-9-10-13.1)	109	-1	2	1	-0	15	32	2	20	-12	16	36	-	-	0	-0
13.1 Net domestic consumption including non-energy use	865	20	8	19	44	-	42	20	187	6	49	38	14	-	402	18
13. Net domestic consumption	784	18	8	1	44	-	42	20	187	6	7	18	14	-	402	18
14. Manufacturing, mining and quarrying	239	18	8	1	15	-	-	0	9	5	6	11	14	-	151	2
14.1. Mining and quarrying	5	-	-	-	0	-	-	0	3	-	0	0	-	-	2	0
14.2. Manufacture of paper and paper products	21	-	-	-	7	-	-	-	0	1	0	0	0	-	12	0
14.3. Manufacture of industrial chemicals	56	7	2	0	2	-	-	0	0	1	2	5	12	-	25	0
14.4. Manufacture of iron, steel and ferro alloys	33	7	5	0	0	-	-	-	0	0	0	0	2	-	18	0
14.5. Manufacture of aluminium and other non-ferrous metals	72	-	-	0	0	-	-	-	0	-	1	2	-	-	69	0
14.6. Other manufacturing industries	52	3	0	0	6	-	-	0	5	3	3	5	0	-	25	1
15. Transport	207	-	-	-	5	-	41	17	136	0	0	4	0	-	3	-
15.1. Railw ays and subw ays	3	-	-	-	0	-	-	-	1	-	-	-	-	-	3	-
15.2. Air transport	17	-	-	-	-	-	0	17	-	-	-	-	-	-	-	-
15.3. Road transport	153	-	-	-	5	-	39	-	109	-	0	1	0	-	-	-
15.4. Coastal shipping	33	-	-	-	-	-	2	-	27	0	-	4	-	-	-	-
16. Other sectors	338	0	0	0	24	-	1	3	41	1	2	2	0	-	248	16
16.1. Fishing	19	-	-	-	-	-	0	0	17	1	-	-	-	-	1	-
16.2. Agriculture	13	-	-	-	0	-	0	0	6	-	0	1	-	-	7	0
16.3. Households	172	0	0	-	22	-	1	2	3	-	0	0	0	-	140	4
16.4. Other consumers	122	0	-	0	1	-	0	2	10	0	0	1	0	-	96	12
16.5 Construction	12	-	-	-	0	-	0	0	6	-	1	0	-	-	5	-
12. Consumption for non-energy purposes	82	2	-	18	-	-	-	-	0	-	42	20	-	-	-	-
12.1 Manufacture of industrial chemicals	62	-	-	1	-	-	-	-	-	-	42	20	-	-	-	-
12.2 Other manufacturing	19	2	-	17	-	-	-	-	0	-	0	-	-	-	-	-

Energy balance	**2014**															
PJ																
	Total	Coal	Coke	Petrol coke	Fuel w ood, black liquor, w aste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Natural gas	Other gases	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8 224	47	-	-	53	3 113	177	-	-	-	349	3 985	-	500	-	-
1.1.2 Production of natural gas that is flared off	15	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-
2. Imports	274	21	13	14	7	50	17	23	47	48	10	-	-	-	23	-
3. Exports	7 353	45	-	2	1	2 618	341	6	119	64	307	3 770	-	-	79	-
4.1 Bunkering	15	-	-	-	-	-	-	-	9	6	-	-	-	-	-	-
4.2 Foreign aviation	21	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	26	-1	0	-0	-	16	6	2	-0	1	2	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 150	23	13	11	59	561	-140	-1	-81	-22	54	230	-	500	-56	-
8. Energy converted	1 216	2	3	-	23	535	48	6	29	34	12	17	5	500	3	0
8.1. In blast furnaces	4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	652	-	-	-	-	535	48	6	28	34	1	-	-	-	-	-
8.3. In thermal pow er plants	17	-	-	-	-	-	-	-	0	-	-	16	1	-	-	-
8.4. In dual purpose pow er plants	14	1	-	-	9	-	-	-	0	-	0	0	4	-	0	-
8.5. In district heating plants	18	-	-	-	13	-	-	-	0	-	0	0	0	-	3	0
8.6. In hydropow er plants	500	-	-	-	-	-	-	-	-	-	-	-	-	500	-	-
8.7. Other conversion	11	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-
1.2. Production of derived energy bearers	1 235	-	-	7	-	-	221	32	303	73	20	-	45	-	512	23
9. Consumption by energy sector	242	-	-	-	-	-	0	-	11	-	0	175	24	-	32	0
9.1.1 Crude petroleum and natural gas production	194	-	-	-	-	-	-	-	11	-	-	159	-	-	24	-
9.1.2 Natural gas w hich is flared off on oil fields	15	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-
9.2. Coal mines	1	-	-	-	-	-	-	-	0	-	-	-	-	-	0	-
9.3. Petroleum refineries	26	-	-	-	-	-	0	-	0	-	0	-	24	-	2	-
9.4. Pumping storage pow er plants	4	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	0	-	0	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	0	-	-	0	-	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	0	-	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	39	-	-	-	-	-	-	-	-	-	-	0	2	-	31	6
11. Statistical differences (7-8+1.2-9-10-13.1)	56	-0	3	1	-	26	-7	6	4	12	14	-1	0	-	0	-
13.1 Net domestic consumption including non-energy use	833	21	7	17	36	-	40	20	178	6	47	39	14	-	390	17
13. Net domestic consumption	753	19	7	1	36	-	40	20	178	6	7	18	14	-	390	17
14. Manufacturing, mining and quarrying	240	19	7	1	10	-	-	0	8	4	5	11	14	-	159	2
14.1. Mining and quarrying	5	-	-	-	-	-	-	0	2	0	0	0	-	-	2	0
14.2. Manufacture of paper and paper products	16	-	-	-	2	-	-	-	0	1	0	1	0	-	12	0
14.3. Manufacture of industrial chemicals	59	8	2	-	3	-	-	0	1	1	2	4	12	-	26	1
14.4. Manufacture of iron, steel and ferro alloys	34	8	5	1	0	-	-	-	0	-	0	0	2	-	19	0
14.5. Manufacture of aluminium and other non-ferrous metals	73	-	-	0	0	-	-	-	0	-	1	2	-	-	71	0
14.6. Other manufacturing industries	52	3	0	0	5	-	-	0	4	3	3	4	0	-	28	1
15. Transport	203	-	-	-	5	-	39	17	133	1	0	5	0	-	3	-
15.1. Railw ays and subw ays	3	-	-	-	0	-	-	-	1	-	-	-	-	-	3	-
15.2. Air transport	17	-	-	-	-	-	0	17	-	-	-	-	-	-	-	-
15.3. Road transport	152	-	-	-	5	-	37	-	109	-	0	1	0	-	-	-
15.4. Coastal shipping	31	-	-	-	-	-	2	-	23	1	-	4	-	-	-	-
16. Other sectors	310	0	0	0	21	-	1	3	37	1	2	2	0	-	229	15
16.1. Fishing	17	-	-	-	-	-	0	0	15	0	-	-	-	-	1	-
16.2. Agriculture	13	-	-	-	0	-	0	0	6	-	0	1	-	-	6	0
16.3. Households	161	0	0	-	19	-	1	1	2	-	0	0	0	-	134	4
16.4. Other consumers	108	0	-	0	1	-	0	2	8	0	0	1	0	-	84	11
16.5 Construction	12	-	-	-	0	-	0	0	6	-	1	0	-	-	5	-
12. Consumption for non-energy purposes	80	2	-	16	-	-	-	-	0	-	40	22	-	-	-	-
12.1 Manufacture of industrial chemicals	63	-	-	1	-	-	-	-	-	-	40	22	-	-	-	-
12.2 Other manufacturing	17	2	-	15	-	-	-	-	0	-	0	-	-	-	-	-

Part 2: More detailed energy balance sheets for 2008-2014

Footnotes to Part II

Blast furnace gas:
Included in "Other gases" in the regular tables.

Fuel wood:
Included in "Fuel wood, black liquor, waste" in the regular tables.

Other biomass:
Includes wood waste, black liquor, wood pellets and briquettes, landfill gas and other biogases, transport biofuels.
Excludes fuel wood and biomass fractions of municipal waste and hazardous waste.

Included in "Fuel wood, black liquor, waste" in the regular tables.

Waste:
Includes municipal, industrial and hazardous waste. Excludes wood waste and black liquor.
Included in "Fuel wood, black liquor, waste" and "Heavy fuel oil" (for hazardous waste) in the regular tables.

Heavy fuel oil:
Excludes hazardous waste (which is included with heavy fuel oil in the regular tables).

Refinery gas and fuel gas:
Included in "Other gases" in the regular tables.

Refineries: Coke burn-off and calcining:
Included in "Other gases" in the regular tables.

Energy balance	**2008**																			
PJ																				
Footnotes, seepage 28 of Annex III																				
	Total	Coal	Coke	Blast furnace gas	Petrol coke	Fuelw ood	Other biomass	Waste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Refinery gas and fuel gas	Refineries: Coke burn-off and calcining	Natural gas	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9 184	96	-	-	-	21	25	9	4 383	211	-	-	-	280	-	-	3 652	507	-	-
1.1.2 Production of natural gas that is flared off	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	-	-	-
2. Imports	240	18	13	-	17	5	-	-	35	20	11	41	60	8	-	-	-	-	12	-
3. Exports	8 163	94	-	-	0	0	-	-	3 771	311	12	105	111	259	-	-	3 438	-	62	-
4.1 Bunkering	27	-	-	-	-	-	-	-	-	-	-	16	11	-	-	-	-	-	-	-
4.2 Foreign aviation	16	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	-16	3	-0	-	-0	-	-	-	-17	-1	-1	1	-1	1	-	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 236	23	13	-	17	26	25	9	631	-80	-18	-80	-63	30	-	-	247	507	-50	-
8. Energy converted	1 200	1	2	0	-	-	4	7	551	44	0	16	47	13	-	-	3	507	2	0
8.1. In blast furnaces	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	660	-	-	-	-	-	-	-	551	44	0	16	47	1	-	-	-	-	-	-
8.3. In thermal pow er plants	5	-	-	0	-	-	2	-	-	-	-	0	-	-	-	-	3	-	-	-
8.4. In dual purpose pow er plants	5	1	-	-	-	-	-	4	-	-	-	0	-	-	-	-	-	-	0	-
8.5. In district heating plants	10	-	-	0	-	-	3	3	-	-	-	1	-	0	-	-	1	-	2	0
8.6. In hydropow er plants	507	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	507	-	-
8.7. Other conversion	11	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-
1.2. Production of derived energy bearers	1 218	-	-	2	6	-	2	4	-	208	40	279	96	16	32	8	-	-	512	14
9. Consumption by energy sector	256	-	-	-	-	-	-	-	-	0	-	8	-	0	19	8	201	-	21	0
9.1.1 Crude petroleum and natural gas production	186	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	168	-	12	-
9.1.2 Natural gas w hich is flared off on oil fields	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	-	-	-
9.2. Coal mines	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.3. Petroleum refineries	29	-	-	-	-	-	-	-	-	0	-	0	-	-	19	8	-	-	2	-
9.4. Pumping storage pow er plants	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	-	0	-	0	-	0	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	41	-	-	0	-	-	1	-	-	-	-	-	-	-	2	-	0	-	35	3
11. Statistical differences (7-8+1.2-9-10-13.1)	89	4	0	-	3	-	0	-	80	24	3	10	-25	-16	-0	-	7	-	-0	0
				-		-	-	-					-		-	-				
13.1 Net domestic consumption including non-energy use	868	19	11	1	20	26	21	5	-	59	18	165	11	50	11	-	36	-	403	11
13. Net domestic consumption	781	17	11	1	0	26	21	5	-	59	18	165	10	10	11	-	12	-	403	11
14. Manufacturing, mining and quarrying	273	17	10	1	0	-	16	5	-	-	0	11	5	8	11	-	9	-	179	1
14.1. Mining and quarrying	5	-	-	-	-	-	0	0	-	-	0	3	-	0	0	-	0	-	2	0
14.2. Manufacture of paper and paper products	37	-	-	-	-	-	13	1	-	-	-	0	3	0	-	-	0	-	20	-
14.3. Manufacture of industrial chemicals	56	6	3	1	-	-	0	-	-	-	0	0	1	3	11	-	4	-	27	1
14.4. Manufacture of iron, steel and ferro alloys	34	7	7	0	-	-	-	-	-	-	-	0	-	0	-	-	0	-	18	0
14.5. Manufacture of aluminium and other non-ferrous metals	86	-	-	-	-	-	-	-	-	-	-	0	-	1	-	-	2	-	83	0
14.6. Other manufacturing industries	55	3	1	0	0	-	3	4	-	-	0	6	0	4	-	-	3	-	30	1
15. Transport	198	-	-	-	-	-	3	-	-	58	14	113	5	0	-	-	2	-	2	-
15.1. Railw ays and subw ays	3	-	-	-	-	-	0	-	-	-	-	1	-	-	-	-	-	-	2	-
15.2. Air transport	14	-	-	-	-	-	-	-	-	0	14	-	-	-	-	-	-	-	-	-
15.3. Road transport	146	-	-	-	-	-	3	-	-	57	-	86	-	0	-	-	0	-	-	-
15.4. Coastal shipping	34	-	-	-	-	-	-	-	-	2	-	26	5	-	-	-	2	-	-	-
16. Other sectors	310	0	0	-	-	26	1	1	-	1	4	41	0	2	-	-	2	-	222	10
16.1. Fishing	17	-	-	-	-	-	-	-	-	0	0	16	0	-	-	-	0	-	1	-
16.2. Agriculture	14	-	-	-	-	-	0	0	-	0	0	6	-	0	-	-	1	-	7	0
16.3. Households	161	0	0	-	-	26	-	-	-	1	2	3	0	1	-	-	0	-	126	3
16.4. Other consumers	107	0	0	-	-	-	1	1	-	0	2	11	-	0	-	-	1	-	85	7
16.5 Construction	10	-	-	-	-	-	0	0	-	0	0	6	-	1	-	-	0	-	4	-
12. Consumption for non-energy purposes	87	2	-	-	20	-	-	-	-	-	0	0	1	40	-	-	23	-	-	-
12.1 Manufacture of industrial chemicals	63	-	-	-	1	-	-	-	-	-	-	0	-	38	-	-	23	-	-	-
12.2 Other manufacturing	24	2	-	-	19	-	-	-	-	-	0	0	1	2	-	-	-	-	-	-

Energy balance	**2009**																			
PJ																				
Footnotes, seepage 28 of Annex III																				
	Total	Coal	Coke	Blast furnace gas	Petrol coke	Fuelw ood	Other biomass	Waste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Refinery gas and fuel gas	Refineries: Coke burn-off and calcining	Natural gas	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	9 048	74	-	-	-	22	22	10	4 147	238	-	-	-	274	-	-	3 804	457	-	-
1.1.2 Production of natural gas that is flared off	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-
2. Imports	280	12	8	-	13	5	-	-	52	17	9	74	59	12	-	-	-	-	20	-
3. Exports	8 187	67	-	-	0	0	-	-	3 645	367	6	98	85	269	-	-	3 598	-	53	-
4.1 Bunkering	23	-	-	-	-	-	-	-	-	-	-	14	9	-	-	-	-	-	-	-
4.2 Foreign aviation	15	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	24	-4	0	-	0	-	-	-	23	-0	0	2	-1	3	-	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 144	15	8	-	14	27	22	10	576	-113	-12	-37	-36	20	-	-	225	457	-32	-
8. Energy converted	1 176	1	2	0	-	-	4	8	548	46	1	15	55	12	-	-	24	457	3	0
8.1. In blast furnaces	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	665	-	-	-	-	-	-	-	548	46	1	14	55	1	-	-	-	-	-	-
8.3. In thermal pow er plants	25	-	-	0	-	-	1	-	-	-	-	0	-	-	-	-	23	-	-	-
8.4. In dual purpose pow er plants	6	1	-	-	-	-	-	5	-	-	-	0	-	-	-	-	-	-	0	-
8.5. In district heating plants	11	-	-	0	-	-	3	3	-	-	-	1	-	0	-	-	1	-	3	0
8.6. In hydropow er plants	457	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	457	-	-
8.7. Other conversion	10	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-
1.2. Production of derived energy bearers	1 189	-	-	1	5	-	1	4	-	232	35	279	82	20	30	10	-	-	474	16
9. Consumption by energy sector	240	-	-	-	-	-	-	-	-	0	0	9	-	0	18	10	178	-	25	0
9.1.1 Crude petroleum and natural gas production	185	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	160	-	17	-
9.1.2 Natural gas w hich is flared off on oil fields	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-
9.2. Coal mines	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.3. Petroleum refineries	30	-	-	-	-	-	-	-	-	0	-	0	-	0	18	10	-	-	2	-
9.4. Pumping storage pow er plants	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	38	-	-	0	-	-	1	-	-	-	-	-	-	-	2	-	1	-	31	3
11. Statistical differences (7-8+1.2-9-10-13.1)	54	0	-0	-	3	-	-0	-	28	17	3	49	-18	-20	0	-	-9	-	0	0
13.1 Net domestic consumption including non-energy use	825	14	7	1	16	27	19	5	-	56	18	169	9	48	10	-	32	-	382	12
13. Net domestic consumption	749	12	7	1	0	27	19	5	-	56	18	169	8	9	10	-	13	-	382	12
14. Manufacturing, mining and quarrying	224	12	7	1	0	-	13	5	-	-	0	9	4	7	10	-	9	-	145	1
14.1. Mining and quarrying	4	-	-	-	-	-	0	0	-	-	0	2	0	0	0	-	0	-	2	0
14.2. Manufacture of paper and paper products	31	-	-	-	-	-	10	1	-	-	0	0	3	0	-	-	0	-	17	-
14.3. Manufacture of industrial chemicals	48	4	1	1	-	-	0	0	-	-	0	1	1	3	10	-	4	-	22	0
14.4. Manufacture of iron, steel and ferro alloys	23	5	5	0	-	-	0	-	-	-	0	0	-	0	-	-	0	-	13	0
14.5. Manufacture of aluminium and other non-ferrous metals	72	-	-	-	0	-	-	-	-	-	0	0	-	1	-	-	2	-	69	0
14.6. Other manufacturing industries	46	3	0	0	0	-	3	4	-	-	0	5	0	3	-	-	3	-	23	1
15. Transport	197	-	-	-	-	-	4	-	-	55	15	116	4	0	-	-	2	-	2	-
15.1. Railw ays and subw ays	3	-	-	-	-	-	0	-	-	-	-	1	-	-	-	-	-	-	2	-
15.2. Air transport	15	-	-	-	-	-	-	-	-	0	15	-	-	-	-	-	-	-	-	-
15.3. Road transport	144	-	-	-	-	-	4	-	-	53	-	87	-	0	-	-	0	-	-	-
15.4. Coastal shipping	35	-	-	-	-	-	-	-	-	2	-	28	4	-	-	-	2	-	-	-
16. Other sectors	328	0	0	-	0	27	1	0	-	1	4	45	0	2	-	-	2	-	235	11
16.1. Fishing	20	-	-	-	-	-	-	-	-	0	0	19	0	-	-	-	-	-	1	-
16.2. Agriculture	14	-	-	-	-	-	0	-	-	0	0	6	-	0	-	-	1	-	7	0
16.3. Households	167	0	0	-	-	27	-	-	-	1	2	4	0	1	-	-	0	-	131	3
16.4. Other consumers	117	0	-	-	0	-	1	0	-	0	2	11	-	0	-	-	1	-	93	8
16.5 Construction	10	-	-	-	-	-	0	-	-	0	0	5	-	1	-	-	0	-	4	-
12. Consumption for non-energy purposes	76	2	-	-	16	-	-	-	-	-	0	0	1	39	-	-	19	-	-	-
12.1 Manufacture of industrial chemicals	57	-	-	-	1	-	-	-	-	-	-	0	-	37	-	-	19	-	-	-
12.2 Other manufacturing	19	2	-	-	15	-	-	-	-	-	0	0	1	2	-	-	-	-	-	-

Energy balance	**2010**																			
PJ																				
Footnotes, seepage 28 of Annex III																				
	Total	Coal	Coke	Blast furnace gas	Petrol coke	Fuelw ood	Other biomass	Waste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Refinery gas and fuel gas	Refineries: Coke burn-off and calcining	Natural gas	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8 721	54	-	-	-	23	28	11	3 744	226	-	-	-	264	-	-	3 944	425	-	-
1.1.2 Production of natural gas that is flared off	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-
2. Imports	321	19	12	-	14	7	-	-	42	17	17	51	72	15	-	-	-	-	53	-
3. Exports	7 760	48	0	-	1	0	-	-	3 289	316	8	90	73	244	-	-	3 665	-	26	-
4.1 Bunkering	19	-	-	-	-	-	-	-	-	-	-	12	8	-	-	-	-	-	-	-
4.2 Foreign aviation	17	-	-	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	9	-6	-0	-	0	-	-	-	2	8	-0	7	1	-3	-	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 272	20	12	-	14	30	28	11	500	-65	-7	-44	-8	32	-	-	296	425	27	-
8. Energy converted	1 126	1	3	0	-	-	6	9	505	47	4	15	62	13	0	-	33	425	3	0
8.1. In blast furnaces	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	631	-	-	-	-	-	-	-	505	47	4	12	62	1	-	-	-	-	-	-
8.3. In thermal pow er plants	34	-	-	0	-	-	1	-	-	-	-	0	-	-	-	-	32	-	-	-
8.4. In dual purpose pow er plants	8	1	-	-	-	-	0	6	-	-	-	0	-	-	0	-	-	-	0	-
8.5. In district heating plants	15	-	-	0	-	-	5	3	-	-	-	3	-	1	-	-	1	-	3	0
8.6. In hydropow er plants	425	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	425	-	-
8.7. Other conversion	11	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-
1.2. Production of derived energy bearers	1 131	-	-	2	6	-	1	3	-	220	32	264	76	19	30	10	-	-	445	20
9. Consumption by energy sector	232	-	-	-	-	-	-	-	-	0	-	9	0	0	16	10	171	-	26	0
9.1.1 Crude petroleum and natural gas production	181	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	153	-	19	-
9.1.2 Natural gas w hich is flared off on oil fields	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-
9.2. Coal mines	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.3. Petroleum refineries	29	-	-	-	-	-	-	-	-	0	-	0	0	0	16	10	-	-	2	0
9.4. Pumping storage pow er plants	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	0
9.9. Gas supply	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-
10. Losses in transport and distribution	43	-	-	1	-	-	1	-	-	-	-	-	-	-	3	-	1	-	34	4
11. Statistical differences (7-8+1.2-9-10-13.1)	116	1	1	0	3	-	0	-	-5	56	1	11	-1	-10	0	-	59	-	-0	0
				-		-	-	-					-		-	-				
13.1 Net domestic consumption including non-energy use	886	18	8	2	17	30	23	5	-	53	20	185	7	49	11	-	33	-	409	16
13. Net domestic consumption	808	16	8	2	1	30	23	5	-	53	20	185	7	10	11	-	14	-	409	16
14. Manufacturing, mining and quarrying	249	16	8	2	1	-	16	5	-	-	0	11	4	7	11	-	9	-	156	2
14.1. Mining and quarrying	5	-	-	-	-	-	0	0	-	-	0	2	0	0	0	-	0	-	2	0
14.2. Manufacture of paper and paper products	34	-	-	-	-	-	12	1	-	-	-	0	3	0	-	-	0	-	18	0
14.3. Manufacture of industrial chemicals	57	6	2	1	0	-	1	-	-	-	0	1	1	3	11	-	4	-	27	1
14.4. Manufacture of iron, steel and ferro alloys	30	7	6	1	0	-	0	-	-	-	0	0	-	0	-	-	0	-	16	0
14.5. Manufacture of aluminium and other non-ferrous metals	72	-	-	-	0	-	0	0	-	-	0	0	-	1	-	-	3	-	67	0
14.6. Other manufacturing industries	52	3	0	0	0	-	4	4	-	-	0	7	0	3	-	-	2	-	26	1
15. Transport	205	-	-	-	-	-	5	-	-	52	15	126	2	0	-	-	2	-	2	-
15.1. Railw ays and subw ays	3	-	-	-	-	-	0	-	-	-	-	1	-	-	-	-	-	-	2	-
15.2. Air transport	15	-	-	-	-	-	-	-	-	0	15	-	-	-	-	-	-	-	-	-
15.3. Road transport	150	-	-	-	-	-	4	-	-	50	-	96	-	0	-	-	0	-	-	-
15.4. Coastal shipping	36	-	-	-	-	-	1	-	-	2	-	29	2	-	-	-	2	-	-	-
16. Other sectors	354	0	0	-	0	30	2	0	-	1	4	47	0	2	-	-	2	-	251	14
16.1. Fishing	20	-	-	-	-	-	-	-	-	0	0	19	0	-	-	-	-	-	1	-
16.2. Agriculture	14	-	-	-	-	-	0	-	-	0	0	6	-	0	-	-	1	-	7	0
16.3. Households	185	0	0	-	-	30	-	-	-	1	3	4	0	1	-	-	0	-	143	4
16.4. Other consumers	123	0	-	-	0	-	1	0	-	0	2	13	-	0	-	-	1	-	96	11
16.5 Construction	11	-	-	-	-	-	0	-	-	0	0	5	0	1	-	-	0	-	4	-
12. Consumption for non-energy purposes	77	2	-	-	16	-	-	-	-	-	-	0	-	40	-	-	19	-	-	-
12.1 Manufacture of industrial chemicals	60	-	-	-	1	-	-	-	-	-	-	-	-	40	-	-	19	-	-	-
12.2 Other manufacturing	17	2	-	-	15	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-

Energy balance	**2011**																			
PJ																				
Footnotes, seepage 28 of Annex III																				
	Total	Coal	Coke	Blast furnace gas	Petrol coke	Fuelw ood	Other biomass	Waste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Refinery gas and fuel gas	Refineries: Coke burn-off and calcining	Natural gas	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8 328	39	-	-	-	23	30	14	3 491	212	-	-	-	310	-	-	3 767	442	-	-
1.1.2 Production of natural gas that is flared off	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-
2. Imports	296	20	13	-	13	7	-	-	48	16	19	52	56	11	-	-	0	-	41	-
3. Exports	7 429	42	-	-	1	4	-	-	2 907	374	10	129	76	259	-	-	3 575	-	52	-
4.1 Bunkering	20	-	-	-	-	-	-	-	-	-	-	12	9	-	-	-	-	-	-	-
4.2 Foreign aviation	16	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	-21	5	1	-	-2	-	-	-	-19	1	-0	-10	2	1	-	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 155	22	14	-	10	26	30	14	613	-144	-7	-99	-26	63	-	-	209	442	-11	-
8. Energy converted	1 213	2	3	1	-	-	6	12	563	50	9	29	52	12	3	-	27	442	3	0
8.1. In blast furnaces	4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	703	-	-	-	-	-	-	-	563	50	9	27	52	1	-	-	-	-	-	-
8.3. In thermal pow er plants	28	-	-	1	-	-	1	-	-	-	-	0	-	-	-	-	26	-	-	-
8.4. In dual purpose pow er plants	12	1	-	-	-	-	0	8	-	-	-	0	-	0	3	-	0	-	0	-
8.5. In district heating plants	13	-	-	0	-	-	4	3	-	-	-	1	0	0	-	-	1	-	2	0
8.6. In hydropow er plants	442	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	442	-	-
8.7. Other conversion	11	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-
1.2. Production of derived energy bearers	1 215	-	-	4	7	-	1	3	-	239	37	313	71	20	30	10	-	-	459	20
9. Consumption by energy sector	230	-	-	-	-	-	-	-	-	0	-	10	-	0	14	10	165	-	30	1
9.1.1 Crude petroleum and natural gas production	177	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	148	-	19	-
9.1.2 Natural gas w hich is flared off on oil fields	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-
9.2. Coal mines	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.3. Petroleum refineries	27	-	-	-	-	-	-	-	-	0	-	0	-	0	14	10	-	-	2	1
9.4. Pumping storage pow er plants	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	35	-	-	1	-	-	0	-	-	-	-	-	-	-	2	-	1	-	26	5
11. Statistical differences (7-8+1.2-9-10-13.1)	35	2	2	-0	0	-	0	-	49	-3	1	-9	-13	22	0	-	-18	-	-0	-0
				-		-	-	-					-		-	-				
13.1 Net domestic consumption including non-energy use	859	18	9	3	17	26	25	5	-	48	20	185	6	48	11	-	35	-	390	14
13. Net domestic consumption	780	16	9	3	1	26	25	5	-	48	20	185	6	9	11	-	14	-	390	14
14. Manufacturing, mining and quarrying	250	16	8	3	1	-	18	5	-	-	0	11	3	7	11	-	10	-	155	1
14.1. Mining and quarrying	5	-	-	-	-	-	0	0	-	-	0	3	-	0	0	-	0	-	2	0
14.2. Manufacture of paper and paper products	32	-	-	-	-	-	13	1	-	-	-	0	2	0	-	-	0	-	16	0
14.3. Manufacture of industrial chemicals	57	6	2	1	0	-	1	0	-	-	0	2	1	3	11	-	4	-	27	0
14.4. Manufacture of iron, steel and ferro alloys	33	7	6	2	0	-	0	-	-	-	-	0	-	0	-	-	0	-	18	0
14.5. Manufacture of aluminium and other non-ferrous metals	71	-	-	-	0	-	0	-	-	-	0	0	-	1	-	-	2	-	68	0
14.6. Other manufacturing industries	51	3	0	0	0	-	4	4	-	-	0	6	0	3	-	-	4	-	25	1
15. Transport	206	-	-	-	-	-	5	-	-	47	16	130	2	0	-	-	3	-	2	-
15.1. Railw ays and subw ays	3	-	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-	-	2	-
15.2. Air transport	16	-	-	-	-	-	-	-	-	0	16	-	-	-	-	-	-	-	-	-
15.3. Road transport	149	-	-	-	-	-	5	-	-	45	-	99	-	0	-	-	0	-	-	-
15.4. Coastal shipping	37	-	-	-	-	-	-	-	-	2	-	31	2	-	-	-	2	-	-	-
16. Other sectors	325	0	0	-	-	26	2	0	-	1	3	44	0	2	-	-	2	-	232	13
16.1. Fishing	21	-	-	-	-	-	-	-	-	0	0	20	0	-	-	-	-	-	1	-
16.2. Agriculture	13	-	-	-	-	-	0	-	-	0	0	6	-	0	-	-	1	-	6	0
16.3. Households	165	0	0	-	-	26	-	-	-	1	2	3	-	1	-	-	0	-	130	3
16.4. Other consumers	115	0	0	-	-	-	1	0	-	0	2	10	-	0	-	-	1	-	91	10
16.5 Construction	11	-	-	-	-	-	0	-	-	0	0	5	-	1	-	-	0	-	4	-
12. Consumption for non-energy purposes	79	2	-	-	16	-	-	-	-	-	-	0	-	39	-	-	21	-	-	-
12.1 Manufacture of industrial chemicals	61	-	-	-	1	-	-	-	-	-	-	-	-	39	-	-	21	-	-	-
12.2 Other manufacturing	18	2	-	-	15	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-

Energy balance	**2012**																			
PJ																				
Footnotes, seepage 28 of Annex III																				
	Total	Coal	Coke	Blast furnace gas	Petrol coke	Fuelw ood	Other biomass	Waste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Refinery gas and fuel gas	Refineries: Coke burn-off and calcining	Natural gas	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8 587	35	-	-	-	24	27	15	3 186	219	-	-	-	336	-	-	4 226	520	-	-
1.1.2 Production of natural gas that is flared off	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-
2. Imports	282	20	13	-	13	7	-	-	49	19	22	63	49	11	-	-	0	-	15	-
3. Exports	7 674	36	0	-	1	3	-	-	2 672	371	15	109	67	292	-	-	4 028	-	79	-
4.1 Bunkering	19	-	-	-	-	-	-	-	-	-	-	13	7	-	-	-	-	-	-	-
4.2 Foreign aviation	19	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	-12	2	-0	-	1	-	-	-	-4	-7	1	-4	1	-2	-	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 161	21	13	-	13	27	27	15	560	-140	-11	-62	-25	53	-	-	215	520	-64	-
8. Energy converted	1 276	2	3	1	-	-	7	13	552	60	9	24	51	11	4	-	17	520	3	0
8.1. In blast furnaces	4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	696	-	-	-	-	-	-	-	552	60	9	23	51	1	-	-	-	-	-	-
8.3. In thermal pow er plants	18	-	-	1	-	-	1	-	-	-	-	0	-	-	-	-	17	-	-	-
8.4. In dual purpose pow er plants	14	1	-	-	-	-	1	9	-	-	-	0	-	0	4	-	0	-	0	-
8.5. In district heating plants	14	-	-	0	-	-	5	4	-	-	-	1	0	0	-	-	1	-	3	0
8.6. In hydropow er plants	520	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	520	-	-
8.7. Other conversion	10	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-
1.2. Production of derived energy bearers	1 274	-	-	4	5	-	1	4	-	250	40	295	63	20	28	10	-	-	532	20
9. Consumption by energy sector	234	-	-	-	-	-	-	-	-	0	-	9	-	0	13	10	168	-	33	0
9.1.1 Crude petroleum and natural gas production	184	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	151	-	23	-
9.1.2 Natural gas w hich is flared off on oil fields	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-
9.2. Coal mines	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.3. Petroleum refineries	25	-	-	-	-	-	-	-	-	0	-	0	-	0	13	10	-	-	2	0
9.4. Pumping storage pow er plants	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	40	-	-	0	-	-	0	-	-	-	-	-	-	-	2	-	1	-	33	4
11. Statistical differences (7-8+1.2-9-10-13.1)	22	0	2	-0	1	-	0	-	8	5	0	10	-16	18	0	-	-6	-	0	-
				-		-	-	-					-		-	-				
13.1 Net domestic consumption including non-energy use	863	19	8	3	18	27	21	5	-	45	20	189	4	45	10	-	35	-	398	16
13. Net domestic consumption	789	17	8	3	1	27	21	5	-	45	20	189	4	8	10	-	17	-	398	16
14. Manufacturing, mining and quarrying	239	17	8	3	1	-	13	5	-	-	0	8	2	6	10	-	11	-	152	2
14.1. Mining and quarrying	5	-	-	-	-	-	0	0	-	-	0	3	-	0	-	-	0	-	2	0
14.2. Manufacture of paper and paper products	25	-	-	-	-	-	8	1	-	-	0	0	1	0	-	-	0	-	14	0
14.3. Manufacture of industrial chemicals	55	7	2	1	0	-	1	0	-	-	0	1	0	3	10	-	4	-	25	0
14.4. Manufacture of iron, steel and ferro alloys	32	6	6	2	0	-	0	-	-	-	-	0	-	0	-	-	0	-	18	0
14.5. Manufacture of aluminium and other non-ferrous metals	71	-	-	-	0	-	-	-	-	-	-	0	-	1	-	-	2	-	68	0
14.6. Other manufacturing industries	51	3	0	0	0	-	4	4	-	-	0	5	0	3	-	-	5	-	25	1
15. Transport	209	-	-	-	-	-	5	-	-	44	17	135	2	0	-	-	4	-	2	-
15.1. Railw ays and subw ays	3	-	-	-	-	-	0	-	-	-	-	1	-	-	-	-	-	-	2	-
15.2. Air transport	17	-	-	-	-	-	-	-	-	0	17	-	-	-	-	-	-	-	-	-
15.3. Road transport	152	-	-	-	-	-	5	-	-	42	-	104	-	0	-	-	0	-	-	-
15.4. Coastal shipping	37	-	-	-	-	-	-	-	-	2	-	30	2	-	-	-	3	-	-	-
16. Other sectors	341	0	0	-	0	27	2	0	-	1	3	45	0	2	-	-	2	-	244	14
16.1. Fishing	22	-	-	-	-	-	-	-	-	0	0	21	0	-	-	-	-	-	1	-
16.2. Agriculture	14	-	-	-	-	-	0	-	-	0	0	6	-	0	-	-	1	-	7	0
16.3. Households	174	0	0	-	-	27	-	-	-	1	1	3	-	0	-	-	0	-	138	3
16.4. Other consumers	120	0	-	-	0	-	1	0	-	0	2	10	-	0	-	-	1	-	94	11
16.5 Construction	11	-	-	-	-	-	0	-	-	0	0	6	-	1	-	-	0	-	4	-
12. Consumption for non-energy purposes	74	2	-	-	17	-	-	-	-	-	-	0	-	37	-	-	18	-	-	-
12.1 Manufacture of industrial chemicals	56	-	-	-	1	-	-	-	-	-	-	-	-	37	-	-	18	-	-	-
12.2 Other manufacturing	19	2	-	-	16	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-

Energy balance	**2013**																			
PJ																				
Footnotes, seepage 28 of Annex III																				
	Total	Coal	Coke	Blast furnace gas	Petrol coke	Fuelw ood	Other biomass	Waste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Refinery gas and fuel gas	Refineries: Coke burn-off and calcining	Natural gas	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8 153	52	-	-	-	17	28	15	3 024	200	-	-	-	339	-	-	4 009	470	-	-
1.1.2 Production of natural gas that is flared off	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-
2. Imports	347	18	12	-	13	7	-	-	77	11	25	55	81	11	-	-	-	-	36	-
3. Exports	7 250	58	0	-	2	2	-	-	2 516	340	16	115	78	299	-	-	3 770	-	55	-
4.1 Bunkering	19	-	-	-	-	-	-	-	-	-	-	10	9	-	-	-	-	-	-	-
4.2 Foreign aviation	21	-	-	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	4	8	0	-	1	-	-	-	-4	-1	-1	-1	0	1	-	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 232	20	12	-	12	22	28	15	580	-129	-12	-71	-6	52	-	-	256	470	-18	-
8. Energy converted	1 257	2	3	1	-	-	7	14	566	54	5	29	72	12	4	-	16	470	4	0
8.1. In blast furnaces	4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	725	-	-	-	-	-	-	-	566	54	5	28	72	1	-	-	-	-	-	-
8.3. In thermal pow er plants	17	-	-	1	-	-	1	-	-	-	-	0	-	-	-	-	15	-	-	-
8.4. In dual purpose pow er plants	15	1	-	-	-	-	1	10	-	-	-	0	-	0	4	-	0	-	0	-
8.5. In district heating plants	14	-	-	0	-	-	6	4	-	-	-	1	-	0	-	-	1	-	4	0
8.6. In hydropow er plants	470	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	470	-	-
8.7. Other conversion	11	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-
1.2. Production of derived energy bearers	1 272	-	-	4	7	-	1	4	-	256	39	318	68	25	33	11	-	-	482	22
9. Consumption by energy sector	237	-	-	-	-	-	-	-	-	0	-	12	-	0	17	11	167	-	30	0
9.1.1 Crude petroleum and natural gas production	183	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	149	-	22	-
9.1.2 Natural gas w hich is flared off on oil fields	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-
9.2. Coal mines	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.3. Petroleum refineries	30	-	-	-	-	-	-	-	-	0	-	0	-	0	17	11	-	-	2	-
9.4. Pumping storage pow er plants	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	36	-	-	0	-	-	0	-	-	-	-	-	-	-	1	-	1	-	29	5
11. Statistical differences (7-8+1.2-9-10-13.1)	109	-1	2	-0	1	-	0	-	15	32	2	20	-12	16	-0	-	36	-	0	-0
				-		-	-	-					-		-	-				
13.1 Net domestic consumption including non-energy use	865	20	8	3	19	22	21	5	-	42	20	187	2	49	11	-	38	-	402	18
13. Net domestic consumption	784	18	8	3	1	22	21	5	-	42	20	187	2	7	11	-	18	-	402	18
14. Manufacturing, mining and quarrying	239	18	8	3	1	-	14	5	-	-	0	9	1	6	11	-	11	-	151	2
14.1. Mining and quarrying	5	-	-	-	-	-	0	-	-	-	0	3	-	0	-	-	0	-	2	0
14.2. Manufacture of paper and paper products	21	-	-	-	-	-	7	1	-	-	-	0	1	0	-	-	0	-	12	0
14.3. Manufacture of industrial chemicals	56	7	2	1	0	-	2	1	-	-	0	0	0	2	11	-	5	-	25	0
14.4. Manufacture of iron, steel and ferro alloys	33	7	5	2	0	-	0	0	-	-	-	0	-	0	-	-	0	-	18	0
14.5. Manufacture of aluminium and other non-ferrous metals	72	-	-	-	0	-	-	-	-	-	-	0	-	1	-	-	2	-	69	0
14.6. Other manufacturing industries	52	3	0	0	0	-	5	4	-	-	0	5	-	3	-	-	5	-	25	1
15. Transport	207	-	-	-	-	-	5	-	-	41	17	136	0	0	-	-	4	-	3	-
15.1. Railw ays and subw ays	3	-	-	-	-	-	0	-	-	-	-	1	-	-	-	-	-	-	3	-
15.2. Air transport	17	-	-	-	-	-	-	-	-	0	17	-	-	-	-	-	-	-	-	-
15.3. Road transport	153	-	-	-	-	-	5	-	-	39	-	109	-	0	-	-	1	-	-	-
15.4. Coastal shipping	33	-	-	-	-	-	-	-	-	2	-	27	0	-	-	-	4	-	-	-
16. Other sectors	338	0	0	-	0	22	2	0	-	1	3	41	1	2	-	-	2	-	248	16
16.1. Fishing	19	-	-	-	-	-	-	-	-	0	0	17	1	-	-	-	-	-	1	-
16.2. Agriculture	13	-	-	-	-	-	0	-	-	0	0	6	-	0	-	-	1	-	7	0
16.3. Households	172	0	0	-	-	22	-	-	-	1	2	3	-	0	-	-	0	-	140	4
16.4. Other consumers	122	0	-	-	0	-	2	0	-	0	2	10	-	0	-	-	1	-	96	12
16.5 Construction	12	-	-	-	-	-	0	-	-	0	0	6	-	1	-	-	0	-	5	-
12. Consumption for non-energy purposes	82	2	-	-	18	-	-	-	-	-	-	0	-	42	-	-	20	-	-	-
12.1 Manufacture of industrial chemicals	62	-	-	-	1	-	-	-	-	-	-	-	-	42	-	-	20	-	-	-
12.2 Other manufacturing	19	2	-	-	17	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-

Norway NIR 2016_Annex III

Energy balance	**2014**																			
PJ																				
Footnotes, seepage 28 of Annex III																				
	Total	Coal	Coke	Blast furnace gas	Petrol coke	Fuelw ood	Other biomass	Waste	Crude oil	Petrol	Kerosene	Middle distillates	Heavy fuel oil	LPG	Refinery gas and fuel gas	Refineries: Coke burn-off and calcining	Natural gas	Waterfall energy and w ind pow er	Electricity	District heating
1.1.1 Production of primary energy bearers	8 224	47	-	-	-	13	22	18	3 113	177	-	-	-	349	-	-	3 985	500	-	-
1.1.2 Production of natural gas that is flared off	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-
2. Imports	274	21	13	-	14	7	-	-	50	17	23	47	48	10	-	-	-	-	23	-
3. Exports	7 353	45	-	-	2	1	-	-	2 618	341	6	119	64	307	-	-	3 770	-	79	-
4.1 Bunkering	15	-	-	-	-	-	-	-	-	-	-	9	6	-	-	-	-	-	-	-
4.2 Foreign aviation	21	-	-	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-
5. Changes in stocks (+ net decrease, - net increase)	26	-1	0	-	-0	-	-	-	16	6	2	-0	1	2	-	-	-	-	-	-
7. Net domestic supply (1.1.1+1.1.2+2-3-4.1-4.2+5)	1 150	23	13	-	11	19	22	18	561	-140	-1	-81	-22	54	-	-	230	500	-56	-
8. Energy converted	1 216	2	3	1	-	-	6	17	535	48	6	29	34	12	4	-	17	500	3	0
8.1. In blast furnaces	4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2. In crude petroleum refineries	652	-	-	-	-	-	-	-	535	48	6	28	34	1	-	-	-	-	-	-
8.3. In thermal pow er plants	17	-	-	1	-	-	0	-	-	-	-	0	-	-	-	-	16	-	-	-
8.4. In dual purpose pow er plants	14	1	-	-	-	-	0	9	-	-	-	0	-	0	4	-	0	-	0	-
8.5. In district heating plants	18	-	-	0	-	-	6	8	-	-	-	0	-	0	-	-	0	-	3	0
8.6. In hydropow er plants	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	-	-
8.7. Other conversion	11	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-
1.2. Production of derived energy bearers	1 235	-	-	4	7	-	1	4	-	221	32	303	69	20	32	8	-	-	512	23
9. Consumption by energy sector	242	-	-	-	-	-	-	-	-	0	-	11	-	0	16	8	175	-	32	0
9.1.1 Crude petroleum and natural gas production	194	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	159	-	24	-
9.1.2 Natural gas w hich is flared off on oil fields	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-
9.2. Coal mines	1	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-
9.3. Petroleum refineries	26	-	-	-	-	-	-	-	-	0	-	0	-	0	16	8	-	-	2	-
9.4. Pumping storage pow er plants	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
9.5. Hydro electric pow er plants	2	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	2	-
9.6. Thermal pow er plants	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-
9.7. Combined heat and pow er plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	0	-	0	-
9.8. District heating plants	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	0	0
9.9. Gas supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Losses in transport and distribution	39	-	-	-	-	-	0	-	-	-	-	-	-	-	1	-	0	-	31	6
11. Statistical differences (7-8+1.2-9-10-13.1)	56	-0	3	0	1	-	0	-	26	-7	6	4	12	14	0	-	-1	-	0	-
				-		-	-	-					-		-	-				
13.1 Net domestic consumption including non-energy use	833	21	7	3	17	19	17	5	-	40	20	178	2	47	11	-	39	-	390	17
13. Net domestic consumption	753	19	7	3	1	19	17	5	-	40	20	178	2	7	11	-	18	-	390	17
14. Manufacturing, mining and quarrying	240	19	7	3	1	-	9	5	-	-	0	8	0	5	11	-	11	-	159	2
14.1. Mining and quarrying	5	-	-	-	-	-	-	0	-	-	0	2	-	0	-	-	0	-	2	0
14.2. Manufacture of paper and paper products	16	-	-	-	-	-	3	0	-	-	-	0	0	0	-	-	1	-	12	0
14.3. Manufacture of industrial chemicals	59	8	2	1	-	-	3	1	-	-	0	1	-	2	11	-	4	-	26	1
14.4. Manufacture of iron, steel and ferro alloys	34	8	5	2	1	-	0	-	-	-	-	0	-	0	-	-	0	-	19	0
14.5. Manufacture of aluminium and other non-ferrous metals	73	-	-	-	0	-	-	-	-	-	-	0	-	1	-	-	2	-	71	0
14.6. Other manufacturing industries	52	3	0	0	0	-	4	3	-	-	0	4	-	3	-	-	4	-	28	1
15. Transport	203	-	-	-	-	-	5	-	-	39	17	133	1	0	-	-	5	-	3	-
15.1. Railw ays and subw ays	3	-	-	-	-	-	0	-	-	-	-	1	-	-	-	-	-	-	3	-
15.2. Air transport	17	-	-	-	-	-	-	-	-	0	17	-	-	-	-	-	-	-	-	-
15.3. Road transport	152	-	-	-	-	-	5	-	-	37	-	109	-	0	-	-	1	-	-	-
15.4. Coastal shipping	31	-	-	-	-	-	-	-	-	2	-	23	1	-	-	-	4	-	-	-
16. Other sectors	310	0	0	-	0	19	2	0	-	1	3	37	0	2	-	-	2	-	229	15
16.1. Fishing	17	-	-	-	-	-	-	-	-	0	0	15	0	-	-	-	-	-	1	-
16.2. Agriculture	13	-	-	-	-	-	0	-	-	0	0	6	-	0	-	-	1	-	6	0
16.3. Households	161	0	0	-	-	19	-	-	-	1	1	2	-	0	-	-	0	-	134	4
16.4. Other consumers	108	0	-	-	0	-	2	0	-	0	2	8	-	0	-	-	1	-	84	11
16.5 Construction	12	-	-	-	-	-	0	-	-	0	0	6	-	1	-	-	0	-	5	-
12. Consumption for non-energy purposes	80	2	-	-	16	-	-	-	-	-	-	0	-	40	-	-	22	-	-	-
12.1 Manufacture of industrial chemicals	63	-	-	-	1	-	-	-	-	-	-	-	-	40	-	-	22	-	-	-
12.2 Other manufacturing	17	2	-	-	15	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-

Annex IV: CO_2 capture and storage at petroleum production fields – storage site characteristics and monitoring methodology

1 Capture from Sleipner Vest Field well stream and storage at Sleipner Øst Field

1.1 The reservoir's ability to store CO_2 over time

Key goals for geological CO_2 storage site selection and characterization are to assess how much CO_2 can be stored at a potential storage site, demonstrate that the site is capable of meeting required storage performance criteria and to establish a baseline for the management and monitoring of the CO_2 injection and storage.

Excess CO_2 from the Sleipner Vest Field is injected into the Utsira Formation at Sleipner Øst for storage. The Utsira Formation aquifer, which is located above the producing reservoirs at a depth of 800 – 1000 m below sea level, was chosen for CO_2 storage because of its large extension (which guarantees sufficient volume), and its excellent porosity and permeability (which is well suited for high injectivity). Furthermore, the formation is overlain by a thick, widespread sequence of Hordaland Group shales, which should act as an effective barrier to vertical CO_2 leakage, see figure AIV-1 below:

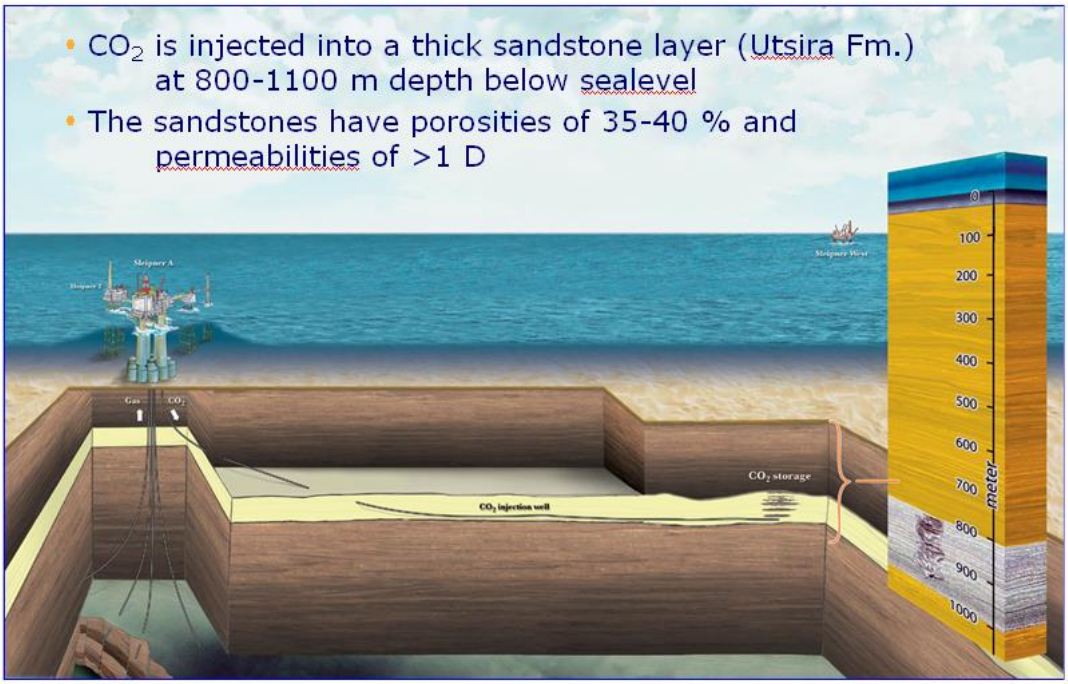

Figure AIV- 1 CO_2 capture at Sleipner Vest and storage at Sleipner Øst

The Utsira formation has the following properties:

- Dome type of structure
- Large extension
- Thickness: 150 – 200 m
- Temp. = 37 degC, P = 104 bar (hydrostatic)
- Unconsolidated fine-grained sand
- High permeability (~ 2 D) and high porosity (35-40%)
- Homogeneous
- Water filled

It also contains several thin intercalated shale layers (1-1.5m), as well as a 5 m thick shaly interval about 20 m below the top. In the Sleipner case it has been very important to locate the injection well and the storage site such that the injected CO_2 could not migrate back to the Sleipner A platform (SLA) and the production wells. This will both prevent corrosion problems in the production wells and minimise the risk of CO_2 leakage through production wells. The injection point is located 2.5 km east of the Sleipner A platform. Following is a figure illustrating the distance between the injection point and the Sleipner installation. Migration evaluations have been based on the Top Utsira map (figure below) with the CO_2 expected to migrate vertically to the sealing shales and horizontally along the saddle point of the structure. This will take the CO_2 away from other wells drilled from the Sleipner platform.

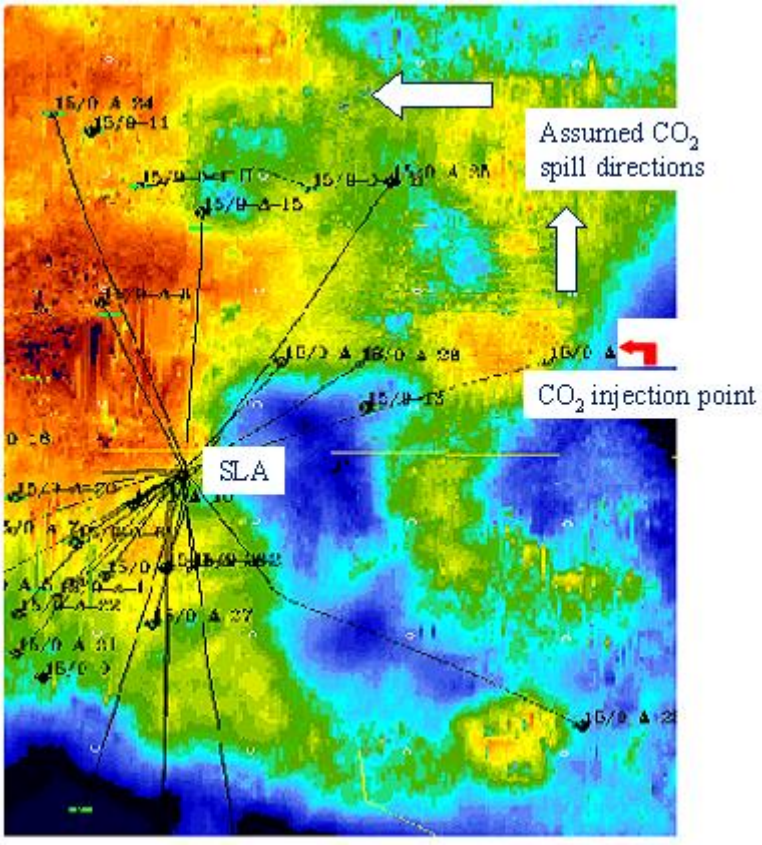

Figure AIV- 2 Position of CO_2 injection point and expected migration direction of CO_2 Sleipner field.

1.2 Applied methods for monitoring the injected CO_2

a) 4D seismic monitoring:

- Baseline seismic survey was shot prior to injection in 1994.
- Repeat time lapse seismic monitoring have been acquired in 1999, 2001, 2002, 2004, 2006, 2008, 2010 and 2013

b) Gravimetric monitoring:

- Pre-installed 30 concrete benchmarks in 2002 across the CO_2 bubble
- Repeat survey 2005 and 2013.

c) Pressure measurements:

The need for reservoir measurements of pressure and temperature in the injection well is being continuously evaluated. Up until now, these measurements have not been deemed critical

d) Well monitoring, safety precautions (leakage):

The wells in the Sleipner area are plotted on a chart to indicate the positioning relative to the CO_2 injection well. The relative distances are given at the top of the Utsira formation. . The labels numbered “900” indicate where the wells are penetrating the 900 meter depth level (top of Utsira formation).

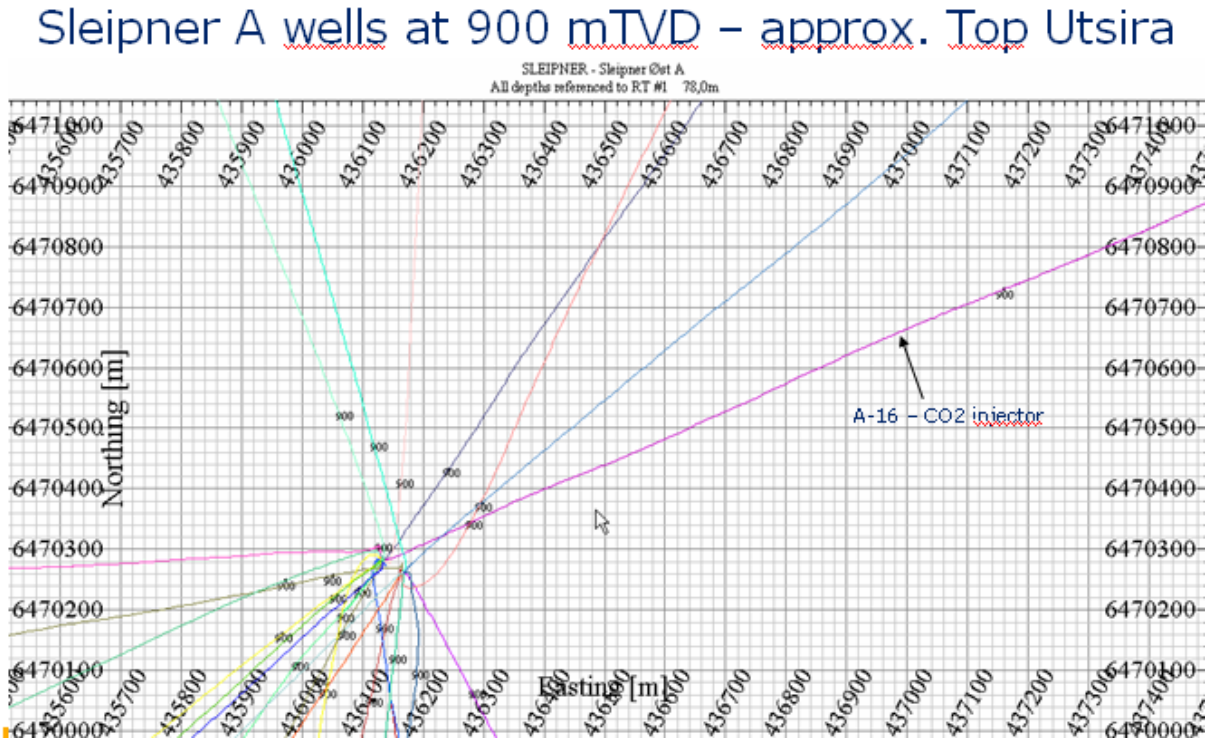

Figure AIV- 3 Positions of Sleipner production wells relative to the CO_2 injection well.

The figure shows that the distance from the CO_2 injection well to the closest neighbouring well is 1000 metres at top of the Utsira formation. Note that the extension of the CO_2 plume is found to be extending NE-SW from the injection point, based on seismic data, and that no production wells (other than the injector) are exposed to the CO_2 plume. This is in accordance with the simulations carried out for the injection on Sleipner.

The main well design at Utsira level:

- 18 5/8" casing set above Utsira Formation
- 13 3/8" casing through Utsira Formation
  - 13 Cr casing from 10 m MD below to 50 m MD above Utsira Formation
  - cemented into 18 5/8" casing

The material quality chosen for the casing through Utsira formation, increases the wells' resistance against CO_2 corrosion.

The reported amounts of CO_2 which are injected in the Utsira formation are based on continuous metering of the gas stream by orifice meter.

1.3 Results of the monitoring programme

a) 4-D seismic

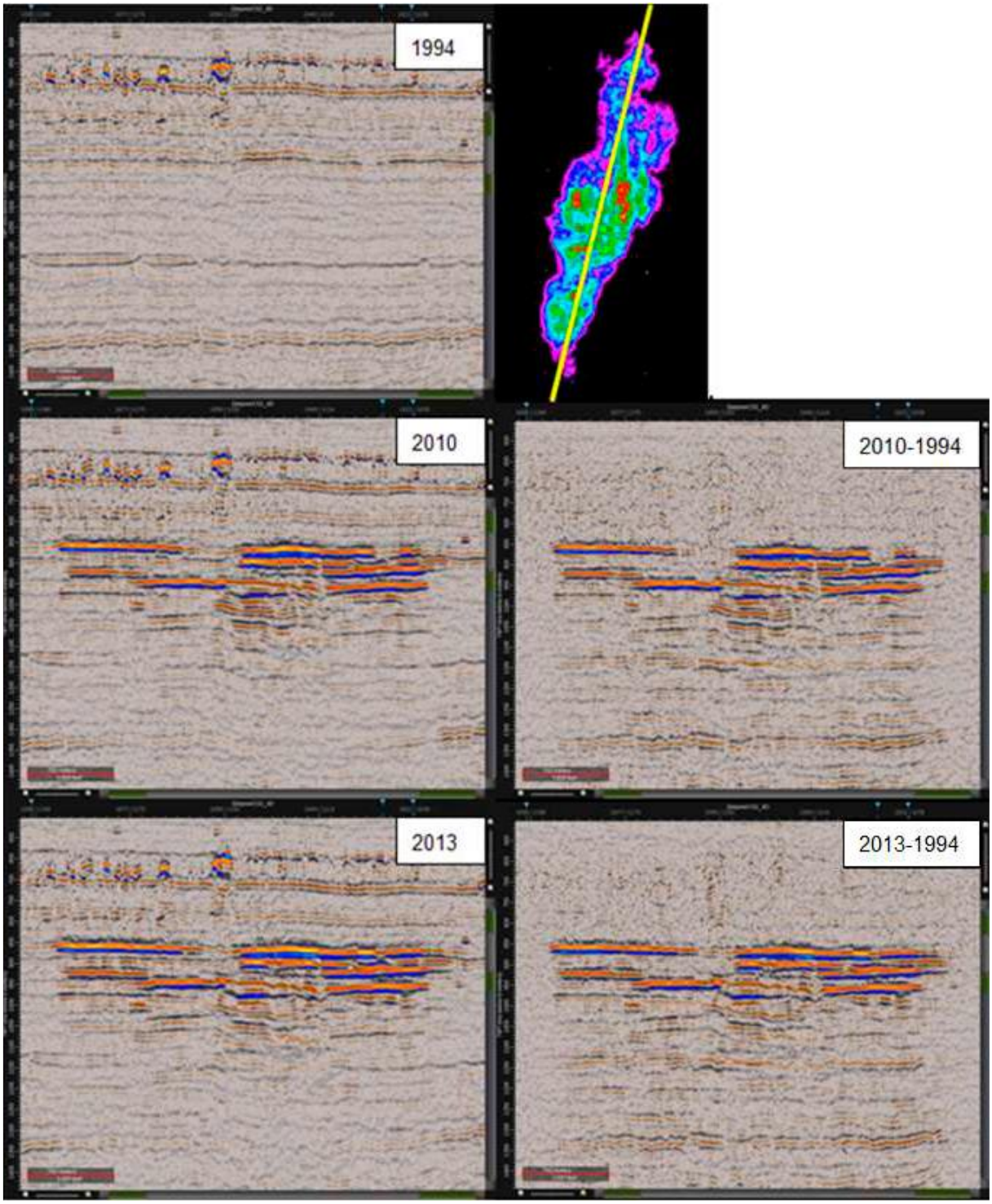

Figure AIV- 4 Results of seismic monitoring 1994 – 2013.Seismic section shown on the upper right figure.

The figure above is based on seismic data from 1994 – 2013.

Based on the seismic data, the extent of the CO_2 plume has been estimated. The figure below shows the CO_2 plume extension in the years 1999, 2001, 2002, 2004, 2006, 2008 and 2013.

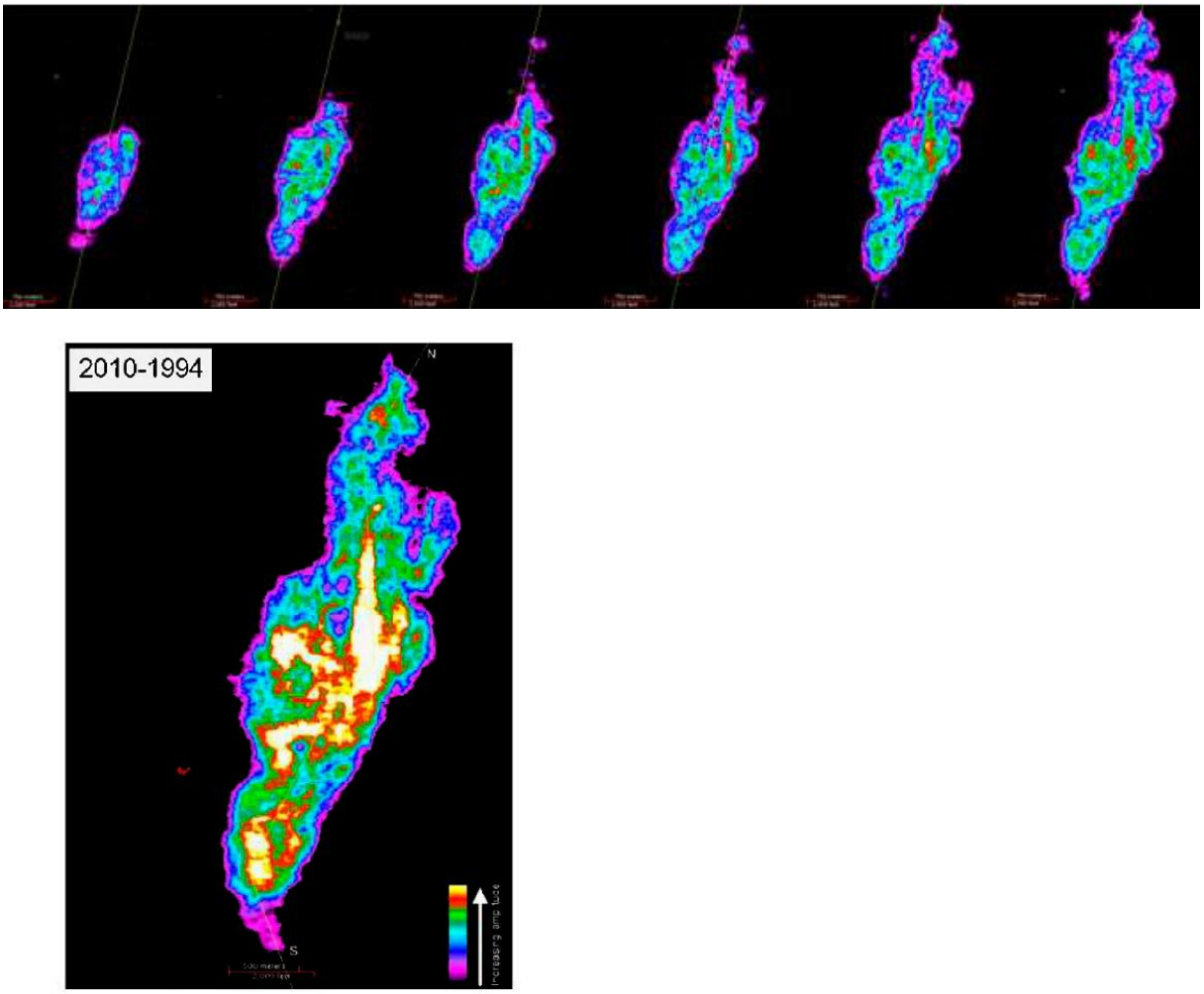

Figure AIV- 5 CO_2 plume extension in 1999 to 2008 and the last figure showing cumulative amplitude from 4D seismic. The differences in amplitudes reflect the cumulative thickness of the CO_2 layers.

The label "No data" in the above figure marks the eastern edge of the mapped area.

In 2010, after injection of about 12 million tonnes during the last 12 years, the maximum lateral migration from the injection point was 2.9 km to the northeast, and the area of the CO_2 plume was about 3.6 km^2. Since the injection started, the plume has steadily grown, and has adopted a preferred NE-SW elongation, which is believed to be caused by the topography of the aquifer/cap rock interface and the inherent buoyancy of the injected CO_2 within the saline aquifer.

b) Gravimetric monitoring:

There is a large uncertainty on in-situ CO_2 density, related to temperature, which cannot be resolved by seismic measurements. CO_2 is close to critical point, and possible densities range from 0.2 to more than 0.7. The gravity data supports a low-density/high temperature CO_2 plume.

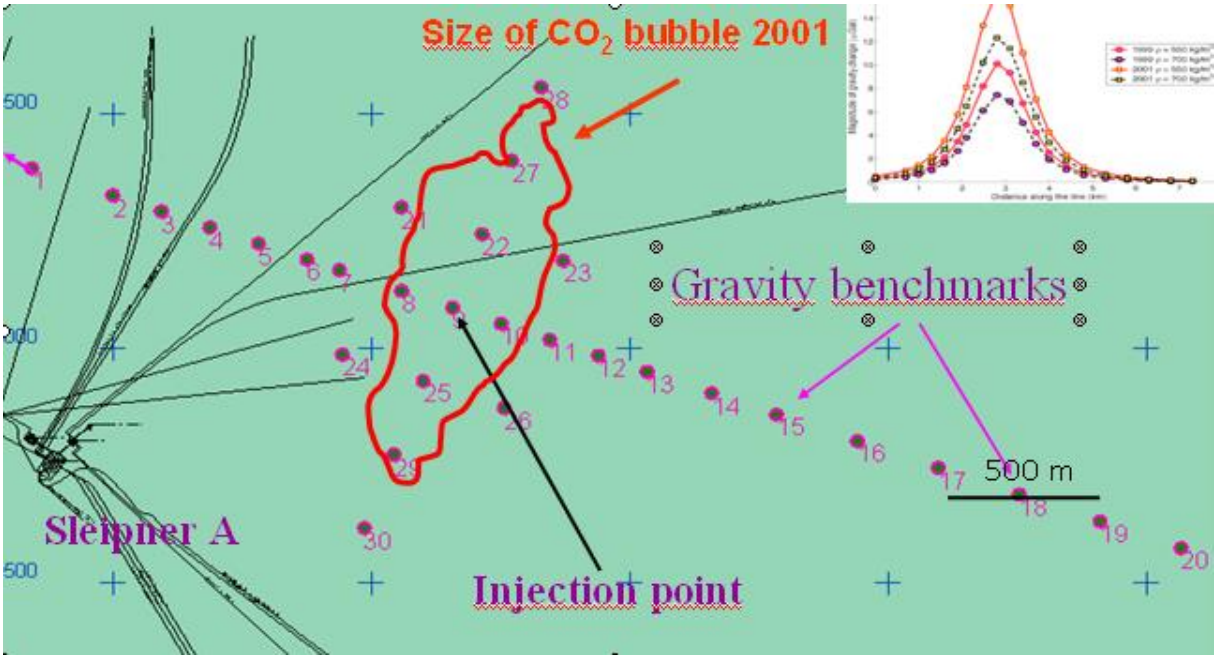

Figure AIV- 6 Gravimetric monitoring.

c) Reservoir simulation:

Flow simulation models, which match the 4D seismic data reasonably well, have been used to predict the CO_2 behaviour. The figure below illustrates results from the simulation model.

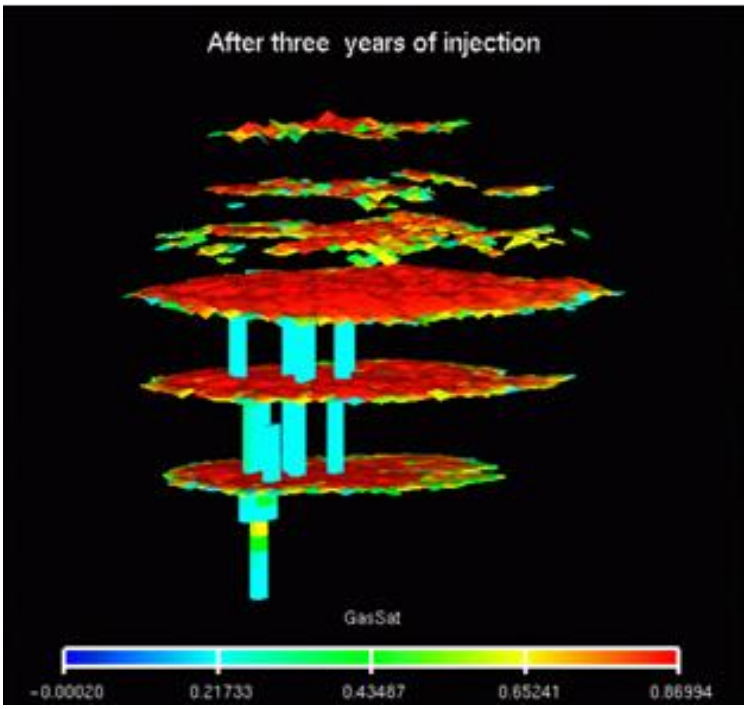

Figure AIV- 7 Flow simulation of CO_2.

The results from the simulations indicate that cap rock shales provide a capillary seal for the CO_2 phase.

Dissolution of CO_2 from the gas cap into the underlying brine column will have a most pronounced effect. The brine on top of the column, which becomes enriched in CO_2, is denser than the brine below due to the special volumetric properties of the CO_2 – brine system. This instability could induce convection currents and enhance the dissolution of CO_2.

The following figure shows simulation results (seen from above) without taking into account the effect of CO_2 dissolution. This gives a conservative estimate of the extent of the CO_2 plume, as dissolution of the CO_2 will contribute to the CO_2 "sinking" inside the Utsira formation, thus reducing the size of the plume. The figure assumes stop of CO_2 injection after 25 years.

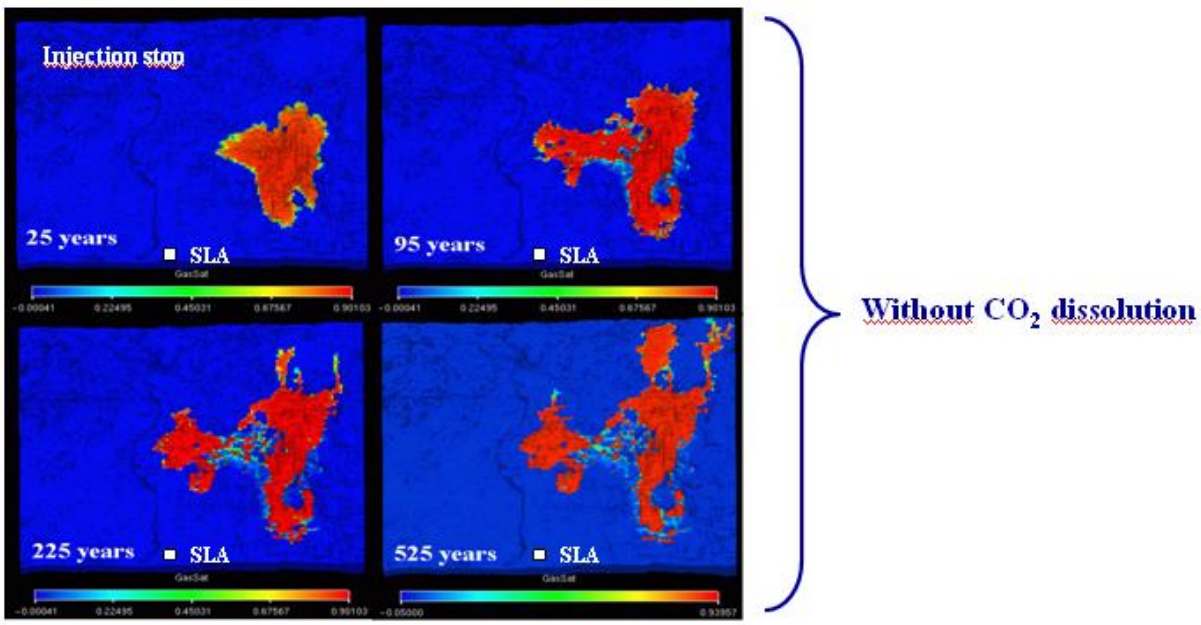

Figure AIV- 8 Simulation results seen from above without taking into account the effect of CO_2 dissolution.

Dependent on the model parameters, most of the free CO_2 will have dissolved into the aquifer after between 5000 and 50000 years.

Note that the CO_2 migrates away from the SLA platform. The migration route is controlled by the topography of the Utsira Formation/cap rock interface. This means that no production wells on Sleipner are exposed to the CO_2 plume.

1.4 Publications and conference presentations

1.4.1 Publications:

- **Chadwick, R.A.**; Arts, R.; Eiken, O.; **Kirby, G.A.**; Lindeberg, E.; Zweigel, P.. 2004 4D seismic imaging of an injected CO2 plume at the Sleipner Field, central North Sea. In: Davies, Richard J., (ed.) *3D seismic technology : application to the exploration of sedimentary basins.* London, UK, Geological Society of London, 311-320. (Geological Society of London Memoir, 29).
- Gale, J., Christensen, N. P., Cutler, A., & Torp, T.A., 2001: Demonstrating the Potential for Geological Storage of CO_2: The Sleipner and GESTCO Projects. Environmental Geosciences, 8 (3), 160 –165.
- Chadwick, A., Holloway, S. & Riley, N., 2001: Deep subsurface CO_2 sequestration - a viable greenhouse mitigation strategy. Geoscientist, vol 11, No 2, Feb 2001, 4-5.
- Zweigel, P. & Gale, J., 2000: Storing CO_2 underground shows promising results.- EOS, Transactions, American Geophysical Union, 81 (45), 529 & 534. (Reprinted with added figure in Earth in Space, 13 (6), 8-9.)
- Carstens, H. (& Torp, T.), 2000: Send CO2 tilbake til undergrunnen. GEO, 3, (6), 12-15.
- Zweigel, P., Lindeberg, E., & Eiken, O., 2000: 4D seismikk løser gåten. GEO, 3, (6), 16-18.

1.4.2 Conference presentations:

Greenhouse Gas Technology-8, Trondheim

- Nooner et al. (in press, 2006): Constraining the density of CO2 within the Utsira formation using time-lapse gravity measurements. Extended abstract.

Offshore Europe, SPE conference 6-9 september 2005, Aberdeen, Scotland

- Hansen, H.,Eiken, O. and Aasum, T.O, 2005: Tracing the path of the carbondioxide from a gas-condensate reservoir, through an amine plant and back into a subsurface acquifer. Case study: The Sleipner area, Norwegian North Sea

2nd Annual Conference on Carbon Sequestration, 5-8 May 2003, Alexandria, VA, US

- Gaus, I., Azarounal, M., & Czernichowski-Lauriol, I., 2003: Reactive transport modeling of dissolved CO2 in the cap rock base during CO2 sequestration (Sleipner site, North Sea). Abstracts of the 2nd Annual Conference on Carbon Sequestration, 5-8 May 2003, Alexandria, VA, US.

6th Petroleum Geology Conference, October 2003, London

- Chadwick, R.A., R.Arts & O. Eiken, 2005, 4D seismic quantification of a growing CO2 plume at Sleipner, North Sea. In; DORÉ, A.G & VINING, B.A (eds) Petroleum Geology: North-West Europe and Global Perspectives, Proceedings of the 6th Petroleum Geology Conference, 1385-1399

6th Greenhouse Gas Control Technologies Conference (GHGT6), October 2003, Kyoto

- Arts; R., Eiken, O., Chadwick, A., Zweigel, P., van der Meer, L., & Zinszner, B., 2002: Monitoring of CO2 Injected at Sleipner Using Time Lapse Seismic Data. Abstracts of the 6th International conference on Greenhouse Gas Control Technology (GHGT-6), Kyoto, Japan, 1-4 October 2002
- Chadwick, A., Zweigel, P., Gregersen, U., Kirby, G., & Johannessen, P., 2002: Geological Characterisation of CO2 Storage Sites: Lessons from the Sleipner, Northern North Sea. Abstracts of the 6th International conference on Greenhouse Gas Control Technology (GHGT-6), Kyoto, Japan, 1-4 October 2002
- Czernichowski-Lauriol, C.A. Rochelle, E. Brosse, N. Springer, K. Bateman, C. Kervevan, J.M. Pearce, B. Sanjuan, 2002: Reactivity of injected CO_2 with the Utsira Sand reservoir at Sleipner. Abstracts of the 6th International conference on Greenhouse Gas Control Technology (GHGT-6), Kyoto, Japan, 1-4 October 2002, p 341.
- Lindeberg, E., Bergmo, P., & Moen, A., 2002: The Long-term Fate of CO2 Injected into an Aquifer. Abstracts of the 6th International conference on Greenhouse Gas Control Technology (GHGT-6), Kyoto, Japan, 1-4 October 2002. Short abstract. Extended abstract
- Torp, T.A. & Gale, J. 2002: Demonstrating Storage of CO2 in Geological Reservoirs: The Sleipner and Sacs Projects. Abstracts of the 6th International conference on Greenhouse Gas Control Technology (GHGT-6), Kyoto, Japan, 1-4 October 2002

EAGE Annual meeting 2002, Florence

- Arts, R., Elsayed, R., van der Meer, L., Eiken, O., Østmo, S., Chadwick, A., Kirby, G., Zinszner, B., 2002: Estimation of the mass of injected CO2 at Sleipner using time-lapse seismic data. EAGE, Annual meeting 2002, Florence, Italy.

Geological Society of London, '3D Seismic Data: Advances in the Understanding of Stratigraphic and Structural Architecture' conference, 14-16 November 2001

- Chadwick, A., Williamson, P., Zweigel, P., Arts, R., Eiken, O., 2001: Time-lapse geophysical monotoring of a subsurface CO2 bubble in the Utsira Sand, Sleipner, northgern North Sea. Presentation at '3D Seismic Data: Advances in the Understanding of Stratigraphic and Structural Architecture' conferece at the Geological Society of London, Burlington House, 14-16 November 2001.

American Association of Petroleum Geologists (AAPG), Annual Meeting, June 2001, Denver

- Eiken, O., Brevik, I., Art, R., Lindeberg, E., Fagervik, K. 2001: Seismic monitoring of CO2 injected into a marine aquifer. American Association of Petroleum Geologists, Annual Meeting, June 2001, Denver, abstract volume.
- Zweigel, P., Arts, R., Bidstrup, T., Chadwick, A., Eiken, O., Gregersen, U., Hamborg, M., Johanessen, P., Kirby, G., Kristensen, L., & Lindeberg, E., 2001: Results and experiences from the first Industrial-scale underground CO_2 sequestration case (Sleipner Field, North Sea). American Association of Petroleum Geologists, Annual Meeting, June 2001, Denver, abstract volume (CD) 6p.

European Union of Geosciences (EUG), XI meeting, April 2001, Strasbourg

- Chadwick, A., Kirby,G., Holloway, S., Zweigel, P., & Arts, R. 2001: The case for underground carbon dioxide sequestration in Northern Europe.- European Union of Geosciences, XI meeting, April 2001, Strasbourg, Abstract volume, 172.
- Czernichowski-Lauriol, I., Rochelle, C.A., Brosse, E., Springer, N., Pearce, J.M., Bateman, K.A., Sanjuan, B., Kervévan, C., 2001: Disposal of CO2 in deep aquifers: geochemical investigations of water-rock-CO2 interactions at Sleipner (North Sea) as part of the SACS project. European Union of Geosciences, XI meeting, April 2001, Strasbourg, Abstract volume, 172.

5th Greenhouse Gas Control Technologies Conference (GHGT5), August 2000, Cairns

- Arts, R., Brevik, I., Eiken, O., Sollie, R., Causse, E., & van der Meer, B. 2000b: Geophysical methods for monitoring marine aquifer CO_2 storage - Sleipner experiences. 5th International Conference on Greenhouse Gas Control Technologies, Cairns (Australia), August 2000. (PDF 922 KB / 6 pages)
- Chadwick, R.A., Holloway, S., Kirby, G.A., Gregersen, U., & Johannessen, P.N. 2000: The Utsira Sand, Central North Sea - An assessment of its potential for regional CO_2 disposal. 5th International Conference on Greenhouse Gas Control Technologies, Cairns (Australia), August 2000. (PDF 446 KB / 6 pages)
- Lindeberg, E., Zweigel, P., Bergmo, P., Ghaderi, A., & Lothe, A. 2000b: Prediction of CO_2 dispersal pattern improved by geology and reservoir simulation and verified by time lapse seismic. 5th International Conference on Greenhouse Gas Control Technologies, Cairns (Australia), August 2000. (PDF 91 KB / 6 pages)
- Pearce, J.M., Czernichowski-Lauriol, I., Rochelle, C.A., Springer, N., Brosse, E., Sanjuan, B., Bateman, K., & Lanini, S. 2000: How will reservoir and caprock react with injected CO_2 at Sleipner? Preliminary evidence from experimental investigations. 5th International Conference on Greenhouse Gas Control Technologies, Cairns (Australia), August 2000. (PDF 14 KB / 6 pages)
- Van der Meer, L.G.H., Arts, R.A., & Paterson, L. (2000): Prediction of migration of CO_2 after injection in a saline aquifer: reservoir history matching of a 4D seismic image with a compositional gas/water model. 5th International Conference on Greenhouse Gas Control Technologies, Cairns (Australia), August 2000. (PDF 14 KB / 6 pages)
- Zweigel, P., Hamborg, M., Arts, R., Lothe A., & Tømmerås, A. 2000: Prediction of migration of CO_2 injected into an underground depository: Reservoir geology and migration modelling in the Sleipner case (North Sea). 5th International Conference on Greenhouse Gas Control Technologies, Cairns (Australia), August 2000. (PDF 1170 KB / 6 pages)

SEG International Conference 2000, Calgary

- Eiken, O., Brevik, I., Arts. R., Lindeberg, E., & Fagervik, K. 2000: Seismic monitoring of CO2 injected into a marine aquifer. SEG Calgary 2000 International conference and 70th Annual meeting, Calgary. (PDF 208 KB / 4 pages)

EAGE Annual Meeting 2000, Glasgow

- Arts, R. J., Zweigel, P., & Lothe, A.E. 2000a: Reservoir geology of the Utsira Sand in the Southern Viking Graben area – a site for potential CO2 storage.- 62nd EAGE meeting, Glasgow, paper B-20. (PDF 269 KB / 4 pages)
- Brevik, I., Eiken, O., Arts, R.J., Lindeberg, E., & Causse E. 2000: Expectations and results from seismic monitoring of CO2 injection into a marine acquifer. 62nd EAGE meeting, Glasgow, paper B-21.
- Gregersen, U, Johannessen, P.N., Chadwick, R.A., Holloway, S. & Kirby, G.A. 2000: Regional study of the Neogene deposits in the southern Viking Graben area - a site for potential CO_2 storage. 62nd EAGE meeting, Glasgow. (PDF 123 KB / 4 pages)

AAPG Int'l Conf. & Exhib. 1999, Birmingham

- Zweigel, P., Lothe, A. E., & Lindeberg, E., 1999: Offshore underground CO2-disposal: Reservoir geology of the Neogene Utsira Formation, Sleipner Field, North Sea.- AAPG Bull., 83, 1346-1347. (Poster at AAPG International Conference, Birmingham, UK, September 1999)

1.4.3 From CO2STORE project:

Title: Sleipner/Utsira CO_2 Geological Storage Full Field Flow and Geochemical Coupling to Assess the Long Term Fate of the CO_2
Authors: Frangeul, Johann, Long Nghiem, Emmanuel Caroli, Sylvain Thibeau
Conference: AAPG Annual Meeting, Dallas USA, April 18-21, 2004
Publication: AAPG Bulletin Vol. 88 (2004), No. 13 (Supplement)
Abstract: available at AAPG
Website:http://www.searchanddiscovery.com/documents/abstracts/annual2004/Dallas/Frangeu.htm

1.4.4 From Saline Aquifer CO_2 Storage (SACS) project:

Geology

- Rock mechanical tests of shale samples from the cap rock of the Utsira Sand in well 15/9-A11 – A contribution to the Saline Aquifer CO_2 Storage (SACS) project. Pillitteri et al. 2003. (PDF 1.7MB)
- Seismic mapping and simulation of CO2 migration in the upper Utsira sand wedge east of the Sleipner injection site – A contribution to the Saline Aquifer CO2 Storage (SACS) project. Hamborg et al. 2003. (PDF 1.4MB)
- Studies on the likelihood for caprock fracturing in the Sleipner CO2 injection case – A contribution to the Saline Aquifer CO2 Storage (SACS) project. Zweigel & Heill 2003. (PDF 2.0MB)
- The effect of time-depth conversion procedure on key seismic horizons relevant for underground CO2 storage in the Sleipner field (North Sea). Zweigel & Hamborg 2002. (PDF 2.6 MB).

- SACS, Task 1.4: Evaluation of cap rock sealing the reservoir. Clay mineralogy investigation of core and cuttings from the Ekofisk and Sleipner areas. Lindgren et al. 2002. (PDF 513 KB).
- Characterisation of the Nordland Shale in the Sleipner area by XRD analysis - A contribution to the Saline Aquifer CO2 Storage (SACS) project. Bøe, R., & Zweigel, P. (Feb. 2001). (PDF 547 KB)
- Reservoir geology of the storage units in the Sleipner CO2 injection case. Zweigel et al (Dec 2000). (ZIP 13.5 MB). Main report only. (PDF 7926 KB)
- Mineralogical and petrographical characterisation of a 1 m core from the Utsira Formation, Central North Sea. Pearce, J.M., Kemp, S.J., and Wetton, P.D., 1999. BGS Technical Report - Mineralogy & Petrology Series, Report WG/99/24C, 26pp. + 3 plates. (ZIP 23562 KB)
- The biostratigraphical and palaeo-ecological application of calcareous microfaunas from the Utsira Formation in Norwegian Well 15/9-A-23. Wilkinson, I. P., 1999. BGS Technical Report – Stratigraphy Series, Report WH/99/124R, 4pp. (PDF 29 KB / 4 pages)

Geochemistry

- Preliminary modelling of the geochemical impact of CO_2 injection on the caprock at Sleipner. Gaus et al. 2002. (PDF 254 KB)
- The solubility of supercritical CO_2 into pure water and synthetic Utsira porewater. Rochelle & Moore 2002. (PDF 1.7 MB)
- Geochemical interactions between supercritical CO_2 and the Utsira Formation: an experimental study. Rochelle et al. 2002. (PDF 4.5 MB)

Geophysics

- Multi-component seismic monitoring of CO2 gas cloud in the Utsira Sand: A feasibility study (Report Work Area 5.6) . Liu et al. (April 2001). (PDF 1586 KB)

2 CO_2 capture from Snøhvit well stream at Hammerfest LNG and storage in the Tubåen and Stø formation in the Snøhvit area – injection well and monitoring methodology

2.1 CO_2 re-injection system and well specification:

2.1.1 Location of the CO_2 injection well F-2 H:

The CO_2 injection well is located at the F-segment at the western part of the Snøhvit reservoir (*Figure AIV- 9*). The injection pipeline is 152 km long (Figure AIV- 10).

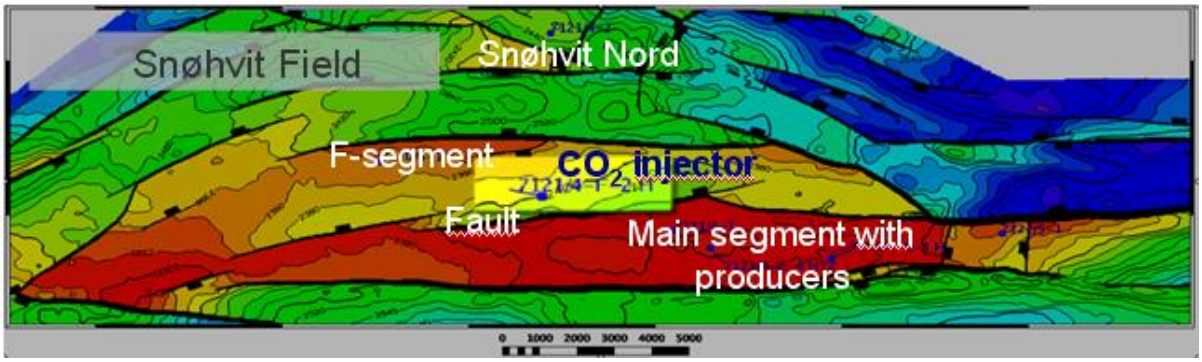

Figure AIV- 9 Location of the CO2 well at Snøhvit.

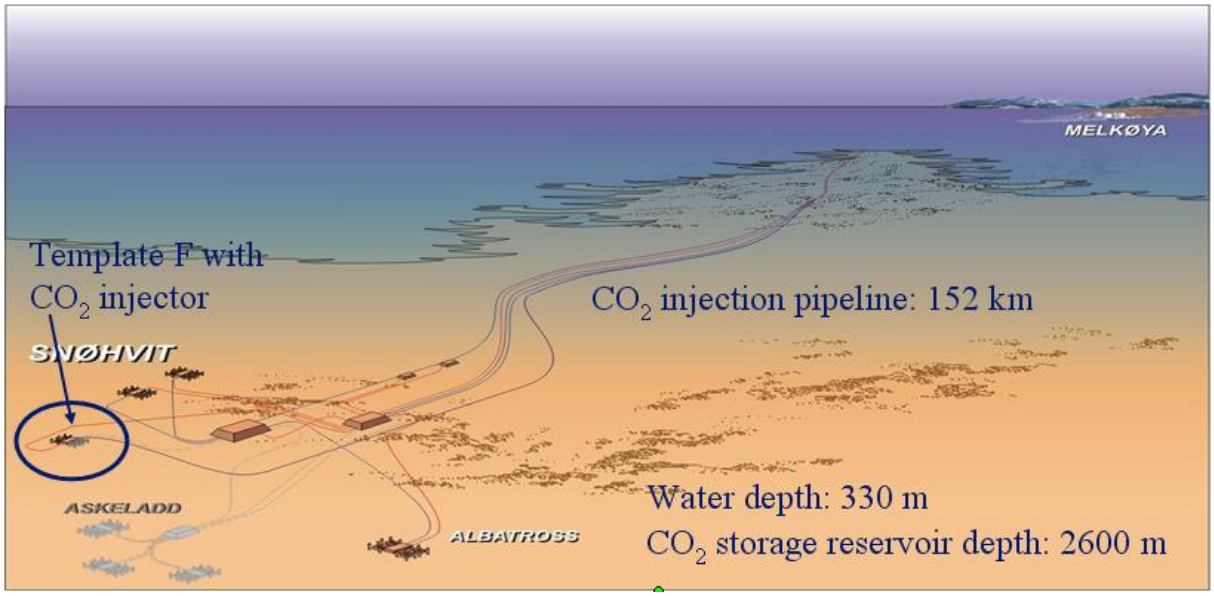

Figure AIV- 10 Field overview.

Table AIV- 1 Key parameters for F-2 H into Tubåen and Stø reservior reservoir.

Key parameters	TUBÅEN	STØ
Initial reservoir pressure	288 bar	255 bar
Initial temperature	98 °C	98 °C
Porosity	10- 16 %	15 %
Permeability	200-800 md	400 md
Reservoir depth	2600 m	2450 m
Water depth at F-template	330 m	330 m
Lenght pipline from Melkøya	152 km	152 km

To keep the CO_2 as deep as possible, it was decided to perforate the mid and lower part of Tubåen as shown in Figure AIV- 11. If injection fails, additional perforations could be added in Tubåen, and/or bottom of Stø could be opened up for injection.

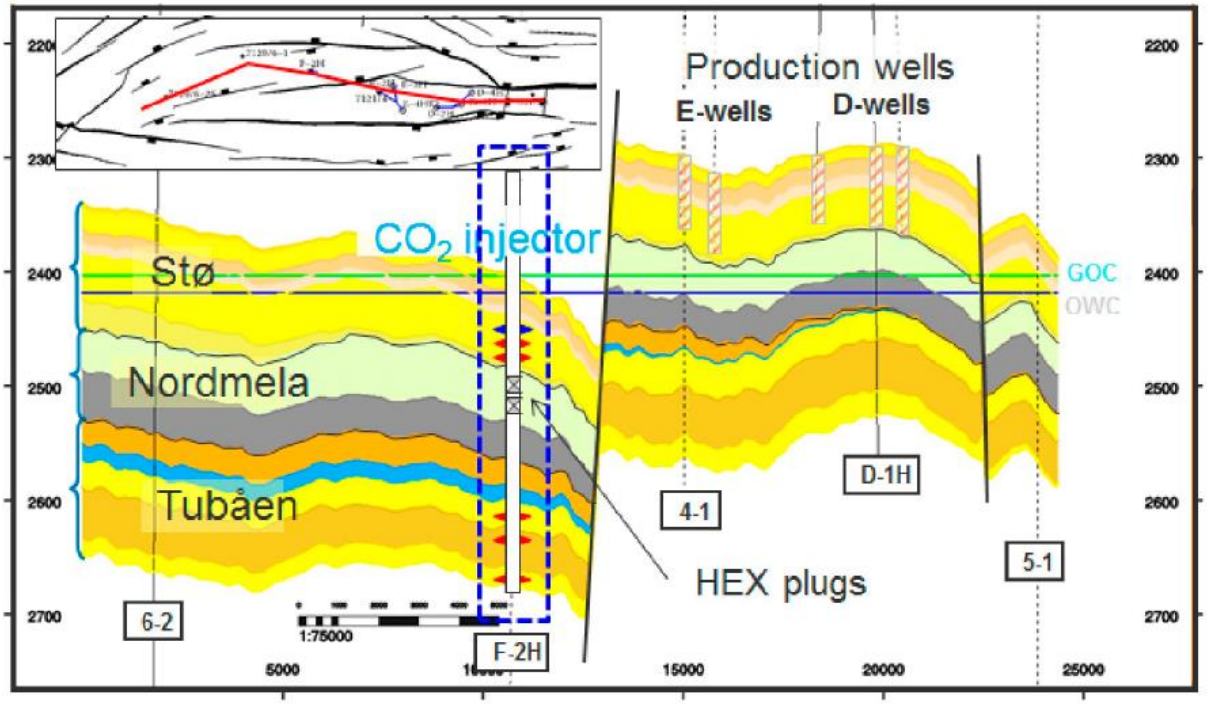

Figure AIV- 11 Cross-section of F-segment where CO_2 is injected.

The completion design basis for the CO_2 injector is a perforated 7" liner. Downhole pressure and temperature gauge is installed. At Snøhvit and Hammerfest LNG, all facilities for separation and injection of CO_2 are placed onshore at the process plant at Melkøya. CO_2 in the feed gas are removed to avoid it freezing out in the downstream liquefaction process. An amine absorption unit performs this operation. The recovered CO_2 is condensed and recompressed before re-injected into Tubåen.

A schematic of the CO_2 re-injection system is shown in Figure AIV- 12. The indicated physical and measured values are expected initial values. Figure AIV- 13 shows the CO_2 phase diagram. The eight

numbers in the phase diagram show CO_2 phase conditions at eight different locations indicated in Figure AIV- 13.

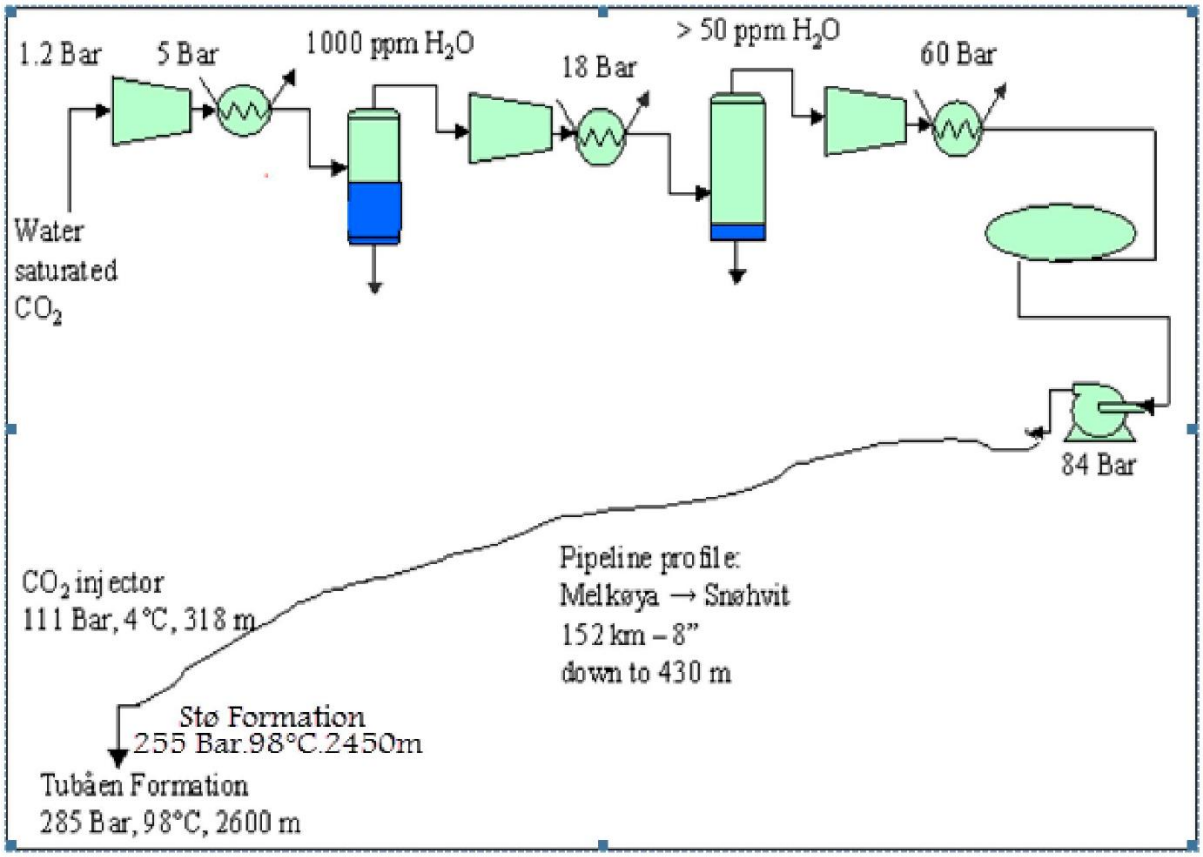

Figure AIV- 12 Schematic of the CO_2 injection system.

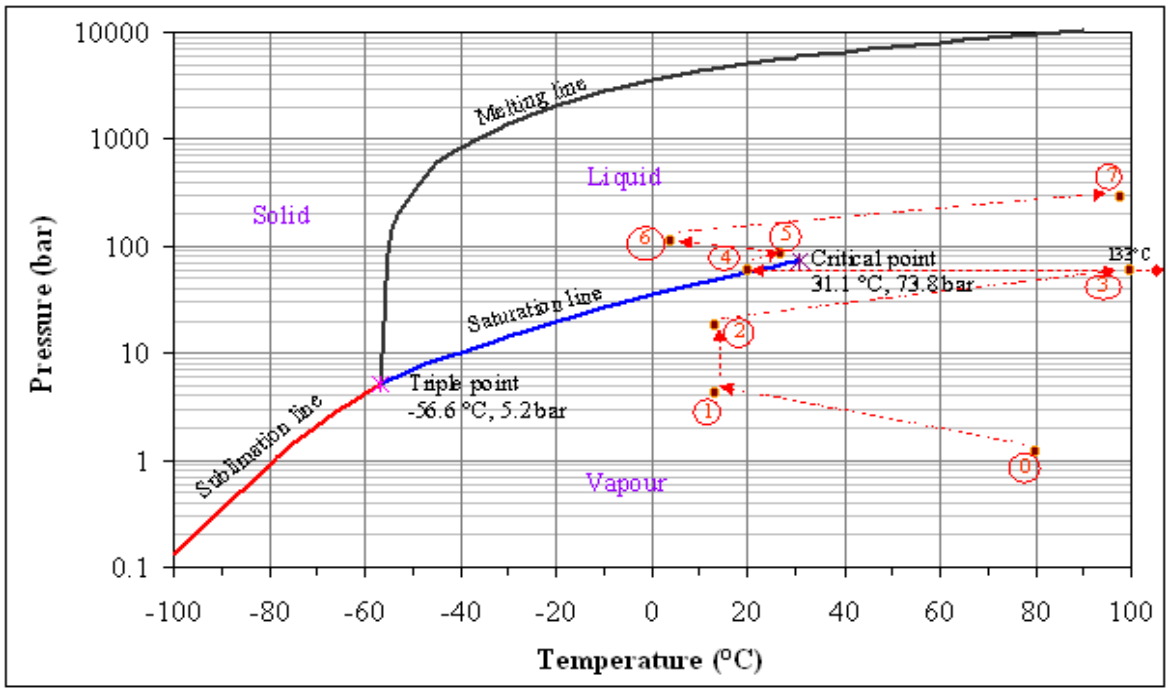

Figure AIV- 13 CO2 phase diagram with eight phase conditions identified in the injection system in the Snøhvit area.

The figures (Figure AIV- 12 and Figure AIV- 13) show that CO_2 most likely are re-injected as a single phase (liquid condition in the pipeline from the export pump (5) to the well head (6), transformed to supercritical condition in the reservoir where the temperature is higher).

2.1.2 CO_2 well stream specification

- >99% CO_2
- max 100 ppm (mol) H2S
- max 50 ppm (wt) H2O
- traces of HC and N2

2.1.3 CO_2 venting to atmosphere:

CO_2 venting is foreseen in case of shut down of the CO_2 reinjection system. The maximum vent rate is almost equal to the CO_2 removal flow rate. A separate vent stack for the CO_2 is provided at the plant.

2.2 Applied methods for monitoring the injected CO_2

a) Seismic monitoring

- 3D seismic shot in 2003
- 2D line shot in 2006
- 3D/4D seismic monitoring survey in 2009, 2011, 2012 and 2014

b) Gravimetric monitoring

- Pre-installed 41 concrete benchmarks across the Snøhvit reservoir in 2007
- The closest is 419 m from the CO_2 well
- Repeat survey carried out in 2011 confirmed the prognoses

Benchmark number 21 is closest to the CO_2 injection well – see Figure AIV- 14.

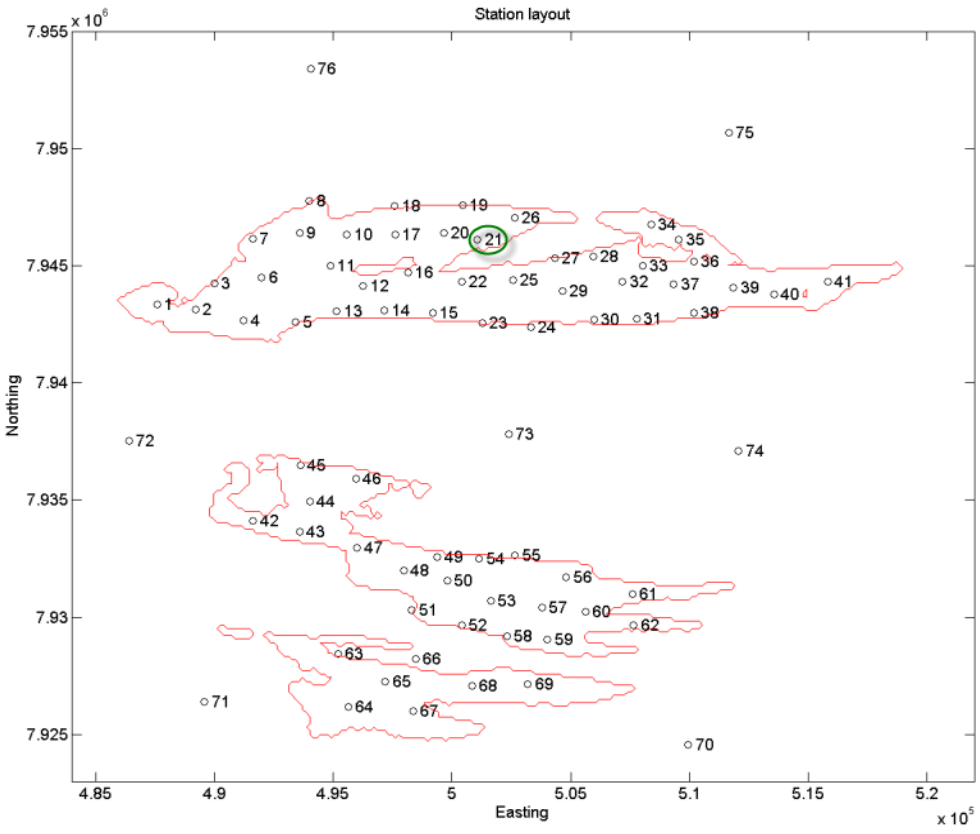

Figure AIV- 14 Benchmarks Gravimetric monitoring CO2 storage in the Snøhvit area.

c) Pressure measurements

Pressure and temperature gauge is installed in the well 600 metres above top reservoir and the pressure development in the injection well F-2 H is monitored on a daily basis. Actual bottom hole

pressure is estimated based on gauge measurements and CO_2 pressure, volume and temperature properties. Data are used in history matching of the reservoir simulation model.

Annex V: National Greenhouse Gas Inventory System in Norway

Information about changes in the document

Date	Version	Performed by	Comment
Nov 2006	1	Norwegian Pollution Control Authority	Part of the initial report 2006
15.04.2010	2	Climate and Pollution Agency	Updates for 2010 submission
25.05.2012	3	Climate and Pollution Agency	Updates for 2012 submission
10.04.2013	4	Climate and Pollution Agency	Updates for 2013 submission
21.03.2014	5	Norwegian Environment Agency	Updates for 2014 submission
1.11.2015	6	Norwegian Environment Agency Norwegian Institute of Bioeconomy Research Statistics Norway	Revision/updates for 2015 Submission
05.04.2016	7	Norwegian Environment Agency Norwegian Institute of Bioeconomy Research Statistics Norway	Revision and updates for the 2016 submission

Version 7

2016

Contents

Preface

According to the decision on Article 5.1 of the Kyoto Protocol all Annex 1 parties that also are Parties to the Kyoto Protocol, must implement a national system for greenhouse gas inventories, which includes (see Annex to decision 19/CMP.1):

> "*all institutional, legal and procedural arrangements made within a Party included in Annex I [to the Kyoto Protocol] for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information*"

A description of the national system was reported as part of a Party's Initial Report to the Kyoto Protocol in line with decision 13/CMP.1. The purpose of the Initial Report was to facilitate the calculation of assigned amount and demonstrate the capacity to account for emissions, removals and assigned amount. Norway's Initial Report was submitted to the Climate Convention in December 2006, and the report on the national system for greenhouse gas inventories was attached to the Initial Report as an appendix.

The report on national system for greenhouse gas inventories was prepared by a project team consisting of representatives from the Norwegian Environment Agency, Statistics Norway, the Center for International Climate and Environmental Research – Oslo (CICERO) and The Norwegian Institute of Bioeconomy Research (formerly The Norwegian Forest and Landscape Institute). Norway's national system has changed over the years, and the changes have been reported annually in the National Inventory Reports.

1 Introduction

A national system for greenhouse gas inventories is introduced in Article 5.1 of the Kyoto Protocol. The objectives of the national system are[1]:

- To enable Annex I Parties to estimate anthropogenic greenhouse gas (GHG) emissions by sources and removals by sinks in accordance with the Kyoto Protocol and decisions made by the Parties
- To assist Annex I Parties in meeting their commitments
- To facilitate review of the submitted information
- To assist Annex I Parties to ensure and improve the quality of their inventories

The Guidelines for national systems are defined in the Annex to COP[2]/CMP[3] decisions 20/CP.7 and 19/CMP.1 (FCCC/CP/2001/13/Add.3). These guidelines describe various functions that need to be in place in the national system, but leave the details of implementation to each Party in accordance with their national circumstances. Decision 3/CMP.11 has implications for the guidelines defined in decision 19/CMP.1 and these implications are to the extent possible reflected in this description of Norway's national system.

The functions are described as *general and specific* functions.

The general functions include:

- Establishing and maintaining *institutional, legal and procedural arrangements* necessary to perform the functions defined in the guidelines for national systems
- Ensuring s*ufficient capacity* for timely performance of the functions defined in the guidelines, including data collection and arrangements for technical competence of the staff involved in the inventory development process
- *Preparing national greenhouse gas inventories* and supplementary information *in a timely manne*r in accordance with the Kyoto Protocol and relevant decisions by the Parties
- Providing information necessary to meet the *reporting requirements*

The specific functions include:

- Planning
  - Designate a single *national entity*

[1] Annex to COP decision 20/CP.7 and CMP decision 19/CMP.1 "Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol" here called "guidelines for national systems".

[2] Conference of the Parties to the United Nations Framework Convention on Climate Change.

[3] The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

  - Define and allocate *specific responsibilities* in the inventory preparation and development process including methodological choice, data collection, processing and archiving, and quality assurance and quality control (QA/QC)
  - Elaborate a *QA/QC plan* describing specific QA/QC procedures to be implemented during the inventory preparation and development process, facilitate the overall QA/QC procedures to be conducted, and establish data quality objectives
  - Establish a process for the *official consideration* and approval of the greenhouse gas inventory, including recalculations, prior to submission, and to respond to any issues raised by the inventory review process
- Preparation
  - Identify *key categories*
  - Prepare estimates in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
  - Collect sufficient data (activity data and emission factors) to support the selected methods
  - Make a quantitative estimate of inventory uncertainty
  - Ensure that recalculations of previously submitted estimates are made in accordance with the good practice guidance
  - Compile the national emission inventory
  - Implement general QC procedures
  - Consider source-specific QC procedures and provide for a basic review of the inventory of personnel that have not been included in the inventory development
- Management
  - Archive information for each year in accordance with relevant decisions
  - Provide a review team with access to archived information used by the Party
  - Respond to requests for clarifying inventory information resulting from different stages of the review process in a timely manner

Good practice is in the guidelines for national systems defined as *a set of procedures intended to ensure that greenhouse gas inventories are accurate in the sense that they are systematically neither over- nor underestimates as far as can be judged, and that uncertainties are reduced as far as possible.* Guidance on preparing greenhouse gas inventories is given in the 1996 IPCC Revised Guidelines for Inventory Preparation (IPCC, 1996), the IPCC Good Practice Guidance for Uncertainty Management in National Greenhouse Gas Inventories from 2000 (IPCC, 2000) and in the 2006 IPCC guidelines for national greenhouse gas inventories (IPCC, 2006). For the land use, land-use change and forestry (LULUCF) sector, the IPCC has prepared a supplementary good practice report in 2004 (IPCC, 2004).

The Parties to the UN Framework Convention on Climate Change (UNFCCC) have through decision 24/CP.19 agreed on revised guidelines for reporting data on emissions and removals, building on the guidance from the IPCC. Data are to be reported annually before

April 15 to the UNFCCC. Reporting includes tables (using the so-called Common Reporting Format (CRF)), the National Inventory Report (NIR) describing data, methodologies and the main results of the inventory and additional documentation. For LULUCF, reporting under the Kyoto Protocol will be different from that under the UNFCCC.

Decision 24/CP.19 also states that Annex I parties under the Convention should design and operate national inventory arrangements. The national inventory arrangements are similar to the national system of the Kyoto Protocol. This report's description of the functions required for the national system is also a description of the national inventory arrangements in Norway.

2 National responsibilities

2.1 General overview

The Norwegian national system for greenhouse gas inventories is based on cooperation between the Norwegian Environment Agency (the national entity), Statistics Norway and the Norwegian Institute of Bioeconomy Research.

In accordance with the decision on Article 5.1 of the Kyoto Protocol a formalized agreement has been signed between the Norwegian Environment Agency as the national entity and the two other institutions. This ensures the continuation of the national system for greenhouse gas inventories and reporting for the period from 2015 – 2022.

Statistics Norway is responsible for the official statistics on emissions to air, excluding LULUCF. The Norwegian Institute of Bioeconomy Research is responsible for the calculations of emission and removals from Land Use and Land Use Change and Forestry – LULUCF and for KP-LULUCF. The reporting to the UNFCCC is based on the official statistics on emissions to air and the calculations of emissions and removals from LULUCF.

2.2 Institutional cooperation, responsibilities and agreements

The three institutions of the national greenhouse gas inventory system, the Norwegian Environment Agency, Statistics Norway and The Norwegian Institute of Bioeconomy Research, work together to fulfill the requirements for the national system. The allocation of responsibilities for producing estimates of emissions and removals, QA/QC and archiving is presented in chapters 3, 4 and 5. An overview is shown in Figure AV-1.

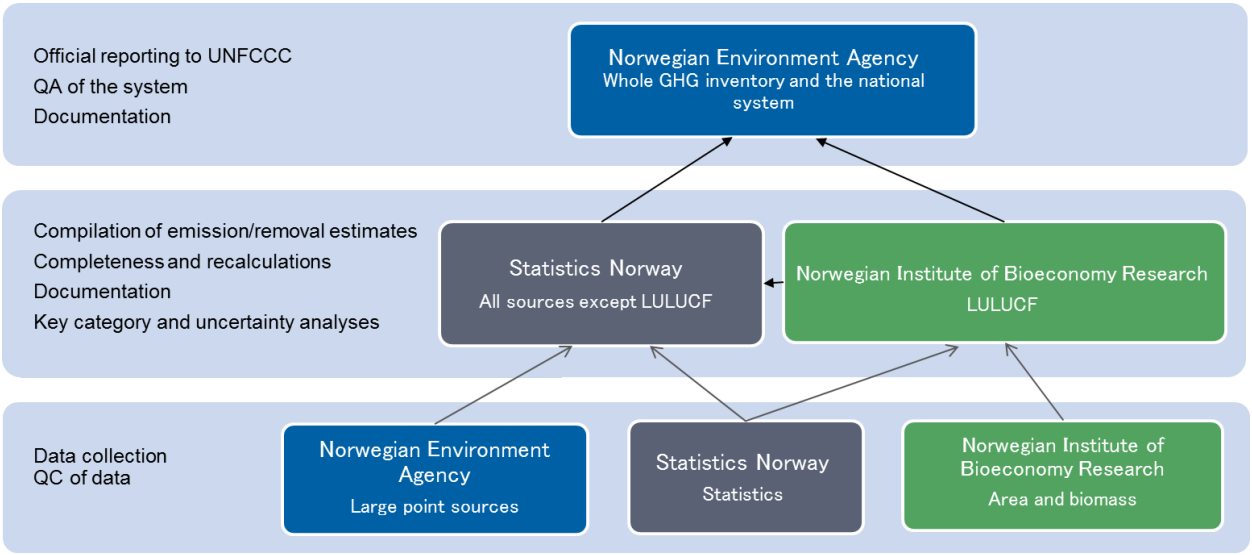

Figure AV-1. Overview of participating institutions, institutional responsibilities and cooperation

To ensure that the institutions comply with their responsibilities, Statistics Norway and The Norwegian Institute of Bioeconomy Research have signed agreements[4] with the Norwegian Environment Agency as the national entity. The obligations of the Norwegian Institute of Bioeconomy Research will also be guided by an annual allotment letter (*tildelingsbrev*) from the Ministry of Agriculture and Food. Through these agreements, the institutions are committed to implementing the QA/QC and archiving procedures, providing documentation, making information available for review, and delivering data and information in a timely manner to meet the deadline for reporting to the UNFCCC.[5]

The establishment of the national system requires close collaboration between the three institutions. The Norwegian Environment Agency as a national entity is responsible for preparing, organizing and reporting meetings between the three institutions. The purpose of the cooperation meetings is to discuss and agree on methodological issues, prioritize resources (e.g. in light of the review reports) and generally facilitate the implementation of the national system. Normally, two cooperation meetings between all three institutions are held every year. The cooperation meeting makes decisions collectively. In addition, bilateral cooperation meetings are arranged between the national entity and each of the other institutions in the national system.

More specifically the cooperation meetings will:

- Prepare for the annual review and address comments received
- Agree on methodological changes in light of review reports, QA/QC findings, new scientific information and available resources
- Agree to implement new data into the inventory
- Agree to recalculations and appropriate methodologies
- Prioritize source-specific QC and methodology studies to improve the estimates in the short and long-term
- Prioritize and interpret QA-procedures
- Review documentation and QA/QC and archiving systems and point out needs for improvements
- Address other relevant technical issues
- Point out weaknesses in capacity
- Point out problems with the implementation of the national systems (institutional and overall)
- Exchange relevant information, including update on current events from the international climate negotiation
- Report the conclusions from the meetings and flag issues for follow-up to the responsible heads of departments in the three institutions

[4]New, formalized agreements were made in 2014 between the Norwegian Environment Agency and Statistics Norway and the Norwegian Environment Agency and The Norwegian Institute of Bioeconomy Research which regulates details about the cooperation within the national system

[5] The agreement between the Norwegian Environment Agency and Statistics Norway also includes commitments for data deliveries for reporting under the Convention on Long-range Transboundary Air Pollution (LRTAP).

Most key data are collected by the three institutions, as shown in Annex 5. Additional key data providers include the Norwegian Petroleum Directorate, the Norwegian Petroleum Industry Association, and the Norwegian Road Federation.

2.3 Securing and developing capacity

Norwegian authorities will secure financial and human capacity for the national system to fulfill the reporting obligations and to ensure that the data quality objectives are met.

The Norwegian Environment Agency is a government institution. The responsibility for the national system is described in the annual letter from the Ministry of Climate and Environment where they give directions on the Norwegian Environment Agency's key priorities and financial resources for the following year. The national system involves several units in the Norwegian Environment Agency. To ensure that the requirements are met, the Section for Emission Inventories and Analysis holds the main responsibility and coordinating role in the Agency.

Statistics Norway is an independent government institution. Statistics Norway is responsible for the official statistics on emissions to air. Statistics Norway is also responsible for compiling the Norwegian greenhouse gas emission inventory, excluding LULUCF, based on the official statistics on emissions to air. The expenses for production and development of the official statistics on emissions to air and the emission inventory are partly covered by Statistics Norway through its financing from the government budget, and partly through specific project funding from the Norwegian Environment Agency.

The Norwegian Institute of Bioeconomy Research is owned by the Ministry of Agriculture and Food as an administrative agency with special authorization and its own supervisory board. Several units within the institution will be involved in the LULUCF inventory. The responsibility for coordination, QA/QC and reporting is placed within one of these units; Department of Forest and Climate. The expenses for production and development of the greenhouse gas inventory are partly covered by the Norwegian Institute of Bioeconomy Research through its funding over the government budget and partly through specific project funding from the Norwegian Environment Agency.

Each institution is obliged to implement internal procedures to fulfill the requirements of the national system, particularly with respect to meeting deadlines, implementation of QA/QC procedures and archiving. Each institution is also obliged to develop the competence of their staff as required.

The three institutions will meet to discuss and share experiences with respect to key topics like QA/QC, uncertainty assessment, archiving and the Kyoto Protocol. These meetings are used to increase the capacity in the project groups in the three institutions. The institutions of the national system may also need to seek partners from other technical authorities or expert institutions to participate in a Tier 2 QA/QC and to improve methodologies and data quality, for example with respect to industrial processes technology, agriculture, soil processes and waste.

2.4 Legal basis

The data collection and data management is secured on a legal basis through three main acts, the Pollution Control Act (forurensningsloven), the Greenhouse Gas Emission Trading Act (klimakvoteloven) and the Statistics Act (statistikkloven).

The *Pollution Control Act* gives the Norwegian Environment Agency the authority to collect and review emission data from large industrial plants (https://lovdata.no/dokument/NL/lov/1981-03-13-6?q=forurensningsloven, http://www.regjeringen.no/en/doc/laws/acts/pollution-control-act.html?id=171893). Emissions of greenhouse gases are considered part of the Pollution Control Act. The Pollution Control Act is a typical enabling act. This means that the details in each case are outlined in discharge permits and regulations issued by the pollution control authorities. The Act was established for the purpose of preventing and reducing harm and nuisance from pollution. This is reflected in the main rule of the act, which says that pollution is forbidden, unless it is specifically permitted by law, regulations or individual permits. Collection and checking of GHG emission data are also covered by the *Greenhouse Gas Emission Trading Act* (https://lovdata.no/dokument/NL/lov/2004-12-17-99?q=klimakvoteloven, http://www.regjeringen.no/en/doc/laws/acts/greenhouse-gas-emission-trading-act.html?id=172242). The implementation rules are stipulated in a regulation (https://lovdata.no/dokument/SF/forskrift/2004-12-23-1851?q=klimakvote). Statistics Norway is a professional independent institution, which through The Statistics Act (https://lovdata.no/dokument/NL/lov/1989-06-16-54?q=statistikkloven) has been given the right to impose upon any person an obligation to provide information necessary for the production of official statistics. The Statistics Act gives Statistics Norway unlimited access to administrative registers and to choose the statistical methods which form the basis for the preparation of official statistics. Statistics Norway is responsible for how and when official statistics are published. The Ministry of Finance is administratively responsible for Statistics Norway, and the fiscal budget for its business is set by the Government and the Norwegian parliament.

2.5 The Norwegian Environment Agency's responsibilities as a national entity

The Norwegian Environment Agency has been appointed by the Ministry of Climate and Environment as the national entity through the budget proposition to the Norwegian parliament (Stortinget) for 2015, which states that "*The Norwegian system will build on existing organization and cooperation between the Norwegian Environment Agency, Statistics Norway and the Norwegian Institute of Bioeconomy Research. These three institutions are held individually responsible that their own contributions to the national system are in line with the guidelines from the climate convention on the calculation and archiving of emissions and removals of greenhouse gases. The Norwegian Environment Agency is still appointed as a national entity with overall responsibility for the inventory and reporting*". (St. prop. Nr. 1 (2014-2015)). This point of the proposition was accepted by the

Norwegian parliament without any remarks. The Norwegian Environment Agency as the national entity is responsible for:

- Reporting the greenhouse gas inventory to the UNFCCC, including the National Inventory Report and CRF tables
- Completing the National Inventory Report
- Implementation of a QA/QC plan
- Preparing for UNFCCC inventory reviews and coordinating the communication with the expert review team, including responses to review findings
- Coordinating the cooperative work between the institutions of the national system, including the establishment of formal agreements
- Informing the cooperating institutions about relevant decisions and meetings
- Informing national institutions (e.g. ministries and data providers) about the requirements of the national system and ensuring that existing information in national institutions is considered and used in the inventory where appropriate
- Working to secure adequate funding for all parts of the national system in collaboration with the Ministry of Climate and Environment, The Ministry of Agriculture and Food, and the Ministry of Finance

2.6 Official consideration and approval of the inventory

The Norwegian Environment Agency as the national entity is in charge of approving the inventory before official submission to the UNFCCC. As a basis for approving the inventory, the Norwegian Environment Agency will consider the completion of the inventory and the National Inventory Report. The Norwegian Environment Agency will also review:

- The QA/QC report from the QA/QC responsible in the Norwegian Environment Agency, attaching QA/QC reports from the institutions of the national system
- Methodological changes and recalculations
- Minutes from the cooperation meetings between the institutions
- Other matters of relevance for the approval of the inventory

2.7 Inventory production plan

The institutions have agreed on a “milestone” production plan (Table AV-1). The plan will be supplemented by internal production plans in the three institutions. After the implementation of the new CRF reporting tool in 2015, the reporting cycle for 2016 has been used to implement new production routines arising from the new CRF reporting tool. The production plan in Table AV-1 is updated accordingly. Figure AV-2 gives an overview of the inventory preparation cycle.

Table AV-1 Milestone inventory production plan (indicative dates)

	Responsible	**Deadline**
Consideration of methodological changes needed for the next year's reporting, including those based on the review report from last year's reporting cycle	Norwegian Environment Agency	February 1st
Agreement on major methodological changes needed for next year's reporting	All	May 15th
Emission data from large industrial plants sent to Statistics Norway	Norwegian Environment Agency	October 15th
All non-LULUCF data collection completed	Statistics Norway	November 1st
LULUCF area data collection for the previous calendar year completed	Norwegian Institute of Bioeconomy Research	December 1st
National publishing of official statistics on emissions to air[1]	Statistics Norway	December
QA/QC of the emission estimates from the official statistics to air for use in the emission inventory	Norwegian Environment Agency	January 15th
All data entered into the CRF software	Statistics Norway and Norwegian Institute of Bioeconomy Research	February 1st
Review of documentation and necessary updates made[2]	All	February 1st
QA/QC of emission inventory in the CRF software completed	All	March 15th
NIR first draft	Norwegian Institute of Bioeconomy Research and Norwegian Environment Agency	March 15th
QA/QC reports sent to the Norwegian Environment Agency	All	March 30th
NIR finalized	Norwegian Environment Agency	April 13th
QA/QC report finalized	Norwegian Environment Agency	April 13th
Formal approval of the inventory for the purpose of reporting	Norwegian Environment Agency	April 13th
Reporting	Norwegian Environment Agency	April 15th

[1] The official statistics on emissions to air have a different aggregation of emissions than the greenhouse gas emission inventory reported to the UNFCCC. However, the activity data, emission factors and calculation methodologies are the same.

[2] This point includes internal documentation in all institutions as well as external documentation in the Norwegian Institute of Bioeconomy Research and Statistics Norway

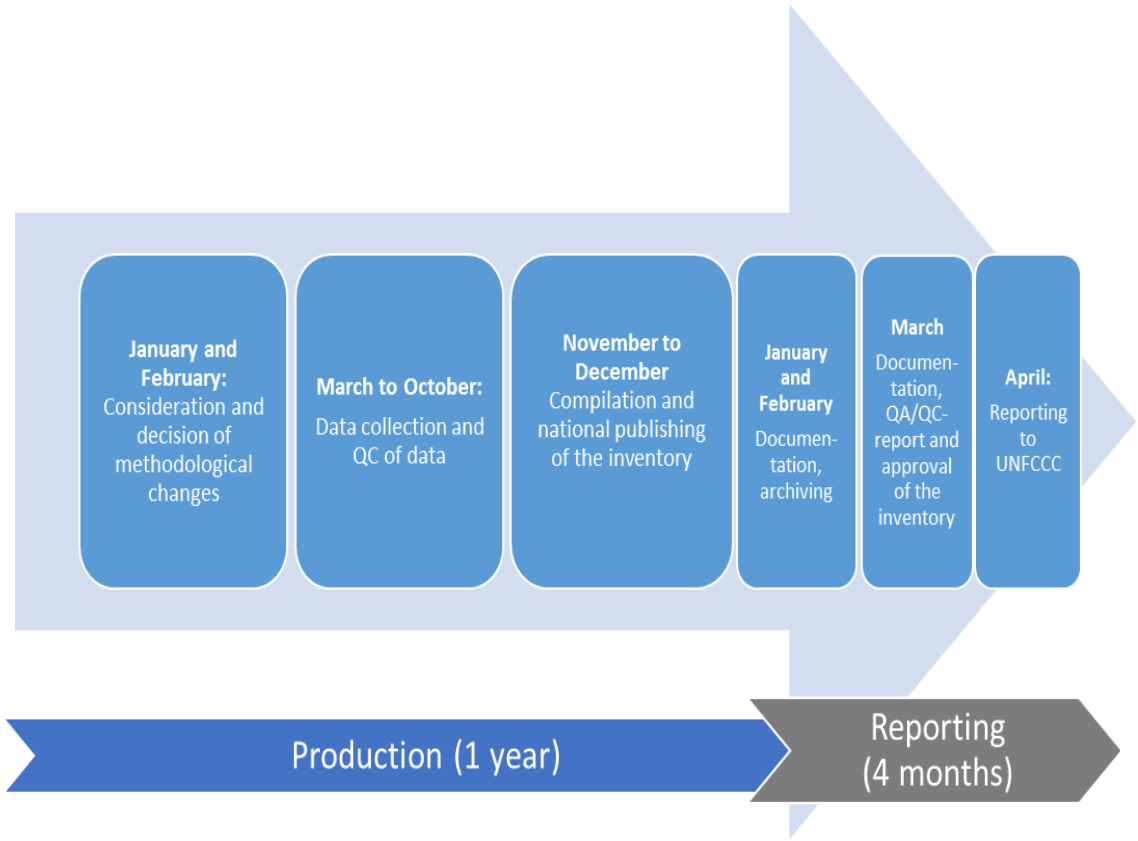

Figure AV-2. The inventory preparation cycle

3 QA/QC-plan

3.1 Data quality objectives

Good practice defines the data quality objectives to be *transparency, completeness, consistency, comparability and accuracy*. These objectives are used as a foundation of the QA/QC system implemented in Norway. In addition, we consider *timeliness* as part of the data quality objectives. Below we describe the objectives in more detail as they have been elaborated for the national system in Norway.

Transparency implies:

- Availability of sufficient documentation to enable estimates to be replicable from emission factors, activity data or plant emission measurement[6] for emission/removal data, irrespective of which institution or company made the estimates. This includes appropriate references to supplementary information (e.g. scientific literature)
- Availability of supplementary documentation (in English if practical) of models to enable a review, including a description of main assumptions and sources of data
- Availability of supplementary documentation (in English if practical) of data collection of key activity data
- Availability of sufficient documentation of methodological choices, including choice of measurement methods
- Explanation of reasons for not estimating an emission or removal occurring in Norway, for example an explanation of why an estimate is considered insignificant, see NIR chapter 1.7
- Documentation of QA/QC procedures

Completeness implies that:

- Estimates are made for all sources and sinks identified unless it can be documented that emissions/removals are insignificant
- Notation keys are used for all cells to be reported in the CRF
- Regular evaluation assessing potentially new sources and include these in the inventory

Consistency implies that:

- The same data sources and assumptions are used across gases, sectors and years of the inventory
- The same methodology has been used for all years of a time-series

[6] This criterion can be difficult to fulfill in cases where complex models are used.

- Data (activity data and measured data) have been collected using the same method for all years of the time-series
- Appropriate splicing techniques in accordance with the good practice guidance have been applied in cases of inconsistencies of time-series or changes in methodologies

Comparability implies that:

- Methodologies are consistent with the IPCC Guidelines and the good practice guidance
- Reporting guidelines are followed
- Emissions and removals are allocated to appropriate categories of the CRF as described in the IPCC Guidelines and good practice guidance

Accuracy implies that:

- Uncertainties are reduced by selecting higher tiers for key categories or increased sampling/frequency of surveyed data and emission measurements (taking costs into account)
- Data collected are checked to assess their reliability and possible over- or underestimates and identified biases are reduced
- Uncertainty estimates are collected and reported for all data
- Data are compared with independent information where possible

Timeliness implies that:

- Data are collected, processed and reported in accordance with a timetable that allows reporting within the official deadline for submission to the UNFCCC

3.2 QA/QC responsibilities

All three institutions are responsible for implementing QC procedures to meet the data quality objectives of the data they collect. Each institution is also responsible for implementing QA procedures on method implementation and of data originally collected by another institution in addition to reviewing the QC performed on these data by the institution collecting the data.

The Norwegian Environment Agency as the national entity is responsible for overall QC and in charge of checking that the appropriate QC procedures are implemented internally at the Norwegian Environment Agency, Statistics Norway, and the Norwegian Institute of Bioeconomy Research. Statistics Norway has an overall responsibility for QC of the data of the emission inventory, including the estimate of total emissions. The Norwegian Environment Agency checks the QC reports and may request Statistics Norway to revise the inventory if the QC report is not satisfactory, if errors in the inventory are identified, or if any of the methodologies used are not as agreed by the cooperation meeting. In the event of a disagreement between the Norwegian Environment Agency and Statistics Norway on any numbers in the emission inventory, the Norwegian Environment Agency may change the estimates in the CRF. They will inform Statistics Norway about this decision and the reasons

for it, and they will document in the NIR why the data in the CRF are different from those of the national inventory compiled by Statistics Norway.

Each institution is responsible for the annual reporting on their completion of the QC procedures before the inventory submission to the UNFCCC. The reporting is based on a general and a source-specific QC checklist and a textual description of possible recalculations, issues to be followed up before the next submission and other relevant information. The QC reports are sent to the Norwegian Environment Agency.

The Norwegian Environment Agency, as the national entity, is responsible for the overall QA of the national system, including the UNFCCC reviews and any national reviews undertaken.

3.3 QC procedures

The input data used in the Norwegian national inventory are classified as emission factors, model and other estimation parameters, activity data (statistical data) and emissions from industrial and large plants (point sources). The output is classified as estimated emissions and removals, CRF tables and NIR information. QC procedures are established for each element of input data and output.

Chapter 6 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 1 (IPCC, 2006) gives guidance on QC.

QC is defined *as a system of routine technical activities, to measure and control the quality of the inventory as it is being developed*. The QC system is designed to:

i) Provide routine and consistent checks to ensure data integrity, correctness, and completeness
ii) Identify and address errors and omissions
iii) Document and archive inventory material and record all QC activities

The IPCC Guidelines distinguishes between *general* and *category-specific* QC procedures. The general procedures focus on the processing, handling, and documentation procedures that are common to all inventory source categories. The category specific QC procedures are directed at specific types of data used in the methods for individual categories and require knowledge of the category, the types of data available and the parameters associated with emissions.

3.3.1 General QC procedures

The general QC procedures are performed annually for all data collected and all estimated data. For all sectors except LULUCF, most of these checks are performed automatically through use of Statistics Norway's emission model. However, checks are also performed manually on some data, for example, emission data collected from plants and activity data, emission factors and other estimation parameters for key categories. Identified problems are normally corrected before the final submission or flagged for correction in the next submission. For the LULUCF sector, the QC checks are also described in chapter 6 of the NIR.

In 2011, new routines for input data control were completed and implemented by Statistics Norway. Reported emissions, emission factors and activity data for the latest inventory year are now routinely compared to those of the previous inventory year. Changes larger than 50-185 %, depending on gas and source, are automatically flagged for further manual QC. In addition, implied emissions factors are calculated for emissions from stationary combustion and IPPU at point sources. The IEFs are subjected to the same comparison between t and t-1.The most thorough checks are made for the gases and categories with the largest contribution to total emissions.

Furthermore, result control routines have been extended to include comparison of emission estimates at the level of IPCC and NFR[7] reporting. Previously, the comparison was performed for national source categories.

The general checks for the three institutions are summarized in Table AV-2.

Table AV-2. General annual QC checks for the Norwegian Environment Agency (Acronyms: NEA: Norwegian Environment Agency, SN: Statistics Norway, NIBIO: The Norwegian Institute of Bioeconomy Research)

	Check	**Responsible**
Time-series and inventory version comparisons to detect problems with units, computational errors as well as other human errors.		
	Compare all emissions reported from industrial and other large plants to those of the previous inventory year and flag changes of more than 20% (10% for plants included in emission trading) for further QC in collaboration with the plant.	NEA
Completeness checks		
	Identify large plants previously included in the inventory that no longer are included (and explain the reason for exclusion) and new plants included in the inventory (including an explanation of whether this plant is new) and communicate this information to SN.	NEA
Consistency checks		
	Checks for time-series consistency in cases where emissions from plants collected by the Norwegian Environment Agency only are available for parts of the time-series.	SN + NEA
	Checks for time-series consistency where activity data are only available on a non-annual or cyclical basis.	NIBIO (SN and NEA)

[7] Nomenclature for reporting of air pollution data to UNECE.

	Check	Responsible
	IEF checks of input data: Checking derived emission factors for individual plants (reported emissions divided by energy consumption, production or other activity data), flagging plants whose IEFs deviate significantly from the default values for further investigation. The investigation of flagged observations is prioritized based on magnitude of emissions and deviation from default IEFs, focusing on correcting obvious errors.	SN, NEA
Recalculations		
	Check that appropriate recalculations are made, if needed, whenever methodologies or data sources have changed.	All
	Check that appropriate recalculations are made when preliminary data have been replaced with final data.	All (NIBIO in particular)
	Check that when recalculations are performed these are made consistently throughout the time-series.	All
	Check that where splicing techniques are needed, these are applied in accordance with good practice and are documented.	All
Documentation		
	Check documentation for completeness and need for general revisions	All

Table AV-3. General annual QC checks for Statistics Norway

	Check	Responsible
Time-series and inventory version comparisons to detect problems with units, computational errors as well as other human errors.		
	Time series check of input data: Compare non-LULUCF input data (reported emissions, emission factors and activity data) for the latest inventory year to those of the previous inventory year. Changes larger than 50-185 %, depending on gas and source, is flagged for further QC. The most thorough checks are made for the gases and categories with the largest contribution to total emissions.	SN
	Time series check of emissions, 1: Compare all estimated emissions for the latest inventory year to those of previous inventory year at	SN

	Check	Responsible
	the level of IPCC reporting and flag changes of more than 50 % for further QC.[8]	
	Time series check of emissions, 2: Compare all estimated emissions for the latest year in the time series to those of previous inventory year at the level of IPCC reporting and flag changes of more than 0.1% of total emission of the gas for further QC.[9]	SN
	Inventory version check of emissions: Compare all estimated emissions to previous estimates for the same inventory year[10] at the level of IPCC reporting and flag changes of more than 0.1% for further QC.	SN
	Inventory version check of emissions: Compare all estimated emissions to previous estimates for the same inventory year[11] at the level of IPCC reporting and flag changes of more than 0.1% of total emission of the gas for further QC.	SN
Completeness checks		
	Check that aggregate energy use in the emission model reflect the most recent energy balance.	SN
	Check the difference between estimated fuel use for road transport with fuel sales.	SN
	Flag incomplete categories through use of the emission model and data reported for previous years. Empty cells are subject to additional checks.	SN
	Check that all cells with energy consumption have a corresponding emission factor.	SN
	Check for completeness/double-counting with emission data reported from industrial plants by ensuring that the corresponding energy use is appropriately subtracted from the energy data of the emission model.	SN

[8] 80-125 % for CO_2, 60-167 % for CH_4 and N_2O and 30-133 % for HFCs, PFCs and SF_6.

[9] 80-125 % for CO_2, 60-167 % for CH_4 and N_2O and 30-133 % for HFCs, PFCs and SF_6.

[10] Norway is preparing a preliminary inventory shortly after the inventory year.

[11] Norway is preparing a preliminary inventory shortly after the inventory year.

	Check	**Responsible**
	Check for completeness/double-counting between the LULUCF inventory and the inventory of other sources.	SN
Consistency checks		
	Comparison of emissions in the main emission model with totals estimated in sub-model (e.g. road transport and waste models).	SN
	Check for consistency where the same data are used in more than one category (SN). The emission model of SN is designed to avoid duplicating data by entering of the same data only once. This check also includes consistency checks between data used by the Norwegian Environment Agency and the Norwegian Institute of Bioeconomy Research with data used for the other categories.	SN
	Checks for time-series consistency in cases where emissions from plants collected by the Norwegian Environment Agency only are available for parts of the time-series.	SN + NEA
	Checks for time-series consistency where activity data are only available on a non-annual or cyclical basis.	NIBIO (SN and NEA)
	IEF checks of input data: Checking derived emission factors for individual plants (reported emissions divided by energy consumption), flagging plants whose IEFs deviate significantly from the default values for further investigation. The investigation of flagged observations is prioritized based on magnitude of emissions and deviation from default IEFs, focusing on correcting obvious errors.	SN, NEA
	IEF checks of results: Checking derived emission factors at the level of reporting, singling out sources whose IEFs deviate significantly from default values. Based on the significance of the source and the level of deviation from the default IEF, sources are selected for further investigation. The focus is on the most recent years of the time series.	SN
Recalculations		
	Check that appropriate recalculations are made, if needed, whenever methodologies or data sources have changed.	All
	Check that appropriate recalculations are made when preliminary data have been replaced with final data.	All (NIBIO in particular)
	Check that when recalculations are performed these are made consistently throughout the time-series.	All
	Check that where splicing techniques are needed, these are applied	All

	Check	**Responsible**
	in accordance with good practice and are documented.	
Documentation		
	Check documentation for completeness and need for general revisions	All

Table AV-4. General annual QC checks for the Norwegian Institute of Bioeconomy Research

Check performer	***Type of check***
Checks for errors in time-series, units, computational and human errors	
All source-responsible	Evaluate emission from the whole time series by providing: 1) range of appropriate values, 2) red color on extraordinarily large inter-annual variation, and 3) explanation of why in the LULUCF excel sheet.
Area responsible	Analyze area changes in land use and provide a range of appropriate annual changes.
LULUCF compiler	Ensure that drastic annual changes are commented and that all reported C changes are within the range provided in the LULUCF excel sheet.
Completeness checks	
LULUCF compiler	Of inclusion of all emission/removal sources.
LULUCF compiler	All LULUCF and KP tables in CRF are inspected for missing annual values.
Checks for errors in time-series, units, computational and human errors	
NIBIO & Statistics Norway	Two cross-checks with SSB: 1) areas of cultivated organic soils and 2) volume of N-fertilizer used in Forest.
Qualified NIBIO person	Consistency check of areas reported in CRF tables for convention and KP.
Source-responsible	Living biomass in forest is used as model input for estimating C stock changes in forest soils and DOM. The biomass estimates are cross-checked.
LULUCF compiler	It is checked that the area of drained forest is used both for estimating CO_2 (Table 4.A) and N_2O and CH4 emissions (Table (II)).
Recalculations	
LULUCF compiler	All recalculations made are described in the NIR in chapter 6 and 11 *LULUCF* and *KP-LULUCF* and repeated for LULUCF in chapter 10 *Recalculations.*

All source-responsible	Sink/source category reporters explain when recalculations have been made in the LULUCF excel sheet.
LULUCF compiler	CRF recalculations are made for 1990, 2000, and the last year of the inventory period and inspected manually.
Documentation	
LULUCF compiler	Check that new methods are described in detail and that the documentation is stored properly and can be made available upon request during review.
All source-responsible	Store all source/sink specific information on: B:\30-I\35\351015_LULUCFrapportering\Rapportering\2016… and B:\30-I\35\341110-3_Jord C modell…

3.3.2 Category-specific QC

These checks are normally not performed on an annual basis, but are performed regularly and in addition to the general QC checks, often in conjunction with improvement projects. The goal is to perform a category-specific QC, including an updated uncertainty analysis, within cycles of approximately 5 years for key categories and potential key categories, and at least every 10 years for other categories. An annual and long-term prioritization will be made annually by the Norwegian Environment Agency, Statistics Norway and the Norwegian Institute of Bioeconomy Research, in collaboration with other relevant authorities, as a part of the improvement plan (with the Norwegian Environment Agency in charge) (see Section 3.6). For example, the review reports, QA/QC conclusions and need for improved emission data for emission reduction plans will be important for a final prioritization. QC findings are followed up by revising emission factors, activity data, other estimation parameters or the methodologies. The changes are approved in the autumn meetings between the Norwegian Environment Agency, Statistics Norway and the Norwegian Institute of Bioeconomy Research.

Estimated emissions and removals

The QC checks on emission and removal estimates come in addition to those undertaken on the input data as described below.

The QC checks of estimates include:

- A comparison of the methodologies used to estimate emissions and removals with those recommended in the latest IPCC Guidelines
- A review of availability of data and resource requirements for selecting a higher tier
- A review of alternative methodologies
- A comparison of (higher tier) estimates with lower tiers
- A comparison of estimates to those of inventories from countries with similar national circumstances using appropriate drivers

- An assessment of time-series consistency (for example, that the same method has been used for all years of the time-series) and use of splicing techniques (where relevant)
- A review and documentation of model assumptions
- A review and update of documentation, including archiving of supplementary documentation
- A check of whether the allocation to categories in the CRF is correct

QC checks for completeness include:

- A review of relevant emission sources not included in the inventory (the IPCC Guidelines, inventories from countries with similar national circumstances and literature)
- A review of methodologies and data availability for these potential sources
- A documentation of reasons for not including a source in the inventory

Emission data reported from industrial plants

Plant emission data that are used in the EU emission trading system undergo annual QC checks. The source-specific QC checks for other plants are performed less frequently (every 3 years) for emission estimates within key categories which account for 25-30 % of the total of that (key) category. The frequency of checking of non-key plants, which are not included in the emission trading scheme is every 5 years. Statistics Norway is responsible for reporting the results of the key category analysis to the Norwegian Environment Agency, while the Norwegian Environment Agency will perform the assessment of the "key plants" within a category.

The QC checks include:

- An assessment of the internal QA/QC of the plants reporting data to the Norwegian Environment Agency
  - Their QA/QC system including archiving
  - Any changes to the QA/QC system
- An assessment and documentation of measurements and sampling
  - Measurement frequency
  - Sampling
  - Use of standards (e.g. ISO)
  - Documentation for archiving
- An assessment and explanation of changes in emissions over time (e.g. changes in technology, production level or fuels) (annual check)
- An assessment of time-series consistency back to 1990 in cooperation with Statistics Norway[12] (if plant emission data are missing for some years and estimates are made using aggregate activity data and emission factors)

[12] For plants included in the emission trading scheme historical data are derived in cooperation with the industry organization

- A comparison of plant emissions to production ratios with those of other plants, including explanations of differences
- A comparison of the production level and/or fuel consumption with independent statistics (in collaboration with Statistics Norway)
- An assessment of reported uncertainties (including statistical and non-statistical errors) to the extent this has been included in the reporting

The QC checks should be made in close cooperation with the emission reporting plants.

Emission factors & other estimation parameters

The category specific QC will be performed by the Norwegian Environment Agency, Statistics Norway, the Norwegian Institute of Bioeconomy Research and/or another institution with expertise in the category subject to review. It can address a single category or several related categories (e.g. road transportation and agriculture) and will include an assessment of the emissions factors currently in use and conclude on the need for revisions.

This QC will include the following elements:

- A comparison of the emission factor with those
  - recommended in the IPCC Guidelines
  - identified through a literature search (peer reviewed literature and other reports)
  - identified by national source-experts (e.g. industry organizations and researchers)
  - that can be derived from emission data reported from the plants
- An assessment of the representativeness of the emission factors used for national circumstances (particularly when they are based on default emission factors and international research)
- A quantification of the uncertainty (addressing statistical and non-statistical errors)
- An assessment of the content of documentation, including technical documentation
- An assessment of the availability (archiving) of documentation, including technical documentation
- An assessment of changes in emission factors over time due to changes in technology and/or management

Activity data

The category specific QC will be performed by the Norwegian Environment Agency, Statistics Norway and The Norwegian Institute of Bioeconomy Research for the data collected by each institution. Some activity data are originally collected by another institution. In this situation, the Norwegian Environment Agency, Statistics Norway or the Norwegian Institute of Bioeconomy Research (as appropriate) are responsible for assessing the QC applied on these data and perform their own additional QC on aggregate data.

The activity data QC will include the following elements:

- An evaluation and documentation of the QC routines applied at the survey level (at the point of interview/field work and the data checking/processing level)
- An evaluation of the techniques used to obtain annual data (if applicable)

- An assessment of sampling and representativeness, including an evaluation of possible bias for application of the data in inventories (for LULUCF area data and for statistical survey data)
- An assessment of the classification of land areas and assumptions needed to apply data from the national forest inventory (NFI)
- A review and assessment of alternative data sources
- A comparison with independent data sources (if possible)
- A quantification of uncertainties (including statistical and non-statistical errors)

Documentation

For each category, a review and update of the documentation will be performed if needed. The requirements for documentation will be highest for key categories. The QC should include:

- An assessment of whether the documentation is sufficient to understand the data, methods and assumptions behind an estimate of emissions or removals
- A recording of changes that have been made as a response to the QC checks
- A description of consequences for the time-series of changes in data or methods
- Writing and archiving of additional technical documentation as needed (in English if practical or in Norwegian) to enable the replicability of estimates for a reviewer

3.3.3 Common Reporting Format (CRF) tables

After the implementation of reporting with the new CRF software, Statistics Norway and the Norwegian Institute of Bioeconomy Research transfer emission data using Excel imports. Separate datasets for activity data and notation keys have been developed. QC consistency checks are built-in features in the new CRF, and these are used actively. Statistics Norway and the Norwegian Environment Agency are responsible for additional checks on an annual basis:

- Check of total emissions against those of the emission model
- Check of sectoral totals against those of the emission model
- Check of notable changes from previous submissions for individual categories
- Check of correct use of notation keys
- Check of exported CRF tables to ensure that they are in accordance with the results of the emission model

The Norwegian Institute of Bioeconomy Research is responsible for checking all LULUCF entries with data from its database. Exported CRF tables are checked to ensure that they are in accordance with the LULUCF database.

The Norwegian Environment Agency is responsible for a final check of the CRF for completeness and for checking that Statistics Norway and The Norwegian Institute of Bioeconomy Research have completed the QC checks they are responsible for. The Norwegian Environment Agency is responsible for making the final approval of the CRF tables.

3.3.4 National Inventory Report (NIR)

The Norwegian Environment Agency is responsible for the annual QC of the NIR. This includes checking that:

- All figures on emissions and removals (including the key category analysis) in tables and text are consistent with those reported in the CRF
- Trends in emissions and removals are explained
- All methodological changes are explained
- All recalculations are explained and the effect on time-series consistency reported
- The textual description reflects methodologies used
- Responses to the review report are reflected
- Priorities for improvements are described in accordance with decisions

All other information is correct (including QA/QC plan, uncertainties and completeness)

3.3.5 Timeliness

The Norwegian Environment Agency, Statistics Norway and the Norwegian Institute of Bioeconomy Research have agreed on a timetable to enable the Norwegian Environment Agency to report to UNFCCC by April 15 (see Table AV-1). It is the responsibility of the Norwegian Environment Agency, Statistics Norway and the Norwegian Institute of Bioeconomy Research to make this timetable known in their respective institutions to ensure that the internal deadlines for data collection and processing in each institution as far as possible follow the emission inventory production cycle.

3.3.6 QC documentation

The members of the inventory team working with individual sectors or parts of a sector fill in a QC checklist to the person at each institution in charge of QC, who then reports to the person in charge of QC for the national system. The reports include a description of the general and source-specific tests that have been conducted, and whether these have or will be used to correct any data. The list of general and category-specific QC tests described above will be used as a checklist for the QC reports.

3.4 QA procedures

According to the 2006 IPCC Guidelines(IPCC, 2006), “Good practice for QA procedures includes reviews and audits to assess the quality of the inventory, to determine the conformity of the procedures taken and to identify areas where improvements could be made”. QA involves reviewers that have not been involved in preparing the inventory. They should be independent from the institutions involved in the national system, or not closely involved in the inventory compilation. We distinguish between QA of input data and of the entire inventory.

3.4.1 Statistical data and emissions reported from plants

Emissions reported from plants

Emissions reported from industrial sites are always checked by the Norwegian Environment Agency (see section 3.3.2) by the Department in charge of evaluating emission permits. Also, the Department of Inspection and Environmental Data in the Norwegian Environment Agency, includes two units responsible for chemicals and product control, and industrial and offshore control. These sections work independently from the units responsible for the evaluating of emissions permits. They inspect and monitor industrial sites, including underlying documentation for the emission estimates.

There are two types of controls, one is a *frequency-based control* and the other is a *specific campaign control*.

The frequency-based control is as shown in Table AV-5.

Table AV-5. Independent control frequency of industrial plants

Control class[1]	Inspection	Audit	Self-reporting
1	Every four years	Every four years	Annually
2	Every six years	Every six years	Annually
3	Every 3-4 years	-	Annually
4	If needed	-	If needed

[1]Industrial sites are divided into four control classes. Those that have the largest potential to generate pollution are included in class 1. Those that are included in class 4 have a relatively limited potential to generate pollution. The potential to generate pollution is determined by the hazard of their emissions and discharges, the quality/sensitivity of the recipient and the use of hazardous chemicals.

There are three main methods of determining compliance at industrial sites:

- *Inspections* are normally a one-day unannounced visit at the site. An inspection is a useful method to verify compliance with the specific requirements
- *Audits* and source testing of emissions: Environmental audits and source testing are used not only to monitor compliance but also to evaluate the environmental management system in the enterprise. These audits are more comprehensive than inspections and are planned well in advance in cooperation with the industrial site
- *Self-reporting* of data: For enterprises in control class 1, 2 and 3, the permit includes a requirement to establish and maintain a well-defined self-monitoring program. Once a year they must submit an account of their emissions to the Norwegian Environment Agency. This report should include their total emissions, any discharges exceeding the discharge limits or other violations. The reasons for violations must be given together with an explanation of corrective actions taken to avoid recurrence. This self-reported data is often checked during inspections and audits

An inspection is a one-day on-site control, while an audit may take 3-5 days. The focus of a control/revision may vary. The administrative department in charge of evaluating emission permits can suggest topics for focus of the controls.

Control campaigns take place after a consideration of experiences and results of previous campaigns. Typically, such campaigns will be used to check reported emissions.

The Norwegian Environment Agency has several possibilities for sanctions and other enforcement instruments to ensure compliance at industrial sites. They include the requirement to provide information to the authorities, coercive fines, withdrawal of the permit, and reporting violations to the prosecuting authorities.

Particular controls are directed to the plants included in the emission trading system to check that reported emissions are in compliance with the emission trading regulation (Annex 3). All plants will be controlled once over a period of three years. These controls have focused on the plant's implementation of the reporting requirements. The basis for the reporting, including activity data, emission factors, and uncertainty estimates have been reviewed. So far the controls have aimed at facilitating reporting, and the plants have not been punished for possible weaknesses. These controls will continue, and it is expected that deficiencies will be met with stringent requests for improvements. Future requirements for controls will be consistent with international rules, particularly the rules associated with the EU Emissions Trading System.

For the purpose of the inventory, additional QA is undertaken by the Section for Emission Inventories and analysis in the Norwegian Environment Agency before the data are sent to Statistics Norway. These QA checks include consideration of time-series consistency and a comparison of emissions per unit produced.

Statistical data

All data collected by institutions not included in the national system undergo a QA performed by the Norwegian Environment Agency or Statistics Norway or the Norwegian Institute of Bioeconomy Research as appropriate. Furthermore, the inventory teams perform a QA of data collected in their institutions in addition to the QC performed by the units responsible for the data collection. For example, Statistics Norway, where possible, compares data on fuel consumption sampled in official statistics to emission data from fuel consumption at plants reported to the Norwegian Environment Agency, and deviations are explained through contact with the plants.

3.4.2 The entire inventory

UNFCCC review

The annual review of the inventory and NIR under the UNFCCC is considered to be part of the QA. This review is performed by a team of experts (sector experts and generalists) from other Parties. Their tasks include examining the data and methods used by Norway along with the documentation and concluding whether they are in accordance with current guidelines. The review results in a review report which indicates specific areas where the inventory is in need of improvements.

Expert peer review

The inventory and its documentation is published annually, and industry associations, relevant research institutions, directorates and environmental organizations may review and

suggest improvements to the inventory. Any results of this review will be used by the cooperating institutions to improve the inventory.

Audits

The Norwegian Environment Agency, Statistics Norway and the Norwegian Institute of Bioeconomy Research are audited by the Auditor General of Norway. In addition to financial audits, the auditor general also performs performance audits, which consist of a systematic analysis of the economy and an evaluation of the efficiency and effectiveness of the government administration on the basis of the decisions and intentions of the Norwegian parliament. The Office of the Auditor General uses performance audits to shed light on specific areas within the government administration where there is a risk of noncompliance and/or deficiencies in relation to the resolutions and intentions of the Norwegian parliament. An audit of the national system may be initiated as a part of this.

The usefulness of having a private company conduct an independent audit of the implementation of the national system will be considered at a later stage.

3.5 Implementation of QA/QC procedures

The institutions of the national system have implemented the QA/QC plans by establishing internal procedures. These procedures assign internal responsibilities for the QA/QC checks suggested in chapter 3.3 and facilitate input to the QA/QC report. The QA/QC procedures are under continuous development, and inventory compilers in all institutions of the national system are informed about the data quality objectives of the national system, as well as any priority areas related to the development of the QA/QC procedures.

3.6 Plan for improving the data

The inventory may, for some source categories, need to be further developed before it can fulfill the data quality objectives. The three institutions collectively produce plans for improving the data. The plans are based on the key category analysis, the UNFCCC review, QA/QC activities, new information and other needs, for example, needs for better data for the development of emission reduction strategies and regional statistics.

The cooperating institutions produce a plan for improvements of the inventory. This plan may also point out needs that can not be handled through ordinary inventory projects, because more in depth research projects are required. In autumn, the three institutions agree on priorities for the following year.

4 Production of emission data

Details of the methods and framework for the production of the emission inventory are given in the reports “Documentation of the Norwegian system of emission inventories” (Statistics Norway 2014), “Emissions and removals of greenhouse gases from land use, land-use change and forestry in Norway” (NIJOS, 2005), and “Emissions and methodologies for cropland and grassland used in the Norwegian national greenhouse gas inventory” (Borgen and Hylen, 2013). Statistics Norway’s documentation is updated annually in conjunction with important methodological changes and is used as a basis for the NIR.

Norway has an integrated inventory system for producing inventories of the greenhouse gases included in the Kyoto Protocol and the air pollutants SO_2, NO_x, non-methane volatile organic compounds (NMVOC), ammonia, CO, particulate matter, heavy metals and persistent organic pollutants reported under the LRTAP Convention. The data flow and QA/QC procedures are to a large extent common for all pollutants.

4.1 Assessment of key categories

The key category assessment is made by Statistics Norway using the IPCC Tier 1 and the Tier 2 method, which includes uncertainty estimates. The assessment is updated annually and is made for the level and trend since 1990. Statistics Norway also considers the qualitative criteria for identification of key categories. In accordance with the IPCC good practice guidance for LULUCF (IPCC, 2004) the analysis is made in two parts, one excluding LULUCF emissions and removals and another integrating LULUCF with the rest of the inventory. Due to the large LULUCF sink in Norway, the results of these two parts are quite different.

4.2 Data collection

In the agreements, the three institutions of the national system have defined areas of responsibility for data collection. The current division of responsibility for the most important data is shown in Table AV-6. The table focuses on data that are updated regularly and not emission factors that are assumed constant over several years. Emission factors are normally collected through dedicated projects. The institutions may agree to reallocate responsibilities through the cooperation meetings.

Table AV-6. Main responsibilities for data collection

Institution	Data	Institution in charge of primary data collection
Norwegian Environment Agency	• Emissions and activity data from industrial plants (point sources) (around 70 at present, but some of these do not report GHG emissions)	• Norwegian Environment Agency
	• Emissions from off-shore activities, including drilling activities, fugitive emissions, well-testing oil burning and emission factors for crude oil loading	• The Norwegian Petroleum Directorate and the Norwegian Environment Agency
	• Methane recovery from landfills	• Norwegian Environment Agency
	• Amounts of waste incinerated	• Norwegian Environment Agency
	• Data on Industrial waste water	• Norwegian Environment Agency
	• Import of HFCs, PFCs and SF_6 by application. Import HFCs, PFCs and SF_6 in products	• Norwegian Environment Agency, Statistics Norway
Statistics Norway	• Energy balance/account (energy use by sector and application), energy use in point sources. This statistics is building on a number of primary data sources (surveys, registers and censuses)	• Statistics Norway
	• Production data, import and export	• Statistics Norway
	• Vehicle registrations	• Statistics Norway
	• Transport statistics	• Statistics Norway, Institute for Transport Economics (TØI), Norwegian Road Federation (opplysningsrådet for veitrafikk)
	• Agriculture statistics, including cultivated area, animal population and manure management	• Statistics Norway, Cow Recording System at TINE BA, Norwegian Institute of Bioeconomy Research

	• Fertilizer use and lime application	• Norwegian Food Safety Authority (Mattilsynet), Directorate for Nature Management (Direktoratet for naturforvaltning)
	• Waste disposal and waste characteristics	• Statistics Norway
	• Waste water statistics	• Statistics Norway
	• Biological treatment of waste	• Statistics Norway
The Norwegian Institute of Bioeconomy Research	• Area statistics from the national forest inventory and national land resource surveys	• Norwegian Institute of Bioeconomy Research
	• Data needed to estimate changes in biomass stocks from the national forest inventory	• Norwegian Institute of Bioeconomy Research
	• Area statistics from administrative sources, e.g. agriculture statistics	• Statistics Norway
	• Climate and meteorological data needed to calculate soil carbon	• Norwegian Meteorological Institute
	• Activity data for HWP	• FAO

4.3 Uncertainty calculations

Norway has quantified uncertainties in input data and in total emissions and its trend (Norwegian Pollution Control Authority 1999a; Statistics Norway 2000; Statistics Norway 2001b; Statistics Norway 2009, Appendix D; Statistics Norway 2011). The uncertainties in input data were made in consultation with sector experts, combining expert judgments by source experts, information in the IPCC good practice guidance (IPCC, 2000) with other sources of information. The uncertainties were combined using the IPCC Tier 2 method (bootstrap techniques). The last uncertainty analysis of the total inventory has been performed in 2016 on 1990 and 2014 emission data. Uncertainty estimates for sources are also updated yearly when the estimation methods or data sources are being changed.

Uncertainties in the LULUCF sector are based on standard sampling methodology for changes in land-use categories and the largest sink or source categories. Default factors and expert judgments are used for some of the smaller sink or source categories.

4.4 Recalculations

In accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 1, chapter 5 (IPCC, 2006), Norway routinely evaluates whether recalculations of historical data are needed. Recalculations are made if there have been methodological changes influencing emissions in previous years or changes in data due to correction of errors or changes in preferred data sources.

When data sources are not available for the whole time-series since 1990, one of the proposed methods from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 1, chapter 5 (IPCC, 2006) is used to splice data. Normally extrapolations using drivers correlated with emissions or the overlap method is used. Smaller emission sources may be linearly extrapolated (or kept constant). The method is chosen on the basis of available data and suitability of drivers.

Data from the National Forest Inventory are collected over a period of five years. Each year provides a statistically representative coverage of Norwegian forests, but with only 1/5 of the statistical support of the full inventory. Annual reports can be issued based on the annual data, but are known to result in large inter-annual variations. We therefore estimate carbon stock changes using a five year moving average with extrapolation of the last years (between 1 and 4), which results in a recalculation of the last 4 years.

4.5 Emission calculations

4.5.1 The main emission model

The model was developed by Statistics Norway (1992, 1994). It was redesigned in 2003 in order to improve reporting to the UNFCCC and LRTAP, and to improve QA/QC procedures. The model is programmed in SAS system software and is flexible with respect to output, i.e. it can produce tables (input and output) in accordance with different aggregation levels and parameters. Furthermore, it has been designed to fit the availability and aggregation of input data and is flexible with respect to changes. Emission factors can be entered for groups of years.

The model is called “Kuben” (“the Cube”). Several emission sources – e.g. road traffic, air traffic, waste and solvents – are covered by more detailed satellite models. Aggregated results from these side models are used as input to the general model.

The general emission model is based on equation (1).

(1) Emissions (E) = Activity level (A) · Emission Factor (EF)

For emissions from *combustion*, the activity data is based on energy use. In the Norwegian energy balance/accounts, the use of different forms of energy is distributed by industries (economic sectors). In order to calculate emissions to air, energy use must also be allocated to technical sources (e.g. equipment). After energy use has been allocated in this way, the energy accounts may be viewed as a cube in which the three axes are fuels, industries, and sources.

The energy use data are combined with a corresponding matrix of emission factors. In principle, there should be one emission factor for each combination of fuel, industry, source, and pollutant. Thus, the factors may be viewed as a four-dimensional "cube" with pollutants as the additional dimension. However, in a matrix with a cell for each combination, most of the cells would be empty (no consumption). In addition, the same emission factor would apply to many cells. There are about 25 fuels and about 25 technical sources used for energy combustion.

Emissions of some pollutants from major manufacturing plants (point sources) are available from measurements or other plant-specific calculations (collected by the Norwegian Environment Agency). When such measured data are available, the estimated values are replaced by the measured ones:

(2) Emissions (E) = [(A - A_{PS}) · EF] + E_{PS}

where A_{PS} and E_{PS} are the activity and the measured emissions at the point sources, respectively. Emissions from activities for which no point source estimate is available ($A-A_{PS}$) are still estimated with the regular emission factor.

Non-combustion emissions are generally calculated in the same way, by combining appropriate activity data with emission factors. Some emissions are measured directly and reported to the Norwegian Environment Agency, and some may be obtained from current reports and investigations. The emissions are fitted into the general model using the parameters industry, source, and pollutant. The fuel parameter is not relevant here. The sources for non-combustion emissions and for combustion without energy use are based on EMEP/NFR and UNFCCC/CRF categories, with further subdivisions where more detailed methods are available.

The model uses approximately 130 *industries* (economic sectors). The classification is almost identical to that used in the National Accounts, which is aggregated from the European NACE (rev. 1) classification (Statistics Norway 1994). The large number of sectors is an advantage in dealing with important emissions from manufacturing industries. The disadvantage is an unnecessary disaggregation of sectors with very small emissions. To make the standard sectors more appropriate for calculation of emissions, a few changes have been made, e.g. "Private households" is defined as a sector. Information about the geographical distribution of emissions is useful for modelling and control purposes and constitutes a fifth axis.

4.5.2 The LULUCF model

The Norwegian Institute of Bioeconomy Research is in charge of estimating emissions and removals from Land use, Land-Use Change and Forestry (LULUCF) for all categories where area statistics are used for activity data. A calculation system in the form of computer programs that uses R and excel has been developed for the implementation of the IPCC good practice guidance for the LULUCF sector. The systems use input data from different sources and create final output datasets. These final datasets include all data needed for the tables in the common reporting format (CRF), both for the Climate Convention and the Kyoto-protocol.

The National Forest Inventory (NFI) database contains data on areas for all land uses and land-use conversions as well as carbon stocks in living biomass. The NFI is used to estimate total area of forest, cropland, wetlands, settlements and other land and land-use transitions between these. The data from the NFI is complemented with other data (e.g. horticulture, fertilizer usage on forest land, drainage of forest soil, and area of forest wild fires) collected by Statistics Norway, Norwegian Agricultural Authority, and The Directorate for Civil Protection and Emergency Planning.

The sampling design of the NFI is based on a systematic grid of geo-referenced sample plots covering the entire country. The NFI is a continuous forest inventory in which 1/5th of the sample plots are revisited each year. This results in a 5-year cycle in which all permanent plots are revisited (See section 1.3). Until 2010 the estimates were based on detailed information from sample plots below the coniferous limit. To confirm the land use and the extent of the area of forest and other wooded land at higher altitudes and in Finnmark County, the NFI conducted a complete forest inventory during 2005–2010 for these areas. All areas were for the first time included in the estimates for the LULUCF sector in the 2012 submission. The estimates of land-use, land-use change, and carbon stock change above the coniferous limit and in Finnmark County, have been back-casted to 1990 using information from NFI plots, maps, and old and new aerial photos.

The calculations of biomass and carbon stock in forest are based on single tree measurements and stand attributes from the permanent sample plots on forest and other wooded land. Biomass is calculated using single tree biomass equations developed in Sweden for Norway spruce, Scots pine and birch (Marklund 1987, 1988 and Petersson and Ståhl 2006). These equations provide biomass estimates for various tree biomass components: stem, bark, living branches, dead branches, needles, stumps, and roots.

The dynamic soil model Yasso07 is used to calculate changes in carbon stock in dead organic matter and mineral soil for forest land remaining forest land. (Tuomi et al., 2011; Tuomi et al., 2009). Simulations were made for individual NFI plots for the entire time-series. The Yasso07 model provides an aggregated estimate of total carbon stock change of litter, dead wood and soil organic matter. All data used as input to the models is provided by the Norwegian Institute of Bioeconomy Research. Data used for estimation of carbon stock changes on cropland, grassland, wetlands, and settlements are derived from Statistics Norway, Norwegian Meteorological Institute and Norwegian Institute of Bioeconomy Research.

5 Handling of data

5.1 Archiving

The guidelines for the national system specify the requirements for archiving. Archiving shall include:

- Disaggregated emission factors
- Activity data
- Documentation of data collection, assumption and aggregation
- Internal documentation on QA/QC procedures
- External and internal reviews
- Documentation on annual key sources
- Planned inventory improvements

All three institutions are responsible for archiving the data they collect and the estimates they calculate with associated methodology documentation and internal documentation on QA/QC. The Guidelines for National Systems, however, state that “Annex I Parties should make the archived information accessible by compiling it at a single location.

Due to the differences in the character of data collected, Norway has chosen to keep archiving systems in the three institutions, which means that not all information are archived at a single location, see Table AV-7 for an overview. These archiving systems are, however, consistent. Although the data are archived separately, all can be accessed efficiently during a review. However, data archived at Statistics Norway are subject to rules of confidentiality, and this must be taken into consideration during reviews. In addition, the Norwegian Environment Agency is continuously collecting physical copies of the most important methodology reports, based on the reference list of the NIR. Electronic copies of the most important methodology reports are also collected. This is systematized in a catalogue in the agency's achieving system (ePhorte) and in an EndNote library. URLs are also included if available. Some of the older methodology reports have been scanned in order to make them more easily available. The archiving systems in all three institutions were developed for the implementation of the national system, see section 7.3.

The common rules for archiving of data are the following:

- Data and information are archived for each submission year
- Data and information are archived in a single location within each institution (this may imply double archiving)
- Archiving for a submission year includes:
    - All input data
    - All estimated emissions
    - All partly filled-in or final CRF
    - All technical documentation
    - Recalculations of previous estimates, if any

    - The NIR (where relevant)
- The file structure is documented
- The platform at which the data and information is archived undergoes a daily backup and the backup is securely saved

Confidentiality is an issue for the data collected by Statistics Norway when there are few entities reporting for a source category. Confidential data previously used in the inventory are for many sources replaced by non-confidential data collected by the Norwegian Environment Agency. In order to comply with confidentiality issues, emission estimates for these sources are aggregated. This is especially prominent in source category 2F, where emissions from 2F2-5 are aggregated in category 2F6 due to confidentiality.

Table AV-7. Responsibilities for archiving information. Capital, bold X indicates archiving also of datasets sent from the other institutions.

	Norwegian Environment Agency	**Statistics Norway**	**Norwegian Institute of Bioeconomy Research**	**Comments**
Disaggregated emission factors	x	**X**	x	All EF (except LULUCF) are archived by Statistics Norway
Activity data	x	**X**	x	
Emission data collected from large plants	**X**	**X**		Statistics Norway does not collect these data, but archived as part of the emission model
Documentation of data collection, assumption and aggregation	**X**	**X**	x	Norwegian Environment Agency is developing a library of all important reports (including background reports)
Internal documentation on QA/QC procedures	x	x	x	

External and internal reviews	**X**	x	x	
Documentation on annual key categories		x		
Planned inventory improvements	**X**			
Estimated emissions (model output)		**X**		
CRF	**X**	(x)		
NIR	**X**			
Recalculations	**X**	**X**	x	

5.2 Access to archived data during a review

By systematic archiving as described above, all information can be made available to a review team. The most relevant documentation is available in the central archive of the Norwegian Environment Agency. Comprehensive documentations for LULUCF and other emission sources are available in English (e.g. NIJOS, 2005). Additional technical documentation may be in Norwegian only, as will the emission reports from the plants. The Norwegian Environment Agency, Statistics Norway and The Institute of Bioeconomy Research are responsible for having competent personnel on duty during a review to access data if requested. Confidential information from Statistics Norway can be made available to the review team when the revision takes place in Statistics Norway's premises and after a confidentiality declaration is signed.

5.3 Allocation of responsibilities during a review

The Norwegian Environment Agency has the main responsibility for coordinating the review. Statistics Norway and the Norwegian Institute of Bioeconomy Research are allocated specific responsibilities during the review. The Norwegian Environment Agency is responsible for informing the experts at all three organizations about the timing of the review at least two months before it takes place to ensure their availability.

Table AV-8. Main responsibilities during a review (lead in capital)

	Norwegian Environment Agency	**Statistics Norway**	**Norwegian Institute of Bioeconomy Research**
Preparation and coordination	X		
General, national system and cross-cutting issues	X	x	
Energy	X	X	
Industrial processes and product use	X	X	
Agriculture		X	
LULUCF	X		X
Waste	X	X	
Direct communication with UNFCCC Secretariat	X		

6 References

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7 Annexes

7.1 Annex1. Key data providers

Data providers and sources for the emission inventory ranked by their importance.

	Very important	Important	Less important
1. Data from Statistics Norway			
• Energy statistics	X		
• Consumer surveys			X
• Living condition survey			X
• Foreign trade statistics			X
• Production statistics			X
• Petroleum statistics	X		
• Agriculture statistics	X		
• Waste statistics		X	
• Waste water statistics			X
• Vehicle registry		X	
• Transport statistics		X	
2. Other institutions			
• The Norwegian Institute of Bioeconomy Research	X		
• Norwegian Environment Agency	X		
Forurensning	X		
EPIM Environment Hub (EEH) previously Environmental Web (including data from the Norwegian Petroleum Directorate)	X		
• FAOSTAT (Food and Agriculture Organization of the United Nations, Statistics division)	X		
• Norwegian Meteorological Institute	X		

• Norwegian Petroleum Industry Association (NP, norsk petroleumsinstitutt)		X
• Norwegian Petroleum Directorate (NPD) (Oljedirektoratet)	X	
• Institute of Transport Economics (TØI)		X
• Norwegian Road Federation (Opplysningsrådet for veitrafikk)	X	
• Norwegian Food Safety Authority (Mattilsynet)		X
• The Directorate for Civil Protections and Emergency Planning (DBS)	X	
• Directorate of Customs and Excise	X	
• SRG (Stiftelsen Returgass)		X

7.2 Annex 2. QC of activity data – existing routines

7.2.1 Statistics Norway

Documentation of the statistics and routines is available on web (www.ssb.no/en/ (for each statistics click at "about the index")). An example from the energy statistics is given below. As a part of the statistical production reported data are checked and the primary data providers are contacted for explanations/revisions if needed.

Example: Energy use in the manufacturing sector

The purpose of the statistics is to give information about energy use in mining and manufacturing. Since the 70's the energy use data have been collected as a part of the structural business statistics for manufacturing. From the reference year 1998 the energy use data are collected in a single survey, as a part of an ongoing project between Statistics Norway and the Norwegian Water Resources and Energy Directorate (Enova SF from 2003). The purpose of this is to improve the quality of the energy use information and to develop and produce some new statistics products.

Population
From the reference year 1998 the statistics cover all existing local kinds of activity units within mining and manufacturing, which means division 10, 12-37 in the Norwegian Standard Industrial Classification. Statistics Norway collects data for a sample. For the other units the energy use data are estimated. The estimation is based on turnover and information from the sample. There are about 18000 units in the population (2013). Until the reference year 1997 enterprises with individual proprietorship where the owner is

working alone (one-man-enterprise), and other local kind of activity units with employment less than half a man-year worked, are not included. The change in the population from the reference year 1998 leads to a break in the statistics.

Data sources

Data of energy use are collected from a sample of local units in manufacturing, mining and quarrying. Turnover data from the short-term turnover statistics (by preliminary figures) and energy costs from the structural data for the manufacturing sector (by final figures) are used by estimating energy use data for units outside the sample. Information on activity codes, addresses and other information are also collected from the Central Register of Establishments and Enterprises of Statistics Norway.

Sampling

The survey has a sample of 2 200 local kind of activity units. The sample consists of the biggest units in each subgroup, chosen by number of employees in each subgroup, and some small and medium sized units. Each industry is represented with as many units as possible. Small units are chosen randomly from a stratified sample.

The units in the sample cover about 94 per cent of the total energy use and about 86 per cent of the total energy costs in the mining and manufacturing sector.

Collection of data

The survey is based on questionnaires that are sent out in January the year after the reference year. It is possible to choose between paper forms and electronic forms. The Statistics Act is used, and the units are required to respond. The deadline is in February. There are three reminders. Units that have not responded after the third reminder have to pay a fine. Even if the units pay the fine, they still have to respond.

Control and revision

When we receive the data we first have a consistence check against the previous year to identify serious errors. If we detect serious error we correct the data. Afterwards we are doing a more intimate control of the units with the largest energy consumed. The units are classified after this criterion:

Group 1: Energy use > 50 GWh (103 units in 2014)
Group 2: 10 GWh < energy use < 50 GWh (247 units in 2014)
Group 3: Energy use > 5 GWh or/else energy cost. > 1 mil. NOK (600 units)
Group 4: Energy use < 5 GWh or/else energy cost. < 1 mil. NOK (1 100 units)

The local activity units in group 1 have highest priority and will be controlled first. Then we continue with the units in groups 2 and 3. Here we have a more intimate consistence check against the previous year and against energy costs in the Central Register of Establishments and Enterprises. If we detect errors in the data, we contact the local activity units. At the end of the control, we have a consistence check of total energy use and costs in each industry against the previous year.

Estimation
Turnover data from the short-term turnover statistics (by preliminary figures) and energy costs from the structural data for the manufacturing sector (by final figures) are used by estimating energy use data for units outside the sample.

Frequency and timeliness

Preliminary figures are published within 6 months after the end of the reference year. Final figures are published within 18 months after the end of the reference year.

Legal authority
The Statistics Act §§2-2 and 2-3

7.2.2 The Norwegian Environment Agency

Emission data reported from the plants to the Norwegian Environment Agency are entered into the database Forurensning and the information is forwarded to an officer in charge. The officer in charge will check the following:

- That the data in Forurensning are registered as reported from the plants and appropriate corrections are made
- The methodology that was used for estimating emissions
- Emission in comparison to the emission level reported for the previous year. Emissions are displayed graphically. In the case of large deviations the plant is contacted to provide an explanation.
- Emission relative to the production level. In the case of large variations in this ratio the plant is contacted to provide an explanation.
- The emissions seen in relation to other factors, for example changes in production technologies, control technologies or fuels

The Section for Emission Inventories and Analysis in the Norwegian Environment Agency are performing additional checks of data before they are sent Statistics Norway, including assessment of time-series consistency and consistency of data reported from plants using comparable technologies.

7.2.3 The Norwegian Institute of Bioeconomy Research

Survey level

The Norwegian Institute of Bioeconomy Research is responsible for the Norwegian National Forest Inventory (NFI). The NFI has long traditions and the attributes assessed or measured in the field are subject to frequent revisions, while at the same time an attempt is made to preserve the long time series of key attributes. The main objectives of the NFI are to provide updated forest information to national forest administrations, to be able to report adequately to international forest resources assessments and to provide data for special studies.

Prior to every field season, all field workers are gathered for one week of briefing on the inventory work. New attributes or altered definitions of attributes will especially be emphasized. The course includes practical training and exercises, under which the assessments and measurements made by each of the fieldworkers will be compared and discussed in plenary.

During the field season, each field worker will usually be visited by a supervisor from the head office. The supervisor will join the field worker on some sample plots in the field, giving an opportunity to discuss possible problems and misunderstandings with regard to classifications and measurements. Normally an assessment check will also be performed, i.e. a subset of the sample plots will be measured a second time by an independent control team. Normally the proportion of plots selected for checking constitutes about 5% of the plots. The results from the assessment check will not be used to replace or adjust the original data, but only to assess data quality, detect misunderstandings and incorrect working techniques. Thus, it may lead to improvement of field instructions and training.

Data is being entered directly into a handheld data logger during the inventory work. A number of consistency checks has been built into the data logger, e.g. to ensure that the correct attributes will be assessed under the current area class. Data from the previous inventory cycle will be stored in the data logger and a warning will appear if the data are not in accordance with what has been assessed before. That also includes single tree data where current diameter and tree height will be checked against the one measured 5 years earlier, in order to detect an unlikely increment rate or any confusion with identifying trees. Every week the data are transferred to the head office via e-mail. Further testing for correspondence between different attributes will also be carried out, and detected errors or inconsistencies will be returned to the field crew for clarification.

Data processing

After calculation of volume and annual increment of each sampled tree, the estimates are aggregated to geographical regions and the whole country. One sample plot in the productive forest stratum (3x3 km net) represents an area close to 900 ha. After having made the appropriate summaries, the results are compared with corresponding data from the last inventory and the entire time series of data.

7.3 Annex 3 Archiving – development of routines

7.3.1 Statistics Norway

Archiving of the emission inventory in Statistics Norway takes place at several levels:

1) The inventory is a part of Statistics Norway's central data archiving system. All input data to and results from the general emission model from every publication cycle are stored and documented in this system. Archiving is made after each inventory calculation has been finalized.

2) Input data received as spreadsheets, mail, etc, are stored in folders for every publication cycle. These folders also include preliminary calculations before data are entered into the general emission model.

3) Several input data are used in preliminary calculations before entering into the general Norwegian emission inventory model. This includes satellite models such as road traffic and waste, as well as a number of simpler calculations that do not fit into the framework of the general model. The preliminary calculations are not included in the central archiving system, which is not suited for such a diverse collection of data. For some satellite models there is an established archiving routine where all input data and results from every calculation cycle are stored.

4) During improvement projects, adaptation of activity data or calculations of emission factors are often performed. Examples are emission factors for flaring and air traffic. These improvement projects are not archived as part of the annual folder system, but are stored in separate folders. They are not overwritten when new methodologies, emission factors or activity data are implemented.

Statistics Norway will improve its archiving system in line with the requirements for the national system. This will include improved archiving of input and output from side models (satellite models). These will be archived in one place and the storage of revised versions due to recalculations will be improved as will the documentation of recalculations.

Recalculations are documented for internal use. This document will receive increased status and its accessibility will be improved.

7.3.2 The Norwegian Environment Agency

Emissions from large industrial plants

Reports with emission data and QA control from large industrial plants are sent to the Norwegian Environment Agency and archived in Ephorte. Ephorte is an electronic recordkeeping tool that meets the specifications set by the Noark Standard. The Noark Standard is a specification of functional requirements for electronic recordkeeping systems used in public administration in Norway and has been approved by the Norwegian National Archives. These data reported from the plants are then stored in the Forurensning database[13]. All written correspondence between the plants and the Norwegian Environment Agency is archived in Ephorte. If a plant submits additional information as a result of the QA/QC, this information will also be archived in Ephorte and Forurensning will be corrected accordingly. The Forurensning database does not currently have the functionality to store the original emission data if previously reported data are corrected, but this functionality may be developed. After QA/QC described in 3.3.2, the data (with supplementary notes) for the large industrial plants are stored and archived in a designated file on the Norwegian Environment Agency's server, before being sent to Statistics Norway.

[13] The Forurensning database replaced the previous database INKOSYS in 2006. All data in INKOSYS is transferred to Forurensning.

Emissions from off-shore activities

Emission data from off-shore activities are archived in EPIM Environment Hub (EEH). This is a database operated by the Norwegian Petroleum Directorate, the Norwegian Environment Agency and the Norwegian Oil Industry Association. The Norwegian Environment Agency aggregates data from the EPIM Environment Hub (EEH). The data are stored and archived in a designated file on the Norwegian Environment Agency's server before being sent to Statistics Norway.

Data on methane recovery from landfills, amounts of waste from incineration plants and wastewater production from industry

Emission data from the landfill owners are sent to the County Departments of Environmental Affairs and are then stored in the Forurensning database. After QA/QC, these data (with supplementary notes) are stored and archived in a designated file on the Norwegian Environment Agency's server before being sent to Statistics Norway

Import of HFC/PFC and SF_6

Companies that import *HFC/PFC and SF_6* in bulk reported this information to the Norwegian Environment Agency annually up to 2009. The reports are archived in Ephorte. After 2009, Statistics Norway collects the amounts of imported and exported gases from registers at the Norwegian Directorate of Customs and Excise. All import of F-gases is covered in these registers, as Norway lays a tax on the import of F-gases. .

The Norwegian Environment Agency have improved its archiving routines for emissions and other data reported from industrial plants and for emissions and other data reported from oil and gas facilities in FORURENSNING.

From 2009 the Norway's official report is uploaded to UNFCCC submission portal. The CRFs tables and NIR are also uploaded to REPORTNET from 2002 and will also be uploaded there in the future. Before 2002 the reports are stored at the Norwegian Environment Agency's server.

7.3.3 The Norwegian Institute of Bioeconomy Research

The tables and data programs etcetera are currently being stored on the institute's server. Every night a new backup copy is made and stored outside the building. This will ensure that no data can disappear due to technical failure. Files that have been left unchanged will, therefore, exist as long as there is a wish to keep them. Even after purposely deleting or changing the data, the files will exist for 2-3 months, or until the data tapes are over written with new data.

Annex VI: SUMMARY 2 REPORTS FOR CO_2 EQUIVALENT EMISSIONS 1990-2014

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1990
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	24770.16	6167.66	4511.00	0.04	3894.80	2098.54	NA,NO	NA,NO	41442.21
1. Energy	29064.46	919.80	182.45						30166.71
A. Fuel combustion (sectoral approach)	26192.00	331.44	177.47						26700.92
1. Energy industries	7214.26	53.41	13.62						7281.29
2. Manufacturing industries and construction	3990.52	10.63	29.02						4030.17
3. Transport	10102.37	90.96	83.33						10276.66
4. Other sectors	4422.54	175.81	47.75						4646.10
5. Other	462.32	0.63	3.76						466.71
B. Fugitive emissions from fuels	2872.46	588.36	4.98						3465.79
1. Solid fuels	20.43	163.42	NA,NO						183.85
2. Oil and natural gas	2852.03	424.93	4.98						3281.94
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	6398.65	11.93	2090.48	0.04	3894.80	2098.54	NA,NO	NA,NO	14494.44
A. Mineral industry	724.40								724.40
B. Chemical industry	1188.51	10.69	2051.30	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	3250.49
C. Metal industry	4167.07	1.24	5.02		3894.80	2045.16			10113.29
D. Non-energy products from fuels and solvent use	287.45	NA	NA						287.45
E. Electronic Industry						NO	NO	NO	NO
F. Product uses as ODS substitutes				0.04	NO				0.04
G. Other product manufacture and use	NO	NO	34.16			53.38			87.53
H. Other	31.22	NA	NA						31.22
3. Agriculture	231.52	2910.30	1812.39						4954.22
A. Enteric fermentation		2552.24							2552.24
B. Manure management		330.91	110.33						441.24
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1693.67						1693.67
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		27.15	8.39						35.53
G. Liming	230.97								230.97
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-10924.66	143.57	310.43						-10470.66
A. Forest land	-12313.17	49.48	300.15						-11963.55
B. Cropland	1717.00	84.85	NE,NO						1801.85
C. Grassland	65.53	8.20	NE,NO						73.73
D. Wetlands	-7.94	1.04	0.11						-6.79
E. Settlements	613.84	NO	3.54						617.38
F. Other land	0.07	NO	0.01						0.08
G. Harvested wood products	-1000.00								-1000.00
H. Other									
5. Waste	0.19	2182.07	115.25						2297.50
A. Solid waste disposal	NO	2061.76							2061.76
B. Biological treatment of solid waste		2.92	2.61						5.53
C. Incineration and open burning of waste	0.19	0.02	0.07						0.27
D. Waste water treatment and discharge		117.37	112.57						229.94
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2097.52	2.70	16.92						2117.14
Aviation	619.47	0.03	5.86						625.36
Navigation	1478.05	2.67	11.06						1491.78
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4481.60								4481.60
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	4929.19								4929.19
Indirect N_2O			14.11						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	51912.87
Total CO_2 equivalent emissions with land use, land-use change and forestry	41442.21
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	51912.87
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	41442.21

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1991
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	20970.44	6158.28	4360.64	9.91	3456.70	1983.46	NA,NO	NA,NO	36939.43
1. Energy	28023.96	945.39	178.02						29147.38
A. Fuel combustion (sectoral approach)	25794.74	312.98	174.27						26281.99
1. Energy industries	7569.85	56.40	15.65						7641.90
2. Manufacturing industries and construction	3805.16	10.06	27.51						3842.73
3. Transport	10003.07	86.81	84.17						10174.04
4. Other sectors	4000.58	159.15	43.57						4203.30
5. Other	416.07	0.57	3.38						420.02
B. Fugitive emissions from fuels	2229.22	632.41	3.75						2865.39
1. Solid fuels	20.15	159.49	NA,NO						179.64
2. Oil and natural gas	2209.07	472.92	3.75						2685.75
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	5845.63	10.17	1940.83	9.91	3456.70	1983.46	NA,NO	NA,NO	13246.70
A. Mineral industry	679.54								679.54
B. Chemical industry	1060.45	9.13	1902.61	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2972.19
C. Metal industry	3797.71	1.04	4.28		3456.70	1926.60			9186.33
D. Non-energy products from fuels and solvent use	265.05	NA	NA						265.05
E. Electronic Industry						NO	NO	NO	NO
F. Product uses as ODS substitutes				9.91	NO				9.91
G. Other product manufacture and use	NO	NO	33.94			56.86			90.80
H. Other	42.89	NA	NA						42.89
3. Agriculture	201.20	2899.60	1809.93						4910.72
A. Enteric fermentation		2545.83							2545.83
B. Manure management		332.43	113.36						445.79
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1689.97						1689.97
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		21.34	6.59						27.93
G. Liming	200.64								200.64
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-13100.53	145.15	317.09						-12638.30
A. Forest land	-14625.94	51.06	304.58						-14270.30
B. Cropland	1721.54	85.08	NE,NO						1806.62
C. Grassland	68.53	7.98	NE,NO						76.50
D. Wetlands	-9.34	1.04	0.11						-8.18
E. Settlements	666.53	NO	5.14						671.67
F. Other land	0.15	NO	0.01						0.16
G. Harvested wood products	-922.00								-922.00
H. Other									
5. Waste	0.19	2157.97	114.77						2272.93
A. Solid waste disposal	NO	2047.81							2047.81
B. Biological treatment of solid waste		2.93	2.62						5.55
C. Incineration and open burning of waste	0.19	0.03	0.07						0.29
D. Waste water treatment and discharge		107.20	112.08						219.28
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[2]									
International bunkers	1811.80	2.29	14.66						1828.75
Aviation	559.65	0.03	5.29						564.97
Navigation	1252.15	2.26	9.37						1263.78
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4379.89								4379.89
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	5098.50								5098.50
Indirect N_2O			13.43						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	49577.73
Total CO_2 equivalent emissions with land use, land-use change and forestry	36939.43
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	49577.73
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	36939.43

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1992
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	21040.44	6245.91	3827.73	19.95	2637.22	672.58	NA,NO	NA,NO	34443.84
1. Energy	28811.56	1044.19	180.24						30035.98
A. Fuel combustion (sectoral approach)	26265.81	309.99	176.33						26752.14
1. Energy industries	8124.82	60.80	16.92						8202.55
2. Manufacturing industries and construction	3674.97	10.08	26.78						3711.82
3. Transport	10280.26	83.47	86.53						10450.26
4. Other sectors	3692.87	154.96	42.04						3889.87
5. Other	492.90	0.68	4.05						497.63
B. Fugitive emissions from fuels	2545.75	734.20	3.90						3283.85
1. Solid fuels	17.75	141.75	NA,NO						159.50
2. Oil and natural gas	2528.00	592.45	3.90						3124.35
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	5855.30	10.51	1408.71	19.95	2637.22	672.58	NA,NO	NA,NO	10604.27
A. Mineral industry	738.32								738.32
B. Chemical industry	1004.90	9.46	1370.46	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2384.82
C. Metal industry	3807.23	1.05	4.40		2637.22	608.87			7058.77
D. Non-energy products from fuels and solvent use	263.68	NA	NA						263.68
E. Electronic Industry						NO	NO	NO	NO
F. Product uses as ODS substitutes				19.95	NO				19.95
G. Other product manufacture and use	NO	NO	33.85			63.71			97.56
H. Other	41.18	NA	NA						41.18
3. Agriculture	166.20	2917.47	1802.14						4885.80
A. Enteric fermentation		2571.49							2571.49
B. Manure management		334.36	113.56						447.92
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1684.99						1684.99
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		11.61	3.59						15.20
G. Liming	165.65								165.65
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-13792.81	145.34	322.32						-13325.15
A. Forest land	-15706.10	51.30	308.06						-15346.75
B. Cropland	1716.72	85.28	NE,NO						1801.99
C. Grassland	70.40	7.73	NE,NO						78.12
D. Wetlands	-2.18	1.04	0.11						-1.03
E. Settlements	719.18	NO	6.48						725.66
F. Other land	0.18	NO	0.02						0.20
G. Harvested wood products	-591.00								-591.00
H. Other									
5. Waste	0.19	2128.41	114.33						2242.93
A. Solid waste disposal	NO	2007.74							2007.74
B. Biological treatment of solid waste		2.94	2.63						5.57
C. Incineration and open burning of waste	0.19	0.05	0.07						0.30
D. Waste water treatment and discharge		117.68	111.63						229.31
E. Other									
6. Other *(as specified in summary 1.A)*									

Memo items:[(2)]									
International bunkers	2169.53	2.86	17.42						2189.81
Aviation	602.87	0.03	5.70						608.60
Navigation	1566.66	2.83	11.72						1581.21
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4098.40								4098.40
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	5260.92								5260.92
Indirect N_2O			12.34						

Indirect CO_2[(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	47768.99
Total CO_2 equivalent emissions with land use, land-use change and forestry	34443.84
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	47768.99
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	34443.84

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1993
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	23553.19	6323.73	4033.95	31.64	2648.27	703.76	NA,NO	NA,NO	37294.54
1. Energy	29958.16	1168.49	185.66						31312.32
A. Fuel combustion (sectoral approach)	27252.38	331.03	181.53						27764.94
1. Energy industries	8391.90	63.37	15.61						8470.89
2. Manufacturing industries and construction	3896.68	10.60	27.71						3934.99
3. Transport	10926.73	82.67	90.12						11099.53
4. Other sectors	3654.60	173.86	45.08						3873.55
5. Other	382.46	0.53	3.01						385.99
B. Fugitive emissions from fuels	2705.78	837.46	4.13						3547.38
1. Solid fuels	18.24	143.95	NA,NO						162.18
2. Oil and natural gas	2687.55	693.52	4.13						3385.20
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	6368.64	10.63	1616.83	31.64	2648.27	703.76	NA,NO	NA,NO	11379.78
A. Mineral industry	923.86								923.86
B. Chemical industry	1059.83	9.45	1577.48	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2646.76
C. Metal industry	4073.79	1.18	4.81		2648.27	632.70			7360.75
D. Non-energy products from fuels and solvent use	268.07	NA	NA						268.07
E. Electronic Industry						NO	NO	NO	NO
F. Product uses as ODS substitutes				31.64	NO				31.64
G. Other product manufacture and use	NO	NO	34.55			71.06			105.61
H. Other	43.09	NA	NA						43.09
3. Agriculture	193.82	2887.81	1786.14						4867.77
A. Enteric fermentation		2539.68							2539.68
B. Manure management		332.07	108.19						440.26
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1673.00						1673.00
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		16.05	4.96						21.01
G. Liming	193.27								193.27
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-12967.59	144.01	324.99						-12498.59
A. Forest land	-15021.74	49.98	309.53						-14662.24
B. Cropland	1712.33	85.50	NE,NO						1797.83
C. Grassland	76.11	7.50	NE,NO						83.61
D. Wetlands	-12.42	1.04	0.11						-11.27
E. Settlements	771.87	NO	7.54						779.41
F. Other land	0.26	NO	0.02						0.28
G. Harvested wood products	-494.00								-494.00
H. Other									
5. Waste	0.16	2112.79	120.32						2233.27
A. Solid waste disposal	NO	1994.91							1994.91
B. Biological treatment of solid waste		6.60	5.90						12.50
C. Incineration and open burning of waste	0.16	0.05	0.07						0.28
D. Waste water treatment and discharge		111.22	114.35						225.57
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2312.09	3.07	18.55						2333.71
Aviation	635.14	0.04	6.01						641.19
Navigation	1676.94	3.03	12.54						1692.51
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4408.22								4408.22
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	5416.49								5416.49
Indirect N_2O			13.37						
Indirect CO_2[(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	49793.13
Total CO_2 equivalent emissions with land use, land-use change and forestry	37294.54
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	49793.13
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	37294.54

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1994
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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	23664.56	6392.25	4111.26	49.88	2342.53	837.57	NA,NO	NA,NO	37398.06
1. Energy	31500.69	1208.55	198.78						32908.03
A. Fuel combustion (sectoral approach)	28665.65	341.64	194.38						29201.67
1. Energy industries	9095.32	65.65	16.57						9177.54
2. Manufacturing industries and construction	4595.80	11.72	32.09						4639.61
3. Transport	10654.23	79.20	94.79						10828.21
4. Other sectors	3798.28	184.53	46.58						4029.38
5. Other	522.02	0.55	4.36						526.94
B. Fugitive emissions from fuels	2835.04	866.91	4.40						3706.36
1. Solid fuels	17.84	140.44	NA,NO						158.28
2. Oil and natural gas	2817.20	726.47	4.40						3548.07
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	6760.17	11.48	1685.74	49.88	2342.53	837.57	NA,NO	NA,NO	11687.39
A. Mineral industry	942.11								942.11
B. Chemical industry	1148.74	10.16	1643.42	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2802.32
C. Metal industry	4360.92	1.33	5.32		2342.53	754.68			7464.77
D. Non-energy products from fuels and solvent use	265.66	NA	NA						265.66
E. Electronic Industry						NO	NO	NO	NO
F. Product uses as ODS substitutes				49.88	NO				49.88
G. Other product manufacture and use	NO	NO	37.01			82.89			119.90
H. Other	42.74	NA	NA						42.74
3. Agriculture	173.72	2934.23	1772.23						4880.18
A. Enteric fermentation		2585.32							2585.32
B. Manure management		337.39	110.86						448.25
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1657.81						1657.81
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		11.52	3.56						15.08
G. Liming	173.17								173.17
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-14770.20	144.31	329.11						-14296.77
A. Forest land	-16634.26	50.33	312.41						-16271.52
B. Cropland	1711.24	85.70	NE,NO						1796.94
C. Grassland	77.84	7.25	NE,NO						85.09
D. Wetlands	-21.92	1.04	0.11						-20.76
E. Settlements	824.56	NO	8.40						832.96
F. Other land	0.33	NO	0.03						0.36
G. Harvested wood products	-728.00								-728.00
H. Other									
5. Waste	0.18	2093.67	125.40						2219.24
A. Solid waste disposal	NO	1986.02							1986.02
B. Biological treatment of solid waste		6.66	5.96						12.62
C. Incineration and open burning of waste	0.18	0.06	0.07						0.30
D. Waste water treatment and discharge		100.93	119.37						220.30
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2462.27	3.37	19.64						2485.28
Aviation	616.57	0.04	5.83						622.45
Navigation	1845.70	3.33	13.81						1862.83
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4719.90								4719.90
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	5565.21								5565.21
Indirect N_2O			12.87						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	51694.84
Total CO_2 equivalent emissions with land use, land-use change and forestry	37398.06
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	51694.84
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	37398.06

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1995
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NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	24355.69	6281.32	4145.88	92.30	2314.05	579.82	NA,NO	NA,NO	37769.05
1. Energy	31356.05	1179.37	205.22						32740.64
A. Fuel combustion (sectoral approach)	28613.51	334.75	200.75						29149.02
1. Energy industries	8985.02	66.06	17.05						9068.13
2. Manufacturing industries and construction	4357.82	12.06	32.60						4402.49
3. Transport	10934.00	75.92	100.38						11110.30
4. Other sectors	3867.33	180.22	46.82						4094.37
5. Other	469.34	0.48	3.90						473.73
B. Fugitive emissions from fuels	2742.54	844.62	4.47						3591.63
1. Solid fuels	17.40	136.72	NA,NO						154.12
2. Oil and natural gas	2725.15	707.90	4.47						3437.51
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	6914.85	12.08	1687.73	92.30	2314.05	579.82	NA,NO	NA,NO	11600.82
A. Mineral industry	988.33								988.33
B. Chemical industry	1165.03	10.70	1644.76	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2820.48
C. Metal industry	4478.86	1.38	5.53		2314.05	485.64			7285.46
D. Non-energy products from fuels and solvent use	235.72	NA	NA						235.72
E. Electronic Industry						1.03	NO	NO	1.03
F. Product uses as ODS substitutes				92.30	NO				92.30
G. Other product manufacture and use	NO	NO	37.44			93.15			130.59
H. Other	46.91	NA	NA						46.91
3. Agriculture	193.86	2893.52	1791.29						4878.68
A. Enteric fermentation		2544.14							2544.14
B. Manure management		335.10	111.41						446.51
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1675.47						1675.47
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		14.28	4.41						18.69
G. Liming	193.31								193.31
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-14109.21	144.26	333.31						-13631.64
A. Forest land	-15873.44	50.30	315.17						-15507.98
B. Cropland	1752.30	85.90	NE,NO						1838.20
C. Grassland	92.52	7.03	NE,NO						99.55
D. Wetlands	0.25	1.04	0.11						1.41
E. Settlements	926.82	NO	9.26						936.09
F. Other land	0.33	NO	0.03						0.36
G. Harvested wood products	-1008.00								-1008.00
H. Other									
5. Waste	0.15	2052.08	128.33						2180.56
A. Solid waste disposal	NO	1939.91							1939.91
B. Biological treatment of solid waste		6.72	6.01						12.73
C. Incineration and open burning of waste	0.15	0.06	0.07						0.27
D. Waste water treatment and discharge		105.39	122.25						227.64
E. Other									
6. Other ***(as specified in summary 1.A)***									
Memo items:[2]									
International bunkers	2841.18	4.12	22.42						2867.72
Aviation	585.57	0.05	5.54						591.15
Navigation	2255.62	4.07	16.88						2276.57
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4826.14								4826.14
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	5707.30								5707.30
Indirect N_2O			13.71						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	51400.70
Total CO_2 equivalent emissions with land use, land-use change and forestry	37769.05
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	51400.70
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	37769.05

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1996
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NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	25107.97	6344.51	4164.49	130.01	2107.62	547.68	NA,NO	NA,NO	38402.28
1. Energy	34485.69	1222.55	218.98						35927.22
A. Fuel combustion (sectoral approach)	31284.95	347.90	213.89						31846.74
1. Energy industries	9876.24	70.75	17.91						9964.90
2. Manufacturing industries and construction	4914.72	12.89	34.31						4961.93
3. Transport	11298.85	70.86	105.14						11474.85
4. Other sectors	4772.80	192.89	53.21						5018.89
5. Other	422.33	0.52	3.33						426.17
B. Fugitive emissions from fuels	3200.74	874.65	5.08						4080.47
1. Solid fuels	17.35	135.77	NA,NO						153.12
2. Oil and natural gas	3183.39	738.88	5.08						3927.35
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6919.42	11.82	1670.75	130.01	2107.62	547.68	NA,NO	NA,NO	11387.30
A. Mineral industry	989.53								989.53
B. Chemical industry	1166.24	10.36	1626.89	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2803.48
C. Metal industry	4468.91	1.46	5.89		2107.62	450.76			7034.63
D. Non-energy products from fuels and solvent use	247.97	NA	NA						247.97
E. Electronic Industry						1.03	NO	NO	1.03
F. Product uses as ODS substitutes				130.01	NO				130.01
G. Other product manufacture and use	NO	NO	37.98			95.89			133.87
H. Other	46.77	NA	NA						46.77
3. Agriculture	180.46	2962.76	1810.91						4954.13
A. Enteric fermentation		2606.05							2606.05
B. Manure management		341.13	113.09						454.22
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1693.01						1693.01
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		15.58	4.81						20.39
G. Liming	179.91								179.91
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-16477.73	145.63	335.37						-15996.73
A. Forest land	-18574.57	51.47	316.48						-18206.62
B. Cropland	1748.31	86.35	NE,NO						1834.66
C. Grassland	110.15	6.78	NE,NO						116.93
D. Wetlands	2.66	1.04	0.11						3.81
E. Settlements	1057.39	NO	9.88						1067.27
F. Other land	0.33	NO	0.03						0.36
G. Harvested wood products	-822.00								-822.00
H. Other									
5. Waste	0.13	2001.75	128.48						2130.37
A. Solid waste disposal	NO	1898.12							1898.12
B. Biological treatment of solid waste		7.81	6.98						14.79
C. Incineration and open burning of waste	0.13	0.07	0.07						0.27
D. Waste water treatment and discharge		95.75	121.43						217.19
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	3171.59	4.54	25.10						3201.23
Aviation	691.44	0.06	6.54						698.04
Navigation	2480.16	4.48	18.55						2503.19
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4847.70								4847.70
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	5847.62								5847.62
Indirect N_2O			14.22						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	54399.01
Total CO_2 equivalent emissions with land use, land-use change and forestry	38402.28
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	54399.01
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	38402.28

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

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NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	25191.66	6338.35	4159.99	191.94	1882.70	553.17	NA,NO	NA,NO	38317.81
1. Energy	34316.40	1305.80	226.94						35849.13
A. Fuel combustion (sectoral approach)	31366.92	357.07	221.97						31945.95
1. Energy industries	10243.89	75.51	17.54						10336.94
2. Manufacturing industries and construction	4828.03	14.16	36.53						4878.71
3. Transport	11559.43	68.38	111.46						11739.27
4. Other sectors	4294.68	198.48	52.96						4546.12
5. Other	440.89	0.55	3.46						444.90
B. Fugitive emissions from fuels	2949.48	948.74	4.97						3903.18
1. Solid fuels	15.90	125.48	NA,NO						141.38
2. Oil and natural gas	2933.58	823.25	4.97						3761.80
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	7184.96	17.77	1656.74	191.94	1882.70	553.17	NA,NO	NA,NO	11487.29
A. Mineral industry	1047.29								1047.29
B. Chemical industry	1217.68	16.23	1612.59	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2846.51
C. Metal industry	4615.87	1.54	6.23		1882.70	417.24			6923.59
D. Non-energy products from fuels and solvent use	247.80	NA	NA						247.80
E. Electronic Industry						1.03	NO	NO	1.03
F. Product uses as ODS substitutes				191.94	NO				191.94
G. Other product manufacture and use	NO	NO	37.91			134.91			172.82
H. Other	56.33	NA	NA						56.33
3. Agriculture	180.63	2914.64	1804.73						4900.00
A. Enteric fermentation		2568.75							2568.75
B. Manure management		334.69	110.66						445.34
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1690.61						1690.61
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		11.21	3.46						14.67
G. Liming	180.07								180.07
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-16490.47	146.49	339.88						-16004.10
A. Forest land	-18990.10	51.68	317.78						-18620.65
B. Cropland	1840.08	87.00	NE,NO						1927.08
C. Grassland	138.17	6.78	0.29						145.24
D. Wetlands	3.34	1.04	0.11						4.49
E. Settlements	1161.71	NO	12.06						1173.77
F. Other land	0.33	NO	0.03						0.36
G. Harvested wood products	-644.00								-644.00
H. Other									
5. Waste	0.14	1953.64	131.70						2085.48
A. Solid waste disposal	NO	1850.94							1850.94
B. Biological treatment of solid waste		9.96	8.90						18.86
C. Incineration and open burning of waste	0.14	0.09	0.07						0.30
D. Waste water treatment and discharge		92.64	122.73						215.37
E. Other									
6. Other *(as specified in summary 1.A)*									

Memo items:[(2)]									
International bunkers	3772.86	5.50	29.76						3808.12
Aviation	770.89	0.08	7.29						778.26
Navigation	3001.98	5.42	22.47						3029.86
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5051.59								5051.59
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	5983.66								5983.66
Indirect N_2O			14.15						

Indirect CO_2[(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	54321.91
Total CO_2 equivalent emissions with land use, land-use change and forestry	38317.81
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	54321.91
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	38317.81

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

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NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	22671.35	6139.70	4247.29	244.45	1711.98	693.29	NA,NO	NA,NO	35708.06
1. Energy	34449.50	1238.20	221.39						35909.09
A. Fuel combustion (sectoral approach)	31375.71	338.88	216.37						31930.95
1. Energy industries	9929.33	72.42	17.53						10019.28
2. Manufacturing industries and construction	4943.25	12.90	33.84						4989.99
3. Transport	11985.55	63.44	112.49						12161.47
4. Other sectors	4141.92	189.63	49.41						4380.96
5. Other	375.67	0.49	3.09						379.25
B. Fugitive emissions from fuels	3073.78	899.33	5.03						3978.14
1. Solid fuels	16.06	126.02	NA,NO						142.08
2. Oil and natural gas	3057.73	773.30	5.03						3836.06
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	7327.76	22.78	1736.16	244.45	1711.98	693.29	NA,NO	NA,NO	11736.42
A. Mineral industry	1023.10								1023.10
B. Chemical industry	1050.82	21.20	1691.88	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2763.90
C. Metal industry	4975.50	1.58	6.29		1711.98	555.18			7250.53
D. Non-energy products from fuels and solvent use	222.64	NA	NA						222.64
E. Electronic Industry						1.03	NO	NO	1.03
F. Product uses as ODS substitutes				244.45	NO				244.45
G. Other product manufacture and use	NO	NO	37.98			137.08			175.07
H. Other	55.70	NA	NA						55.70
3. Agriculture	160.63	2920.37	1813.94						4894.94
A. Enteric fermentation		2574.31							2574.31
B. Manure management		334.29	111.18						445.47
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1699.13						1699.13
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		11.77	3.64						15.41
G. Liming	160.07								160.07
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-19266.68	146.45	341.77						-18778.46
A. Forest land	-21829.31	51.02	319.23						-21459.06
B. Cropland	1821.11	87.63	NE,NO						1908.73
C. Grassland	118.83	6.78	NE,NO						125.60
D. Wetlands	-1.51	1.04	0.11						-0.36
E. Settlements	1332.87	NO	12.60						1345.47
F. Other land	0.33	NO	0.03						0.36
G. Harvested wood products	-709.00								-709.00
H. Other									
5. Waste	0.15	1811.88	134.03						1946.07
A. Solid waste disposal	NO	1721.43							1721.43
B. Biological treatment of solid waste		12.23	10.94						23.17
C. Incineration and open burning of waste	0.15	0.13	0.07						0.35
D. Waste water treatment and discharge		78.09	123.03						201.12
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	3687.43	5.27	29.23						3721.92
Aviation	821.39	0.09	7.77						829.25
Navigation	2866.04	5.18	21.46						2892.67
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4669.26								4669.26
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6117.24								6117.24
Indirect N_2O			14.27						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	54486.52
Total CO_2 equivalent emissions with land use, land-use change and forestry	35708.06
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	54486.52
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	35708.06

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1999
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	20863.93	6035.68	4477.79	316.37	1599.97	833.74	NA,NO	NA,NO	34127.47
1. Energy	35318.31	1202.51	231.57						36752.39
A. Fuel combustion (sectoral approach)	31631.49	335.24	225.32						32192.05
1. Energy industries	9889.53	67.24	18.24						9975.01
2. Manufacturing industries and construction	4519.86	13.60	34.49						4567.95
3. Transport	12303.51	59.88	115.62						12479.01
4. Other sectors	4511.20	194.04	53.67						4758.92
5. Other	407.39	0.47	3.30						411.16
B. Fugitive emissions from fuels	3686.82	867.27	6.24						4560.34
1. Solid fuels	18.38	141.50	NA,NO						159.88
2. Oil and natural gas	3668.44	725.78	6.24						4400.46
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	7213.26	21.82	1960.85	316.37	1599.97	833.74	NA,NO	NA,NO	11946.00
A. Mineral industry	990.72								990.72
B. Chemical industry	873.40	20.30	1917.29	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2810.99
C. Metal industry	5073.60	1.52	6.12		1599.97	691.98			7373.19
D. Non-energy products from fuels and solvent use	218.73	NA	NA						218.73
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				316.37	NO				316.37
G. Other product manufacture and use	NO	NO	37.44			140.62			178.06
H. Other	56.80	NA	NA						56.80
3. Agriculture	159.06	2982.92	1800.06						4942.04
A. Enteric fermentation		2635.91							2635.91
B. Manure management		336.44	114.08						450.52
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1682.70						1682.70
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		10.57	3.27						13.84
G. Liming	158.51								158.51
H. Urea application	0.55								0.55
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-21826.82	146.84	344.66						-21335.33
A. Forest land	-24321.72	50.77	320.09						-23950.86
B. Cropland	1831.45	88.25	NE,NO						1919.70
C. Grassland	149.97	6.78	0.13						156.87
D. Wetlands	-18.49	1.04	0.11						-17.33
E. Settlements	1397.48	NO	14.08						1411.55
F. Other land	0.48	NO	0.04						0.52
G. Harvested wood products	-866.00								-866.00
H. Other									
5. Waste	0.12	1681.59	140.66						1822.37
A. Solid waste disposal	NO	1582.96							1582.96
B. Biological treatment of solid waste		19.01	16.99						36.00
C. Incineration and open burning of waste	0.12	0.16	0.07						0.35
D. Waste water treatment and discharge		79.46	123.60						203.06
E. Other									
6. Other *(as specified in summary 1.A)*									

Memo items:[2]									
International bunkers	3619.86	4.95	28.97						3653.77
Aviation	941.67	0.11	8.91						950.70
Navigation	2678.18	4.84	20.06						2703.08
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4847.19								4847.19
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6237.73								6237.73
Indirect N_2O			14.24						

Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	55462.80
Total CO_2 equivalent emissions with land use, land-use change and forestry	34127.47
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	55462.80
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	34127.47

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2000
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	18126.36	6101.18	4275.90	383.59	1518.45	891.41	NA,NO	NA,NO	31296.90
1. Energy	34569.36	1331.54	217.65						36118.55
A. Fuel combustion (sectoral approach)	30700.42	343.15	212.91						31256.48
1. Energy industries	10851.82	77.65	16.15						10945.62
2. Manufacturing industries and construction	4361.00	12.73	32.46						4406.18
3. Transport	11681.59	55.82	113.40						11850.81
4. Other sectors	3612.34	196.60	49.52						3858.46
5. Other	193.68	0.36	1.37						195.41
B. Fugitive emissions from fuels	3868.94	988.39	4.74						4862.08
1. Solid fuels	19.27	147.28	NA,NO						166.55
2. Oil and natural gas	3849.67	841.12	4.74						4695.53
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	7486.96	21.10	1780.04	383.59	1518.45	891.41	NA,NO	NA,NO	12081.56
A. Mineral industry	997.93								997.93
B. Chemical industry	1129.54	19.56	1737.15	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2886.24
C. Metal industry	5089.54	1.54	6.00		1518.45	737.58			7353.11
D. Non-energy products from fuels and solvent use	207.19	NA	NA						207.19
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				383.59	NO				383.59
G. Other product manufacture and use	NO	NO	36.90			152.69			189.59
H. Other	62.76	NA	NA						62.76
3. Agriculture	137.22	2861.82	1797.36						4796.40
A. Enteric fermentation		2535.14							2535.14
B. Manure management		315.42	113.19						428.61
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1680.68						1680.68
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		11.27	3.48						14.75
G. Liming	137.11								137.11
H. Urea application	0.11								0.11
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-24067.25	147.64	347.29						-23572.31
A. Forest land	-27033.34	50.96	320.66						-26661.72
B. Cropland	1808.82	88.88	NE,NO						1897.70
C. Grassland	150.06	6.78	0.70						157.54
D. Wetlands	-17.44	1.04	0.11						-16.28
E. Settlements	1559.98	NO	15.16						1575.14
F. Other land	0.66	NO	0.06						0.72
G. Harvested wood products	-536.00								-536.00
H. Other									
5. Waste	0.07	1739.07	133.57						1872.70
A. Solid waste disposal	NO	1634.41							1634.41
B. Biological treatment of solid waste		24.66	22.05						46.71
C. Incineration and open burning of waste	0.07	0.12	0.07						0.26
D. Waste water treatment and discharge		79.88	111.45						191.33
E. Other									
6. Other *(as specified in summary 1.A)*									

Memo items:[2]									
International bunkers	3514.91	4.82	28.12						3547.85
Aviation	912.88	0.12	8.64						921.63
Navigation	2602.03	4.70	19.49						2626.22
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	4705.16								4705.16
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6351.58								6351.58
Indirect N_2O			14.84						

Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	54869.21
Total CO_2 equivalent emissions with land use, land-use change and forestry	31296.90
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	54869.21
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	31296.90

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2001
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	17471.65	6134.39	4206.70	473.59	1531.26	754.79	NA,NO	NA,NO	30572.38
1. Energy	36309.12	1449.67	225.18						37983.98
A. Fuel combustion (sectoral approach)	32753.66	356.63	220.97						33331.27
1. Energy industries	12065.95	86.90	17.00						12169.84
2. Manufacturing industries and construction	4489.33	13.13	34.22						4536.68
3. Transport	11893.63	50.69	114.55						12058.87
4. Other sectors	3995.12	205.39	53.02						4253.52
5. Other	309.64	0.53	2.18						312.35
B. Fugitive emissions from fuels	3555.46	1093.04	4.21						4652.71
1. Solid fuels	17.92	138.10	NA,NO						156.01
2. Oil and natural gas	3537.55	954.94	4.21						4496.70
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	7080.59	23.76	1731.15	473.59	1531.26	754.79	NA,NO	NA,NO	11595.14
A. Mineral industry	957.99								957.99
B. Chemical industry	1089.87	22.39	1692.36	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2804.62
C. Metal industry	4756.85	1.37	5.38		1531.26	615.60			6910.47
D. Non-energy products from fuels and solvent use	204.72	NA	NA						204.72
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				473.59	NO				473.59
G. Other product manufacture and use	NO	NO	33.40			138.05			171.45
H. Other	71.16	NA	NA						71.16
3. Agriculture	139.56	2839.68	1759.35						4738.59
A. Enteric fermentation		2516.28							2516.28
B. Manure management		314.52	114.06						428.58
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1642.54						1642.54
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		8.88	2.74						11.63
G. Liming	139.48								139.48
H. Urea application	0.07								0.07
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-26057.69	148.22	350.50						-25558.97
A. Forest land	-29120.42	50.91	322.17						-28747.34
B. Cropland	1851.22	89.50	NE,NO						1940.72
C. Grassland	140.83	6.78	1.00						148.61
D. Wetlands	-19.31	1.04	0.11						-18.16
E. Settlements	1621.18	NO	16.05						1637.23
F. Other land	0.81	NO	0.07						0.88
G. Harvested wood products	-532.00								-532.00
H. Other									
5. Waste	0.07	1673.06	140.52						1813.65
A. Solid waste disposal	NO	1565.57							1565.57
B. Biological treatment of solid waste		30.48	27.25						57.74
C. Incineration and open burning of waste	0.07	0.11	0.07						0.26
D. Waste water treatment and discharge		76.90	113.20						190.09
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	3428.96	4.79	27.33						3461.08
Aviation	835.42	0.11	7.90						843.44
Navigation	2593.53	4.68	19.42						2617.64
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5150.13								5150.13
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6452.95								6452.95
Indirect N_2O			15.26						
Indirect CO_2[(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	56131.35
Total CO_2 equivalent emissions with land use, land-use change and forestry	30572.38
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	56131.35
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	30572.38

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2002
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	15871.10	5981.80	4449.80	578.47	1658.79	227.34	NA,NO	NA,NO	28767.29
1. Energy	35996.87	1394.32	229.27						37620.47
A. Fuel combustion (sectoral approach)	32981.45	382.79	226.04						33590.28
1. Energy industries	12330.32	90.55	18.19						12439.06
2. Manufacturing industries and construction	4233.87	12.85	32.80						4279.51
3. Transport	11755.61	46.52	113.64						11915.77
4. Other sectors	4177.59	232.44	57.55						4467.57
5. Other	484.07	0.43	3.86						488.36
B. Fugitive emissions from fuels	3015.42	1011.53	3.23						4030.19
1. Solid fuels	16.90	131.03	NA,NO						147.93
2. Oil and natural gas	2998.52	880.50	3.23						3882.25
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6521.89	24.54	1978.96	578.47	1658.79	227.34	NA,NO	NA,NO	10989.98
A. Mineral industry	984.84								984.84
B. Chemical industry	968.35	23.40	1943.62	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2935.37
C. Metal industry	4291.05	1.14	4.48		1658.79	135.20			6090.67
D. Non-energy products from fuels and solvent use	203.76	NA	NA						203.76
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				578.47	NO				578.47
G. Other product manufacture and use	NO	NO	30.86			90.99			121.85
H. Other	73.90	NA	NA						73.90
3. Agriculture	136.07	2826.27	1753.34						4715.67
A. Enteric fermentation		2509.99							2509.99
B. Manure management		309.63	113.03						422.65
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1638.25						1638.25
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		6.66	2.06						8.71
G. Liming	135.64								135.64
H. Urea application	0.43								0.43
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-26783.77	148.63	355.24						-26279.89
A. Forest land	-30118.08	51.31	324.27						-29742.50
B. Cropland	1838.75	89.50	NE,NO						1928.25
C. Grassland	127.82	6.78	1.10						135.70
D. Wetlands	-13.24	1.04	0.11						-12.08
E. Settlements	1728.03	NO	17.87						1745.89
F. Other land	0.95	NO	0.08						1.04
G. Harvested wood products	-348.00								-348.00
H. Other									
5. Waste	0.04	1588.04	132.99						1721.07
A. Solid waste disposal	NO	1490.75							1490.75
B. Biological treatment of solid waste		29.86	26.69						56.55
C. Incineration and open burning of waste	0.04	0.11	0.07						0.23
D. Waste water treatment and discharge		67.32	106.23						173.55
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2808.04	3.84	22.50						2834.38
Aviation	739.74	0.10	7.00						746.83
Navigation	2068.30	3.74	15.50						2087.54
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5273.49								5273.49
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6554.54								6554.54
Indirect N_2O			15.59						
Indirect CO_2[(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	55047.19
Total CO_2 equivalent emissions with land use, land-use change and forestry	28767.29
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	55047.19
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	28767.29

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2003
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	16192.62	6114.85	4312.53	557.83	1051.11	217.37	NA,NO	NA,NO	28446.30
1. Energy	37215.85	1474.36	229.28						38919.49
A. Fuel combustion (sectoral approach)	34309.12	392.53	226.33						34927.98
1. Energy industries	12999.42	97.44	20.01						13116.87
2. Manufacturing industries and construction	4566.54	13.98	34.74						4615.26
3. Transport	11997.28	48.60	111.12						12157.00
4. Other sectors	4542.72	232.11	59.35						4834.19
5. Other	203.15	0.41	1.10						204.66
B. Fugitive emissions from fuels	2906.73	1081.83	2.95						3991.51
1. Solid fuels	22.29	167.77	NA,NO						190.06
2. Oil and natural gas	2884.44	914.06	2.95						3801.46
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6565.86	21.90	1788.24	557.83	1051.11	217.37	NA,NO	NA,NO	10202.31
A. Mineral industry	1035.85								1035.85
B. Chemical industry	941.06	20.83	1755.38	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2717.27
C. Metal industry	4294.33	1.08	4.17		1051.11	164.16			5514.84
D. Non-energy products from fuels and solvent use	209.59	NA	NA						209.59
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				557.83	NO				557.83
G. Other product manufacture and use	NO	NO	28.70			52.07			80.77
H. Other	85.03	NA	NA						85.03
3. Agriculture	123.95	2890.90	1798.68						4813.53
A. Enteric fermentation		2568.73							2568.73
B. Manure management		316.59	119.38						435.96
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1677.57						1677.57
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		5.59	1.73						7.32
G. Liming	123.87								123.87
H. Urea application	0.07								0.07
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-27713.08	149.45	357.80						-27205.83
A. Forest land	-31120.48	51.86	324.56						-30744.06
B. Cropland	1847.99	89.78	NE,NO						1937.76
C. Grassland	133.80	6.78	1.30						141.87
D. Wetlands	-6.51	1.04	0.11						-5.36
E. Settlements	1562.99	NO	19.54						1582.53
F. Other land	1.14	NO	0.10						1.23
G. Harvested wood products	-132.00								-132.00
H. Other									
5. Waste	0.04	1578.23	138.53						1716.81
A. Solid waste disposal	NO	1470.62							1470.62
B. Biological treatment of solid waste		29.07	25.99						55.05
C. Incineration and open burning of waste	0.04	0.11	0.07						0.22
D. Waste water treatment and discharge		78.44	112.48						190.92
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[2]									
International bunkers	2803.69	3.81	22.48						2829.98
Aviation	747.48	0.10	7.07						754.64
Navigation	2056.22	3.72	15.41						2075.34
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5390.92								5390.92
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6652.04								6652.04
Indirect N_2O			15.53						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	55652.14
Total CO_2 equivalent emissions with land use, land-use change and forestry	28446.30
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	55652.14
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	28446.30

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2004
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	17085.04	6058.26	4451.46	597.30	1016.75	263.34	NA,NO	NA,NO	29472.15
1. Energy	37077.10	1506.81	224.38						38808.29
A. Fuel combustion (sectoral approach)	34335.24	383.28	221.20						34939.71
1. Energy industries	13097.24	101.77	17.01						13216.03
2. Manufacturing industries and construction	4381.91	13.18	33.84						4428.92
3. Transport	12357.76	49.81	111.01						12518.57
4. Other sectors	4137.66	218.10	56.63						4412.39
5. Other	360.67	0.42	2.70						363.79
B. Fugitive emissions from fuels	2741.86	1123.54	3.18						3868.58
1. Solid fuels	16.45	127.73	NA,NO						144.18
2. Oil and natural gas	2725.41	995.81	3.18						3724.41
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	7130.39	20.08	1925.77	597.30	1016.75	263.34	NA,NO	NA,NO	10953.64
A. Mineral industry	847.39								847.39
B. Chemical industry	1058.23	18.79	1891.31	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2968.34
C. Metal industry	4924.67	1.29	5.05		1016.75	196.08			6143.83
D. Non-energy products from fuels and solvent use	211.75	NA	NA						211.75
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				597.30	NO				597.30
G. Other product manufacture and use	NO	NO	29.41			66.12			95.54
H. Other	88.35	NA	NA						88.35
3. Agriculture	111.46	2819.07	1797.55						4728.09
A. Enteric fermentation		2494.82							2494.82
B. Manure management		317.99	116.61						434.59
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1679.01						1679.01
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		6.27	1.94						8.21
G. Liming	110.25								110.25
H. Urea application	1.22								1.22
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-27233.95	149.31	358.70						-26725.95
A. Forest land	-30602.01	51.27	325.96						-30224.79
B. Cropland	1823.85	90.23	NE,NO						1914.08
C. Grassland	101.31	6.78	1.45						109.54
D. Wetlands	-6.04	1.04	0.11						-4.88
E. Settlements	1644.79	NO	18.91						1663.70
F. Other land	1.14	NO	0.10						1.23
G. Harvested wood products	-197.00								-197.00
H. Other									
5. Waste	0.04	1562.98	145.05						1708.08
A. Solid waste disposal	NO	1458.18							1458.18
B. Biological treatment of solid waste		35.99	32.02						68.01
C. Incineration and open burning of waste	0.04	0.10	0.07						0.21
D. Waste water treatment and discharge		68.71	112.97						181.68
E. Other									
6. Other ***(as specified in summary 1.A)***									
Memo items:[2]									
International bunkers	2815.92	3.67	22.76						2842.35
Aviation	846.91	0.11	8.01						855.03
Navigation	1969.01	3.56	14.75						1987.32
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5181.60								5181.60
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6752.19								6752.19
Indirect N_2O			15.69						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	56198.10
Total CO_2 equivalent emissions with land use, land-use change and forestry	29472.15
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	56198.10
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	29472.15

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2005
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	18354.34	5848.05	4524.11	614.39	955.32	297.67	NA,NO	NA,NO	30593.88
1. Energy	36736.01	1382.14	199.11						38317.26
A. Fuel combustion (sectoral approach)	34060.94	382.25	196.05						34639.23
1. Energy industries	13369.73	100.69	16.66						13487.08
2. Manufacturing industries and construction	4176.23	14.24	35.61						4226.08
3. Transport	12515.37	49.21	87.07						12651.64
4. Other sectors	3680.10	217.81	54.23						3952.15
5. Other	319.51	0.30	2.47						322.28
B. Fugitive emissions from fuels	2675.07	999.88	3.07						3678.03
1. Solid fuels	14.86	107.55	NA,NO						122.41
2. Oil and natural gas	2660.21	892.33	3.07						3555.61
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6701.89	20.72	2023.34	614.39	955.32	297.67	NA,NO	NA,NO	10613.34
A. Mineral industry	909.40								909.40
B. Chemical industry	813.30	19.60	1992.28	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2825.18
C. Metal industry	4682.43	1.12	4.09		955.32	229.10			5872.06
D. Non-energy products from fuels and solvent use	204.23	NA	NA						204.23
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				614.39	NO				614.39
G. Other product manufacture and use	NO	NO	26.98			67.43			94.41
H. Other	92.53	NA	NA						92.53
3. Agriculture	109.28	2818.43	1792.71						4720.42
A. Enteric fermentation		2491.22							2491.22
B. Manure management		321.95	116.49						438.44
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1674.59						1674.59
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		5.26	1.63						6.89
G. Liming	109.18								109.18
H. Urea application	0.10								0.10
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-25192.89	150.20	362.79						-24679.89
A. Forest land	-28299.52	51.71	327.88						-27919.92
B. Cropland	1850.28	90.68	NE,NO						1940.95
C. Grassland	159.44	6.78	1.61						167.82
D. Wetlands	4.88	1.04	0.11						6.03
E. Settlements	1571.90	NO	20.26						1592.16
F. Other land	1.14	NO	0.10						1.23
G. Harvested wood products	-481.00								-481.00
H. Other									
5. Waste	0.04	1476.56	146.16						1622.76
A. Solid waste disposal	NO	1368.63							1368.63
B. Biological treatment of solid waste		33.62	29.95						63.57
C. Incineration and open burning of waste	0.04	0.09	0.07						0.20
D. Waste water treatment and discharge		74.22	116.14						190.36
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[2]									
International bunkers	3201.39	4.21	25.83						3231.43
Aviation	937.74	0.12	8.87						946.73
Navigation	2263.65	4.09	16.96						2284.69
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5313.15								5313.15
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6847.05								6847.05
Indirect N_2O			16.52						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	55273.78
Total CO_2 equivalent emissions with land use, land-use change and forestry	30593.88
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	55273.78
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	30593.88

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2006
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	17538.68	5723.71	4195.58	678.09	859.08	202.33	NA,NO	NA,NO	29197.46
1. Energy	37540.08	1291.85	202.22						39034.15
A. Fuel combustion (sectoral approach)	34932.09	376.21	199.24						35507.54
1. Energy industries	13319.68	96.86	16.97						13433.51
2. Manufacturing industries and construction	4491.71	14.06	36.31						4542.08
3. Transport	12950.36	46.99	87.33						13084.68
4. Other sectors	3862.61	217.96	56.27						4136.85
5. Other	307.73	0.34	2.35						310.42
B. Fugitive emissions from fuels	2607.99	915.64	2.98						3526.61
1. Solid fuels	13.26	105.36	NA,NO						118.63
2. Oil and natural gas	2594.73	810.28	2.98						3407.99
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6268.74	19.68	1712.15	678.09	859.08	202.33	NA,NO	NA,NO	9740.06
A. Mineral industry	948.02								948.02
B. Chemical industry	908.33	18.94	1681.37	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2608.64
C. Metal industry	4131.70	0.74	2.81		859.08	114.55			5108.87
D. Non-energy products from fuels and solvent use	194.81	NA	NA						194.81
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				678.09	NO				678.09
G. Other product manufacture and use	NO	NO	27.96			86.64			114.60
H. Other	85.88	NA	NA						85.88
3. Agriculture	103.93	2761.79	1767.73						4633.45
A. Enteric fermentation		2437.33							2437.33
B. Manure management		320.06	115.12						435.18
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1651.25						1651.25
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		4.40	1.36						5.75
G. Liming	103.80								103.80
H. Urea application	0.12								0.12
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-26374.06	153.94	365.30						-25854.82
A. Forest land	-29630.55	55.88	328.71						-29245.96
B. Cropland	1843.27	90.58	NE,NO						1933.84
C. Grassland	164.01	6.45	1.81						172.27
D. Wetlands	4.35	1.04	0.11						5.50
E. Settlements	1662.32	NO	21.58						1683.90
F. Other land	4.55	NO	0.10						4.64
G. Harvested wood products	-422.00								-422.00
H. Other									
5. Waste	NE,NO,IE	1496.44	148.19						1644.63
A. Solid waste disposal	NO	1387.47							1387.47
B. Biological treatment of solid waste		34.07	29.79						63.86
C. Incineration and open burning of waste	NE,NO,IE	0.08	0.07						0.14
D. Waste water treatment and discharge		74.82	118.33						193.15
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[2]									
International bunkers	3389.25	4.23	27.60						3421.08
Aviation	1125.12	0.14	10.64						1135.91
Navigation	2264.13	4.09	16.96						2285.18
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5391.03								5391.03
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	6945.86								6945.86
Indirect N_2O			16.62						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	55052.28
Total CO_2 equivalent emissions with land use, land-use change and forestry	29197.46
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	55052.28
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	29197.46

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2007
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	19497.59	5846.52	4030.95	715.38	951.19	72.73	NA,NO	NA,NO	31114.36
1. Energy	39156.87	1450.64	210.42						40817.94
A. Fuel combustion (sectoral approach)	35292.47	404.71	203.90						35901.08
1. Energy industries	13647.30	102.05	16.39						13765.75
2. Manufacturing industries and construction	4224.54	14.39	37.55						4276.48
3. Transport	13395.21	73.73	91.46						13560.39
4. Other sectors	3786.07	214.27	56.72						4057.07
5. Other	239.35	0.28	1.78						241.40
B. Fugitive emissions from fuels	3864.41	1045.93	6.53						4916.86
1. Solid fuels	17.39	133.88	NA,NO						151.27
2. Oil and natural gas	3847.01	912.05	6.53						4765.59
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6586.27	16.33	1506.13	715.38	951.19	72.73	NA,NO	NA,NO	9848.04
A. Mineral industry	1008.00								1008.00
B. Chemical industry	836.28	15.47	1475.64	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	2327.40
C. Metal industry	4446.31	0.86	2.69		951.19	NO			5401.04
D. Non-energy products from fuels and solvent use	206.46	NA	NA						206.46
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				715.38	NO				715.38
G. Other product manufacture and use	NO	NO	27.80			71.59			99.38
H. Other	89.23	NA	NA						89.23
3. Agriculture	98.65	2754.46	1786.56						4639.67
A. Enteric fermentation		2427.61							2427.61
B. Manure management		322.68	115.66						438.33
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1669.61						1669.61
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		4.17	1.29						5.46
G. Liming	97.48								97.48
H. Urea application	1.17								1.17
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-26344.22	149.97	365.30						-25828.95
A. Forest land	-29650.54	51.84	329.15						-29269.56
B. Cropland	1824.39	90.78	0.04						1915.21
C. Grassland	191.14	6.33	2.06						199.52
D. Wetlands	-16.72	1.04	0.11						-15.57
E. Settlements	1661.48	NO	20.98						1682.46
F. Other land	8.03	NO	0.10						8.13
G. Harvested wood products	-362.00								-362.00
H. Other									
5. Waste	NE,NO,IE	1475.11	162.54						1637.65
A. Solid waste disposal	NO	1358.41							1358.41
B. Biological treatment of solid waste		43.30	38.01						81.32
C. Incineration and open burning of waste	NE,NO,IE	0.09	0.07						0.16
D. Waste water treatment and discharge		73.31	124.46						197.77
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[2]									
International bunkers	3235.17	3.90	26.52						3265.59
Aviation	1158.07	0.15	10.96						1169.17
Navigation	2077.10	3.75	15.56						2096.42
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5568.44								5568.44
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7046.88								7046.88
Indirect N_2O			16.19						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	56943.30
Total CO_2 equivalent emissions with land use, land-use change and forestry	31114.36
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	56943.30
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	31114.36

[1] For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

[2] See footnote 7 to table Summary 1.A.

[3] In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2008
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[1]	18012.25	5696.58	3590.43	806.14	895.99	62.39	NA,NO	NA,NO	29063.77
1. Energy	37951.52	1360.80	209.32						39521.63
A. Fuel combustion (sectoral approach)	34758.95	414.81	203.49						35377.26
1. Energy industries	13678.68	107.06	19.70						13805.44
2. Manufacturing industries and construction	4323.71	14.32	37.82						4375.85
3. Transport	13028.34	80.36	90.41						13199.10
4. Other sectors	3446.16	212.68	53.45						3712.29
5. Other	282.06	0.39	2.12						284.57
B. Fugitive emissions from fuels	3192.57	945.98	5.82						4144.38
1. Solid fuels	13.76	108.70	NA,NO						122.46
2. Oil and natural gas	3178.81	837.28	5.82						4021.91
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6843.85	19.96	1075.22	806.14	895.99	62.39	NA,NO	NA,NO	9703.54
A. Mineral industry	1033.17								1033.17
B. Chemical industry	897.74	18.89	1041.30	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	1957.93
C. Metal industry	4617.83	1.08	3.53		895.99	NO			5518.43
D. Non-energy products from fuels and solvent use	204.75	NA	NA						204.75
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				806.14	NO				806.14
G. Other product manufacture and use	NO	NO	30.38			61.25			91.63
H. Other	90.35	NA	NA						90.35
3. Agriculture	95.72	2744.65	1771.23						4611.61
A. Enteric fermentation		2417.64							2417.64
B. Manure management		322.61	116.33						438.94
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1653.54						1653.54
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		4.41	1.36						5.77
G. Liming	94.83								94.83
H. Urea application	0.89								0.89
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[1]	-26878.84	156.39	370.48						-26351.97
A. Forest land	-30555.45	58.45	331.31						-30165.69
B. Cropland	1840.74	90.70	0.08						1931.52
C. Grassland	206.39	6.20	2.30						214.89
D. Wetlands	4.02	1.04	0.11						5.17
E. Settlements	1859.92	NO	23.00						1882.92
F. Other land	11.55	NO	0.10						11.65
G. Harvested wood products	-246.00								-246.00
H. Other									
5. Waste	NE,NO,IE	1414.78	164.19						1578.97
A. Solid waste disposal	NO	1298.54							1298.54
B. Biological treatment of solid waste		42.48	36.59						79.07
C. Incineration and open burning of waste	NE,NO,IE	0.11	0.07						0.18
D. Waste water treatment and discharge		73.65	127.53						201.18
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[2]									
International bunkers	3189.73	3.90	26.07						3219.71
Aviation	1107.82	0.14	10.48						1118.44
Navigation	2081.91	3.76	15.59						2101.27
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5811.08								5811.08
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7143.13								7143.13
Indirect N_2O			16.44						
Indirect CO_2[3]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	55415.75
Total CO_2 equivalent emissions with land use, land-use change and forestry	29063.77
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	55415.75
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	29063.77

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2009
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	14223.13	5612.27	3024.15	856.15	438.35	58.63	NA,NO	NA,NO	24212.68
1. Energy	37694.19	1346.71	206.21						39247.11
A. Fuel combustion (sectoral approach)	35177.01	431.60	202.92						35811.53
1. Energy industries	14396.42	114.78	21.19						14532.39
2. Manufacturing industries and construction	3927.80	12.80	33.55						3974.15
3. Transport	12906.26	85.28	90.16						13081.69
4. Other sectors	3654.11	218.29	55.73						3928.14
5. Other	292.42	0.45	2.30						295.16
B. Fugitive emissions from fuels	2517.18	915.10	3.30						3435.58
1. Solid fuels	11.96	95.99	NA,NO						107.95
2. Oil and natural gas	2505.22	819.12	3.30						3327.63
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	5427.63	18.50	581.63	856.15	438.35	58.63	NA,NO	NA,NO	7380.88
A. Mineral industry	1018.10								1018.10
B. Chemical industry	785.54	17.54	545.74	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	1348.81
C. Metal industry	3349.82	0.95	3.59		438.35	NO			3792.72
D. Non-energy products from fuels and solvent use	190.09	NA	NA						190.09
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				856.15	NO				856.15
G. Other product manufacture and use	NO	NO	32.30			57.49			89.79
H. Other	84.08	NA	NA						84.08
3. Agriculture	88.27	2668.18	1696.39						4452.84
A. Enteric fermentation		2353.70							2353.70
B. Manure management		311.75	113.64						425.39
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1581.91						1581.91
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		2.73	0.84						3.58
G. Liming	86.92								86.92
H. Urea application	1.35								1.35
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-28986.96	150.54	375.38						-28461.03
A. Forest land	-33338.20	52.96	332.70						-32952.54
B. Cropland	1907.05	90.50	0.15						1997.70
C. Grassland	335.82	6.05	2.69						344.56
D. Wetlands	14.73	1.04	0.11						15.88
E. Settlements	2015.60	NO	25.21						2040.82
F. Other land	15.03	NO	0.10						15.13
G. Harvested wood products	63.00								63.00
H. Other									
5. Waste	NE,NO,IE	1428.35	164.54						1592.88
A. Solid waste disposal	NO	1317.57							1317.57
B. Biological treatment of solid waste		38.98	32.99						71.97
C. Incineration and open burning of waste	NE,NO,IE	0.10	0.07						0.17
D. Waste water treatment and discharge		71.70	131.48						203.18
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2850.41	3.32	23.50						2877.23
Aviation	1089.76	0.14	10.31						1100.21
Navigation	1760.65	3.18	13.19						1777.02
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5369.52								5369.52
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7207.22								7207.22
Indirect N_2O			17.27						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	52673.71
Total CO_2 equivalent emissions with land use, land-use change and forestry	24212.68
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	52673.71
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	24212.68

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2010
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	19431.26	5650.10	2944.96	1064.60	238.39	71.91	NA,NO	NA,NO	29401.22
1. Energy	39479.37	1403.33	221.94						41104.64
A. Fuel combustion (sectoral approach)	36722.83	480.06	218.31						37421.19
1. Energy industries	14880.79	127.02	24.36						15032.16
2. Manufacturing industries and construction	4274.73	17.38	38.62						4330.73
3. Transport	13290.00	90.93	91.27						13472.20
4. Other sectors	4007.89	242.67	61.60						4312.16
5. Other	269.42	2.07	2.45						273.93
B. Fugitive emissions from fuels	2756.55	923.27	3.63						3683.45
1. Solid fuels	11.25	90.71	NA,NO						101.96
2. Oil and natural gas	2745.29	832.57	3.63						3581.49
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6274.18	20.12	531.49	1064.60	238.39	71.91	NA,NO	NA,NO	8200.70
A. Mineral industry	1035.80								1035.80
B. Chemical industry	857.49	18.61	498.46	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	1374.57
C. Metal industry	4077.86	1.50	4.87		238.33	NO			4322.55
D. Non-energy products from fuels and solvent use	208.09	NA	NA						208.09
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				1064.60	0.07				1064.67
G. Other product manufacture and use	NO	NO	28.16			70.77			98.94
H. Other	94.94	NA	NA						94.94
3. Agriculture	78.33	2670.41	1647.87						4396.61
A. Enteric fermentation		2350.12							2350.12
B. Manure management		317.15	113.41						430.57
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1533.48						1533.48
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		3.14	0.97						4.11
G. Liming	78.01								78.01
H. Urea application	0.32								0.32
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-26400.63	151.10	378.90						-25870.63
A. Forest land	-31515.08	53.81	334.59						-31126.68
B. Cropland	2021.91	90.33	0.21						2112.44
C. Grassland	271.79	5.93	2.94						280.65
D. Wetlands	9.89	1.04	0.11						11.05
E. Settlements	2118.38	NO	26.19						2144.57
F. Other land	18.48	NO	0.09						18.57
G. Harvested wood products	674.00								674.00
H. Other									
5. Waste	NE,NO,IE	1405.15	164.75						1569.90
A. Solid waste disposal	NO	1291.13							1291.13
B. Biological treatment of solid waste		39.53	33.41						72.94
C. Incineration and open burning of waste	NE,NO,IE	0.08	0.07						0.15
D. Waste water treatment and discharge		74.40	131.28						205.68
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2724.52	2.81	22.88						2750.21
Aviation	1256.23	0.16	11.88						1268.27
Navigation	1468.29	2.65	11.00						1481.94
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	6391.95								6391.95
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7239.08								7239.08
Indirect N_2O			17.76						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	55271.85
Total CO_2 equivalent emissions with land use, land-use change and forestry	29401.22
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	55271.85
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	29401.22

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2011
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	17080.68	5503.21	2934.93	1105.89	262.64	57.92	NA,NO	NA,NO	26945.26
1. Energy	38604.64	1323.27	222.33						40150.24
A. Fuel combustion (sectoral approach)	35863.79	452.76	219.12						36535.68
1. Energy industries	14564.76	120.38	25.45						14710.59
2. Manufacturing industries and construction	4179.38	19.45	41.11						4239.95
3. Transport	13234.19	94.72	93.98						13422.89
4. Other sectors	3641.02	216.22	56.35						3913.59
5. Other	244.44	1.98	2.23						248.65
B. Fugitive emissions from fuels	2740.85	870.51	3.21						3614.57
1. Solid fuels	12.50	98.91	NA,NO						111.42
2. Oil and natural gas	2728.34	771.60	3.21						3503.15
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6261.96	21.19	485.17	1105.89	262.64	57.92	NA,NO	NA,NO	8194.77
A. Mineral industry	1008.82								1008.82
B. Chemical industry	819.59	19.81	452.47	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	1291.87
C. Metal industry	4114.59	1.39	4.30		262.57	NO			4382.84
D. Non-energy products from fuels and solvent use	218.43	NA	NA						218.43
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				1105.89	0.06				1105.95
G. Other product manufacture and use	NO	NO	28.40			56.78			85.18
H. Other	100.54	NA	NA						100.54
3. Agriculture	78.26	2617.25	1686.33						4381.84
A. Enteric fermentation		2305.14							2305.14
B. Manure management		309.73	110.64						420.37
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1574.96						1574.96
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		2.37	0.73						3.11
G. Liming	77.93								77.93
H. Urea application	0.33								0.33
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-27864.18	149.62	379.44						-27335.12
A. Forest land	-32336.23	52.23	334.89						-31949.11
B. Cropland	1978.26	90.40	0.27						2068.93
C. Grassland	279.34	5.95	2.92						288.21
D. Wetlands	20.14	1.04	0.11						21.29
E. Settlements	2112.15	NO	26.38						2138.52
F. Other land	20.17	NO	0.08						20.25
G. Harvested wood products	62.00								62.00
H. Other									
5. Waste	NE,NO,IE	1391.87	161.66						1553.53
A. Solid waste disposal	NO	1279.19							1279.19
B. Biological treatment of solid waste		33.60	27.69						61.28
C. Incineration and open burning of waste	NE,NO,IE	0.07	0.07						0.14
D. Waste water treatment and discharge		79.02	133.90						212.92
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2698.74	2.91	22.52						2724.17
Aviation	1169.26	0.15	11.06						1180.47
Navigation	1529.48	2.76	11.46						1543.70
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	6305.45								6305.45
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7253.22								7253.22
Indirect N_2O			17.28						
Indirect CO_2[(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	54280.38
Total CO_2 equivalent emissions with land use, land-use change and forestry	26945.26
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	54280.38
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	26945.26

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2012
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	17962.60	5465.80	2953.09	1140.97	200.51	57.55	NA,NO	NA,NO	27780.52
1. Energy	38167.89	1306.34	226.20						39700.43
A. Fuel combustion (sectoral approach)	35431.18	488.86	223.08						36143.11
1. Energy industries	14225.66	119.02	27.88						14372.56
2. Manufacturing industries and construction	3928.70	16.47	35.93						3981.10
3. Transport	13169.47	126.94	96.26						13392.66
4. Other sectors	3844.71	224.28	60.66						4129.65
5. Other	262.64	2.15	2.35						267.14
B. Fugitive emissions from fuels	2736.71	817.48	3.13						3557.32
1. Solid fuels	10.49	85.04	NA,NO						95.53
2. Oil and natural gas	2726.22	732.43	3.13						3461.78
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6303.97	20.67	473.38	1140.97	200.51	57.55	NA,NO	NA,NO	8197.04
A. Mineral industry	991.10								991.10
B. Chemical industry	811.96	19.35	440.77	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	1272.09
C. Metal industry	4187.15	1.31	4.21		200.45	NO			4393.12
D. Non-energy products from fuels and solvent use	209.15	NA	NA						209.15
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				1140.97	0.06				1141.03
G. Other product manufacture and use	NO	NO	28.40			56.41			84.81
H. Other	104.61	NA	NA						104.61
3. Agriculture	80.10	2623.57	1687.90						4391.56
A. Enteric fermentation		2307.79							2307.79
B. Manure management		313.28	110.60						423.88
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1576.52						1576.52
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		2.50	0.77						3.27
G. Liming	79.87								79.87
H. Urea application	0.23								0.23
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-26589.36	149.47	380.71						-26059.18
A. Forest land	-31199.03	52.18	335.59						-30811.27
B. Cropland	1977.14	90.35	0.32						2067.81
C. Grassland	274.39	5.90	2.78						283.07
D. Wetlands	20.68	1.04	0.11						21.84
E. Settlements	2151.67	NO	26.97						2178.64
F. Other land	21.78	NO	0.07						21.85
G. Harvested wood products	164.00								164.00
H. Other									
5. Waste	NE,NO,IE	1365.77	184.90						1550.67
A. Solid waste disposal	NO	1234.94							1234.94
B. Biological treatment of solid waste		58.86	50.94						109.80
C. Incineration and open burning of waste	NE,NO,IE	0.05	0.07						0.13
D. Waste water treatment and discharge		71.92	133.89						205.80
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2848.39	2.83	24.06						2875.27
Aviation	1378.69	0.17	13.04						1391.90
Navigation	1469.70	2.66	11.01						1483.37
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5673.24								5673.24
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7253.64								7253.64
Indirect N_2O			18.03						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	53839.70
Total CO_2 equivalent emissions with land use, land-use change and forestry	27780.52
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	53839.70
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	27780.52

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2013
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	17434.07	5462.11	2916.17	1155.10	181.04	60.62	NA,NO	NA,NO	27209.10
1. Energy	37787.88	1326.50	219.67						39334.04
A. Fuel combustion (sectoral approach)	35094.80	467.30	216.41						35778.51
1. Energy industries	14267.26	113.85	28.50						14409.60
2. Manufacturing industries and construction	3923.18	17.44	37.28						3977.89
3. Transport	12968.40	148.77	93.83						13211.00
4. Other sectors	3667.49	183.97	54.45						3905.91
5. Other	268.47	3.27	2.36						274.10
B. Fugitive emissions from fuels	2693.08	859.19	3.26						3555.54
1. Solid fuels	13.60	106.25	NA,NO						119.84
2. Oil and natural gas	2679.48	752.95	3.26						3435.69
C. CO_2 transport and storage	IE,NO								IE,NO
2. Industrial processes and product use	6437.62	19.25	423.64	1155.10	181.04	60.62	NA,NO	NA,NO	8277.28
A. Mineral industry	1049.63								1049.63
B. Chemical industry	753.33	17.98	389.48	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	1160.79
C. Metal industry	4311.11	1.28	4.06		181.02	NO			4497.46
D. Non-energy products from fuels and solvent use	222.44	NA	NA						222.44
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				1155.10	0.02				1155.11
G. Other product manufacture and use	NO	NO	30.10			59.48			89.59
H. Other	101.11	NA	NA						101.11
3. Agriculture	81.83	2636.84	1701.79						4420.45
A. Enteric fermentation		2312.72							2312.72
B. Manure management		321.91	108.67						430.58
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1592.44						1592.44
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		2.20	0.68						2.89
G. Liming	81.67								81.67
H. Urea application	0.16								0.16
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-26873.26	149.54	381.15						-26342.57
A. Forest land	-31702.63	52.25	336.47						-31313.91
B. Cropland	1977.86	90.43	0.36						2068.64
C. Grassland	275.91	5.83	2.68						284.42
D. Wetlands	53.74	1.04	0.11						54.89
E. Settlements	2091.43	NO	26.59						2118.02
F. Other land	23.43	NO	0.06						23.49
G. Harvested wood products	407.00								407.00
H. Other									
5. Waste	IE,NE,NO	1329.98	189.92						1519.90
A. Solid waste disposal	NO	1198.82							1198.82
B. Biological treatment of solid waste		61.34	53.12						114.45
C. Incineration and open burning of waste	IE,NE,NO	0.04	0.08						0.12
D. Waste water treatment and discharge		69.78	136.73						206.51
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2969.39	2.83	25.20						2997.43
Aviation	1505.48	0.19	14.24						1519.91
Navigation	1463.91	2.64	10.96						1477.52
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	5087.43								5087.43
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7253.84								7253.84
Indirect N_2O			17.92						
Indirect CO_2[(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	53551.68
Total CO_2 equivalent emissions with land use, land-use change and forestry	27209.10
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	53551.68
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	27209.10

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2014
Submission 2016 v2
NORWAY

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	17896.56	5490.16	2907.50	1187.55	178.92	54.74	NA,NO	NA,NO	27715.44
1. Energy	37237.52	1464.75	208.33						38910.60
A. Fuel combustion (sectoral approach)	34916.29	475.52	205.37						35597.18
1. Energy industries	14962.02	125.17	28.73						15115.92
2. Manufacturing industries and construction	3732.20	17.24	33.70						3783.14
3. Transport	12867.73	168.92	94.29						13130.94
4. Other sectors	3103.53	159.98	46.46						3309.97
5. Other	250.82	4.21	2.18						257.20
B. Fugitive emissions from fuels	2321.23	989.23	2.96						3313.42
1. Solid fuels	13.30	104.16	NA,NO						117.46
2. Oil and natural gas	2307.93	885.07	2.96						3195.96
C. CO_2 transport and storage	NO,IE								NO,IE
2. Industrial processes and product use	6541.15	18.98	399.88	1187.55	178.92	54.74	NA,NO	NA,NO	8381.22
A. Mineral industry	1062.30								1062.30
B. Chemical industry	689.21	17.58	368.10	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	1074.89
C. Metal industry	4481.21	1.40	4.68		178.92	NO			4666.20
D. Non-energy products from fuels and solvent use	208.54	NA	NA						208.54
E. Electronic Industry						1.14	NO	NO	1.14
F. Product uses as ODS substitutes				1187.55	0.00				1187.55
G. Other product manufacture and use	NO	NO	27.10			53.60			80.70
H. Other	99.89	NA	NA						99.89
3. Agriculture	88.77	2561.96	1726.57						4377.30
A. Enteric fermentation		2249.47							2249.47
B. Manure management		309.79	106.96						416.76
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	1618.77						1618.77
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		2.69	0.83						3.53
G. Liming	88.61								88.61
H. Urea application	0.16								0.16
I. Other carbon-containing fertilizers	NO								NO
J. Other									
4. Land use, land-use change and forestry[(1)]	-25970.89	150.42	380.14						-25440.33
A. Forest land	-30825.84	53.08	336.98						-30435.78
B. Cropland	1962.74	90.55	0.39						2053.68
C. Grassland	221.09	5.75	2.58						229.41
D. Wetlands	44.48	1.04	0.11						45.63
E. Settlements	2052.60	NO	25.58						2078.18
F. Other land	25.04	NO	0.05						25.09
G. Harvested wood products	549.00								549.00
H. Other									
5. Waste	NE,NO,IE	1294.06	192.59						1486.64
A. Solid waste disposal	NO	1169.91							1169.91
B. Biological treatment of solid waste		61.34	53.12						114.47
C. Incineration and open burning of waste	NE,NO,IE	0.03	0.08						0.11
D. Waste water treatment and discharge		62.77	139.39						202.16
E. Other									
6. Other *(as specified in summary 1.A)*									
Memo items:[(2)]									
International bunkers	2684.44	2.25	23.16						2709.84
Aviation	1546.61	0.19	14.63						1561.44
Navigation	1137.83	2.06	8.52						1148.41
Multilateral operations	NO	NO	NO						NO
CO_2 emissions from biomass	3906.87								3906.87
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	7254.04								7254.04
Indirect N_2O			1.45						
Indirect CO_2 [(3)]	NE,NA,IE								

Total CO_2 equivalent emissions without land use, land-use change and forestry	53155.76
Total CO_2 equivalent emissions with land use, land-use change and forestry	27715.44
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	53155.76
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	27715.44

(1) For carbon dioxide (CO_2) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for

(2) See footnote 7 to table Summary 1.A.

(3) In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO_2, the national totals shall be provided with and without indirect CO_2.

Annex VII: SEF and Registry Changes

Annex VII consists of the files:

SEF_NO_2015_CP1.xlsx

SEF_NO_2015_CP2.xlsx

SEF_NO_2013_CP2.xlsx

Annex A, an updated diagram of the database structure

Annex B, site acceptance test

Annex H, test report

Annex VIII: QA/QC performed for GHG emissions from industrial point sources included in the national GHG inventory

1 Introduction

Norway has a long experience of using GHG emissions from industrial point sources in the national GHG inventory. The Norwegian Environment Agency has been given the authority to manage and enforce the Pollution Control Act, the Product Control Act and the Greenhouse Gas Emission Trading Act. The Norwegian Environment Agency grants permits, establishes requirements and sets emission limits, and carries out inspections to ensure compliance. This is the core responsibility of the agency, and this competence and expertise has been built up over the past 50 years.

In 2006, as part of the improvements for the Initial report, the Norwegian Environment Agency performed a major QA/QC exercise on the time series from 1990 to 2004 of greenhouse gas (GHG) emissions from the largest industrial plants in Norway. The following sectors of industry were covered: cement production, mineral fertilizers, carbide industry, production of ferroalloys, production of primary aluminium, anode manufacture, production of iron and steel, nickel production, pulp and paper manufacture, oil refineries, gas terminals, lime production, other mineral production, methanol production, plastics, other chemical industry and production of magnesium.

The main documentation from this work is contained in Excel spread sheets giving the resulting time series for each plant included in this revision, and in a documentation report (SFT 2006). The methodology was also previously presented as an Annex to the National Inventory Reports in some years following this QA/QC exercise.

The ERT of the 2012 NIR concluded (ARR12, §34) that Norway during the review provided the ERT with comprehensive information on the QA/QC procedures applied to plant-specific data, which showed that the QA/QC procedures are robust and comprehensive. The ERT however, found that the information provided in the NIR was partly outdated and recommended that Norway should include a summary of this information in its next annual submission.

Such an annex was provided with the NIR 2013 and this year's annex is an updated version. It describes the agency's approach for QA/QC of GHG emissions from industrial point sources. The annex first describes the method and data sources used for the QA/QC exercise undertaken in 2006 and then describe the changes since then.

2 Method for establishing and verifying data series of emissions 1990-2004

As part of the QA/QC exercise undertaken for the initial report, the following work procedure was established to verify data series:

- For each plant; a first time series of emission data as well as activity data were established with basis on existing sources of data (see section on data sources).
- The first time series of emission data and activity data were presented in both a table format as well as a graphic presentation.
- Based on the table with compiled data and the graphic presentation, it was possible to identify:
  - Lack of emission data and activity data for any year or time series.
  - Possible errors in the reported data. Possible errors were typically identified if there were discrepancies between reported activity data (consumption of raw materials, production volumes etc.) and emissions, or if there were large variations in the existing time series of emissions.
- The emission data where supplemented and/or corrected if possible by one or more of the following sources of information:
  - Supply of new data from the company
  - Supplementary data from Klif paper archives.
  - Verification of reported emission data by new calculations based on reported activity data.
  - Calculation of missing emissions (if sufficient activity data were present).
- A final time series of greenhouse gas emissions from 1990 to 2004 were established, and presented both as a tables and a figure. The origin of the data was documented by the use of colour codes.
- The differences between former and new time series of emissions were identified and documented.

3 Data sources for the data series of emissions 1990-2004

There were six main sources of final data to the time series: the Inkosys (today's Forurensning) database, the white books on GHG, new data calculated by the Norwegian Environment Agency based on reported activity data, new data provided by company, and new data based on interpolation between years. Interpolation was typically used as a method to establish data for the year 1991, if the emissions from 1990 and 1992 were given.

The Inkosys Database (today's Forurensning)

Data from the annual company emission reports were stored in the database Inkosys.

The database contained data from 1992, and held emission and activity data from all companies reporting emissions to the agency. The Inkosys database held reported emissions and activity data

from Norwegian companies. The companies reported the data according to a manual (SFT, 2004). In the agency, the respective responsible officer undertook a control of the data, before they were inserted in the database.

The white book on GHG from Norwegian process industry

The white book on GHG from Norwegian process industry was initiated by the Federation of Norwegian Process industry (PIL), Norwegian Chemical Industrial Worker's Union (NKIF) and Norwegian Oil- and Petrochemical Worker`s Union (NOPEF). The work was carried out by DNV and Sintef, who collected, compiled, controlled and verified all emissions of climate gasses from these industrial plants for the years 1990, 1998, 1999, 2000 and 2001. The methods of work as well as the main results are described in the report from this project (Federation of Norwegian Process Industry 2003). The main data files and verification tables from this work have been made available for the agency. The white book includes data from 60 process industry plants.

Since the emission data in this white book has gone through a thorough verification process, these emissions were assumed to be correct, unless any other information proved them incorrect. If several data sources reported different series of emissions, the data series from the white book were used.

The white book on GHG from Norwegian pulp and paper industry

The white book on GHG from Norwegian pulp and paper industry work was initiated by the Norwegian Pulp and Paper Association, and was carried out by DNV, Sintef and the Norwegian Association of Energy Users and Suppliers. They collected, compiled, controlled and verified all emissions of climate gasses from the relevant pulp and paper plants for the years 1990, 1998, 1999, 2000 and 2001. The methods of work as well as the main results are described in the reports from this project (Norwegian Pulp and Paper Association 2003). The main data files from this work have been made available for the agency.

Since the emission data in this white book has gone through a thorough verification process, these emissions were assumed to be correct, unless any other information proved them incorrect. If several data sources reported different series of emissions, the data series from the white book were used.

Other sources

Other data sources also available for this work were:

- Annual update of the climate gas inventories based on annual reports from Norwegian industry. Reported to Statistics Norway.
- Annual (paper) reports from industry of emission to air, water and soil (Egenrapportering).
- Applications for CO_2-permits for the Norwegian emissions trading scheme.

4 Documentation of calculations and time series 1990-2004

The main documentation from the work is contained in Excel spread sheets giving the resulting time series for each plant included in this revision. Each spread sheet includes emission data and activity data from the relevant data sources for each production plant. It includes the time series for the relevant greenhouse gases, and states the sources for this information. Relevant information related to the QA/QC process for the specific site is noted as a comment or as a text box for each plant.

5 Current QA/QC procedures and data sources.

There have been some changes in the QA/QC for plant specific emissions in the process industry since the QA/QC exercise undertaken in 2006. In addition, the same QA/QC exercise is undertaken for plant specific data included in the inventory in the Energy sector (Energy Industries, Manufacturing Industries and Construction and Fugitive Emissions from Fules – Oil and Natural Gas). The inventory compilers in the Norwegian Environment Agency have more data sources for each plant as all plants submit annual reports electronically as required by their regular permit, some are also covered by the EU emission trading systems (EU ETS) and some were also covered by a voluntary agreement up to and including 2012. The most important changes since 2006 are described below.

5.1 Documentation of calculations and time series consistency

The main documentation from the work is still contained in Excel spread sheets. The emission reports from the enterprises are submitted in a standardized electronic format directly to the Norwegian Environment Agency by 1 March each year. The EU ETS reports are thoroughly checked by the agency by the Department of Climate, while the Department of Industry is in charge of checking the reports submitted due to regular permits. The agency has personnel with extensive technical competence in the relevant industry processes. For EU ETS, the agency may also require third-party verification of emission reports from installations with multiple and complex processes.

For the purpose of the inventory, additional QA is undertaken by the Section for Emission Inventories and Mitigation Analysis before the data are sent to Statistics Norway. These QA checks include consideration of time-series consistency, inter-annual changes and more attention is now given to implied emission factors (IEF). When needed, further QC is undertaken in collaboration with the officer in the agency in charge for the specific plant and/or the plant. New plants and a new sector (gas-fired power plants) have been included. Time series are continuously recalculated if better data/information is gained.

The use of EU ETS data, data from regular reporting and data from the voluntary agreement does not represent a problem for the time series consistency. This is because the Norwegian GHG inventory for a long time (since the early 90ies) has included GHG emissions from industrial point sources (both emissions from processes and combustion). The new data sources provide data of better quality and these are checked against the emissions reported under the regular permits.

The issue of using data from the EU ETS (see section 5.2) and implications for time-series consistency has been discussed with other Parties. We refer to paragraph 38 in Ireland's ARR 2013 as Norway is in a very similar position: "*Following a recommendation in the previous review report that Ireland report transparently on the use of EU ETS data and improve the use of plant-specific data, the Party has reported verified CO_2 emission estimates from the EU ETS for public electricity and heat production, petroleum refining and manufacture of solid fuels. These emission estimates are more accurate and reliable than the plant-specific data reported prior to the availability of the EU ETS emission estimates for the same categories. Ireland reported that the EU ETS emission estimates are available from 2005 onwards only and that the detailed information that underlies these data cannot reasonably be acquired by the national inventory agency for historical years of the relevant time series. As such, the application of the improved methodology introduces a degree of inconsistency in the time series that is unavoidable in this instance. However, given that the EU ETS emission estimates fully cover the subcategory public electricity and heat production and that these estimates match those reported separately under parallel arrangements that have been in place for many years for the same plants, it is assumed that the time-series consistency is not seriously affected and that the use of the EU ETS data does not affect the emissions trend. The ERT agrees with this assessment and commends Ireland for introducing these improvements.*

5.2 Data from the EU ETS

The GHG inventory now includes more reported data from the emissions trading system (ETS) for the periods 2005-2007, 2008-2012 and 2013. In phase III of the ETS from 2013-2020 the scope of sectors covered is expanded, including with aluminum production, ferroalloy production and intra-EU aviation. Starting in 2013 all emission data from installations in the EU ETS are subject to verification from an accredited independent third party. This means that the Norwegian Environment Agency no longer verify the emissions but provide approval of the annual emissions verified by an independent third party. The decisions of approvals of the reports, applications for permits, the permits, the plans for measuring and reporting, the emission reports and approvals are all available to the public.

Industrial installations and aircraft operators covered by the EU ETS are required to have an approved monitoring plan, according to which they monitor and report their emissions during the year. In the case of industrial installations, the monitoring plan forms part of the approved permit that is also required. Installations and aircraft operators have to monitor and report their annual emissions in accordance with two European Commission Regulations, the Monitoring and Reporting Regulation (MRR) and the Accreditation and Verification Regulation (AVR). The agency approves the monitoring plan, if we find it of high enough quality and consistent with the Monitoring and Reporting Regulation. The operators must then perform their measurements and calculations according to this plan, and report according to that. The data in the annual emissions report for a given year must be verified by an accredited verifier by 31 March of the following year. The agency then approves the verified data. Plants covered by the EU ETS are divided into 3 categories (A, B and C), depending on their emissions:

Category A installations covers installations with average reported annual emissions over the previous trading period equal to or less than 50 kilotonnes of fossil CO_2 before subtraction of transferred CO_2

Category B installations covers installations with average reported annual emissions over the previous trading period of greater than 50 kilotonnes and equal to or less than 500 kilotonnes of fossil CO_2 before subtraction of transferred CO_2 and,

Category C installations covers installations with average reported annual emissions over the previous trading period of greater than 500 kilotonnes of fossil CO_2 before subtraction of transferred CO_2.

The agency has developed a web-based electronic reporting template based the Commissions electronic templates for monitoring plans, annual emission reports. The activity-specific guidelines set out in the Monitoring and Reporting Regulation contain specific methodologies for determining the following variables: activity data (consisting of the two variables fuel/material flow and net calorific value), emission factors, composition data, oxidation and conversion factors. These different approaches are referred to as tiers. The increasing numbering of tiers from one upwards reflects increasing levels of accuracy, with the highest numbered tier as the preferred tier.

The operator may apply different approved tier levels to the different variables fuel/material flow, net calorific value, emission factors, composition data, oxidation or conversion factors used within a single calculation. The choice of tiers shall be subject to approval by the competent authority (in Norway, The Norwegian Environment Agency). Equivalent tiers are referred to with the same tier number and a specific alphabetic character (e.g. Tier 2a and 2b). For those activities where alternative calculation methods are provided within these guidelines an operator may only change from one method to the other if he can demonstrate to the satisfaction of the competent authority that such change will lead to a more accurate monitoring and reporting of the emissions of the relevant activity.

The highest tier approach shall be used by all operators to determine all variables for all source streams for all category B or C installations. Only if it is shown to the satisfaction of the competent authority that the highest tier approach is technically not feasible or will lead to unreasonably high costs, may a next lower tier be used for that variable within a monitoring methodology.

Norway has transposed the Monitoring and Reporting Regulation into national law.

All documentation like applications for permits, the permits, the plans for measuring and reporting, the emission reports and approvals are all available to the public.

Data for some important sectors have been reviewed as part of the reviews performed at the Norwegian Environment Agency. However, the EU ETS has introduced a new reporting channel with its own, more specific, energy data. This has made it apparent that for some facilities, the reported emissions do not correspond fully to the energy data reported to Statistics Norway. This is one of the reasons that Statistics Norway is introducing a new check in the current inventory cycle. The total emissions from a facility will be compared to emissions calculated from data reported to the energy statistics together with default emission factors. If deviations are found, the comparison will be made at the level of fuel types. The tolerances for allowed differences are to be decided, as we don't know yet the magnitude of the potential deviations.

The differences between the energy data in the EU ETS and Statistics Norway that has been identified typically refers to emissions from fuel streams in chemical industries and gas processing units that are derived from raw materials. These often have deviating, plant specific emission factors

and energy contents, and in some cases they are reported as raw materials use to the energy statistics.

5.3 Data from the voluntary agreement

The first voluntary agreement between industry and authorities came in place in 1997 and included the aluminium production.

The most sector comprehensive agreement came in 2005 and covered all carbon-intensive industries that were not included in the ETS in 2005-2007 or 2008-. The most important sectors that report or have reported under the voluntary agreement are production of aluminium, ferroalloys, anodes, ammonia, nitric acid and oil refineries and gas terminals. Separate and detailed rules for calculation of emissions and for reporting from industries that is part of the voluntary agreement are developed. A common reporting template is used and there is a guidance document (only in Norwegian). This has led to that the reporting requirements are stricter than before and QC performed by the inventory compilers in the agency before handing over the data to SN is as described in section 5.1. The required methodology for estimating emissions in the voluntary agreement from 2005 is from our judgement consistent with methodologies described in ETS 2008-2012 and the ETS from 2013.

5.4 The Forurensing database

The Inkosys database has been replaced by the “Forurensing” database which was presented to the ERT during the in-country review of the 2012 NIR. All the data from Inkosys has been transferred to Forurensing. The Forurensing database includes the data and information reported by the plants under their regular permit and data as reported under the EU ETS. The database eases the work of the inventory compilers at the agency as a lot of data is easily available. Specific queries can be tailored for withdrawal of data from the database.

5.5 The Norwegian Pollutant Release and Transfer Register (PRTR).

In addition to posting data and information from the EU ETS on the agency's web page, other data is also made publically available. Data from the plants as reported under their regular permit can be accessed through the Norwegian Pollutant Release and Transfer Register (PRTR).[1] The Norwegian PRTR website provides information about discharges to air and water, waste transfers, production volumes and energy use for the most of the emission sources in Norway. The website includes both point sources and diffuse emissions.

[1] See http://www.norskeutslipp.no/en/Frontpage/ for the English version.

5.6 Inspections

The agency has a separate Inspection and Environmental Data Department, which includes two sections for product and industrial control. This department is working independently from the department evaluating emissions permits. They inspect and monitor industrial sites/plants, including underlying documentation for the emission estimates. The Department is part of the NEA and its tasks are described in the National System and it is hence considered a part of the inventory system.

The department has extensive competence and experience in performing audits and inspections. They also have technical expertise in industrial processes and offshore oil and gas production. There is exchange of knowledge and experience between the experts on the ETS and this department. The department has regular training courses for the inspectors, where the regulations they shall audit after is an important element. Particular controls are directed to the plants included in the emission trading system to check that monitoring plan is in line with the how the operator monitors and reports the emissions. The plants are to be controlled based on the risk of erroneous reporting of emissions.

In their applications for permits, the plants describe their internal Quality Control Systems. It is a requirement in the permits that they apply and operate this system. This is one of the areas that the Inspection and Environmental Data Department carefully controls when they carry out inspections and audits at the facilities.

5.7 Guidance documents

During the review process of the NIR submitted in 2012, Norway informed the ERT that the guidelines for measuring within the emissions trading system, the voluntary agreement between the industry and the authority and the guidelines for reporting that all plants with a permit have to follow would be included in the 2013 annual submission. The guidance documents are lengthy and in Norwegian, so instead of attaching these to the NIR URLs are provided below.

EU ETS:
http://www.miljodirektoratet.no/no/Tema/klima/CO2_kvoter/Klimakvoter-for-industrien/Rapportering-og-verifikasjon-av-utslipp/

Environmental web (offshore activities)
http://www.google.no/url?sa=t&rct=j&q=veiledning%20til%20den%20%C3%A5rlige%20utslippsrapporteringen%20olf%202007&source=web&cd=1&ved=0CC0QFjAA&url=http%3A%2F%2Fwww.norskoljeoggass.no%2FPageFiles%2F6542%2FVeiledning%2520til%2520utslippsrapportering%25202009.pdf&ei=qLleUZPBEInK4ATpnYCYBw&usg=AFQjCNH_gQhyHemDnyAMv7TlblmwSIP25g&bvm=bv.44770516,d.bGE

Annual normal permit:
http://www.miljodirektoratet.no/no/Tjenester-og-verktoy/Skjema/landbasert/

Annex IX: Agriculture

1 Animal population data

Table AIX- 1 gives the animal population data used in the Norwegian emission estimations, presented at a detailed level.

Table AIX- 1 Animal population data used in the estimations. 1990, 1995, 2000, 2005-2014.

		1990	1995	2000	2005	2006	2007
Tier 1 3A	Goats	85 126	81 868	72 504	68 898	66 226	66 885
Tier 1 3A	Horses	31 430	38 013	51 156	61 784	63 399	69 311
Tier 1 3A	Swine	518 230	531 290	533 127	556 909	565 216	540 482
Tier 1 3A	Hens	2 895 663	3 556 841	3 228 812	3 343 410	3 302 308	3 546 749
Tier 1 3A	Chicks bred for laying hens, animal places	1 729 532	1 424 417	997 262	1 341 532	1 152 624	1 195 030
Tier 1 3A	Deer	NE	NE	2 280	4 173	5 183	4 830
Tier 1 3A	Reindeer	242 443	212 333	172 407	234 608	233 160	243 251
Tier 1 3A	Fur- bearing animals	160 537	166 346	154 685	175 002	192 735	189 899
Tier 2 3A	Dairy cows	325 896	310 346	284 880	255 663	250 903	246 624
Tier 2 3A	Beef cows	8 193	20 334	42 324	54 841	55 706	57 609
Tier 2 3A	Replacement heifer (whole lifetime)	151 025	145 140	135 725	123 006	118 408	112 974
Tier 2 3A	Finisher heifer <1 year (whole lifetime)	4 134	3 232	6 267	3 745	4 006	3 944
Tier 2 3A	Finisher bulls <1 year (whole lifetime)	13 847	10 825	23 295	14 868	15 019	14 704
Tier 2 3A	Finisher heifer >1 year (whole lifetime)	24 878	24 477	32 443	29 098	29 342	28 933
Tier 2 3A	Finisher bulls >1 year (whole lifetime)	171 871	169 104	175 101	160 711	158 177	156 132

Tier 2 3A	Sheep < 1 år (adj. for lifetime)	519 541	592 999	639 746	467 648	466 899	448 634
Tier 2 3A	Sheep > 1 år	1 028 867	1 138 821	1 129 458	1 057 911	1 002 006	1 019 998
Tier 1 3B	Deer	NE	NE	2 280	4 173	5 183	4 830
Tier 1 3B	Reindeer	242 443	212 333	172 407	234 608	233 160	243 251
Tier 1 3B	Horses	31 430	38 013	51 156	61 784	63 399	69 311
Tier 1 3B	Mink, male	2 969	2 326	3 607	5 171	6 189	6 361
Tier 1 3B	Mink, female	53 442	41 873	64 919	93 076	111 393	114 498
Tier 1 3B	Foxes, male	6 987	8 196	5 782	5 151	5 043	4 633
Tier 1 3B	Foxes, female	97 139	113 950	80 378	71 605	70 110	64 407
Tier 1 3B	Sheep < 1 år (adj. for lifetime)	519 541	592 999	639 746	467 648	466 899	448 634
Tier 1 3B	Sheep > 1 år	1 028 867	1 138 821	1 129 458	1 057 911	1 002 006	1 019 998
Tier 1 3B	Dairy goats	64 041	58 630	50 578	44 374	41 069	39 721
Tier 1 3B	Other goats	21 085	23 238	21 926	24 524	25 157	27 164
Tier 2 3B	Dairy cows	325 896	310 346	284 880	255 663	250 903	246 624
Tier 2 3B	Non-Dairy Cattle	373 948	373 111	415 155	386 269	380 658	374 296
Tier 2 3B	Beef cows	8 193	20 334	42 324	54 841	55 706	57 609
Tier 2 3B	Young cattle	365 755	352 777	372 831	331 428	324 952	316 687
Tier 2 3B	Replacement heifer (whole lifetime)	151 025	145 140	135 725	123 006	118 408	112 974
Tier 2 3B	Finisher heifer <1 year (whole lifetime)	4 134	3 232	6 267	3 745	4 006	3 944
Tier 2 3B	Finisher bulls <1 year (whole lifetime)	13 847	10 825	23 295	14 868	15 019	14 704
Tier 2 3B	Finisher heifer >1 year (whole lifetime)	24 878	24 477	32 443	29 098	29 342	28 933
Tier 2 3B	Finisher bulls >1 year (whole lifetime)	171 871	169 104	175 101	160 711	158 177	156 132
Tier 2 3B	Poultry	7 993 665	9 638 963	10 765 758	12 288 761	12 743 879	13 836 228

Tier 2 3B	Hens	2 895 663	3 556 841	3 228 812	3 343 410	3 302 308	3 546 749
Tier 2 3B	Chicks bred for laying hens, animal places	1 729 532	1 424 417	997 262	1 341 532	1 152 624	1 195 030
Tier 2 3B	Chicks for slaughtering, animal places	3 172 880	4 352 716	6 257 582	7 183 188	7 879 173	8 620 974
Tier 2 3B	Ducks for breeding	2 326	4 490	3 044	6 807	6 735	10 808
Tier 2 3B	Ducks for slaughtering, animal places	4 004	5 555	18 035	14 617	20 846	26 553
Tier 2 3B	Turkey/goose for breeding	13 180	25 441	17 248	38 571	38 167	61 248
Tier 2 3B	Turkey for slaughtering, animal places	176 080	269 504	243 775	360 637	344 025	374 866
Tier 2 3B	Swine	518 230	531 290	533 127	556 909	565 216	540 482
Tier 2 3B	Young pigs for breeding	23 047	24 714	31 172	38 930	37 483	38 494
Tier 2 3B	Sows	62 683	63 944	57 351	60 584	59 647	57 969
Tier 2 3B	Pigs for slaughter, animal places	432 500	442 632	444 604	457 395	468 086	444 019

		2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Tier 1 3A	Goats	65 538	64 389	62 807	62 768	60 776	58 771	60 088
Tier 1 3A	Horses	72 478	75 103	76 752	77 101	77 086	77 059	74 635
Tier 1 3A	Swine	547 379	570 200	577 011	574 182	561 091	562 889	574 135
Tier 1 3A	Hens	3 737 506	3 964 962	3 945 607	3 877 138	4 050 447	4 216 858	4 320 632
Tier 1 3A	Chicks bred for laying hens, animal places	1 099 306	1 442 743	1 166 453	1 010 963	966 488	1 224 355	1 119 406
Tier 1 3A	Deer	5 867	6 835	7 249	7 808	8 367	7 829	7 714
Tier 1 3A	Reindeer	253 721	248 522	254 384	251 071	258 360	246 262	246 262
Tier 1 3A	Fur- bearing animals	174 904	155 204	157 194	168 895	192 447	234 249	223 756
Tier 2 3A	Dairy cows	238 550	210 554	209 094	201 165	203 592	196 085	177 759
Tier 2 3A	Beef cows	60 401	63 803	67 110	68 539	70 434	71 834	73 894

Tier 2 3A	Replacement heifer (whole lifetime)	110 954	109 286	109 150	108 516	106 679	107 650	99 556
Tier 2 3A	Finisher heifer <1 year (whole lifetime)	3 876	3 128	2 966	3 587	3 419	3 660	3 117
Tier 2 3A	Finisher bulls <1 year (whole lifetime)	13 775	11 762	11 685	13 128	15 042	16 552	15 518
Tier 2 3A	Finisher heifer >1 year (whole lifetime)	27 940	27 062	27 000	24 694	21 480	23 600	34 421
Tier 2 3A	Finisher bulls >1 year (whole lifetime)	151 132	152 100	148 883	145 825	141 045	143 867	138 048
Tier 2 3A	Sheep < 1 år (adj. for lifetime)	447 373	464 270	461 592	480 506	463 456	458 413	476 015
Tier 2 3A	Sheep > 1 år	1 035 624	1 061 636	1 054 092	1 050 191	1 048 699	1 042 449	1 058 705
Tier 1 3B	Deer	5 867	6 835	7 249	7 808	8 367	7 829	7 714
Tier 1 3B	Reindeer	253 721	248 522	254 384	251 071	258 360	246 262	246 262
Tier 1 3B	Horses	72 478	75 103	76 752	77 101	77 086	77 059	74 635
Tier 1 3B	Mink, male	6 082	5 526	5 683	6 302	7 440	9 597	9 190
Tier 1 3B	Mink, female	109 468	99 462	102 297	113 439	133 928	172 737	165 423
Tier 1 3B	Foxes, male	3 983	3 370	3 302	3 298	3 428	3 484	3 298
Tier 1 3B	Foxes, female	55 372	46 847	45 911	45 855	47 651	48 432	45 845
Tier 1 3B	Sheep < 1 år (adj. for lifetime)	447 373	464 270	461 592	480 506	463 456	458 413	476 015
Tier 1 3B	Sheep > 1 år	1 035 624	1 061 636	1 054 092	1 050 191	1 048 699	1 042 449	1 058 705
Tier 1 3B	Dairy goats	38 146	37 427	35 706	34 783	33 982	31 406	31 461
Tier 1 3B	Other goats	27 392	26 962	27 101	27 985	26 794	27 365	28 627
Tier 2 3B	Dairy cows	238 550	210 554	209 094	201 165	203 592	196 085	177 759
Tier 2 3B	Non-Dairy Cattle	368 078	367 141	366 794	364 289	358 099	367 163	364 554
Tier 2 3B	Beef cows	60 401	63 803	67 110	68 539	70 434	71 834	73 894
Tier 2 3B	Young cattle	307 677	303 338	299 684	295 750	287 665	295 329	290 660
Tier 2 3B	Replacement heifer (whole lifetime)	110 954	109 286	109 150	108 516	106 679	107 650	99 556

Tier 2 3B	Finisher heifer <1 year (whole lifetime)	3 876	3 128	2 966	3 587	3 419	3 660	3 117
Tier 2 3B	Finisher bulls <1 year (whole lifetime)	13 775	11 762	11 685	13 128	15 042	16 552	15 518
Tier 2 3B	Finisher heifer >1 year (whole lifetime)	27 940	27 062	27 000	24 694	21 480	23 600	34 421
Tier 2 3B	Finisher bulls >1 year (whole lifetime)	151 132	152 100	148 883	145 825	141 045	143 867	138 048
Tier 2 3B	Poultry	15 113 702	15 120 955	15 159 438	14 878 108	15 369 594	17 032 604	17 399 885
Tier 2 3B	Hens	3 737 506	3 964 962	3 945 607	3 877 138	4 050 447	4 216 858	4 320 632
Tier 2 3B	Chicks bred for laying hens, animal places	1 099 306	1 442 743	1 166 453	1 010 963	966 488	1 224 355	1 119 406
Tier 2 3B	Chicks for slaughtering, animal places	9 714 132	9 114 259	9 527 116	9 462 380	9 816 367	11 061 440	11 380 716
Tier 2 3B	Ducks for breeding	9 673	3 278	5 535	2 233	2 034	1 989	3 099
Tier 2 3B	Ducks for slaughtering, animal places	28 713	26 317	30 924	37 668	17 842	47 037	60 247
Tier 2 3B	Turkey/goose for breeding	54 813	18 573	31 366	12 656	11 523	11 268	17 563
Tier 2 3B	Turkey for slaughtering, animal places	469 558	550 823	452 438	475 070	504 892	469 657	498 222
Tier 2 3B	Swine	547 379	570 200	577 011	574 182	561 091	562 889	574 135
Tier 2 3B	Young pigs for breeding	41 205	42 973	40 770	42 023	42 636	42 960	42 634
Tier 2 3B	Sows	57 188	57 469	56 234	53 277	53 154	53 004	50 291
Tier 2 3B	Pigs for slaughter, animal places	448 986	469 758	480 007	478 882	465 301	466 925	481 210

2 Methane emissions from enteric fermentation in Norway's cattle and sheep population

2.1 GE and Y_m

Values for gross energy intake (GE) and CH_4 conversion rate (Y_m) used in the tier 2 CH_4 emissions from enteric fermentation from cattle and sheep are given in Table AIX- 2.

Table AIX- 2 GE and Ym used for the respective animals at the subcategory level. 1990, 1995, 2000, 2005-2014.

		1990	**1995**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Mature dairy cows	Average GE (MJ/head/day)	306.25	305.74	301.40	315.88	316.58	322.28	326.95	330.32	332.99	331.65	336.91	342.83	347.26
	Ym (%)	6.51	6.54	6.55	6.51	6.50	6.49	6.47	6.47	6.45	6.45	6.43	6.42	6.41
Mature non-dairy cattle	Average GE (MJ/head/day)	236.60	236.60	236.60	236.60	236.60	236.60	236.60	236.60	236.60	236.60	236.60	236.60	236.60
	Ym (%)	7.09	7.09	7.09	7.09	7.09	7.09	7.09	7.09	7.09	7.09	7.09	7.09	7.09
Young cattle	Average GE (MJ/head/day)	113.01	117.82	117.01	123.70	123.73	125.60	126.70	128.25	128.74	128.10	128.05	128.98	128.37
	Ym (%)	6.62	6.59	6.55	6.57	6.58	6.55	6.56	6.55	6.55	6.55	6.56	6.56	6.55
Sheep	Average GE (MJ/head/day)	39.03	39.17	39.87	37.97	38.04	38.21	38.20	38.33	38.19	38.39	38.45	38.24	38.35
	Ym (%)	5.47	5.46	5.46	5.50	5.48	5.52	5.53	5.54	5.52	5.52	5.54	5.53	5.53

2.2 Method description

2.2.1 Enteric methane emissions from the cattle population in Norway. Method description

By Tonje Marie Storlien and Odd Magne Harstad. Department of Animal and Aquacultural Sciences, Norwegian University of Life Sciences (2015).

Introduction

It is well known that enteric methane (CH_4) from the ruminants is an important contributor to global warming (Hristov et al., 2013). The amount of CH_4 produced from enteric fermentation is dependent on several factors, like animal species, production level, quantity and quality of feed ingested and environmental conditions (Hristov et al., 2013). IPCC (IPCC, 2006) recommends the use of advanced methods, which include main factors affecting enteric CH_4 emissions for the purpose of estimating enteric CH_4 gas emissions. In Norway detailed information about cattle diet and production is recorded and stored in the Cow recording System (TINE BA). For the dairy cow population, detailed information about individual milk production and feeding is available. Essential information for the beef production like age at slaughter, carcass weight, and average daily gain are available (TINE BA). Thus, this database include country-specific information and is well suited for developing more sophisticated models for predicting enteric CH_4 emission from different categories of cattle.

According to IPCC (IPCC, 2006) the method for estimating CH_4 emission from enteric fermentation requires three basic item:

- No 1. The livestock population must be divided into animal subgroups, which describe animal type and production level.
- No 2. Estimate the emission factor for each subgroup in terms of kilograms of CH_4 per animal per year.
- No 3. Multiply the subgroup emission factors by the subgroup population number to estimate subgroup emission, and sum across the subgroups to estimate total emission.

The Norwegian calculation of enteric CH_4 emissions from cattle is based on a country-specific Tier 2 method (Volden and Nes, 2006) according to the recommendations by the Intergovernmental Panel on Climate Change (IPCC, 2006). However, these models (Volden and Nes, 2006) were introduced in 2006, and the enteric CH_4 emission calculations were based on foreign equations. Since 2006 a significant number of experiments have been conducted to evaluate factors affecting enteric CH_4 emissions from dairy cows on diets typical for the Nordic countries. Based on these results equation for predicting enteric CH_4 emissions was developed (Storlien et al., 2014). Because this equation comprised dairy cows only, an equation published newly by FAO (Hristov et al., 2013) was used to calculate enteric CH_4 emissions from growing cattle (heifers and steers). The objective of this manuscript is to describe the revised methods used to estimate the CH_4 emissions from enteric fermentation in Norwegian cattle production.

General emission factor development and animal subgroups

In all animal subgroups the following basic equation is used to calculate the enteric CH_4 emission factor:

$EF = (GE \times Y_m \times 365 \text{ days/yr}) / 55.65 \text{ MJ/kg } CH_4$

Where:

EF = emission factor, kg CH_4/head/yr

GE = gross energy intake, MJ/head/day

Y_m = CH_4 conversion rate, which is the fraction of GE in feed converted to CH_4.

This equation assumes an emission factor for an entire year (365 days). In some circumstances, the animal category may be defined for a shorter period or a period longer than one year. In such cases the emission factor is estimated for the specific period (e.g., beef cattle which are slaughtered after 230 days).

The methods of calculation require subdividing the cattle populations by animal type, physiological status (dry, lactating or pregnant), live weight and age, and in Table AIX-3 the animal categories used in the calculations are defined. The number of animals in each category is based on the official register of production subsidies. The register covers 90-100% of the animal populations.

Table AIX-3 Categories of cattle used in the Norwegian calculations of methane emissions from enteric fermentation. Animal numbers from 2012[1]

Categories of cattle and sheep	Number of animal by year 2012
Dairy cows	203 592
Beef cows	70 434
Replacement heifers[2]	106 679
Finisher heifers, slaughtered before one year[3]	3 419
Finisher heifers, slaughtered after one year[3]	21 480
Finisher bulls, slaughtered before one year[3]	15 042
Finisher bulls, slaughtered after one year[3].....	141 045

[1] The number of animals is updated annually.

[2] No. of animals counted at time of first calving

[3] No. of animals counted at time of slaughter

For dairy cows, additional information from the Cow Recording System concerning annual milk production and proportion of concentrate in the diet is used. For growing cattle, information from

the Cow Recording System on slaughter age, slaughter weight and average daily weight gain (ADG) is used in the calculations.

Calculation of enteric CH_4 emissions from dairy cows and beef cows

Methodology used to develop equations to calculate enteric CH_4 emission from dairy cows is summarized below:

1. In the estimation of enteric CH_4 emissions milk production level (ECM = energy corrected milk) and diet composition (forage: concentrate ratio on net energy (NEL) basis) were input variables. This approach was used because these two variables are easily available in the Cow Recording System. Length of the lactation was standardized to 305 days, which gives a dry period of 60 days. The lactation curves were estimated in 500 kg ECM intervals, from 5000 to 12 000 kg of ECM (305 day lactation yields).
2. To calculate feed energy value (gross energy (GE), metabolizable energy (ME) and NEL content), animal energy requirement and energy supply, the Nordic feed evaluation system (NorFor) was used (Volden, 2011; Chapter 8 and 9). Standard feed rations at different lactation yields (500 kg intervals) were calculated using three different forage qualities representing low, medium and high energy content (5.8, 6.3 and 6.7 MJ NEL per kg dry matter, respectively). These qualities represent a normal range in forage qualities used in the Norwegian cattle production. Four different concentrate mixtures were used in the diet formulation to complement the animal energy requirement at different production levels. The concentrate mixtures are representative of what used in practical diet formulation in Norway.
3. Estimate of total feed intake and ration forage: concentrate ratio in the dry period and through the lactation period is based on NorFor (Volden, 2011: Chapter 10). Figure AIX-1 presents an example of estimated feed intake through the lactation cycle for a lactation yield of 7500 kg ECM.

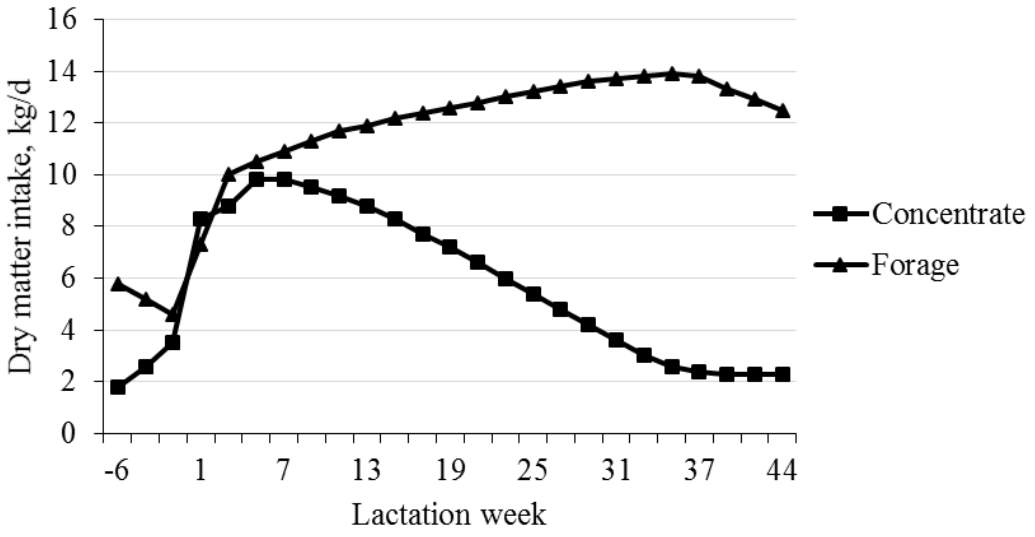

Figure AIX-1. Example of estimated daily feed intake through the lactation cycle. Medium forage quality and a 305 d lactation yield of 7500 kg ECM.

4. In Norway grass silage is the dominating roughage on indoor feeding, constituting approximately 40% of the total feed ration calculated on NEL basis. Typically, the dairy cows are fed indoors for a period of eight to ten months. Therefore, the equation used to estimate enteric CH_4 production was based on diets with grass silage as the roughage (Storlien et al., 2014). This is in accordance with the recommendations of IPCC (IPCC, 2006), which encourage to use a Tier 2 or Tier 3 approach based on country specific data. In the equation of Storlien et al. (2014), feed intake and diet concentration of fatty acids (FA) are input variables as shown below:

   CH_4 (MJ/d) = 6.80 + 1.09 × DMI − 0.15 × FA

   Where:
   DMI = dry matter intake, kg/d
   FA = fatty acids, g/kg DM

This equation covers both dry cows and cows at different production levels.

Daily total dry matter intake (DMI), GE intake and Y_m were calculated based on the parameters described above. DMI was calculated in steps of 14 d intervals for the 305 d milk yield levels and the three forage qualities. From this data set two multiple regression equations were developed and used to calculate average daily GE intake, across stage of lactation, at 305 d lactation yields and different concentrate proportion in the diet. In the statistical analysis, a Proc Mixed procedure was used with stage of lactation as a repeated measurement. Intake of GE was predicted from the following equation:

GE =137.9 + 0.0249 × $Milk_{305}$ + 0.2806 × Concentrate_proportion

Where:
GE = gross energy intake, MJ/day
$Milk_{305}$ = 305 d lactation yield of ECM
Concentrate_proportion = proportion of concentrate in the total diet on net energy basis, %

The following equation was developed to predict Y_m for dairy cows:

Y_m = 7.15 – 0.00004 × $Milk_{305}$ – 0.00988 × Concentrate_proportion

Where:
Y_m = methane conversion rate, %
$Milk_{305}$ = 305 d lactation yield of ECM
Concentrate_proportion = proportion of concentrate in the total diet on net energy basis, %

From this equation, it can be seen that the proportion of GE converted to CH_4 decrease with increased 305 d milk yield and with the proportion of concentrate in the diet. Table AIX-4 present examples of GE and Y_m at different production levels and different proportions of concentrate in the diet. The finding that Y_m decrease with increasing milk yield and proportion of concentrate is well documented (Hristov et al., 2013). The Y_m values presented in Table AIX-4 are at the same level as the default value of 6.5% suggested in IPCC Tier 2 (IPCC, 2006) for dairy cows correspond to a yield of 9000 kg ECM and concentrate proportion of 30%.

Table AIX-4. Daily intake of gross energy (GE) and methane conversion rate (Y_m) at different milk yields (305 d yield of energy corrected milk) and concentrate proportions in the diet on net energy basis

Milk yield, 305 d	Concentrate proportion, %	GE, MJ/d[1]	Y_m, %
5000	20	268	6.8
5000	50	276	6.5
7000	20	318	6.7
7000	50	326	6.4
9000	20	368	6.6
9000	50	376	6.4
11 000	20	418	6.5
11 000	50	426	6.2

[1]Non-lactating period included.

The same approach as used for dairy cows was also used for predicting enteric CH_4 emission from beef cows. The lactation curves were estimated in 500 kg intervals from 1500 to 2500 kg of milk (305 d lactation yields). Intake of GE was predicted from the following equation:

$$GE = 93.8 + 0.0611 \times Milk_{305} + 1.03 \times Concentrate\_proportion$$

Where:

GE = gross energy intake, MJ/day

$Milk_{305}$ = 305 d lactation yield of ECM

Concentrate_proportion = proportion of concentrate in the total diet on net energy basis, %

The following equation was developed to predict Y_m for beef cows:

$$Y_m = 8.5 - 0.0005 \times Milk_{305} - 0.0207 \times Concentrate\_proportion$$

Where:

Y_m = methane conversion rate, %

$Milk_{305}$ = 305 d lactation yield of ECM
Concentrate_proportion = proportion of concentrate in the total diet on net energy basis, %

This equation show that the proportion of GE converted to CH_4 decrease with increased milk yield and with the proportion of concentrate in the diet. With a concentrate proportion of 20%, Y_m at a yield of 1500 and 2500 kg ECM /year correspond to 7.3 and 6.8, respectively.

Calculation of enteric CH_4 emission from growing and finishing cattle and replacement heifers

In the Norwegian Cow recording System, data on growing rate and slaughter parameters are available for different categories of growing and finishing cattle. Approximately 90% of the growing cattle are registered in the recording system. Information about age at calving, age at slaughter, carcass weight and ADG are available. Therefore, the same approach as for dairy cows was used to develop equations for calculating enteric CH_4 emissions, and for development of standard feed rations, i.e., the same forage qualities as for the dairy cows were used. In about 70% of the beef production in Norway, Norwegian Red Cattle is used (dual purpose breed; milk and meat), which is characterized as an early-maturing breed. The feed rations used in practice contain a high proportion of forage, with grass silage as the dominating forage, even during the finishing period. The carcass weight required by the Norwegian market is normally heavy with an average slaughter weight of approximately 300 kg.

Methodology used to develop equations to calculate enteric CH_4 emission from replacement heifers, growing and finishing cattle (bulls and heifers) are summarized below:

1. To describe changes in live weight and ADG over time NorFor was used (Volden, 2011: Chapter 10). An example is shown in Figure AIX-2. From these equations, animal live weight (LW) and ADG were estimated. This information was then used to calculate animal energy requirement for maintenance and growth (Volden, 2011: Chapter 9).
2. To calculate BE intake, NEL intake and concentrate supplementation NorFor was used (Volden, 2011: Chapter 9). Standard rations for the bulls were calculated for slaughter ages of 14, 18 and 22 months. Within slaughter age for the bulls, three carcass weights were used; 290, 320 and 350 kg. For heifers slaughter age was set to 18 months and carcass weight 210 kg. This data matrix represents the variation in practice in Norway. Feed rations were calculated in 30-day intervals from day 150 to slaughter.
3. The equation developed for heifers and steers by FAO (Hristov et al., 2013) was used to predict enteric CH_4 production:

   CH_4 (GE Mcal/day) = – 0.056 + 0.0447 × GEI + 0.0039 × NDF – 0.033× EE + 0.00141 × BW

   Where:
   GEI = gross energy intake (Mcal/day)
   NDF = neutral-detergent fibre, percent in diet, DM basis
   EE = ether extract, percent in diet, DM basis
   BW = body weight, kg

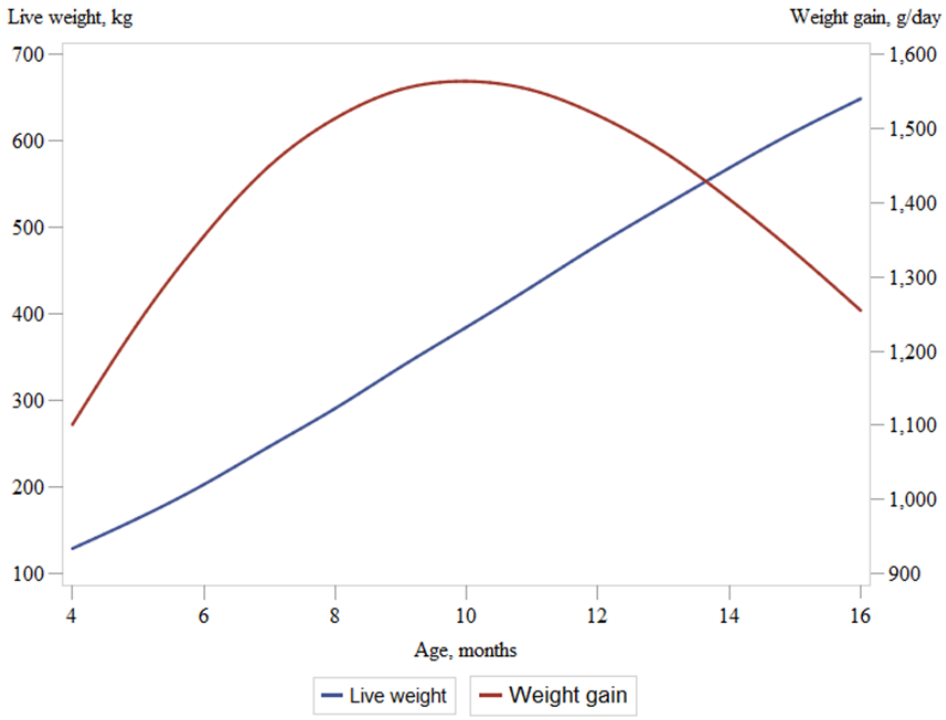

Figure AIX-2. Changes is in daily weight gain over time for a bull with target live weight of 569 kg (290 kg slaughter weight) at 14 months of age.

Based on standard feed rations, daily intake of GE and Y_m were predicted. From the data set a multiple regression analysis were accomplished to develop equations that predict GE and Y_m from animal characteristics available from the Cow Recording System. It was developed two set of equations, one for animals slaughtered < 1 year and one for animals slaughtered > 1 year. The following equations were developed to predict daily intake of GE:

Slaughtered < 1 year:

GE = 38.95 + 1.0558 × CAW – 6.96 × SLA

Slaughtered > 1 year:

GE = 112.99 + 0.3495 × CAW – 4.696 × SLA

Where:

GE = gross energy intake, MJ/d
CAW = carcass weight, kg
SLA = months of slaughter

The following equations were developed to predict Y_m for growing and finishing cattle:

Slaughtered < 1 year:

Y_m = 5.19 – 0.00482 × CAW + 0.1465 SLA

Slaughtered > 1 year:

$Y_m = 5.04 - 0.0054 \times CAW + 0.1453 \times SLA$

Where:

Y_m = methane conversion rate, %
CAW = carcass weight, kg
SLA = months of slaughter

The same approach was used when predicting enteric CH_4 emissions from replacement heifers. Standard rations for the replacement heifers were calculated for age at calving of 24 and 26 months. Within age at calving, three live weights were used; 500, 530 and 560 kg. The following equation was developed to predict daily intake of GE:

$GE = 85.43 + 0.1942 \times LW - 1.83 \times AAC$

Where:

GE = gross energy intake, MJ/d
LW = live weight, kg
AAC = age at calving, months

The following equation was developed to predict Y_m for replacement heifers:

$Y_m = 4.08 + 0.0032 \times LW + 0.0447 \times AAC$

Where:

Y_m = methane conversion rate, %
LW = live weight, kg
AAC = age at calving, months

Table AIX-5 present examples of daily GE intake and Y_m at different age at slaughter and carcass weights.

Table AIX-5. Estimated average daily intake of gross energy (GE) and methane conversion rate Ym (%) at different slaughter age and carcass weights for finishing cattle (bulls and heifers)

Months at slaughter	Carcass weight, kg	GE, MJ/d	Y_m, %
14 …….	290	148	5.52
14 …….	350	170	5.20
22 …….	290	111	6.68
22 …….	350	131	6.36

The Y_m values presented in Table AIX-5 are in between those presented as default values in IPCC Tier 2 (IPCC 2006), which are 3% for feedlot cattle (90% or more concentrates in the diet) and 6.5% for other cattle.

Methane emissions expressed in kg/head/yr from the Norwegian`s cattle population calculated from the revised equations are presented in Table AIX-6. To be comparable with default values suggested by IPCC (IPCC, 2006), CH_4 emissions are standardized to kg/head/year.

Uncertainty related to the calculations is estimated to be ±25%.

Table AIX-6. Revised values for enteric methane emissions from the Norwegian`s cattle population. Animal predictions from year 2012

Categories of cattle	GE intake, MJ/d	Methane lost, % of GE intake	Methane, kg per head per year[8]	Methane, t per year
Dairy cows[1]	337	6.3	139	27800
Beef cows[2]	262	6.9	118	8330
Replacement heifers[3]	133	6.9	60	6360
Finisher heifers, < one year[4]	85	5.9	33	74
Finisher heifers, > one year[5]	78	7.2	37	1487
Finisher bulls, < one year[6]	113	5.7	42	401
Finisher bulls, > one year[7]	129	6.1	52	11073

[1]Dairy cows: milk yield of 7509 kg ECM per year
[2]Beef cows: milk yield of 2500 kg ECM per year
[3]Replacement heifers: 27 months at calving
[4]Finisher heifers, < one year: 7.9 months at slaughter
[5]Finisher heifers, > one year: 22.7 months at slaughter
[6]Finisher bulls, < one year: 7.6 months at slaughter
[7]Finisher bulls, > one year: 18.4 months at slaughter
[8]Methane in kg per head per year was calculated as follows: ((GE intake, MJ/d × methane lost as % of GE/100)/55.65 MJ/kg) × 365, where 55.65 is the energy content (MJ) of 1 kg of methane

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Volden and Nes, 2006. Annex X. X2.2 Method description. Greenhouse Gas Emissions 1990-2012, Annexes to National Inventory Report.

2.2.2 Enteric methane emissions from the sheep population in Norway. Method description

Extraction from note by Harald Volden and Silje K. Nes, Department of Animal and Aquacultural Sciences, Norwegian University of Life Sciences (2006). The complete note also including cattle can be found in the Norwegian NIR 2015, Annex IX.

Introduction

An important end product from the ruminal fermentation is methane (CH_4), and it is well known that the ruminants are important contributors to global warming through CH_4 production. According to IPCC (IPCC 2001) the method for estimating CH_4 emission from enteric fermentation requires three basic items:

- No. 1 The livestock population must be divided into animal subgroups, which describe animal type and production level.
- No 2. Estimate the emission factors for each subgroup in terms of kilograms of CH_4 per animal per year.
- No 3. Multiply the subgroup emission factors by the subgroup populations to estimate subgroup emission, and sum across the subgroups to estimate total emission.

The objective of this manuscript is to describe the methods used to estimate the CH_4 emissions from enteric fermentation in Norwegian's sheep production.

General emission factor development and animal subgroups

In all animal subgroups the following basic equation is used to calculate the CH_4 emission factor:

$EF = (GE \cdot Ym \cdot 365 \text{ days/yr}) / 55.65 \text{ MJ/kg } CH_4$

Where:

EF = emission factor, kg CH_4/head/yr

GE = gross energy intake, MJ/head/day

Y_m = CH_4 conversion rate, which is the fraction of gross energy in feed converted to CH_4.

This equation assumes an emission factor for an entire year (365 days). In some circumstances the animal category may be defined for a shorter period or a period longer than one year and in this case the emission factor will be estimated for the specific period (e.g., lambs living for only 143 days).

Table AIX-7 describe the animal categories used in the calculations.

Table AIX-7 Categories of sheep used in the Norwegian calculations of methane emission from enteric fermentation. Animal numbers from 2004[1]

Categories of sheep	Number of animal by year 2004
Breeding sheep, > one year	878405
Breeding sheep, < one year	387860
Slaughter lamb, < one year. Jan- May	86554
Slaughter lamb, < one year. Jun- Sept	1010461

The number of animals in each category is based on the official register of production subsidies. The register covers 90-100 % of the animal populations[2].

Calculation of methane emission from enteric fermentation in sheep

In Norway sheep are used for meat- and not for milk production. No information system as the Cow Recording System is available for sheep. Information is restricted to number of sheep younger and alder 1 year, the number of slaughtered sheep younger and alder 1 year, and how many sheep younger than 1year that are slaughtered each month throughout the year. Prediction of methane emission from sheep is therefore based on the Tier 2 method described by IPCC (IPCC 2001). In Norway most ewes lamb in the period march to may. There is a big demand for lamb meat around Christmas, and therefore, the major part of the lambs is slaughtered in the period October to December. Lambs that don't fulfil the minimum levels for weight will be fed and slaughtered the next year together with ewe lambs that are not pregnant. On this basis the sheep population has been divided in four categories: 1) lambs under 1 year of age slaughtered in the period from June 1st to December 31st, 2) lambs under 1 year of age slaughtered in the period from January 1st to may 31st, 3) breeding sheep under 1 year of age and 4) breeding sheep over 1 year. Slaughtered lambs younger than 1 one year are divided in two groups because lambs that live longer then December will have an increased energy requirement for maintenance, activity and growth. To be able to divide the number of slaughtered lambs younger than 1 year in the two groups, the portion of slaughtered lambs for each are calculated. This calculation are based on available information of the number of slaughtered lambs younger than 1 year, and the number of lambs slaughtered each month, for two subsequent years. The number of lambs slaughtered in the period from June 1st to December 31st, and in the period from January 1st to may 31st, are added up for each year and the portion according to total number for each period and year were calculated, and an average number of the same period from the two subsequent years where used. The average portion of lambs slaughtered in June – December were found to be 0.921 and the portion slaughtered in January – May were 0.0789.

Prediction of methane emission from sheep is based on the intake of GE and the fraction of GE converted to CH_4 (the CH_4 conversion rate, Y_m). The intake of GE is estimated from the net energy requirement and concersion factors from net energy to GE. According to IPCC (2006) the Y_m for sheep over one year is 6.5 % and 4.5 % for sheep under one year.

[2] The number of animals are updated annually.

The following equation was used to predict GE:

$GE = [(NE_m + NE_a + NE_l + NE_p)/NEM_{ef}] + [(NE_g + NE_{wool})/NEG_{ef}]/ (DE/100)$,

Where:

GE = gross energy, MJ/day

NE_m = net energy for maintenance, MJ/day

$Ne_m = Cf_i \cdot (bodyweight)^{0,75}$

NE_a = net energy for activity, MJ/day

$Ne_a = C_a \cdot bodyweight$

NE_l = net energy for unknown lactation, MJ/day

$NE_l = ((5 \cdot Wg_{wean}) / 365 \text{ days}) \cdot EV_{milk}$

NE_p = net energy for pregnancy, MJ/day

$NE_p = C_{pregnancy} \cdot NE_m$

NE_g = net energy for growth, MJ/day

NE_g = / (365 days/year)

NE_{wool} = net energy for one year of wool production, MJ/day

$NE_{wool} = (EV_{wool} \cdot$ yearly wool production, kg/year)/ (365 days/year)

NEM_{ef} = the ratio of net energy available in a diet for maintenance to digestible energy consumed

NEG_{ef} = the ratio of net energy available for growth in a diet to digestible energy consumed

DE = digestible energy in present of gross energy

Net energy for maintenance is calculated as metabolic bodyweight ($bodyweight^{0,75}$) multiplied with a coefficient (Cf_i) varying with age and sex. Cf_i provided by IPCC (IPCC 2001) is 0.217 for ewes over one year and 0.2496 for intact males over one year. For sheep under one year it is 0.236 for ewes and 0.2714 for intact male lambs. It is not possible to divide the number of sheep by sex, and therefore an average value of 0.2333 for sheep over one year and 0.2537 for sheep under one year has been used. Net energy for activity is calculated as bodyweight multiplied by a coefficient (C_a) corresponding to the animal's feeding situation. According to IPCC (IPCC 2001) C_a for housed ewes is 0.009, sheep grazing on flat pasture 0.0107, sheep grazing on hilly pasture 0.024, and for lambs kept indoor 0.0067. The feeding situation varies during the year, and therefore an average of the first three values (0.0146) has been used for sheep over one year, and an average of the three last values (0.0138) has been used for sheep under one year. Calculation of net energy for lactation is based on the formula for unknown lactation, because sheep in Norway are used for meat production. This formula includes average daily gain for each lamb in the period from birth to weaning, (WG_{wean}), in kg. Weaning was set at seven weeks of age, which is taken as the time when the lambs are

dependent on milk for half their energy requirement, and WG_{wean} was set to 21.5 kg. The energy required for producing 1 kg of milk (EV_{milk}) is 4.6 MJ /kg. Net energy for lactation is calculated for breeding sheep over one year, and for two lambs for each ewe. Net energy for pregnancy is calculated from a coefficient for pregnancy, ($C_{pregnancy}$), multiplied with net energy for maintenance. According to IPCC (IPCC 2001) $C_{pregnancy}$ is 0.077 for one lamb, 0.126 for two lambs and 0.15 for more than two lambs. When the GE intake is calculated an average of the first two values (0.1015) is used for breeding sheep under one year, and an average of all three values (0.1177) is used for breeding sheep over one year. The formula used for calculating net energy for growth include bodyweight at the time of weaning (BW_i), bodyweight at one year of age or at the time of slaughtering (BW_f), average daily gain in the period from weaning to on year of age or slaughtering (WG_{lamb}), and the given factors a and b. This formula was tried out, but the outcome was not in accordance with expected theoretical numbers, and therefore, another method was used to estimate the net energy requirement for growth. This method is based on average daily gain from birth to slaughtering and a net energy requirement of 17.3 MJ per kg gain was used. Average daily gain was calculated on the assumptions that weight at birth was 4.5 kg (Nedkvitne, 1989). Net energy for growth is calculated for both slaughtered and breeding sheep younger than 1 year. The need for net energy for wool production is calculated as the amount of wool produced during a year multiplied with the net energy content of 1 kg wool (EV_{wool}), which is 24 MJ/kg (IPCC 2001). The quantity of wool produced was set to 1.9 kg for sheep under one year and 4.1 kg for sheep over one year.

From the estimated net energy requirement, daily GE intake is calculated based on conversion factors from net energy to GE. Conversion ratios was derived from the Dutch net energy system (Van Es, 1975), where values of 65, 81 and 43 % were used as average conversion rates from net energy to metabolizable energy, from metabolizable energy to digestible energy and from digestible energy to GE, respectively.

For slaughtered lamb under one year, the requirements for net energy (MJ/day), NE_m, NE_a, NE_g, and NE_{wool}, where added up and converted into GE as described above. For these two animal sub-categories, June – December and January – May, the CH_4 emission was calculated for the living period, since the lamb live shorter than one year. When calculating methane emission from lambs it is, according to IPCC (2001), assumed that lambs do not emit methane until half of their energy requirement is covered from milk, and this phase has been set to 7 weeks of age. Therefore, when calculating methane emission from lambs younger than one year, daily emission is multiplied with the age at slaughter subtracted the 7 weeks. For breeding sheep under one year the requirements for net energy (MJ/day), NE_m, NE_a, NE_g, and NE_{wool}, where multiplied by 365 days, and net energy for pregnancy in MJ/day where multiplied by 150 days. Then the total requirement for net energy, MJ/year, was divided by 365 to get the energy requirement in MJ/day, and then converted GE. For breeding sheep over one year calculation of total net energy requirement was done in the same way as for breeding sheep under one year. For this category of sheep net energy for unknown lactation (IPCC 2001) was used and this was done by multiplying daily requirement by 96 days, and then divided by 365 days.

In Table AIX-8 daily GE intake and CH_4 production for the different sub-categories of sheep is presented. The CH_4 emission values, expressed as kg CH_4/head /year, are higher than IPCC Tier 1 values. It is likely that the IPCC Tier 1 CH_4 emission factors for sheep under Norwegian feeding practices and management strategies are set too low.

Table AIX-8 Methane emissions from enteric fermentation in Norwegian's sheep, as determined by emission factors taken from IPCC Tier 2 guidelines for 2006 (sheep). Animal predictions from year 2004

Categories of sheep	GE intake, MJ/d	Methane lost, % of gross energy intake	Methane, kg per head per year[12]	Methane, t per year		
				1990	2000	2004
Breeding sheep, < one year[8]	51	4.5	15	3317	4212	2876
Breeding sheep, > one year[9]	40	6.5	17	13688	15127	14976
Slaughter lamb, < one year. Jan- May[10] .	51	4.5	15	389	387	467
Slaughter lamb, < one year. Jun- Dec[11] .	49	4.5	14	3142	3120	3768

[8]Breeding sheep, < one year:

[9]Breeding sheep, > one year:

[10]Slaughter lamb, < one year. Jan- May: 4.8 moths at slaughter

[11]Slaughter lamb, < one year. Jun- Dec: 11 moths at slaughter

[12]Methane in kg per head per year was calculated as follows: ((GE intake, MJ/d x methane lost as % of GE/100)/55.65 MJ/kg)*365, where 55.65 is the energy content (MJ) of 1 kg of methane.

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3 Nitrogen excretion tables, AD tables for calculation of N and VS for cattle and $Frac_{GASF}$

3.1 Nitrogen excretion tables

Table AIX- 9 Nitrogen excretion table. 1990, 1995, 2000, 2005-2014. Total N. N excretion per animal, kg

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tot-N, dairy cow[1]	107.6	96.2	100.9	113.2	115.6	117.8	121.6	123.0	124.0	123.2	125.0	127.1	128.3
Tot-N, beef cow[1]	60.7	61.4	61.4	63.0	63.2	63.8	64.1	64.4	64.6	64.4	64.5	64.8	64.5
Tot-N, Replacement heifer [2]	66.8	65.9	67.8	77.0	78.4	80.8	82.8	83.9	84.9	84.1	84.6	86.6	84.8
Tot-N, Finisher heifer[3]	58.5	61.2	55.8	64.3	64.1	62.3	62.5	65.3	66.1	63.5	64.2	64.4	65.4
Tot-N, Finisher bull[3]	53.8	54.7	52.6	65.9	67.0	66.0	67.4	68.7	68.7	66.7	65.5	66.5	67.6
Sows	18.4	22.2	25.9	29.7	30.5	31.3	32.0	32.8	33.5	34.3	34.3	34.3	34.3
Pigs for slaughter	4.0	3.8	3.6	3.4	3.4	3.4	3.3	3.3	3.2	3.2	3.2	3.2	3.2
Young pigs for breeding	7.6	8.1	8.6	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.7	9.7	9.7
Hens[4]	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Chicks bred for laying hens[4]	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chicks for slaughtering[4]	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turkey[4]	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5
Duck[4]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Goose[4]	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Horse	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Dairy goats	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9

Other mature goats	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Young goat	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Goat, all	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
Sheep > 1 år	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
Sheep < 1 år	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Mink	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Fox	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Deer	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Reindeer	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Turkey/goose/duck for breeding[4]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	2.0
Chicks for slaughtering[5]	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Turkey[5]	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Chicks bred for laying hens [5]	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Duck [5]	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Pigs for slaughter[5]	10.0	10.1	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.6	10.6	10.6	10.6

[1]Applies per cow-year, [2]applies until first calving, [3]applies for whole life-cycle, [5]N-excretion per counted animal, [4]N excretion per pen, kg per year

Table AIX- 10 Nitrogen excretion table. 1990, 1995, 2000, 2005-2014. Ammonium N

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Urine-N, dairy cow[1]	60.4	48.8	54.3	63.7	65.9	67.1	70.0	70.7	71.2	70.8	71.6	72.6	73.0
Urine-N beef cow[1]	33.0	33.6	33.6	34.9	35.0	35.4	35.7	35.9	36.1	35.9	36.0	36.3	36.0
Urine-N, Replacement heifer [2]	34.0	32.0	33.9	40.8	41.9	43.6	45.1	45.9	46.5	46.0	46.3	47.6	46.5
Urine-N, Finisher heifer[3]	35.3	37.0	33.5	39.0	38.8	37.7	37.8	39.6	40.1	38.5	38.9	39.0	39.7
Urine-N, Finisher bull[3]	31.6	30.1	29.6	39.3	40.3	39.6	40.9	41.7	41.7	40.4	39.6	40.2	40.9
Sows	12.6	15.1	17.5	19.9	20.4	20.9	21.4	21.9	22.4	22.9	22.9	22.9	22.9
Pigs for slaughter	2.8	2.6	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Young pigs for breeding	5.3	5.6	5.8	6.1	6.2	6.2	6.3	6.3	6.4	6.5	7.5	7.5	7.5
Hens[4]	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Chicks bred for laying hens[4]	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chicks for slaughtering[4]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turkey[4]	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Duck[4]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goose[4]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Horse	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Dairy goats	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
Other mature goats	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Young goat	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Goat, all	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Sheep > 1 år	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4

Sheep < 1 år	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Mink	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Fox	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Deer	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Reindeer	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Turkey/goose/duck for breeding[4]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.2	0.8	0.8
Chicks for slaughtering[5]	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Turkey[5]	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
Chicks bred for laying hens [5]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Duck [5]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Pigs for slaughter[5]	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0

[1]Applies per cow-year, [2]applies until first calving, [3]applies for whole life-cycle, [5]N-excretion per counted animal, [4]N excretion per pen, kg per year

3.2 Activity data tables for calculation of N and VS for cattle

Table AIX- 11 Activity data used for calculation of N and VS for cattle. 1990, 1995, 2000, 2005-2014.

Year	**Dairy cows**				**Beef cow (mature non-dairy cattle)**			
	Milk yeld (kg ECM per cow per year)	Weight (kg)	Protein content in the roughhage g/kg dry matter	calculated protein content, g/kg dry matter	Milk yeld (kg ECM per cow per year)	Weight (kg)	Protein content in the roughhage g/kg dry matter	calculated protein content, g/kg dry matter
1990	6 320	508	150	184	2 000	508	120	200
1995	6 326	525	150	149	2 000	525	120	200
2000	6 156	524	150	167	2 000	524	120	200
2005	6 723	562	150	184	2 000	562	120	200
2006	6 742	566	150	190	2 000	566	120	200
2007	6 961	578	150	190	2 000	578	120	200
2008	7 144	585	150	195	2 000	585	120	200
2009	7 276	592	150	195	2 000	592	120	200
2010	7 373	597	150	195	2 000	597	120	200
2011	7 309	592	150	195	2 000	592	120	200
2012	7 509	594	150	195	2 000	594	120	200
2013	7 741	602	150	195	2 000	602	120	200
2014	7 919	596	150	195	2 000	596	120	200
Year	**Heifer for replacement**				**Bulls for slaughter**			
	Weight by first calving (kg)	Feeding period, months	Protein content in the roughhage	Protein content in concentrates,	Slaughter weight	Slaughter age. Months	Protein content in the roughhage	Protein content in concentrates,

			g/kg dry matter	g/kg dry matter			g/kg dry matter	g/kg dry matter
1990	435	26.0	140	184	255	18.8	140	184
1995	449	26.0	140	149	276	18.9	140	149
2000	448	26.0	140	167	269	16.7	140	167
2005	481	26.0	140	184	296	18.0	140	184
2006	485	25.9	140	190	297	18.0	140	190
2007	495	25.9	140	190	296	17.5	140	190
2008	501	26.0	140	195	298	17.4	140	195
2009	507	26.0	140	195	301	17.4	140	195
2010	511	25.9	140	195	302	17.4	140	195
2011	507	26.0	140	195	297	17.1	140	195
2012	509	26.1	140	195	294	16.9	140	195
2013	515	26.2	140	195	298	16.7	140	195
2014	510	26.9	140	195	302	16.5	140	195

3.3 $Frac_{GASF}$

Table AIX- 12 and Table AIX- 13 presents weighting of loss factors based on basis data for N-loss factor, N-share and amount for the different synthetic fertilisers. For the period 1990-1999 the same estimate for nitrogen loss and amount of nitrogen distributed on fertiliser type are used, which gives a constant $Frac_{gasf}$ (total N-losses are however adjusted for total nitrogen sale each year). The NH_3 emission factors (per cent loss of N) for the different types of fertilisers was given by ECETOC (1994) and Norsk Hydro, *pers. Comm.*[3]. Table AIX- 14 presents the timeseries for $Frac_{gasf}$ used in the Norwegian inventory.

Table AIX- 12 Weighting of loss factors based on basis data for N-loss factor, N-share and amount for the different synthetic fertilisers. 2014

Fertiliser type	**Amount of fertiliser (tonnes)**	**%-N**	**Loss (% of N)**
Ammonium nitrate	9073	34	5
Ammonium nitrate m/S	40776	27	5
Potassium sulphate	1010	0	0
Potassium sulphate m/Mg	16	0	0
Potassium chloride	638	0	0
Kalkamonsalpeter	111	27	1
Calcium nitrate	23129	16	0
Calcium nitrate m/B	13465	15	0
NK-fertiliser 22-12	3665	15	1
NP-fertiliser 10-4	4045	10	1
NP fertiliser 12-23	949	12	1
NPK-fertiliser 6-5-20	37	6	1
NPK-fertiliser 8-5-19	734	8	1
NPK-fertiliser 12-4-18	21547	12	1
NPK-fertiliser 18-3-15	32213	18	1
NPK-fertiliser 19-4-12	1967	19	1
NPK-fertiliser 21-3-8	9858	21	1

[3] Norsk Hydro (1995): Personal information, Kaarstad, Norsk Hydro.

NPK-fertiliser 22-2-12	1755	22	1
NPK-fertiliser 22-3-10	31675	22	1
NPK-fertiliser 25-2-6	124169	25	1
NPK-fertiliser 27-3-5	104813	27	1
PK-fertiliser 0-11-21	29466	0	1
P-fertiliser 0-20-0	226	0	1
Urea	222	46	15
Other fertiliser with N content	294	20	1
Other fertiliser	699	0	1

Source: Statistics Norway

Table AIX- 13 Weighting of loss factors based on basis data for N-loss factor, N-share and amount for the different synthetic fertilisers. 1990-1999

Fertiliser type	**Amount of fertiliser (tonnes)**	**%-N**	**Loss (% of N)**
Calcium nitrate	65869	15.5	0
Calcium ammonium nitrate	40642	27.5	1
Forest-calcium ammon	1483	15.0	1
Forest-AN	7	27.0	0
Urea	754	46.0	15
Ammonium sulphate	11	27.0	5
Ammonium nitrate	76	27.0	5
NK 17-17	257	16.9	1
NK 17-20	359	16.9	1
NK19-15	385	19.0	1
NK 22-10	2575	22.0	1
NK21-10	630	20.3	1
NK 22-10	2575	22.0	1
NPK 6-7-21	671	6.0	1
NPK 11-5-17	24826	11.0	1
NPK 11-5-17	111	11.0	1
NPK 14-4-15	82	14.0	1

NPK 14-6-16	1745	14.0	1
NPK15-4-12	5767	14.6	1
NPK15-4-12 m/Co	13	15.0	1
NPK 17-5-13	36892	17.2	1
NPK 18-3-15	102101	17.6	1
NPK 18-3-15	1347	17.8	1
NPK 20-2-12	863	21.0	1
NPK 20-3-6	83	20.0	1
NPK 21-4-10	158262	20.6	1
NPK 21-4-10	332	21.2	1
NPK 22-2-12	61932	21.6	1
NPK 23-3-6	221	23.0	1
NPK 23-3-6	28488	23.0	1
N- 24 m/micro	0	24.0	1
NPK 10-3-7	191	10.0	1
NPK 11-1-7	1	11.0	1
NPK 14-0-6	113	14.0	1
NPK 19-2-4	736	19.0	1
NPK 15-3-7	50	15.0	1
NPK 7-2-10	106	7.0	1
18-0-0 foliar spray	9	18.0	1
NPK 10-0-9	11	10.0	1
NPK 3-2-9	1	3.0	1

NPK (Nitrogen,phosphorus, potassium)
Source: Statistics Norway

Table AIX- 34 $Frac_{gasf}$ used in the Norwegian inventory. 1990, 1995, 2000, 2005-2014.

Year	$Frac_{gasf}$
1990	0.009
1995	0.009
2000	0.010
2005	0.011
2006	0.011
2007	0.012
2008	0.010
2009	0.017
2010	0.013
2011	0.013
2012	0.014
2013	0.014
2014	0.015

Source: Statistics Norway

Annex X: Overview of notation keys IE and NE

Norway has had technical difficulties with the specification of methods, emission factors, notation keys and documentation boxes in the CRF. We have strived for completeness and consistency with the information in the NIR. In particular, our use of Excel import to the CRF makes it difficult to enter cell comments with IE and NE explanations. Thus, Table9 in the CRF tables has only a few entries.

Exlanations on the use of notation keys IE and NE are instead included in the documentation boxes in the CRF. As a supplement to Table 9, all information about use of notation keys IE and NE is gathered in this annex.

1.1 Included elsewhere (IE)

1.1.1 Energy (source category 1)

Table AX. 1. Description of the use of notation IE in the energy sector

Notation key	Source category	Components	Allocation as per IPCC Guidelines	Allocation used by Norway	Explanation
IE	1A3ei Pipeline transport - gaseous fuels	CO_2, CH_4, N_2O	1A3ei	1A1cii	It is not possible to split emissions from emissions in 1A1c ii
IE	1B1aii Underground mines - Post-mining activities	CO_2, CH_4	1B1aii	1B1ai	It is not possible to split emissions into mining and post mining activities
IE	1B2aii Surface mines - Post-mining activities	CO_2, CH_4	1B2aii	1B2ai	It is not possible to split emissions into mining and post mining activities
IE	1B2a2 Oil - Production 1Bb1 Natural gas - Exploration	CO_2, CH_4	1B2a2 1B2a1	1.A.1.c and 1.B.2.C.	It is combustion for energy purposes in oil and gas exploration and venting and flaring.
IE	1B2b2 Natural gas – Production 1B2b3 Natural gas - Processing	CO_2, CH_4	1B2b2 1B2b3	1.A.1.c, 1.B.2.B.5 and 1.B.2.C.2	It is combustion for energy purposes in oil and gas production off shore, gas terminals on land, venting at gas terminals, and flaring.
IE	1B2b4 Natural gas - Transmission and storage	CO_2	1B2b4	1.B.2.B.6	Emissions are included with emissions from gas terminals and cannot be split
IE	1B2b5 Natural gas - Distribution	CO_2, CH_4	1B2b5	1.B.2.B.6	emissions are included with emissions from gas terminals and cannot be split
IE	1B2c1i Venting and Flaring - Venting - Oil 1B2c1ii Venting and Flaring - Venting - Gas	CO_2, CH_4	1B2c1i 1B2c1ii	1.B.2.C.1iii	It is not possible to split emissions from emissions in 1B2c1 iii
IE	1B2c2iii Venting and Flaring - Flaring - Combined	CO_2, CH_4, N_2O	1B2c2iii	1.B.2.C.2.i/ii	Flaring combined is split between oil (1.B.2.C.2.i) and gas (1.B.2.C.2.ii) and distributed in these 2 sectors
IE	1C2a Injection 1C2b Storage	CO_2	1C	1.B.2.C	Only emission from venting are estimated and thus, reported into 1.B.2.c

1.1.2 Industrial processes and product use (source category 2)

Table AX. 2. Description of the use of notation IE in the IPPU sector

Notation key	Source category	Components	Allocation as per IPCC Guidelines	Allocation used by Norway	Explanation
IE	2F3 Fire protection 2F4 Aerosols 2F5 Solvents	HFC	2F3 2F4 2F5	2F6	Emissions and activity data for are aggregated in 2F6 due to confidentiality Note: In the CRF tables, notation key "C" is used.
IE	2G1 Electrical equipment	SF_6	Emissions from manufacturing	Emissions from stocks	All emissions are reported as a single item due to confidentiality.

1.1.3 Agriculture (source category 3)

Table AX. 3. Description of the use of notation IE in the agriculture sector

Notation key	Source category	Components	Allocation as per IPCC Guidelines	Allocation used by Norway	Explanation
IE	3B5 Indirect N_2O emissions	N_2O	3B5	3.D.2.1	The nitrogen model used for the estimations included emissions in Volatilized N from agricultural input. It shall be updated for next submission
IE	3D15 Mineralization/immobilization associated with loss	N_2O	3D15	LULUCF	It has been chosen to include these emissions in LULUCF

1.1.4 LULUCF (source category 4)

Table AX. 4. Description of the use of notation IE in the LULUCF sector

Notation key	Source category	Components	Allocation as per IPCC Guidelines	Allocation used by Norway	Explanation
IE	4A2 Biomass burning - wild fires	CH_4	4A2	4A1	

1.2 Not Estimated (NE)

1.2.1 Agriculture (source category 3)

Table AX. 5. Description of the use of notation NE in the agriculture sector

Notation key	Source category	Components	Explanation
NE	3A4 Other livestock – Other 3B4 Other livestock - Other	CH_4, N_2O	Since the number of animal from this category is very low, it has been decided to not estimate emissions from this category
NE	3B5 Indirect N2O emissions	N_2O	Due to lack of data, emissions have not been estimated. It should be included in the next submission
NE	3A Enteric fermentation 3B Manure management	NMVOC	Due to lack of data, emissions have not been estimated. It should be included in the next submission
NE	3D Agricultural Soil	CH_4, NOx, NMVOC	Due to lack of methodology and lack of data, emissions have not been estimated. NOx and NMVOC should be included in the next submission
NE	3I Other Carbon-containing Fertilizers	CO_2	No activity data is available for Other Carbon-containing Fertilizers. Therefore, emissions have not been estimated.

1.2.2 LULUCF (source category 4)

Table AX. 6. Description of the use of notation NE in the LULUCF sector

Notation key	Source category	Components	Explanation
NE	4A2 Biomass burning - controlled burning	CH_4	Emissions from controlled burning are considered negligible

1.2.3 Waste (source category 5)

Table AX. 7 Description of the use of notation NE in the waste sector.

Notation key	Source category	Components	Explanation
NE	5A1 Managed waste disposal site 5B Biological treatment of solid waste 5D1 Domestic wastewater	NOx, CO, NMVOC	Due to the lack of data available to implement methodologies, emissions have not been estimated.
NE	5C2 Open burning of waste	CO_2, CH_4, NOx, CO, SO2, NMVOC	Due to the lack of data available to implement methodologies, emissions have not been estimated.
NE	5D2 Industrial wastewater	N_2O, NOx, CO, NMVOC	Due to the lack of data available to implement methodologies, emissions have not been estimated.
NE	5D3 other	CH_4, NOx, CO, SO2, NMVOC	Due to the lack of data available to implement methodologies, emissions have not been estimated.

Annex XI: Reference Approach versus Sectoral Approach - Quantification of differences

In the review of the Norwegian greenhouse gas inventory submitted in 2011 the ERT raised potential problems with non-inventory elements of Norway's annual submission under the Kyoto Protocol. Norway was asked to explain the difference between Reference Approach (RA) and Sectoral Approach (SA). Norway has examined the differences and the results are explained in this annex.

Reference versus sectoral approach
Norway has calculated energy consumption and CO_2 emissions from energy combustion based on RA and SA. The supply side in the RA is from the national energy balance that is included in Annex III in the NIR. In previous submissions we have used energy balance data reported to IEA in RA even if the energy balance reported in Annex III also in previous submissions have been the national energy balance. The supply data in RA are now consistent with the energy balance data used in the SA.

The result of the estimation with the two methods is shown in Table AXI-1. There are large differences between the output from RA and SA, both for the energy consumption data and the CO_2 emissions. The difference between the *fuel consumption* in the RA and SA ranges between +/- 30 per cent. The deviations for CO_2 emissions are generally around 3 percentage points higher. The highest discrepancy for CO_2 is in 1990, 2000 and in 2004-2006. For 2014, the difference for CO_2 is -4.4 per cent. The large discrepancies are primarily due to statistical differences in the energy balance, as shown below.

Table AXI-1. Comparison of fuel consumption and CO_2 emission data between the Reference Approach (RA) and the Sectoral Approach (SA). 1990-2014.

	Fuel Consumption			**CO_2 emissions**		
Year	RA, apparent consumption (PJ)	SA (PJ)	Difference RA-SA (%)	RA (Gg)	SA (Gg)	Difference (%)
1990	273	385	-29.1	19844	26192	-24.2
1991	350	381	-8.1	25123	25795	-2.6
1992	335	388	-13.5	23789	26266	-9.4
1993	331	404	-18.2	23345	27252	-14.3
1994	348	424	-17.9	24634	28666	-14.1
1995	358	423	-15.4	24909	28614	-12.9
1996	351	460	-23.7	24582	31285	-21.4
1997	387	465	-16.8	26905	31367	-14.2
1998	454	464	-2.2	31447	31376	0.2
1999	520	464	12.1	36346	31631	14.9
2000	602	453	32.9	42070	30700	37.0
2001	547	479	14.2	36916	32754	12.7
2002	456	486	-6.2	31116	32981	-5.7
2003	500	506	-1.2	33787	34309	-1.5
2004	593	510	16.1	41203	34335	20.0
2005	548	502	9.2	38263	34061	12.3
2006	599	523	14.5	42307	34932	21.1
2007	453	531	-14.7	30919	35292	-12.4
2008	525	531	-1.0	36162	34759	4.0
2009	510	543	-6.0	35227	35177	0.1
2010	599	558	7.4	40457	36723	10.2
2011	503	543	-7.3	34605	35864	-3.5
2012	483	539	-10.5	32973	35431	-6.9
2013	579	537	7.8	39700	35095	13.1
2014	539	492	-8.7	33397	34916	-4.4

Source: Statistics Norway/ Norwegian Environment Agency

Quantification of differences between RA and SA

Summary. *We have made a comparison of the fuel consumption in RA and SA to the energy balance where we explain the differences between RA and SA. The comparison was made for natural gas and solid and liquid fuels separately. This is an answer to questions raised in the Saturday Paper by the ERT reviewing the Norwegian 2011 submission. The comparison is summarized in Table 3 in this annex.*

The main result is that the difference between the energy consumption in RA and SA is mainly due to statistical differences in the energy balance (column M in Table 3). In addition, a number of other smaller differences were identified. The remaining difference between RA and SA after adjusting for these items is within +/- 3 per cent. There are very large statistical differences in the Norwegian energy balance, and they fluctuate strongly between years.

The Reference Approach is a method to use the supply part of the energy balance to calculate CO_2 emissions from fuels. A simple correction is used to exclude non-combustion emissions. The result is then compared with the sectoral approach to combustion emissions (source category 1A). For Norway, the RA gives for many years large deviations from the SA with respect to both energy use and CO_2 emissions.

The SA is based on the consumption part of the energy balance. This section shows how the RA and the SA corresponds to the energy balance. *The main conclusion is that the major cause of deviations between the approaches is the statistical differences in the energy balance.*

The supply data used in in the RA Table 1A(b) are from the national energy balance reported in the NIR. See the first paragraph under *Reference versus sectoral approach* in the annex. The only differences are in the NCV values for natural gas and crude oil production, and the inclusion of lubricants and bitumen in the RA. When corrected for these items, the total supply in the RA is equal to the net domestic supply (item 7) in the energy balance for these fuels.

Item 7 Net domestic supply in the energy balance is equal to the sum of the following items in the balance (according to the definition of the statistical difference (item 11)):

Table AXI-2: Energy Balance and its allocation in the Reference Approach and the GHG inventory

8. Energy converted	8.1-8.2 (blast furnaces and petroleum refineries): Transformation to other fossil fuels. Not included in the inventory. Part of statistical differences in transformation 8-3-8.6 (power and heating plants): Sectoral Approach – 1A1a
1.2. Production of derived energy bearers	Not included in the inventory. Part of statistical differences in transformation
9. Consumption by energy sector	Sectoral Approach – 1A1a-c *Exceptions:* 9.1.2. Flaring on oil fields Inventory: 1B2c RA: Excluded 9.3. Petroleum refineries: In the inventory, burning off of coke is in 1B2a-4
10. Losses in transport and distribution	Only flares in manufacturing. In the inventory, included in 2 Industrial processes
11. Statistical differences (7-(8-1.2)-9-10-12-13)	Not included in the inventory: Statistical differences
12. Consumption for non-energy purposes	- In the inventory: allocated to 2 Industrial processes - In the RA: included in the correction item for feedstock and non-energy use
13. Net domestic consumption	SA: 1A2-1A5. *Exceptions:* Coal and coke used as reducing agents with utilization of heat is accounted here in the energy balance, and not in item 12. - In the inventory, this use is allocated to 2 - Industrial processes - In the RA, this use is included in the correction item for feedstock and non-energy use

Note: Item 13.1 in the energy balance is the sum of items 12 and 13, *i.e*, net domestic consumption including non-energy use.

Table AXI- 2 shows that the net supply includes items that are handled in different ways in the inventory:

- Combustion which is included in the sectoral approach
- Emissions that are included elsewhere in the inventory
- Items that are not included in the inventory but appear as statistical differences.

In the RA, the energy consumption and CO_2 emissions are corrected for ”non-energy use and feedstocks”. As currently implemented, this correction includes item 12 Consumption for non-energy purposes and the part of item 13 Net domestic consumption which is reducing agents. The correction also includes lubricants and bitumen, which are not part of the national energy balance net supply.

This means that the following items will remain as differences between the Reference and Sectoral approaches:

- Statistical differences. This includes:
    - Main statistical difference (item 11). Range: -30 PJ to 200 PJ (excluding waterfall energy, electricity, and district heating)
    - Statistical differences within the transformation sector. This appears when the production of derived energy bearers (item 1.2) is different from the consumption in the

transformation sectors (item 8). Transformation to heat or power by consumption is handled in the sectoral approach and is excluded from this comparison. Range: 0 PJ to 30 PJ

Possible causes of the statistical differences are discussed in Annex XII.

- Emissions that are included elsewhere in the inventory, but were omitted from the correction item in the RA:
    - Losses (item 10, i.e, flaring in manufacturing). Range: 2-5 PJ
    - Burning off of coke in refinery crackers and related emissions. Range: 6-11 PJ

Some differences between the Reference and Sectoral approaches still remain when correcting for these items. The remaining differences may be due to minor differences in definitions and scope, and to errors in the energy or emission inventories. Range: -9 PJ to 13 PJ.

The analysis is summarized in Table AXI-3 below. The analysis in the CRF tables is shown in the left part. Further corrections are included in the following columns.

Table AXI-3. Overview over the Reference and Sectoral approaches for energy. PJ.

	Consumption data from CRF Table1.A(c)					Additional adjustments in RA consumption			Remaining difference RA-SA	
Unit: PJ	**RA: Apparent consumption (*incl* non-energy use and feedstocks)**	**SA: Consumption (*incl* Other fuels)**	**Correction for non-fuel use and feedstocks in CRF**	**Difference RA-SA, PJ**	**Difference RA-SA, per cent of SA**	**Statistical differences**	**Other corrections**	***Other fuels* in SA excluded from comparison**	**Remaining difference RA-SA, PJ**	**Remaining difference RA-SA, per cent of SA**
	A	B	=D+Q+S			N	=E+P+R		U*	V*
1990	363	292	96	-25	-9 %	-21	6	-6	-5	-1.6 %
1991	466	375	86	4	1 %	9	5	-6	-4	-1.1 %
1992	446	380	86	-21	-5 %	-20	7	-6	-2	-0.4 %
1993	464	398	93	-27	-7 %	-29	7	-6	1	0.3 %
1994	511	416	96	-1	0 %	-2	4	-6	3	0.8 %
1995	510	421	103	-13	-3 %	-6	2	-7	-2	-0.5 %
1996	518	451	103	-36	-8 %	-34	5	-7	-1	-0.2 %
1997	512	454	114	-56	-12 %	-41	4	-7	-12	-2.7 %
1998	601	469	121	10	2 %	21	5	-8	-8	-1.6 %
1999	693	471	118	105	22 %	107	4	-8	2	0.4 %
2000	760	433	119	208	48 %	208	7	-9	2	0.4 %
2001	649	464	132	52	11 %	58	4	-9	-0	0.0 %
2002	718	479	122	117	24 %	107	2	-9	18	3.7 %
2003	633	496	130	8	2 %	25	-1	-12	-4	-0.8 %
2004	830	501	129	200	40 %	209	0	-11	2	0.4 %
2005	726	504	123	99	20 %	108	1	-13	3	0.6 %
2006	738	516	119	103	20 %	116	-0	-13	-0	0.0 %
2007	597	522	125	-49	-9 %	-49	6	-13	6	1.2 %
2008	710	520	130	60	12 %	73	3	-14	-3	-0.5 %
2009	676	526	111	39	8 %	49	4	-13	-0	0.0 %
2010	682	553	115	14	2 %	27	6	-14	-5	-0.9 %
2011	761	549	119	93	17 %	93	6	-16	11	2.0 %
2012	644	534	116	-6	-1 %	-2	5	-16	8	1.4 %
2013	698	532	121	45	8 %	40	6	-16	16	2.9 %
2014	652	518	125	9	2 %	66	3	-16	-44	-8.5 %

Source: Statistics Norway/Norwegian Environment Agency

Notes

a) Difference between "Reference approach" and "Apparent energy consumption" in CRF table 1.A(c), equal to the total from non-fuel use in table 1.A(d) (=D+Q+S in table AXI-4)

b) Energy balance items "Statistical differences" *plus* balance of non-combustion transformation items (consumption in blast furnaces, petroleum refineries and other conversion *minus* production of derived energy bearers). (=N in table 4)

c) Energy balance item "Losses"; petrol coke/CO gas burnt in refineriea and reported as fugitive emissions in the inventory; correction for different NCV values used for condensate in energy balance and in the RA. (=E+P+R in table 4)

d) *Other fuels* are currently not included in the reference approach

The following Table AXI-4 – Table AXI- 8 show in more detail how the energy balances and the Reference and Sectoral approaches are related for the different fuel groups. Table AXI-4 is a combined table for liquid and solid fuels, in PJ. For natural gas there are Table AXI-4—Table AXI-7 in Sm^3, PJ, and CO_2.

The reasons for these choices are purely practical: Gaseous fuels comprise only a single fuel and thus simple to handle, and variations in NCV and C content means that data in Sm^3, PJ and CO_2 give different and relevant information. For liquid and solid fuels, transformation means that only tables covering all fuels are meaningful. The PJ table is the simplest one to prepare. Liquid and solid were

combined because one of the energy types in the energy balance (”other gases”) is a combination of mainly secondary fuels derived from both liquid and solid primary fuels.

Solid fuels and liquids

Table AXI-4 is organized in four parts, from left to right. After each part, the remaining difference between RA and SA is given.

1. The consumption according to RA (uncorrected) and SA
2. Differences between the RA and the energy balance: lubricants and bitumen, and differences in NCV values. When adjusted for these items, the RA supply is equal to the energy balance.
3. Statistical differences
4. Emissions that is included elsewhere in the inventory.

Table AXI 4. Overview of discrepancies in energy goods. Solid and liquid fuels. PJ

Unit: PJ	Consumption data from CRF Table1.A(c)			Included in RA, but not in the NIR energy balance			Remaining difference RA-SA	Included in RA and energy balance, but not included in total emissions (in any source categories): Statistical differences and other discrepancies between supply and consumption in the energy balance							Remaining difference RA-SA
	RA: Apparent consumption (*incl* non-energy use and feedstocks)	SA: Consumption	Difference RA-SA	Fuel types not included in NIR energy balance (lubricants, bitumen)	Different NCV values for condensate production	Total adjustment		8.1. Transformation - In blast furnaces	8.2. Transformation - In crude petroleum refineries	8.7. Other conversion	1.2. Production of derived energy bearers	SDT. Statistical differences within transformation (8.1+8.2+8.7-1.2)	11. Statistical differences (7-8+1.2-9-10-13.1)	Total adjustment (SDT + 11)	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
			=A-B			=D+E	=C-F					=H+I+J+K		=L+M	=G-N
1990	363	286	77	11	-0	10	67	1	575	-	591	-15	-6	-21	88
1991	397	277	120	13	-0	13	107	2	545	-	573	-26	56	30	77
1992	357	277	80	12	-0	11	69	1	615	-	635	-19	7	-12	81
1993	357	288	69	13	-1	12	57	1	613	-	640	-26	-6	-32	88
1994	397	300	97	15	-3	12	85	2	633	-	664	-29	23	-6	91
1995	407	296	112	14	-4	10	102	2	583	-	603	-18	26	8	94
1996	392	325	67	17	-5	12	54	1	648	-	678	-28	-13	-41	95
1997	404	319	85	16	-7	9	76	2	655	-	679	-22	-0	-22	99
1998	441	323	118	16	-6	10	108	2	641	-	651	-8	17	10	99
1999	505	330	175	15	-7	8	167	2	658	-	682	-22	95	73	94
2000	582	299	283	13	-6	7	276	2	656	10	669	-1	178	177	99
2001	458	309	148	12	-8	5	144	1	616	11	627	1	34	35	108
2002	433	310	123	13	-10	3	119	1	579	11	601	-9	24	14	105
2003	435	318	117	13	-13	-1	117	1	645	12	670	-12	22	10	107
2004	589	314	275	14	-12	2	274	2	619	11	648	-17	189	172	101
2005	538	307	231	15	-12	3	229	1	681	11	713	-20	151	131	98
2006	555	321	235	15	-13	2	233	2	718	13	754	-21	158	138	95
2007	396	320	76	17	-7	11	66	2	713	11	747	-20	-17	-37	103
2008	480	309	171	16	-8	8	163	2	660	11	693	-19	82	63	101
2009	446	307	138	18	-9	9	129	2	665	10	699	-22	64	42	87
2010	462	319	142	15	-8	7	135	3	631	11	666	-21	57	36	99
2011	454	313	141	17	-8	9	131	4	703	11	736	-19	52	34	97
2012	431	309	122	17	-8	9	113	4	696	10	722	-13	29	16	97
2013	477	309	167	15	-7	8	159	4	725	11	767	-27	73	46	113
2014	430	296	135	19	-6	13	122	4	652	11	700	-33	57	24	98

Source: Statistics Norway/ Norwegian Environment Agency

*Table AXI-4 **continued**. Overview of discrepancies in energy goods. Solid and liquid fuels. PJ*

Unit: PJ	Included in RA and energy balance, but reported in other source categories [than 1A=Sectoral Approach]					Remaining difference RA-SA	
	10. Losses in transport and distribution	**12. Consumption for non-energy purposes**	***part of* 9.3. Consumption in energy sectors (petrol coke/CO in refinery)**	***part of* 13 Net domestic consumption (coal and coke as reducing agent)**	**Total adjustment: 10+12+(9.3pp+13pp)**	**PJ**	**% of SA**
	P	Q	R	S	T	U	V
					=P+Q+R+S	=O-T =C-(F+N+T)	
1990	-	47	6	39	92	-5	-1.6 %
1991	-	41	6	32	78	-2	-0.6 %
1992	-	42	8	32	82	-1	-0.3 %
1993	-	50	8	29	87	1	0.4 %
1994	-	52	7	29	88	3	1.0 %
1995	-	53	6	36	95	-1	-0.4 %
1996	3	53	7	33	96	-1	-0.4 %
1997	3	56	8	34	100	-2	-0.6 %
1998	3	52	8	36	100	-1	-0.3 %
1999	4	49	7	35	95	-1	-0.3 %
2000	3	49	10	37	100	-1	-0.4 %
2001	4	65	8	32	108	-0	0.0 %
2002	3	67	9	25	104	1	0.4 %
2003	2	68	10	25	105	2	0.6 %
2004	3	57	9	31	100	1	0.3 %
2005	2	59	11	24	96	2	0.6 %
2006	2	59	11	21	92	3	0.8 %
2007	3	65	10	23	100	2	0.8 %
2008	3	64	8	25	99	1	0.5 %
2009	3	57	10	15	85	2	0.7 %
2010	4	58	10	21	93	6	1.9 %
2011	3	57	10	21	92	6	1.8 %
2012	3	56	10	22	91	6	1.9 %
2013	2	62	11	22	97	16	5.3 %
2014	2	58	8	23	91	7	2.3 %

Source: Statistics Norway/ Norwegian Environment Agency

Note to Table AXI-4: The correction for ”non-energy use and feedstock” in the CRF includes items D, Q, and S in the table.

Natural gas

Table AXI-5—Table AXI-7 that follows are simpler than Table AXI-4, but all relevant columns are included.

The difference between RA and SA with respect to energy consumption is presented in volume terms in Table AXI-5. The primary data are usually by volume, and this approach avoids problems with finding the correct NCV values.

The following columns in Table AXI-5 show that the remaining difference between RA and SA is almost wholly explained by non-energy use, losses, and statistical differences. When adjusted for these terms, the remaining difference is well below 1 per cent.

In Table AXI-6, the same analysis is presented in energy units (PJ). Variations in NCV between years and between sectors blur the clearer picture from the Sm^3 data in Table AXI-5.

Calculation notes to Table AXI-6:
In this table, the data for RA and SA were converted using the NCVs from CRF Table 1 A(b). These values correspond to a large fraction of high-NCV gas used in offshore oil and gas extraction. The correction items from the energy balance were converted using the NCVs in the national energy balance. These values reflect the composition of produced gas, and are closer to dry gas values. The choice of NCV for the energy balance items is somewhat arbitrary, since it is not known in which part of the inventory the statistical differences originate, and the composition of feedstock gas is not known.

Table AXI-5. Overview of discrepancies on energy goods. Natural gas. Million Sm^3

	Consumption data			Included in RA, but not in SA. Data from NIR energy balances, underlying data in Sm3				Remaining difference RA-SA	
Unit: 10^6 m^3	RA: Apparent consumption	SA: Consumption (recalculated with NCV of RA/SA)	Difference RA-SA	10. Losses in transport and distribution	11. Statistical differences (7-8+1.2-9-10-13.1)	12. Consumption for non-energy purposes	Total: 10+11 +12	10^6 m^3	% of SA
1990	1 698	2 293	-595	60	-595	-	-535	-60	-2.6 %
1991	2 204	2 416	-212	60	-212	-	-152	-60	-2.5 %
1992	2 676	2 590	85	-	85	-	85	-	0.0 %
1993	2 826	2 724	102	-	102	-	102	0	0.0 %
1994	2 549	2 924	-376	-	-376	-	-376	1	0.0 %
1995	3 142	2 967	174	-	174	-	174	0	0.0 %
1996	2 694	3 183	-489	-	-490	-	-490	0	0.0 %
1997	3 987	3 449	538	7	307	223	537	1	0.0 %
1998	4 693	3 319	1 374	22	926	419	1 367	8	0.2 %
1999	4 451	3 132	1 319	19	843	462	1 324	-5	-0.2 %
2000	4 772	3 619	1 153	37	636	480	1 153	1	0.0 %
2001	7 130	3 987	3 143	14	2 552	576	3 142	1	0.0 %
2002	4 958	4 144	814	11	409	429	849	-35	-0.9 %
2003	6 016	4 391	1 625	13	1 012	597	1 623	3	0.1 %
2004	4 687	4 614	72	14	-630	687	70	2	0.1 %
2005	4 566	4 548	18	10	-598	605	17	2	0.0 %
2006	5 024	4 714	311	11	-325	621	308	3	0.1 %
2007	5 749	4 937	812	26	296	511	834	-22	-0.4 %
2008	5 770	5 175	596	13	195	650	858	-262	-5.1 %
2009	5 579	5 573	6	20	-263	520	277	-271	-4.9 %
2010	7 803	5 614	2 189	15	1 647	544	2 207	-17	-0.3 %
2011	5 396	5 314	82	15	-498	591	108	-26	-0.5 %
2012	5 590	5 261	329	25	-182	514	357	-27	-0.5 %
2013	6 721	5 171	1 551	16	1 009	564	1 590	-39	-0.8 %
2014	6 069	5 549	519	8	-37	614	586	-66	-1.2 %

Source: Statistics Norway/ Norwegian Environment Agency

Table AXI-6. Overview of discrepancies on energy goods. Natural gas. PJ

	Consumption data from CRF Table1.A(c)			Included in RA, but not in SA. Data from NIR energy balances				Remaining difference RA-SA	
Unit: PJ	RA: Apparent consumption (*incl.* non-energy use and feedstock)	SA: Consumption	Difference RA-SA	10. Losses in transport and distribution	11. Statistical differences (7-8+1.2-9-10-13.1)	12. Consumption for non-energy purposes	Total: 10+11 +12	PJ	% of SA
	A	B	C	P	M	Q	T	U	V
			=A-B				=P+M+Q	=C-T	
1990	68	92	-24	2	-22	-	-19	-4	-4.9 %
1991	89	97	-9	2	-8	-	-6	-3	-3.0 %
1992	108	104	3	-	3	-	3	0	0.3 %
1993	114	110	4	-	4	-	4	0	0.3 %
1994	103	118	-15	-	-14	-	-14	-1	-0.9 %
1995	127	119	7	-	7	-	7	0	0.4 %
1996	108	128	-20	-	-18	-	-18	-1	-1.1 %
1997	160	138	22	0	11	8	20	2	1.3 %
1998	188	133	55	1	34	15	50	5	4.0 %
1999	178	125	53	1	31	17	48	5	3.8 %
2000	191	145	46	1	23	17	42	4	2.9 %
2001	286	160	126	1	92	21	114	12	7.7 %
2002	199	166	33	0	15	15	31	2	1.2 %
2003	241	176	65	0	37	22	59	6	3.7 %
2004	188	185	3	0	-23	25	3	0	0.2 %
2005	183	182	1	0	-22	22	1	0	0.1 %
2006	201	189	12	0	-12	22	11	1	0.7 %
2007	229	197	32	1	11	18	30	3	1.3 %
2008	230	206	24	0	7	23	31	-7	-3.3 %
2009	220	220	0	1	-9	19	10	-10	-4.4 %
2010	307	221	86	1	59	19	79	7	3.3 %
2011	213	210	3	1	-18	21	4	-1	-0.3 %
2012	221	208	13	1	-6	18	13	0	0.2 %
2013	274	205	69	1	36	20	56	13	6.1 %
2014	241	220	21	0	-1	22	21	-0	0.0 %

Source: Statistics Norway/ Norwegian Environment Agency

Table AXI-7 below presents the differences between RA and SA with respect to CO_2 emissions. Most of the difference is likely due to problems with assigning correct NCV values to both reference and sectoral approaches. The problems with NCV values in Table AXI-8 feed directly into the CO_2 comparison. In addition, the Norwegian NCV and C content values now used might not fully reflect the actual content of gas burned offshore. For most years after 2000 the data indicate that the gas has a even higher energy and carbon content than the factors used. See Table AXI-8. The inventory generally uses plant-specific data for consumption by volume and for CO_2 emissions, but plant specific NCV data have not been obtained so far.

Calculation notes to Table AXI-7:
CO_2 emissions corresponding to the correction items are calculated using NCV and C content values of the energy balance.

Table AXI-7. Overview of discrepancies on energy goods. Natural gas. Gg CO_2

	Emission data from CRF Table1.A(c)			Included in RA, but not in SA				Remaining difference RA-SA	
Unit: Gg CO_2	RA: Actual CO_2 emissions	SA: CO_2 emissions	Difference RA - SA	10. Losses in transport and distribution	11. Statistical differences (7-8+1.2-9-10-13.1)	12. Consumption for non-energy purposes ---------- *RA emissions are already corrected*	Total: 10+11	Gg CO_2	% of SA
1990	3 975	5 431	-1 456	124	-1 227	-	-1 103	-354	-6.5 %
1991	5 158	5 712	-554	126	-445	-	-319	-235	-4.1 %
1992	6 263	6 120	144	-	178	-	178	-34	-0.6 %
1993	6 615	6 401	214	-	213	-	213	1	0.0 %
1994	5 965	6 948	-983	-	-805	-	-805	-178	-2.6 %
1995	7 346	7 042	304	-	374	-	374	-71	-1.0 %
1996	6 296	7 527	-1 231	-	-1 041	-	-1 041	-189	-2.5 %
1997	8 760	8 184	576	15	639	-	654	-78	-1.0 %
1998	9 934	7 870	2 064	46	1 909	-	1 955	109	1.4 %
1999	9 248	7 838	1 409	38	1 728	-	1 766	-357	-4.6 %
2000	9 962	9 002	960	76	1 307	-	1 383	-423	-4.7 %
2001	15 223	10 231	4 992	29	5 212	-	5 241	-249	-2.4 %
2002	10 526	10 560	-33	23	831	-	853	-887	-8.4 %
2003	12 591	11 116	1 474	27	2 063	-	2 090	-616	-5.5 %
2004	9 285	11 489	-2 203	28	-1 284	-	-1 257	-947	-8.2 %
2005	9 190	11 538	-2 348	19	-1 213	-	-1 194	-1 155	-10.0 %
2006	10 210	11 408	-1 198	23	-656	-	-633	-565	-5.0 %
2007	12 087	11 734	354	53	595	-	648	-294	-2.5 %
2008	11 827	11 898	-71	26	393	-	418	-489	-4.1 %
2009	11 546	12 518	-972	39	-528	-	-489	-483	-3.9 %
2010	16 495	12 853	3 643	31	3 312	-	3 343	299	2.3 %
2011	10 944	12 271	-1 328	30	-998	-	-968	-359	-2.9 %
2012	11 627	12 042	-414	49	-362	-	-313	-102	-0.8 %
2013	14 098	11 810	2 288	32	2 007	-	2 040	248	2.1 %
2014	12 417	12 660	-243	16	-73	-	-57	-186	-1.5 %

Source: Statistics Norway/ Norwegian Environment Agency

Table AXI-8 gives the NCV and carbon content values used in the RA and SA in the 2013 submission. NCV values used in the national energy balance are also shown. The carbon content to be used with correction items from the energy balance was calculated for these tables and has not been published elsewhere (method shown below). Finally, an "actual" C content is calculated as the ratio between the implicit kg C/Sm^3 factor in the inventory and the NCV used. The high values after 2000 indicate that the NCV now used may be too low for these years.

Calculation notes to Table AXI-8:
The carbon content to be used with a given NCV is calculated by inverting the formula in OLF (2008) for estimating CO_2 factors (in kg/Sm^3) from the NCV (in MJ/Sm^3): $fCO_2 = 0.0724 * NCV - 0.5771$.

Table AXI-8. NCV and C content data for natural gas

	NCV used in energy balance	**NCV used in RA and SA**	**C content to be used with Energy balance correction items**	**C content used in RA and SA**	**"Actual C content" (SA)**
	MJ/S m^3	MJ/Sm^3	tC/TJ	tC/TJ	tC/TJ
1990	36.45	40.30	15.43	15.84	16.03
1991	36.99	40.30	15.49	15.84	16.00
1992	36.74	40.30	15.46	15.84	15.99
1993	36.81	40.30	15.47	15.84	15.90
1994	37.53	40.29	15.55	15.84	16.08
1995	37.62	40.27	15.56	15.84	16.07
1996	37.35	40.26	15.53	15.84	16.02
1997	36.72	40.11	15.46	15.82	16.13
1998	36.45	40.07	15.43	15.82	16.14
1999	36.27	39.99	15.41	15.81	17.07
2000	36.36	40.03	15.42	15.81	16.95
2001	36.18	40.05	15.40	15.82	17.47
2002	36.00	40.07	15.37	15.82	17.34
2003	36.12	40.06	15.39	15.82	17.24
2004	36.12	40.04	15.39	15.81	16.96
2005	36.01	40.01	15.38	15.81	17.29
2006	35.88	40.00	15.36	15.81	16.50
2007	35.70	39.84	15.34	15.80	16.27
2008	35.75	39.88	15.34	15.80	15.73
2009	35.72	39.50	15.34	15.76	15.51
2010	35.74	39.36	15.34	15.75	15.87
2011	35.64	39.43	15.33	15.75	15.97
2012	35.46	39.61	15.31	15.77	15.76
2013	35.44	39.59	15.30	15.77	15.73
2014	35.31	39.64	15.29	15.77	15.70

Source: Statistics Norway/ Norwegian Environment Agency

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