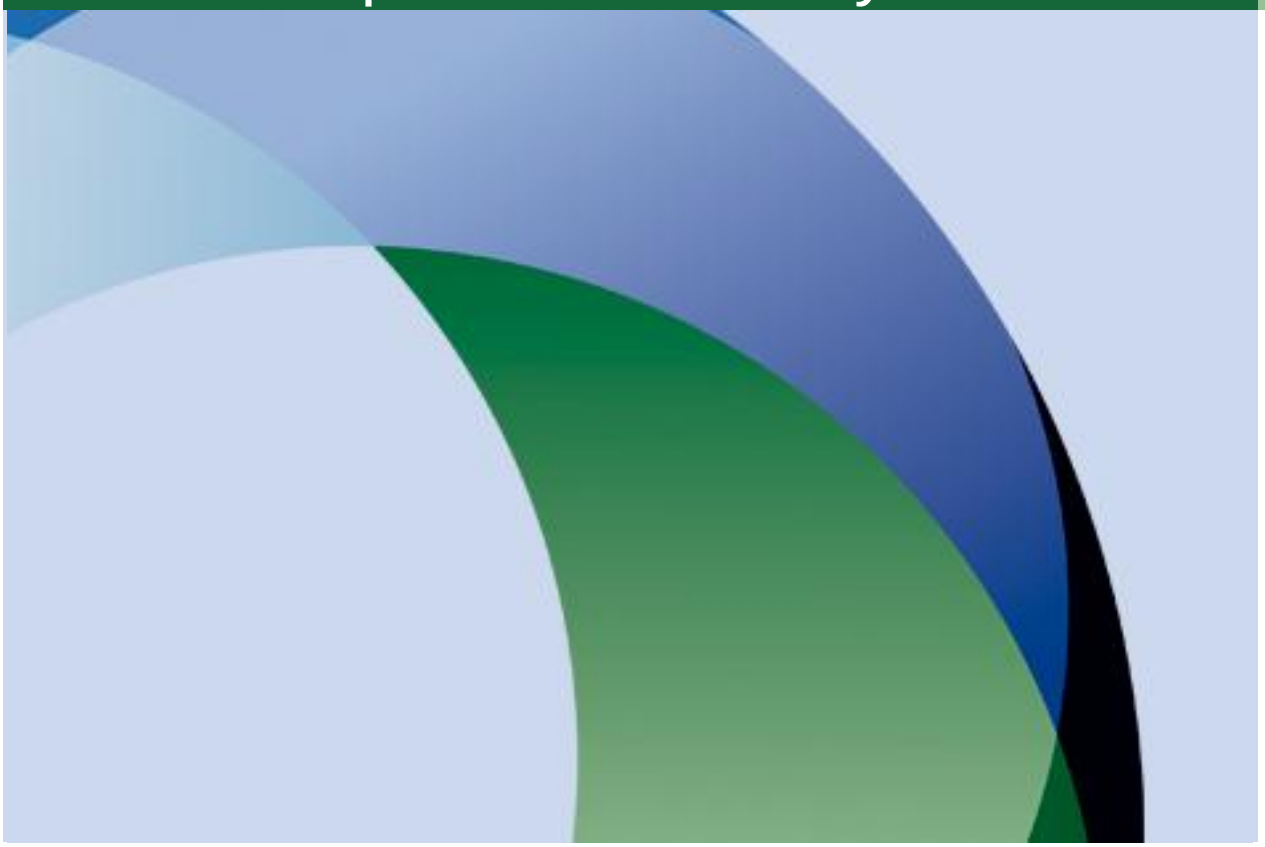
KLIMA- OG FORURENSNINGS-DIREKTORATET

Chemicals in products

Survey of the phthalate DEHP in articles imported to Norway

TA 2845 2011



Carried out by

COWI

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Summary

The main objective of this study is to investigate to what extent the consumption of bis(2-ethylhexyl)phthalate (DEHP) in articles in Norway reflects the consumption patterns for this substance in the EU.

For DEHP in mixtures, which are registered in the Norwegian Product Register, the total consumption in Norway in 2009 was 2.4 tonnes. If the consumption in Norway would have been similar to the average per capita consumption in the EU, the DEHP consumption in mixtures in Norway in 2009 would have been 85 tonnes DEHP. DEHP on its own was in 2009 not used for manufacturing of articles in Norway, but some imported semi-manufactures with DEHP such as PVC coated textiles may have been used for manufacturing of articles in Norway.

Estimating the Norwegian consumption, by assuming that the consumption resembles the average EU per capita consumption of DEHP, would result in a total consumption in Norway of approximately 2,800 tonnes in 2007 and about 2,000 tonnes in 2009.

The application of DEHP as primary plasticiser in PVC represented more than 95% of the DEHP consumption for manufacturing of articles in the EU. Based on data from the trade statistics it is estimated that the import of flexible PVC in articles to Norway is of a magnitude that could justify that the DEHP consumption with PVC in articles could be of a size similar to the EU average.

Based on the available data, the consumption of DEHP in Norway in 2009 in mixtures and articles is estimated at 1,200-2,500 tonnes DEHP. The estimate indicates that the consumption in Norway is of the same magnitude as in the EU.

However, the import is in fact not directly linked to the use of DEHP for manufacturing of articles in the EU. Approximately half of the total import of DEHP in articles originates from Asia although import from Asia accounted only for 20% of the total tonnage of the articles. The reason is that in articles of flexible PVC manufactured in Asia, DEHP accounted in 2009 for 60% of the plasticiser content, whereas in articles manufactured in the EU in 2009 DEHP is estimated to account for approximately16% on average of the plasticiser content. Import from Denmark and Sweden constitutes 37% of the total import to Norway of the relevant product groups and DEHP has been largely phased out in the manufacturing of PVC articles in these countries. The total DEHP content of articles imported from EU Member States is consequently significantly below the quantities which would be estimated if the EU average was applied for all import from the EU.

The use of DEHP in the EU is decreasing these years, while the consumption of the substance in Asia is stable. The consumption of DEHP in articles in Norway will consequently increasingly be dependent on the use of the substance in Asia.

Norsk sammendrag

Målet for dette prosjektet er å kartlegge bruk og forekomst av bis(2-ethylhexyl)phthalate (DEHP) i produkter og materialer på det norske markedet. Et viktig element er å vurdere i hvilken grad informasjon om bruk og omsetning i EU kan benyttes som utgangspunkt for beregning av omsetning av DEHP på det norske markedet.

I kjemiske produkter som er registrert i det Norske Produktregister, var det samlede forbruket av DEHP på 2,4 tonn i 2009. Hvis forbruket i Norge var av samme størrelse per innbygger som forbruket til kjemiske produkter i EU, skulle forbruket av DEHP i kjemiske produkter i Norge vært 85 tonn. DEHP ble i 2009 ikke brukt til produksjon av produkter i Norge, men visse importerte halvfabrikata, eksempelvis PVC overflatebehandlede tekstiler, kan ha vært brukt til produksjon av produkter i Norge.

Hvis det samlede forbruket av DEHP i Norge beregnes ut fra en antakelse om at det norske forbruket svarer til det gjennomsnittlige forbruket av DEHP per innbygger til produksjon av produkter i EU, ville forbruket i Norge vært 2.800 tonn i 2007 og omkring 2.000 tonn i 2009.

Bruk av DEHP som primær mykner i PVC utgjorde mer enn 95 % av forbruket av DEHP til produksjon av produkter i EU. Data i handels- og produksjonsstatistikk viser at import av fleksibel PVC til Norge er i en størrelsesorden som tilsier at omsetningen av DEHP i PVC-materialer kan ligge på samme nivå i Norge som gjennomsnittet i EU.

Basert på de tilgjengelige data er forbruket av DEHP i Norge i kjemiske produkter og artikler anslått til 1.200-2.500 tonn DEHP. Beregningen indikerer at forbruket av DEHP i Norge er i samme størrelsesorden som i EU.

Imidlertid er importen av produkter med DEHP til Norge ikke direkte koblet til forbruket av DEHP til fremstilling av produkter i EU. Omkring halvparten av den samlede import til Norge av DEHP i produkter stammer fra Asia selv om import fra Asia kun utgjorde omkring 20 % av den samlede vekt av produktene. Årsaken er at DEHP utgjorde 60 % av innholdet av myknere i fleksibelt PVC produsert i Asia, mens DEHP kun utgjorde omkring 16 % av myknerne i PVC i produkter produsert i EU. Import fra Danmark og Sverige utgjorde 37 % av den samlede import til Norge av de relevante produktgruppene. Siden DEHP er nesten helt faset ut i disse landene, er resultatet at DEHP i den samlede import fra EU er mindre enn den ville være hvis det i beregningen var regnet med at DEHP-innholdet i alle produkter fra EU tilsvarte gjennomsnittet i EU.

Forbruket av DEHP i EU går ned, mens forbruket av DEHP i Asia er stabilt. Forbruket av DEHP i produkter i Norge vil derfor i stigende grad være avhengig av forbruket av stoffet i Asia.

1. Introduction

1.1 Identity of the substance

This report concerns the following substance:

Chemical Name:	Bis(2-ethylhexyl)phthalate
Abbreviations:	DEHP, DOP
EC Number:	204-211-0
CAS Number:	117-81-7
IUPAC Name:	Di(2-ethylhexyl)- 1,2-benzenedicarboxylate

1.2 Background and objectives

DEHP and a number of other phthalates are priority hazardous substances and Norway has national targets for the reduction of the releases of these substances.

DEHP are according to the Regulation on classification, labelling and packaging (CLP Regulation) classified with the hazard statement code H360FD: "May damage fertility. May damage the unborn child" (EC, 2009). The CLP Regulation will enter into force in Norway when it is included in the EFTA agreement and will be in force in parallel with the regulations on classification, labeling, etc. of dangerous chemicals (FOR, 2002) until June 1, 2015.

The existing data on the consumption of DEHP in Norway is based on data from the Norwegian Product Register which register the consumption of DEHP in Norway in mixtures. No data are currently available on the consumption of DEHP in articles.

The registered DEHP consumption in Norway is considerably below the consumption which could be estimated by assuming that the per capita consumption in Norway resemble the EU average. As shown in Table 1.1 assuming a per capita consumption like for the EU in 2007 would yield a Norwegian consumption of nearly 2,800 tonnes, contrary to the 2.4 tonnes registered in the Product Register for 2009 (the data are further discussed in the following sections). The main differences concern DEHP in plasticisers for PVC which account for more than 90% of the EU and the global consumption of DEHP.

The quantities of DEHP registered in the Norwegian Product Register has decreased from approximately 2,200 tonnes in 1995 to 2.4 tonnes in 2009 (Klif, 2011)

In Norway, since 1999 DEHP has been prohibited in toys and childcare articles to children below 3 years. From 2007 the substance has been prohibited in all toys intended for children up to 14 years.

For the period 1999-2005, the use of DEHP in toys and childcare articles intended to be placed in the mouth by children under the age of three was subject to a temporary ban at European Union level. In the EU, since 2005 DEHP shall not be used as substances or as constituents of preparations, at concentrations of greater than 0.1% by mass of the plasticised material, in toys and childcare articles (Regulation No 1907/2006 (REACH), Annex XVII). Furthermore, DEHP is not permitted for use in cosmetics in Norway (kosmetikkforskriften) and in the EU (Directive 2004/93/EC).

The main objective of this study is to investigate to what extent the consumption of DEHP in articles in Norway reflects the consumption pattern for these substances in the EU.

Table 1.1 *Comparison between registered consumption in Norway and the estimated consumption if the consumption in Norway resembles the average EU per capita consumption*

Application area	**Consumption, tonnes DEHP per year**		
	EU, 2007 *1	**Norway, if average EU 2007 per capita consumption is applied *2**	**Registered in the Norwegian Product Register, 2009 *3**
Additives for PVC *4	282,100	2,672	0.0
Additives and sealants	7,000	66	0.0
In paints and lacquers	900	9	2.2
Dyes and Inks	1,000	10	0.0
Other uses	0	0	0.2
Total		2,756	2.4

*1 Source: COWI *et al.* (2009). Indicates the amount of DEHP used for production in the EU, and do not include import and export with articles. Import and export with articled has been demonstrated to approximately outbalance each other at the aggregated level shown in this table.

*2 Estimated quantities of DEHP in mixtures and articles sold in Norway,

*3 Source: Klif 2011. Based on data from the Norwegian Product Register.

*4 A small amount of the DEHP may be used for plasticising other types of plastics

1.3 Methodology

1.3.1 Data on DEHP consumption in the EU

The description of the consumption of DEHP in the EU is mainly based on a detailed assessment of 2007 data for the EU production and consumption undertaken for the European Chemicals Agency (COWI *et al.*, 2009). The assessment includes a detailed breakdown of the EU consumption into the different applications, obtained from manufacturers of the substance.

1.3.2 Data on DEHP in mixtures

The consumption of DEHP in Norway as a pure substance and in mixtures is registered in the Norwegian Product Register. The data from 2009 is based on the volumes registered by the registrants.

1.3.3 Statistics

Data on import of relevant commodity groups by export country have been retrieved from the online database StatBank Norway of Statistics Norway using the database ”03057: Imports and exports, by commodity number and country (1999-2009)”. The nomenclature used by Statistics Norway for the external trade statistics is identical to the Combined Nomenclature (CN8) used in the EU for the first six digits, but differs for the last two. In general for the products concerned the Norwegian statistics is less differentiated on the last two digits. It is in this study assumed that the country from which the product imported (the export country) is identical with the country of origin i.e. the country where the articles are produced. Statistics Norway has confirmed that the registered export country would in general also be the country of origin; i.e. if the export country is France the products in general origin from France (Statistic Norway, 2010). The distribution between import from the EU and import from Asia for the product groups covered by this study follows the expected pattern based on knowledge about the trade of the different types of PVC products in the EU. As an example, the main part of PVC products such as flooring and cables are imported from EU Member States. This is in correspondence with the fact that the import of these heavy product types into the EU (extra-EU trade) is small compared to the intra-EU trade (COWI *et al.*, 2008). For bags and flip-flop sandals, the import data shows the expected pattern: the major part is imported from Asia. It is therefore considered, that for the product groups included this study, the export country is in general also the country of origin.

1.3.4 Estimating PVC and DEHP in articles

Commodity groups with articles that may contain flexible PVC have been identified on the basis of a Danish investigation of import of phthalates in different PVC-containing articles (Skårup and Skytte, 2003). In the Danish study the average content of flexible PVC and

phthalates was determined for more than 100 different commodities groups. The commodity numbers used in the Danish study was the combined nomenclature (CN8) with 8 digits. For each commodity group the study provides data on the percentage flexible PVC of the total weight and the plasticiser content of flexible PVC. The estimates on percentage flexible PVC both reflect the typical PVC content of the products (in the case they contain PVC) and the percentage of the products which contain PVC. The latter may for some product groups have changed over time due to an increasing demand for PVC-free products. The nomenclature used by Statistics Norway is as mentioned above similar for the 6 first digits, but differs for the last two. For this reason it has been necessary to select, on the basis of the description of the groups, the relevant commodity groups of the Norwegian external trade statistics, which most adequately matched the commodity codes of the CN8. For some of the products groups it is explicitly indicated in the statistics that the products are made of PVC e.g. flooring and wall covering, sheets and films. The average content of PVC and plasticiser is based on the estimates from the Danish study. As the specific commodity groups used in the Norwegian statistics is somewhat different from the commodity groups used in Denmark (and the EU), the percentage flexible PVC and plasticiser content have been estimated for each commodity group i.e. for all cables instead of for each CN8 code within the group of cables. These estimates are based on averages when using the methodology in Denmark. Applying the commodity-specific percentages from the Danish study (from 2003) on the products on the Norwegian market is therefore somewhat uncertain, but it is estimated that with the applied modifications, for most commodity groups the percentages still are within an acceptable uncertainty. The methodology for estimating the import is in this report designated “the Danish methodology”.

The methodology has been evaluated by Brandt and Hansen (2009). For the product groups covered by the Danish tax system, they compared the supply of phthalates estimated on the basis of this methodology with the estimated consumption of phthalates based on the tax proceeds. For the flooring the two estimation methods gives quite different estimates, whereas for other products the estimations based on import/export and production statistics seems to provide a quite good estimate.

Furthermore, the content of the products on the EU market has recently been investigated as part of collection of background data for an Annex XV restriction report on DEHP and three other phthalates prepared by the Danish EPA (Høibye *et al.*, 2009).

On the basis of the two mentioned studies, the PVC content of flooring as well as the specific plasticiser content of the products has been adjusted.

As applied here the estimates on phthalate content have been replaced by estimates on average plasticiser content, and an estimate on the percentage of the plasticisers which are accounted for by DEHP. The percentage of DEHP of the total plasticiser content is estimated to be different from the geographical regions and different percentages has been applied for import from Asia, Americas, EU (excl. Denmark and Sweden), Denmark and Sweden and the rest of the world.
The import of the DEHP in articles within each commodity group (C_8, 8 digit commodity group), $Import_{DEHP,C8,total}$ is calculated using the following equation:

$$Imp_{DEHP,C8,total} = \sum_{reg=1}^{5} Imp_{C8,reg} * Flex\ PVC_{C8} * Plasticiser_{PVC,C8} * DEHP_{plasti,reg}$$

where

$Imp_{C8,\ reg}$	is the import in tonnes of the commodity group from the region (e.g. Asia)
$Flex\ PVC_{C8}$	is the percentage flexible PVC of the total volume of the commodity (same for all regions)
$Plasticiser_{PVC,C8}$	is the percentage plasticiser of the flexible PVC in the commodity (same for all regions)
$DEHP_{plasti,\ reg}$	is the percentage DEHP of the plasticisers used in the region (same for all commodities).

As indicated, the total import of DEHP in each commodity group is calculated as the sum of the import from the five regions:

$$Imp_{DEHP,C8,total} = Imp_{DEHP,C8,Asia} + Imp_{DEHP,C8,Americas} + Imp_{DEHP,C8,SE+DK} + Imp_{DEHP,C8,rest\ EU} + Imp_{DEHP,C8,rest\ world}$$

For some commodity groups not covered by this methodology, where it is well known that DEHP is used and estimates on the consumption is available from the EU or from Denmark, the consumption in Norway has been roughly estimated on a per capita basis.

2. Usage and supply of DEHP

This chapter describes the use of DEHP in the EU and other parts of the world. The information is presented with the aim of providing the background for the estimates on DEHP in articles imported to Norway in Chapter 5.

2.1 Usage and supply of DEHP in the EU and other parts of the world

According to The European Council for Plasticisers and Intermediates (ECPI), in Western Europe about one million tonnes of phthalates are produced each year. Approximately 900,000 tonnes of the plasticisers are used to plasticise PVC (ECPI 2011a).

DEHP has historically been the most important plasticiser, but the consumption of DEHP has decreased significantly the last decade, as it has been replaced by other plasticisers, first of all the phthalates DINP and DIDP. The consumption of DEHP in terms of tonnage and percentage of total plasticiser consumption reported by different sources is therefore highly dependent on the year of reference.

According to WECPI's DEHP information centre DEHP account today for 15% of all plasticiser usage in Western Europe corresponding to about 180,000 tonnes (ECPI 2011b) whereas another website from the same organisation indicated the percentage to be 12% (ECPI, 2011a).

The most recent detailed survey present 2007 data and at that time the total DEHP consumption for manufacturing of mixtures and articles in the EU was about 291,000 tonnes (COWI *et al.*, 1999). Of the 341,000 tonnes produced in the EU in 2007, 187,000 tonnes were produced in Western Europe and the remaining part in Eastern Europe. No data was available on the total EU plasticiser consumption in the EU and consequently the DEHP consumption as percentage of total EU consumption could not be estimated, but was likely higher that the 18% reported for Western Europe.

A recent estimate, presented at the 22nd Annual Vinyl Compounding Conference in July 2001, represents 2010 data (Calvin, 2011). The breakdown of the plasticiser market in Western Europe, USA and Asia is shown in Table 2.1. According to this presentation, DEHP accounted for 16% of the plasticiser market in Western Europe in 2010, whereas it accounted for 19% of the market in the USA and 60% of the market in Asia. The total global market for plasticisers was estimated at 6 million tonnes, with 1.4 million tonnes in Europe, the Middle East and Africa, 1.1 million tonnes in the Americas and 3.5 million tonnes in Asia (Calvin, 2011). Of the global plasticiser market, phthalates account for 84% (Calvin, 2011).

The percentage for Europe is somewhat higher than the percentages presented by the European Council for Plasticisers and Intermediates (ECPI, 2011a) which indicates a decrease in the percentages represented by DEHP from 18% in 2007 to about 12% of the phthalate use in 2010. The 16% indicated by Calvin (2011) is assumed to be representative for the 2009 situation. Likewise, the 2010 data for the USA and Asia is used as best estimate for the 2009 situation.

If the percentages shown for USA are used as best estimate for the Americas and the percentages for Western Europe are used as best estimated for Europe, the Middle East and Africa, then DEHP should account for about 42% of the global plasticiser market and Asia should represent 83% of the global consumption of DEHP. However, according to a recent market report from Ceresana Research, DEHP in 2010 accounted for roughly 54% of the global plasticiser marker (Ceresana, 2011). It could indicate that the percentages for Eastern Europe, the Middle East and Africa could be higher than the percentages for Western Europe.

Table 2.1 World plasticiser market 2010 (Calvin, 2011)

Plasticiser	**Percentage of total ***		
	Western Europe	**USA**	**Asia**
DEHP	16	19	60
C9/C10 phthalates **	63	33	21
Linears/other phthalates	6	19	9
Non phthalates	16	38	10
Total	100	100	100

* The data are indicated to be based on two market reports (SRI,CMAI) and BASF estimates.

** Note of the authors of this report: Mainly DINP (C9) and DIDP (C10).

According to a recent article from August 2011 in ICIS Chemical Industry News, although European DEHP capacity is estimated at 200,000 tonnes/year, consumption has been reduced year by year to just above 100,000 tonnes/year (Victory and Abreu, 2011). This is however not supported by the information from other sources.

Whereas the share of DEHP of the total plasticiser market has decreased in the Americas and Europe for the period 2006 to 2010, the percentage has been stable in Asia (Calvin, 2011). With a growing market in Asia the total market of DEHP in Asia has increased from 2006 to 2010, but is expected to slightly decrease for the period 2010 to 2017 (Calvin, 2011). A market report concerning China's demand for DEHP indicates that the DEHP market has grown at a fast pace in the past decade and the report projects for the period 2008 to 2012 that both production and demand will continue to grow (AMID, 2008).

The reported average of 60% DEHP of total plasticiser market in Asia may in fact overlay some differences among the countries in Asia with a higher percentage for some countries and a lower for others.

A market survey of production of and market for chlorinated paraffins in China indicated that DEHP accounted for about 79% of the 1.05 million tonnes plasticiser market in China in 2005 (CCM Chemicals, 2006 – only a part of the report has been available).

Differences among EU Member States

For medium chained chlorinated paraffins (MCCPs), which are often used as co-plasticisers in PVC with DEHP as the primary plasticiser, regional differences within the EU have been reported (Lassen *et al.*, 2010). The consumption of MCCPs in some Member States such as Sweden and Germany is relative small compared to the EU average. As articles with plasticised PVC imported to Norway from Sweden, Denmark, Finland and Germany account for nearly 50% of the total import, it highly impacts the estimate on the potential import of DEHP in articles, if DEHP is also less used for production of PVC articles in these countries.

Specific data on the distribution of plasticisers in manufactured PVC have been available for Sweden only (Table 2.2). The total consumption of plasticisers for PVC in Sweden has remained at a level of 30,000 tonnes/per year over the period 1994 to 2008, but DEHP has been largely replaced by DINP. In production of PVC in Sweden, DEHP in 2008 accounted for 5% of the total, which is well below the EU average.

The available assessments of DEHP and phthalates from Germany do not indicate that the consumption of DEHP in Germany should differ from the general use pattern in Western Europe. Information from Denmark indicates that DEHP has largely been phased out in manufacturing of articles in Denmark (Brandt and Hansen, 2009).

Table 2.2 *Use of plasticisers for production of PVC articles in Sweden in 2008 (KemI, 2011)*

Substance	Consumption in 2008, tonnes	Percentage of total
DEHP	1,486	5%
DINP	12,489	43%
DIDP	1,060	4%
BBP	19	0.1%
Other phthalates	12,486	43%
Adipates	1573	5%
Total plasticiser use	29,115	100%

Summary
For the assessments of the potential import of DEHP in articles to Norway it will be assumed that DEHP accounts for 5% of the imported plasticisers in articles from Sweden and Denmark, 16% of plasticisers in articles from the rest of Europe, 19% of plasticisers in articles from the Americas and 60% in articles from Asia and other parts of the world. Other parts of the world account for an insignificant part of the import of the relevant articles to Norway.

2.2 Use of DEHP by product group

The overall application of plasticisers in Europe by application area is shown in Table 2.3. In Western Europe about one million tonnes of phthalates are produced each year, of which approximately 900,000 tonnes are used to plasticise PVC (polyvinyl chloride). The overall application pattern has not changed significantly for many years.

Table 2.3 *Application of plasticisers in Europe (based on ECPI, 2011c)*

Application area	**Percentage of total plasticiser use**
Floor and wall covering	14%
Wires and cables	25%
Film and sheet	22%
Extrusions - e.g. hoses and other endlessly formed plastic profiles	11%
Coated fabric	10%
Plastisols – i.e. paste-like applications, for example in automobile underselling	9%
Other	9%

An overview of the EU consumption of DEHP by product group in 2007 is shown in Table 2.4. Besides the use in flooring, wall covering, wires and cables major application areas are film/sheet and coated products made by calendering (16% of total), hoses and profiles (12%), and coated fabric and other products from plastisol (17%). The figures are based on dta on DEHP consumption for production of mixtures and articles in the EU as well as an analysis of import and export of DEHP in articles. It should be noted that at the time of the analyses no data on the use of DEHP in Asia was available and the analysis use the same percentage DEHP for both import and export. Consequently, the import of DEHP in articles is probably significantly underestimated and the actual total consumption in end-products higher than indicated.

In general, the use pattern for DEHP is very similar to the general pattern for plasticisers; at aggregated level DEHP has not in particular been replaced for some specific applications. For

this reason it will by the estimates on import in articles be roughly assumed that the percentage accounted for by DEHP will be the same for all the application areas except for toys as discussed in section 5.8.

In films for packaging of food, DEHP has to a large extent been replaced, and film and sheet account for a smaller percentage of the DEHP consumption (16% for DEHP while 22% for all plasticisers). The consumption of DEHP for wires and cables account for 17% of DEHP consumption whereas it takes up 25% of total plasticiser consumption. These differences are estimated to be small compared with the uncertainty on the distribution between the different application areas and the overall uncertainty of estimating the import with articles, and the 16% DEHP will be used for all product groups.

Table 2.4 *EU consumption of DEHP in end-products by product group in 2007 (Source: COWI et al., 2009)*

Application areas	**Consumption Tonnes**	**Percentage of total DEHP consumption**
Flooring, wall covering, roofing	47,600	23%
Wires and cables	64,100	17%
Film/sheet and coated products made by calendering	44,000	16%
Coated fabric and other products from plastisols	47,800	17%
Hoses and profiles (extrusion)	34,700	12%
Shoe soles	19,400	7%
Other moulded products	3,000	1%
Other polymer applications	12,300	4%
Non polymer applications	9,920	3%
Total	268,900	100%

A more detailed distribution of the consumption of DEHP for manufacture and end-product use in the EU is shown in Table 2.5. For the major product groups, apart from "other polymer applications", the import with articles balanced the export. For the minor application areas and non-polymer applications import/export with mixtures and articles was not assessed.

Table 2.5 Estimated DEHP tonnage for EU manufacture and in end-products marketed in the EU in 2007 (COWI et al., 2009)

Applications area	**DEHP tonnage, tonnes/year**		**Percentage of total DEHP in marketed end-product**
	Manufacture	**End-products marketed**	
Indoor uses:			

Applications area	DEHP tonnage, tonnes/year		Percentage of total DEHP in marketed end-product
	Manufacture	End-products marketed	
Flooring: - PVC flooring (with PVC surface) - Carpets with PVC back-coating - Cork with PVC top-coating or back-coating	33,000	30,200	10.6%
Wall covering	11,000	10,100	3.5%
Wires and cables (sheathing)	52,000	52,600	18.5%
Hoses and profiles: - Hoses and tubes in industry; - Profiles of electrical equipment - Medical tubing	31,000	29,600	10.4%
Film/sheet and coated products made by calendering: - Curtains, blinds, table linen, etc.; - Packaging; - Tape and self-adhesive foils; - Office supplies (ring binders, files, slip cases, etc.); - Water beds and air mattresses - Medical bag/sheet devices; - Bottom sheets for hospitals.	44,000	41,200	14.5%
Coated fabric and other products from plastisol: - Upholstery and car seats; - Luggage; - Clothing (e.g. oilcloths)	31,000	31,800	11.2%
Moulded products	3,000	5,000	1.8%
Other polymer applications	12,300	20,100	7.1%
Non polymer applications:			
Adhesives and sealant	4,000	4,000	1.4%
Lacquers and paints	500	500	0.2%
Printing ink	1,000	1,000	0.4%
Other non-polymeric	20	20	0.0%
Outdoor uses:			
Calendered roofing material	600	600	0.2%
Coil coated roofing material	3,000	3,000	1.1%
Wire and cables - air	2,400	2,400	0.8%
Wire and cables - soil	9,700	9,700	3.4%
Coated fabric - Rainwear; - Tarpaulins;	12,800	12,800	4.5%
Car undercoating	4,000	4,000	1.4%
Hoses and profiles - Garden hoses - Windows profiles	3,700	3,700	1.3%
Shoe soles (moulded)	19,400	19,400	6.8%

Applications area	DEHP tonnage, tonnes/year		Percentage of total DEHP in marketed end-product
	Manufacture	End-products marketed	
Non polymer applications:			
Lacquers and paints	400	400	0.1%
Adhesives and sealant	3,300	3,300	1.2%
Total (round)	282,000	285,000	100%

Consumption of DEHP in Japan

For the estimates of the potential import of DEHP in articles to Norway, it would be relevant to know to what extent DEHP in other parts of the worlds are used for other articles than reported for Europe. Data for China, Korea and other large users of plasticisers have not been available, but data for Japan have been identified.

The consumption of DEHP by application area in Japan in 2003 is shown in Table 2.6 DEHP accounted in 2003 for 62% of phthalate consumption in Japan. The table includes the use of DEHP as industrial raw material (12%), which is not reported for EU, but the study does not further describe this use. More than 90% of the DEHP was used for PVC.

The main application areas were the same as reported from Europe, although some differences in the distribution between the different areas are seen.

Table 2.6 Consumption of DEHP in Japan in 2003 by application area (NITE, 2006)

Application area	Consumption of DEHP Tonnes	Percentage of total
Wires and cables	31,600	17%
Hoses and gaskets	7,800	4%
Flooring material	28,000	15%
Wallpaper	25,300	13%
General-purpose films and sheets	27,600	15%
PVC films for agriculture	15,600	8%
Synthetic (PVC) leather *	7,700	4%
Footwear	3,100	2%
Industrial raw materials	23,300	12%
Paints, pigments and adhesives	9,100	5%
Others	9,900	5%
Total	189,000	100%

* The report uses the term “leather” in the table, but indicates in the body text that the leather is manufactured from plasticised PVC resin. This product group is in the data for Europe included in “Coated fabric and other products from plastisols”.

Consumption of phthalates in Denmark

In Denmark, phthalates for some application areas are subject to tax and the phthalate consumption with a number of products can be estimated on the basis of the tax proceeds. For the period 2001 to 2009 the phthalate content of products subject to tax has decreased from 5,636 tonnes (Skårup and Skytte, 2003) to 3,844 tonnes (Brandt and Hansen, 2010). Data for 2009 are shown in Table 2.7. The type of phthalates in the articles is not registered and consequently it is not possible to estimate the DEHP consumption. The total content of DEHP, BBP and DBP are estimated on the basis of general knowledge on the use of the substances, but the estimates are quite uncertain as the import by region has not been assessed on the basis of the trade statistics.

Not all phthalate containing articles are covered by the tax system. Phthalates in plasticised PVC in vehicles, in coating of bags and a number of other products, where the plasticised PVC accounts for a minor part of the products, are not subject to tax and not included in the table. This may to some extent explain that the per capita consumption estimated from the tax proceeds is far below the average EU per capita consumption.

However, the distribution may give some hints of which products with phthalates and DEHP may also be used in Norway.

Table 2.7 *Consumption of phthalates in Denmark in products subject to tax in 2009 estimated in the basis of the tax proceeds (Based on Brandt and Hansen, 2010)*

Application area	Consumption of phthalates in 2005-2007 Tonnes/year	Percentage of total	Estimated content of DEHP, BBP and DBP Tonnes/year
Cables and wires	1,900	49%	300-1,200
Tubes, hoses, etc.	630	16%	70-140
Gloves, rainwear, and other clothing	540	14%	270-430
Flooring*	370	10%	<100
Roofing	160	4%	<16
Foils and tape	120	3%	60-100
Office articles (with foils)	85	2%	≤17
Tarpaulins	28	1%	≤3
Table lined, curtains, etc.	9	0%	5-7
Steel gutter	2	0%	0.2-1
Total	3,844		705-2,014

* The authors note that this volume is very small and would on the basis of the trade statistics be expected to be around 1000 tonnes,

3. DEHP use in PVC

As indicated in Table 2.4, PVC use in polymeric materials account for about 97% of the total consumption of DEHP. No specific information is available on the use in other polymers than PVC, and it is here estimated that PVC may account for about 95% of the total use of DEHP in polymeric materials in the EU. From the USA it is reported that 90% of the all used DEHP is used for PVC (TURI, 2009), and from Japan that more than 90% was used for PVC (NITE, 2006).

3.1 Average plasticiser content of flexible PVC

The EU Risk Assessment for DEHP states with reference to Kirk-Othmer Encyclopedia of Chemical Technology that the typical concentration of DEHP in flexible PVC-products is 30% (w/w) (ECB, 2008). The same information is indicated by ECPI's DEHP Information Centre (ECPI, 2011b).

In fact, the plasticiser content varies quite extensively among the different applications of the flexible PVC. Furthermore, the available results of tests of products clearly demonstrate that DEHP is typically used together with some co-plasticisers and that the DEHP content of the materials is most often below the 30%. As an example10-20% plasticiser content, depending on product type, has been estimated for flooring products for the professional market, while higher concentrations, 25-30%, have been mentioned for low-price cushioned vinyl for the private market (Høibye *et al.*, 2011). In these products, typically more plasticisers will be used in conjunction.

As consequence, if DEHP accounts for 16% of the plasticiser market, more than16% of the flexible PVC produced in Western Europe will contain DEHP, but the DEHP content will typically be lower than the average plasticiser content of the products.

The average plasticiser content of plasticised (flexible) PVC will here be estimated on the basis of data on the total market for plasticisers and flexible PVC.

The 6 million tonnes plasticisers used globally are mainly used to plasticise approximately 12 million tonnes PVC resin (Calvin, 2011) and the average plasticiser content of the final PVC material can be estimated at approximately 33% if no other substances are added. According to ECVM, the total European PVC resin consumption in Europe in 2007 was 6.5 million tonnes (ECVM, 2011). Based on the breakdown on applications it can be estimated that flexible PVC today takes up about 35% of the total PVC resin consumption corresponding to

about 2.3 million tonnes PVC resin. If 930,000 tonnes plasticisers are used to plasticise 2.3 million tonnes PVC resin the average plasticiser content of the plasticised PVC will be about 29% if no other substances are added. The final plasticised PVC will typically also contain at least some pigments and for some purposes also fillers, stabilisers and flame retardants. Data on the total tonnage of PVC plastics, after addition of plasticisers, fillers, etc. have not been identified. The average content of plasticisers will be less than the 29% of the final PVC material. On the other hand, a German summary indicates that flexible PVC on average contains 30-35% plasticisers (UBA, 2007).

As a best estimate it will be assumed, if nothing else is indicated, that the finished PVC materials on average contain 20-30% plasticisers. This range will be used for the estimates on plasticiser content of most of the marketed articles.

3.2 Surveys of DEHP in marketed articles

3.2.1 Surveys of products marketed in Norway

A number of surveys of plasticisers (and other substances) in products marketed in Norway have been undertaken by the Climate and Pollution Agency (Klif). The surveys are spot tests of products considered most likely to contain hazardous substances. Only a few products have been tested for DEHP content as part of the surveys. The results are shown in Table 3.1. The table does not include the samples for which it is indicated “some” of “trace”, but where actual concentration is not quantified.

Due to the low number of spot tests and the targeted sampling, the results do not provide a comprehensive view of the presence of DEHP in products on the market, and provide limited information of where DEHP can be found in articles and the concentration of DEHP in the different materials.

Table 3.1 *DEHP content of products tested positive for DEHP in surveys of marketed products in Norway*

Product	Content, % of main material				
	DEHP	**DBP**	**DINP**	**MCCP**	**Year**
Winter gloves (coated textile in palm)	13.5	0.27	0.13	0.12	2009
Winter gloves (coated textile in palm)	22	n.d.	n.d.	n.d.	2009
Children's gloves (textile with plastic)	0.002	0.002	0.013	<0.01	2006
Children's gloves (textile)	0.042	0.001	n.d.	<0.01	2006
Pinafore	10.6	0.698	n.d.	<0.01	2006
Children's purse (plastic)	7.97	0.022	11.8	<0.01	2006
Children's gloves	1.063	0.002	n.d.	<0.01	2006

n.d.: not detected

The table does not include the samples for which it is indicated "some" of "trace", but where actual concentration is not specified.

3.2.2 Surveys of products marketed in Denmark

A number of studies of the presence of DEHP and other phthalates in products marketed in Denmark have been undertaken as part of the Danish EPA's surveys on chemicals in consumer products. The results of a number of surveys are shown in Table 3.2.

The surveys concern products that are marketed in Denmark or sold via Danish internet sites. The countries of origin of the products are often not indicated in the survey reports. However, as the articles are traded on a global market the surveys are considered to be representative for articles marketed in Norway.

Apart from analyzing for DEHP, the studies included other phthalates and other substances. A large proportion of the tested products contained more than one phthalate. The phthalates included in the different studies vary, and the studies cannot be expected to give a comprehensive view of the phthalate content of the products. Other phthalates analysed for in some of the studies include DIBP, DBP, BBP, DINP and DIDP. Please consult the original studies for more information on the content of other phthalates.

It is notable that none of the samples of flooring (16 samples) and vinyl wall paper (15 samples) from the 2010 study contained DEHP. The flooring included vinyl flooring, vinyl tile, carpet tile and carpets with rubber back. The study on flooring which is 10 years old may still gives an indication of DEHP concentration in these products where it is used (Pors and Fuhlendorf, 2001.

Table 3.2 *DEHP in products marketed in Denmark and analysed as part of the Danish EPA's surveys on chemicals in consumer products.*

Product group	**Number of samples**	**Number of samples with > 1% of DEHP ***	**DEHP content of samples with > 1% of DEHP**		**Source:**
			range (w/w)	**average (w/w)**	
Sponge bags and backpacks	10	4	2-20	11	Tønning *et al.*, 2010a
Swimming equipment, water wings	12	1	33	33	- "-
Swimming pools	8	1	26	26	- "-
Oilcloth and dinner mats	12	4	13-25	21	- "-
Shower curtains	10	5	23-30	26	- "-
Balance balls (fitness balls)	10	2	44	44	- "-
Floor covering	16	0			Tønning *et al.*, 2010b
Vinyl wall paper	15	0			- "-
Furniture (footstool, dining table chair, barstool)	15	9	7.2-39.2)	16	- "-
Curtains	1	0			- "-
Lamp shades	10	0			- "-
Mattresses, airbeds	13	4	1.1-28.2	20	- "-
Shower curtains	10	4	8.2-30.4	17	- "-
Plastic sandals	60	16	1- 46	22	Tønning *et al.*, 2010c
Packaging for shampoo and bath soap	10	3	26-27	27	Poulsen and Schmidt, 2007
Erasers	26 (10) *	3	22-54	37	Svendsen et. al. 2007
Sex toys	15	6	18-61	29	Nilsson *et al.*, 2006
Toys for animals	13	4	11-39	21	Müller *et al.*, 2006
Flooring	5	3	4.7-16	10	Pors and Fuhlendorf, 2001
Shower curtains	3	3	7-23	17	- "-
PVC gloves	4	3	27-40	34	- "-
Vinyl wallpaper	4	2	7-9	8	
Carpet tiles	2	1	9	9	- "-
Shoulder bags, (transparent plastic, cloth like, artificial leather)	3	3	12-21	7	- "-

* 9 out of 26 erasers were made of PVC; of these 3 contained DEHP.

For some product groups the percentage of the samples containing DEHP was quite high. Nine out of 15 samples of furniture contained DEHP. The furniture was all covered with leatherette (artificial leather) and consisted of poufs, dining table chairs, easy chairs and barstools (Tønning *et al.*, 2010b).

For the plastic sandals, 22 of 60 contained DEHP in a range of 1-46%. The average DEHP concentration of the 22 samples containing DEHP was 22% (Tønning *et al.*, 2010c). DEHP was found both in the inner and outer part of the sole and in the strap.

For the total dataset represented in Table 3.2 the average content is 22% DEHP in those products containing DEHP in a concentration above 1%. As mentioned, the DEHP was often used together with other plasticisers so the average plasticiser content was significantly above the 22%, but cannot be calculated as the surveys did not include all plasticisers.

Survey of the Danish Informationscenter for Miljø & Sundhed

The Danish Informationscenter for Miljø & Sundhed (IMS) prepared some spot tests of phthalates in different children products in 2009 (IMS, 2011). DEHP was found in the following 6 of the 8 tested products (with concentration indicated in brackets): shower curtain (26%), backseat protection cover (12%), dinner mat (11%), bag chair (6.7%), children leatherette jacket (23%), table cloth (14%).

The specific content of PVC and DEHP in the different groups of articles is further described in Chapter 5.

4. DEHP in mixtures in Norway

The consumption of DEHP in Norway as a pure substance and in mixtures is registered in the Norwegian Product Register. The Product Register does not include information on consumption of substances in articles such as plastics and rubber products. The registered consumption by product group in 1995, and 2008 and 2009 is shown in Table 4.1.

The declaration to the Product Register is mandatory for all mixtures which include one or more hazardous substances i.e. substances listed in the regulations relating to the classification and labelling of dangerous chemicals. These regulations transpose the EU CLP Regulation on classification, labelling and packaging into the Norwegian legislation. For declared products all constituents of the product are registered, whether or not the substances are included in the list of the regulations.

Mixtures that come under legislation on foodstuffs, medicinal and cosmetic products are exempted from the mandatory declaration. Furthermore, mixtures produced or imported in a quantity of less than 100 kg per year are exempted.

The marked decrease in the consumption from 2008 to 2009 is due to the replacement of DEHP by DINP by one company responsible for the majority of the consumption in 2008.

Table 4.1 *Consumption of DEHP as a pure substance and in mixtures according to data from the Norwegian Product Register (Source: Klif, 2011)*

Product group	**Registered consumption of DEHP, in tonnes**		
	1995	**2008** [3)]	**2009** [3)]
Paints and lacquers. Plasticisers for plastics, rubber, paints, and adhesives	Approx 1,600 [2)]	8.3 [4)]	2.2
Dyes and inks	22		0
Other products	Approx 680 [1)]	5.32	0.2
Total	Approx 2,300 [2)]	86.6	2.4

1) Paint and adhesives are included in the total

2) Includes some articles

3) Registered in the Product Register. DEHP in imported articles are not included

4) Include use in mixtures in Norway which was not registered in the Product Register

5. DEHP in articles imported into Norway

Based on the assessment of the main uses of DEHP, it is estimated that DEHP may mainly be imported into Norway with the following articles of flexible PVC):

- Flooring, wall covering, roofing
- Wires and cables
- Film/sheet and coated products made by calendering
- Coated fabric and other products from plastisols
- Hoses and profiles (extrusion)
- Shoe soles
- Other moulded products
- Other polymer applications

DEHP in paints/coatings, adhesives and sealants may be imported in mixtures for use in Norway, but will in this case be registered in the Norwegian Product Register. In the EU the non-polymer applications account for 3% of the total consumption, and the main application area is sealants and adhesives. A small quantity of DEHP may be imported in articles in the form of painted or lacquered surfaces (e.g. on furniture) or in adhesives within the articles. It would be very uncertain to estimate the possible import of DEHP in non-polymer applications in articles, but in any case the total quantity will be small.

In the EU in 2007, about 95% of the DEHP is used as plasticiser in PVC and even the percentage at global scale have not been reported it is likely that 90-95% of the DEHP is used for PVC. As the import of DEHP for non-polymer applications in articles is very small, the PVC represents nearly 100% of the total import with articles.

5.1 Overview

As mentioned in the previous sections, it can be estimated that DEHP accounted for about 16% of the total consumption of plasticisers in the EU in 2009. As DEHP is often used together with other plasticisers, more than 16% of the flexible PVC produced in the EU the same year contained DEHP. Limited data on the regional differences in the use of DEHP within the EU is available, but it is known that DEHP accounted for only 5% of the plasticisers used for manufacture of PVC in Sweden and for the main areas it is not used in Denmark. The distribution of the DEHP consumption by applications area in the EU is more or less the same as the general distribution of plasticisers, but it seems that DEHP is less used for wires and cables, and a little more for flooring, wall covering and roofing.

DEHP account for a larger percentage of the global market for plasticisers, and in 2010 the substances accounted for 18% of the plasticiser market in the USA and 60% of the market in Asia. Some data indicated that it may even be more than 60% in China and less in other Asian countries, but the data are very uncertain and for the estimates here it will be assumed that 60% of all flexible PVC imported from China and other countries in Asia in 2009 contained DEHP.

For the estimate of the potential import of DEHP with articles the import of relevant articles has been divided on the geographic areas: Sweden and Denmark (5% DEHP and no DEHP in flooring), rest of EU (16% DEHP), Asia (60%), the Americas (19%) and the rest of the world (60%).

Import to Norway of articles with flexible PVC

Import to Norway of the main products groups with flexible PVC are shown in Table 5.1. The estimates are based on the methodology presented in section 1.3.4. The results in the last row "DEHP content, tonnes" are summarised in Table 5.2 together with estimates for other product groups where a per capita estimation method is used.

The basis for the estimates and a further description of the use areas is provided in the sections below. The description of the use areas is to a large extent based on the background data report for the Annex XV restriction report for the phthalates DEHP, BBP, DBP and DIBP (Høibye *et al.*, 2011).

Based on estimates of the content of flexible PVC in the product groups (see section 1.3.4. and the notes to Table 4.1) it is estimated that the total content of flexible PVC in imported articles within all the product groups covered by the assessment in 2009 was around 26,000 tonnes. Please note that this is slightly below what has been reported in a previous similar estimate (Lassen *et al.*, 2010) due to a re-evaluation of the PVC content for some products groups and addition of some groups as discussed in the sections below.

The total EU consumption of flexible PVC is at least 3.5 million tonnes (2.3 million tonnes PVC resin, 0.93 million tonnes plasticiser in addition to other constituents). If the per capita consumption in Norway resembles the EU average the total consumption of flexible PVC would be 33,000 tonnes, indicating that the estimated import covers a significant part of the total flexible PVC. The size of the import of flexible PVC with articles to Norway is consequently at a level that could justify that the Norwegian consumption of DEHP with flexible PVC could be at the same level as the EU average.

Of the total tonnage of PVC-containing products, 31% was imported from Sweden and 5% from Denmark and consequently it highly influences the estimated volume that DEHP is less used in these countries than the EU average.

Semi-manufactured goods

For two of the product groups: sheets and foils of PVC and textiles with PVC coating, a part of the products may be semi-manufactured goods used for further manufacturing in Norway. The foils may be used for a number of different articles like office and school supplies, and the textiles with PVC coating may be used e.g. for manufacturing of bags or clothing.

Re-export

Some imported products may in fact be re-exported and the net-import is consequently over-estimated by the applied method. However, the re-export is estimated to be relatively small and the underestimation small compared with the overall uncertainty on the estimates.

Other product groups with flexible PVC

Flexible PVC may be used in smaller quantities in a wide range of articles not included in this assessment such as some medical equipment (apart from the product group included), in wires and other parts of electronic and electrical equipment (apart from the wires included here), in parts of vehicles, balls for playing, shoe soles (apart from those included in the table) and carpets with PVC foam. For some of these applications estimates are provided in section 5.85.8 .

Estimate of DEHP in imported PVC articles

The indicated ranges represent for each group the most likely volumes, but due to the uncertainty the actual volume for some of the product groups may be outside the indicated range.

Whereas only 20% of the PVC products were imported from Asia, articles from Asia accounted for 49% of the total estimated import of DEHP with the products included. While the use of DEHP in the EU is decreasing, the same is not the situation in Asia and the total import of DEHP with articles to Norway will increasingly be dependent on the use of DEHP in Asia. China represented 77% of the total import from Asia. The trend in consumption in articles in Norway will consequently not directly follow the trend in the use of DEHP for manufacturing of articles in the EU.

As DEHP is not used in any significant amount in the domestic production of articles (apart from eventual DEHP in imported semi-manufactured goods), the total DEHP consumption in articles in Norway is estimated to roughly correspond to the import.

Table 5.1 *Import to Norway of main product groups containing flexible PVC in 2009 [continued on next page].*

	Flooring and wall-cover		Wall paper		Cables		Sheets and foils of PVC		Inflatable mattresses		Sporting equipment and pools		Office articles	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%
Total import	12,198	100%	463	100%	37,923	100%	3,373	100%	245	100%	5,817	100%	4,496	100%
EU + Switzerland	11,608	95%	455	98%	34,037	90%	3,281	97%	9	4%	3,735	64%	3,699	82%
- Denmark, Sweden *1	5,849	48%	8	2%	17,724	47%	790	23%	4	2%	1,597	27%	906	20%
Asia	479	4%	5	1%	3,064	8%	72	2%	234	95%	1,974	34%	668	15%
Americas	97	1%	3	1%	598	2%	3	0%	2	1%	102	2%	115	3%
Rest of the world	14	0%	0	0%	225	1%	17	1%	-0	0%	6	0%	14	0%
PVC content														
PVC of total weight, % *2	50%		24%		50%		100%		20%		30%		34%	
Weight of PVC, tonnes	6,099		232		9,102		3,373		221		582		225	
Plasticiser content, % of PVC *2	15-25 %		20-30 %		20-30 %		20-30 %		20-30 %		20-30 %		20-30 %	
DEHP content, tonnes *3	93-154		8-11		268-402		98-148		26-38		33-49		9-14	

*1 Note that Denmark and Sweden is a subgroup of “EU + Switzerland”.

*2 The percentages of PVC of the total weight are in general based on data from Denmark around 2000 (Skårup and Skytte, 2003) see section 1.3.4. For some applications areas the percentages PVC and the plasticiser content have been re-evaluated as described in the following sections.

*3 DEHP percentage of plasticiser content : Sweden and Denmark (5% DEHP and no DEHP in flooring), rest of EU (16% DEHP), Asia (60%), the Americas (19%) and the rest of the world (60%).

Table 7.1 *Import to Norway of main product groups containing flexible PVC in 2009 [continued from previous page]*

	Medical equipment		Textiles with PVC coating		Bags		Clothing of plastics		Clothing with coating		Hoses and tubes		Slippers, flip-flops etc., of plastics	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%
Total import	977	100%	844	100%	6,202	100%	3,285	100%	2,901	100%	6,038	100%	1,859	100%
EU + Switzerland	766	78%	305	36%	1,064	17%	823	25%	86	3%	5,415	90%	49	3%
- Denmark, Sweden *1	462	47%	63	7%	259	4%	704	21%	17	1%	2,997	50%	12	1%
Asia	106	11%	536	63%	5,099	82%	2,427	74%	2,798	96%	512	8%	1,804	97%
Americas	100	10%	2	0%	33	1%	29	1%	14	0%	43	1%	1	0%
Rest of the world	977	100%	844	100%	6,202	100%	3,285	100%	2,901	100%	6,038	100%	1,859	100%
PVC content														
PVC of total weight, % *2	80%		20%		5%		30%		10%		50%		34%	
Weight of PVC, tonnes	781		169		310		986		290		3,019		632	
Plasticiser content, % of PVC *2	20-30 %		15-25 %		20-30 %		20-30 %		15-25 %		20-30 %		20-30 %	
DEHP content, tonnes *3	93-154		8-11		268-402		98-148		26-38		33-49		9-14	

*1 Note that Denmark and Sweden is a subgroup of “EU + Switzerland”.

*2 The percentages of PVC of the total weight are in general based on data from Denmark around 2000 (Skårup and Skytte, 2003) see section 1.3.4. For some applications areas the percentages PVC and the plasticiser content have been re-evaluated as described in the following sections.

*3 Estimated assuming the following DEHP percentage of total plasticiser content: Import from Sweden and Denmark (5% DEHP and no DEHP in flooring), rest of EU (16% DEHP), Asia (60% DEHP), the Americas (19% DEHP) and the rest of the world (60% DEHP).

5.2 Flooring, wall covering and roof covering

5.2.1 PVC flooring, roof covering and heavy wall covering

Flooring, roof covering and heavy style wall covering made of PVC are vinyl materials with and without textile or PUR backing material. Flooring may be delivered in rolls or tiles, while the qualities used for wall coverings are typically delivered in rolls only. The thickness of the material will generally be in the range of 1-3 mm. The products may be used for covering of ceilings as well e.g. in bathrooms.

So-called heterogeneous and homogenous types are mainly marketed to professional users requiring high wear resistance. For the private market, mainly the softer type "cushioned vinyl" is marketed. Plasticiser concentrations vary quite extensively depending on flooring type. 10-20% plasticiser content has been mentioned for products for the professional market, while higher concentrations, 25-30%, have been mentioned for low-price cushioned vinyl for the private market (Høibye *et al.*, 2011).

The specific PVC content of the flooring varies significantly by type. The applied Danish methodology assumes that PVC with backing textile (CN 39.18.10.10) contains 5% PVC while flooring with no backing (CN 39.18.10.90) consists of 100% PVC. The Norwegian statistics has a different differentiation depending on the thickness of the flooring (more or less than 1.5 mm). New data indicates that the large difference between the two groups used in the Danish methodology is too simplified and do not reflect the actual situation.

In order to obtain an estimate of the average plasticiser and PVC content of flooring produced in the EU, the total manufactured volume of flooring can be compared to the use of plasticisers in the EU. The total manufactured volume in 2010 was 1.44 million tonnes (Høibye *et al.*, 2011) while the consumption of plasticisers for flooring is reported to be approximated 140,000 tonnes (Table 2.3). On average, the manufactured flooring contains consequently 10% plasticisers and if is assumed that the average plasticiser content of the PVC part is 20%, then PVC on average account for approximately 50% of the total weight. If the total supply of flooring in Denmark is compared with the phthalate content estimated from the tax proceeds, with similar assumptions as used above, the average PVC content of flooring sold in Denmark in 2007 can be estimated at 45%. The 50% PVC will here be used as best estimate and the plasticiser content of the PVC part is assumed to be 15-25%.

Import of flooring, wall covering and roof covering by main export countries is shown in Appendix 2 (Table A2.1). About 95% of the flooring and wall cover is imported from the EU

and about half of this is imported from Sweden. Flooring manufactured in Sweden is known not to contain DEHP.

Eight companies, either foreign manufacturers of flooring for the Norwegian market or major Norwegian suppliers of different brands of flooring have been contacted to collect information on DEHP in flooring and wall covering. According to the answers, covering five major brands, none of the products contain DEHP. The answers confirms that flooring imported from Sweden do not contain DEHP, but it cannot be excluded that flooring, roofing and wall covering imported from other EU Member states contain DEHP, and the 4% imported from Asia most likely contains DEHP.

According to the Prodcom database, data for production of PVC flooring with backing (textile etc.) in Norway is confidential, whereas the production of flooring without backing is reported as 0. The reported export, however, indicates that the manufacturing of these products in Norway is very small. According to the survey of DEHP use in Norway (see Chapter 4) DEHP are not used for production of these products in Norway.

In a recent survey of flooring (16 samples) and vinyl wall covering (15 samples) in Denmark DEHP was not detected indicating that DEHP is not widespread used in imported products (Table 3.2), but it cannot be excluded that some products on the market still contain DEHP. In an older survey the average DEHP content of flooring, vinyl wallpaper, and carpet tiles with > 1% DEHP was in the range of 8-10 %. The DEHP was typically used together with other plasticisers (Table 3.2).

It is for the estimates assumed that flooring imported from Sweden and Denmark (nearly 50% of the total) does not contain DEHP, but for the rest of the EU a percentage of 16% is applied as it cannot be ruled out that some of the flooring contain DEHP.

5.2.2 Wall paper

Whereas the wet-room wall coverings are relatively thick PVC membranes and probably included in the commodity codes with flooring, the vinyl wall coverings are included in commodity code 48.14.20.00 covering plastic coated wallpaper (not specified that it is PVC coating). PVC wallpaper is also called vinyl wall covering. Some types come with a backside of fibres. According to Høibye *et al.* (2011) a major producer estimates that PVC wallpaper constitutes 90-95% of the EU market for wallpaper, and that paper wallpaper thus constitutes a relatively minor share. The usage of PVC wallpaper is widespread in Europe due to its surface which is very resistant to washing, and which can be produced with more detailed surface structures than is possible with paper. According to major producers of PVC wallpaper, the

typical plasticiser concentrations of the PVC are 25-30%. However, according to another European producer of wallpaper, PVC wallpaper is not much used in Scandinavia. According to the website of a major Norwegian supplier) vinyl wallpaper is suited for rooms with high level of wear such as halls, kitchens and living rooms (Borge, 2011). Vinyl wall paper is the only wall paper which is specifically indicated at the web-site as plastic coated.

Total import of wallpaper in 2009 was 463 tonnes with EU Member States representing more than 90% (mainly Germany, Belgium and the Netherlands).

The Danish methodology does not include the wall paper (applies a question mark for this product group). The PVC content will here roughly be estimated to be 50% of the total volume and the DEHP content of wallpaper is on this basis estimated at 8-11 tonnes.

5.2.3 Total import with flooring, roof covering and wall paper

Based on the assumptions described, the total DEHP import with flooring, roofing, wall cover and wall paper is estimated at 101-167 tonnes.

5.3 Cables and wires with PVC

The product group consists of isolated electrical wires and cables, as well as optical fibre cables, of types used in homes and offices. PVC is used as insulation as well as coating material. According to Høibye *et al.* (2011), the typical plasticiser concentrations in the PVC insulation is 20-30% and the average PVC content of regular PVC insulated wires and cables is around 30% for single solid copper conductor wire (used for 230-400V installations), whereas it is around 65% for 2-3 conductors flexible connecting cords used in the home or office, and around 70% for 3- and 5-conductors construction cables (230-400V installations).

Cables and wires with PVC isolation is reported to be one of the major uses of DEHP in the EU.

A significant part of the consumption of wires and cables in Norway is based on domestic production. As the production volume is confidential for one of the type of conductors > 1000 V it is on the basis of the statistics not possible to estimate the total consumption of wires and cables in Norway. According to the survey of DEHP use in Norway manufacturers of cables in Norway do not use DEHP in the production of cables. The same is the situation as regards cables manufactured in Denmark.

Import of wires and cables to Norway by main export country is shown in Appendix 2 (Table

A2.1). In total, 47% of the import originates from Sweden and Denmark. The imported cables from these countries most likely do not contain DEHP, although it cannot be excluded that some cables from Sweden contain DEHP.

The rest of the imported cables, containing estimated 5,000 tonnes of PVC, are imported from many different countries including China (5%), France (4%), Italy (2%), Estonia (2%), the Netherlands (2%), UK (2%), Poland (1%) and Belgium (1%). All of these may in principle contain DEHP.

Four major manufactures of cables represented on the Norwegian market, and a supplier of cables and wires, have been contacted to collect information on DEHP in the products. The companies together have production facilities all over Europe. Three manufacturers have responded that none of their products contain DEHP while one manufacturer and the supplier did not answer the request.

In Denmark, the estimated import of phthalates using the methodology applied here gave an estimated supply very close to the estimate based on the tax proceeds (Brandt and Hansen, 2009)

The total PVC content of the imported cables is estimated at about 9,000 tonnes. The total potential import of DEHP with the cables is estimated at 268-402 tonnes, representing 34% of the total quantified import.

5.4 Film, foil, sheets and coated products made by calendering

At EU level, the consumption of DEHP is estimated by use areas defined by the applied manufacturing methods. In 2007, film/sheet and coated products made by calendering accounted for 23% of the total EU consumption.

Calendering is a process where the molten plastic is placed between rollers and rolled to turn it into sheets. Examples of products include: Curtains, blinds, table linen, packaging, tape and self-adhesive foils, office supplies (ring binders, files, slip cases, etc.), geo membranes, medical bag/sheet devices, bottom sheets for hospitals, and artificial leather. Flooring and roof membranes is also produced by calendering, but included elsewhere.

5.4.1 Sheets and foils

The statistics include 5 commodity groups specifically covering sheets, films, bands and similar products of PVC and these products are expected to be 100% PVC. One of the product

groups is specifically indicated to have more than 6 percent plasticiser. The groups are not identical to the CN8 groups used in the Danish methodology, which has more groups specifically indicating that the material is plasticised PVC. The total import with the materials is estimated at 98-148 tonnes. Some of these products may be used in Norway as semi-manufacturers for production of e.g. office supplies.

5.4.2 PVC water- and air mattresses.

Water beds

Water bed mattresses are made of flexible PVC with different barriers of PVC or other materials inside the mattress. In addition, the water beds generally contain a PVC safety liner which can contain the total water amount in case of leaks. Specific import data on water beds are not available neither in the EU nor Norway. Høibye *et al.* estimates on the basis of German data that total EU sale of waterbeds correspond to 3,000-6,000 tonnes PVC and 600-1,800 tonnes plasticiser but do not provide any estimate on DEHP content.

Air mattresses

PVC air mattresses now dominate the EU market according to Høibye *et al.* (2011), who indicate a typical content of 20-30% plasticiser, while traditional rubber/cotton air mattresses are also available, but may be loosing market share.

It is estimated that on average about 90% of the weight of the air mattresses is PVC. A recent survey of air mattresses marketed in Denmark found DEHP in 4 out of 13 products with an average concentration of 20%.

The total import of inflatable mattresses to Norway was 245 tonnes and it is estimated that 26-38 tonnes DEHP may be imported with this products group.

5.4.3 PVC bathing equipment

The product group covers all kinds of bathing equipment made of plasticised PVC film or coated fabrics inclusive of pools (inflatable and non-inflatable), swim-coats/wings/belts except items classified as toys.

The commodity group used in the EU (CN 95.06.62.90, “Articles/equipment for sport and open-air games, swimming and paddling pools”) is more specific than the commodity groups used by Statistics Norway (95.06.62.08 and 95.06.62.09) which covers equipment for normal physical exercise including swimming pools and splash pools. The Danish methodology assumes that about 30% of the products in the CN 95.06.62.90 are made of PVC. Comparing the Norwegian import of the two commodity groups and the total EU import within

95.06.62.90 (Høibye *et al.*, 2011) indicates that the swimming equipment would cover a smaller part of the total commodity group and it is therefore assumed that the PVC content is rather 10% of this group

Information from dominant suppliers to the Danish market states that only the large inflatable swimming pools and pool covers contain phthalates (Høibye *et al.*, 2011). Typically, the pools contain 20-30% plasticiser and pool covers contain 25-30 % plasticiser. For inflatable swimming pools etc. sold in Denmark and the other Nordic countries, a dominant supplier assumes DEHP to be widely used (Høibye *et al.*, 2011). However, surveys of this equipment in Denmark indicate that DEHP may be less used. One out of 8 testes swimming pools and one out of 12 swimming equipment of PVC marketed in Denmark contained DEHP in a concentration of 26 and 33% (w/w), respectively (Table 3.2).

On basis of the assumptions described above, the total DEHP import is estimated at 33-49 tonnes, but this estimate is quite uncertain.

5.4.4 Office articles

PVC film is widely used for office articles such as ring binders, files, slip cases, etc. The products are covered by the commodity group "office and school articles of plastic". The total import of DEHP with these articles are estimated at 9-14 tonnes which is quite well in accordance with the supply in Denmark estimated at the basis of the tax proceeds.

5.4.5 Medical equipment

DEHP and other phthalates are used in a range of medical tubes (e.g. catheters), bags, and sheet devices and bottom sheets for hospitals. DEHP is according to ECPI used in almost all PVC healthcare applications – and is actually specified by the European Pharmacopoeia as the plasticiser for blood bags (ECPI, 2011 b). The commodity group 90.18.39.00 covers catheters, hypodermic needles and the like and is included under tubes below. Medical equipment based on sheets such as blood bags are not covered by a specific commodity group, but may be included in more aggregated groups and some may in fact be covered by some of the commodity groups on foils, sheets, etc. of PVC described above.

5.4.6 Other products

In total, the estimated DEHP import with the listed product groups is estimated at 166-249 tonnes corresponding to 20% of the total quantified import of DEHP.

Products not covered here may be medical equipment based on sheets and foils, but also sheets and foils used for other applications may be outside the covered commodity groups.

Some application areas may be covered here or under coated fabric in the next chapter. As an example shower curtains may either be made of coated fabric or PVC foils.

5.5 Coated fabric and other products from plastisol

Coated fabric and other products from plastisol (excluding flooring and wall covering prepared from plastisol) in 2007 accounted for 11% of total DEHP consumption in the EU.

Plastisol is a liquid form of vinyl that is cured by heat to form a solid end-product. Plastisols are dispersions of PVC resin in plasticisers, and modified with other raw materials to yield the desired properties of the end user. According to the web-site of a supplier of PVC plastisols, the plastisol are used for a range of manufacturing processes producing a wide range of articles (Chemionics, 2011):

- Dip coating (e.g. coated tools handles, gloves, coated chains and outdoor furniture);
- Dip moulding (e.g. caps, plugs, bellows, can holders and adult toys);
- Hot melt (e.g. artificial stone)
- Industrial fabric coating/laminating (e.g. wall covering, artificial leather, industrial belting, narrow fabrics, tarpaulins /tents, window shaded, curtains, movie screens, automotive security shades)
- Rotational moulding (e.g. boat fenders, toys, doll parts, play balls, medical bulbs, mannequins, anatomical models, lamp bases.
- Slush moulding (e.g. industrial boots, automotive parts, toys, vinyl masks)
- Textile printing (e.g. work gloves (dotting & palm coating), hospital socks, T-shirt printing, entrance mats)
- Open/In-Place moulding (e.g. air filter end-seal gaskets, slipper / sock soles, bottle cap liners
- Closed cavity moulding (e.g. cast film, walk-on mats, sound-dampening barriers, roofing coating)
- Spray Coatings (tank linings/tank coatings, battery tray/box linings
- Foams (e.g. air filters , anti-fatigue mats, bottle cap sealants, gaskets, specialty textiles, hand tools, specialty metal coating, dip moulded grips)

As it appears, plastisols can be applied for a very wide range of products, of which some are included elsewhere in this survey. The wide range of products where flexible PVC is applied on tools, automotive parts, filters, etc. are not covered by the assessment as these products in general are included in aggregated commodity groups where the PVC accounts for a very small part of the total tonnage.

5.5.1 Coated fabrics

Examples of PVC coated textile products within this group is shown below (excluding child-care articles because DEHP is not allowed for use in these products).

- Table cloths and aprons;
- Venetian blinds, curtains shower curtains and similar items;
- Tents;
- Tarpaulins (for trucks and for construction);
- Camping chairs and bag chairs;
- Imitation leather fabric used in clothing and furniture;
- Awnings, canopies and tarpaulins:
- Rainwear and water resistant gloves;
- Shoes, boots and waders;
- Conveyer belts for industry and airports.

Coated fabric used for bags and other travel items is described separately below.

EuPC (European Plastics Converters) has reported that the use of DEHP may be more widespread than the average percentage DEHP share in plasticiser use in Europe for the application "flexible PVC film products" (Høibye *et al.*, 2011). EuPC estimated that about 50% of such products would contain DEHP, whilst the actual use would vary from company to company.

Recent surveys of products on the Danish market found DEHP in 5 out of 10 samples of shower curtains, and 4 out of 12 samples of oilcloth and dinner mats (Table 3.2). One manufacturer in Norway has reported that DEHP is present in PVC-coated textiles used for waterproof working clothing.

Coated textiles

A range of the products are covered by specific commodity groups of textiles with PVC coating. 63 % of the products were imported from Asia and the total DEHP import is estimated at 11-19 tonnes. A part of this is probably used for manufacturing of textile products in Norway.

5.5.2 Clothing

The total phthalate content of "gloves, rainwear, and other clothing" in Denmark is based on the tax proceeds estimated at 540 tonnes. As a majority of these products are imported from Asia, the DEHP import is likely about half of this corresponding to about 270 tonnes. The tax covers two product groups defined by commodity groups which are identical with product

groups in the Norwegian trade statistics: Clothing of plastics and clothing impregnated with plastics. Estimating the import to Denmark from the statistics using the Danish methodology resulted in significant lower quantities compared with the estimate based on tax proceeds (Skårup and Skytte, 2003; Brandt and Hansen, 2009). It indicates that the PVC percentages applied for the product groups are too low and they are here therefore adjusted.

Clothing of plastics

Clothing of plastics, including gloves and accessories to such clothing, is covered by a specific commodity group. It is expected that this group covers rainwear, gloves, aprons, and safety clothing of plastics. Rainwear is today to a large extent made from polyurethane. The Danish methodology assumes that PVC account for 15% of the weight of the commodity group but it will here be adjusted to 30%. The total DEHP import with these products is on this basis estimated at 91-137 tonnes.

Clothing impregnated, coated or laminated

PVC is widely used in thin coating of fabric for clothing. The total imported tonnage of the commodity groups covering clothing impregnated, coated or laminated (62.10.20.00, 62.10.30.00, 62.10.40.00, 62.10.50.00) and gloves impregnated or coated with plastics (61.16.10.91, 61.16.10.99) was 2,900 tonnes of which 96% was imported from Asia. Two of the product groups (6210.40.00 and 6210.50.00), representing the majority of the volume, are covered by the Danish tax, but it is estimated that the other Norwegian product groups include clothing of similar material.

MCCPs (medium chained chlorinated paraffins) have been identified in a number of textile products in Norway (see Lassen *et al.*, 2010). MCCP is widely used as a co-plasticiser to DEHP. MCCP was found in 6 of 15 tested products of coated textiles in gloves, bags and chairs. The concentration in the fabric where the MCCP was found (including both the textile and the coating) was on average 0.5%. The typical concentration of MCCP when used in PVC is reported to be 6-10 %. This could indicate that the PVC content of the textiles could be 5-10% of the total. According to Norwegian manufacturers of bags, backpacks and water resistant clothing, PVC is not present in the products with a few exemptions (Lassen et al, 2010). The answers from the manufacturers clearly indicate that MCCP containing PVC is not present in many products of the high-end brands, but the fact that 96% of the products are imported from Asia could indicate that low-end products in fact account for a significant part of the total import. Assuming 10% of the product group is PVC, the total import of DEHP with the product group can be estimated at 25-42 tonnes. In total, the textile products are estimated to contain 116-179 tonnes DEHP, which is still lower than the estimated import to Denmark, but is here considered the best estimate.

Artificial leather (vinyl leather, leatherette, plether, etc.) may be produced either by calendering or from plastisol. PVC leather is widely used for upholstery, clothing and fabric. Used for upholstery it may be imported as part of furniture and vehicles. In surveys of products on the Danish market DEHP was found in 9 out of 15 samples of PVC leather on furniture in an average concentration of 16% in the leather material (Table 3.2). The artificial leather takes up a small part of the products and is not included in the Danish methodology.

5.5.3 Travel goods

The product group covers plasticised PVC parts on bags, brief- and suitcases and similar items. The PVC parts in questions include thin PVC film typically used inside the bags and cases, PVC coated fabrics and leather-look, and PVC marks, figures, profiles sewn, welded or otherwise attached to the outer surface or bottom of the bags and cases. A dominant vendor of bags in Denmark informs that approx. 20% of their bags contain PVC (Høibye *et al.*, 2011). According to this vendor, the content of PVC in bags varies from bags made entirely or almost entirely of PVC to bags containing only small fractions of PVC, as PVC in these cases is used mainly for decorations and similar purposes.

As described in the previous section, MCCP was found in 6 of 15 tested products in Norway of coated textiles in gloves, bags and chairs indicating that DEHP may likely also be present in these products. A recent survey of consumer products in Denmark found DEHP in 4 out of 10 tested sponge bags and backpacks (Table 3.2). The concentration in the products with DEHP ranged from 2 to 20 % with an average of 11% in the tested material.

In the statistics on external trade, suitcases and bags with an outer surface of textile are aggregated with suitcases and bags with an outer surface of plastic, e.g. hard trunk suitcases. Suitcases and bags of leather and artificial leather (often PVC coatings) are included in separate commodity codes.

The total import of bags, suitcases, backpacks, was 6,200 tonnes. The majority of the import (82%) was from Asia (mainly China), while some 17% was imported from the EU. Høibye *et al.* (2011) assumes on the basis of collected information that 20% of all bags contains PVC, and that 70-90% of these bags contains in the range of 1-5% PVC, while the remainder (10-30%) is made entirely of PVC. In total PVC would under these assumptions account for on average 5% of the total weight of the commodity groups.

The total import of DEHP with bags is under this assumption estimated at 32-48 tonnes.

5.5.4 Car undercoating

About 4,000 tonnes DEHP was used in the EU for car undercoating in 2007. No data are available on the use of DEHP for car undercoating of cars from other parts of the world. It is likely that the per capita consumption in Norway is quite similar to the EU average so the import can be roughly estimated at 20-80 tonnes.

5.5.5 Other application

The total import of products within the group ”Coated fabric and other products from plastisol“ is 179-326 tonnes which is below the EU per capita average for the group.

Most likely the reason is that a range of products have not been covered. It can be various products with a PVC cover (tools, steel gutter, etc.) and moulded products from plastisol.

The Danish tax system includes coated steel gutter and the total phthalate content of marketed products is estimated at 2 tonnes/year.

5.6 Hoses and profiles

DEHP is used to plasticise a variety of hoses, tubes and profiles (gaskets) of PVC and 34,700 tonnes DEHP was in 2007 used for this product group in the EU. The products are covered by a number of commodity groups which are not specific for products of PVC. Estimating the supply in Denmark using the Danish methodology gave an estimate close to the estimate based on the tax proceeds (Brandt and Hansen, 2009) indicating that the estimates are quite robust. On the basis of the methodology, the total import of DEHP to Norway is estimated at 89-134 tonnes which should be added to the quantity estimated in next section in order to be compared with the EU data.

5.6.1 Medical equipment

DEHP and other phthalates are used in a range of medical tubes (e.g. catheters), bags, and sheet devices and bottom sheets for hospitals. DEHP is used in almost all PVC healthcare applications – and is actually specified by the European Pharmacopoeia as the plasticiser for blood bags (ECPI, 2011 b). Even DEHP may in the EU be more widely used for this application area than other areas, the general DEHP share for the different regions will be applied. The commodity group 90183900 covers catheters, hypodermic needles and the like. The majority of the products (78%) are imported from the EU. The total DEHP import is estimated at 25-38 tonnes.

5.7 Footwear

Flexible PVC is used in footwear for basically two application areas:

- Plastic footwear such as plastic sandals, flip/flops, slippers, boots and the like;
- PVC soles of other types of footwear.

According to ECPI (2011b), DEHP-plasticised PVC is used for many shoe soles because of its flexibility, durability and anti-slip properties and in 2007 some 19,400 tonnes DEHP was used for shoe soles in the EU (7% of total use). In Japan, footwear accounted in 2003 for 2% of total DEHP use.

5.7.1 Plastic footwear

The product group covers sandals, slippers, flip-flops and ladies' shoes made partly or completely of PVC. The group also covers thermo boots for children and plastic boots.

No exact knowledge of the share of shoes containing PVC and the precise average content of PVC in shoes are available. A Google search indicates the wide use of PVC in these types of footwear with the following number of picture hits: "PVC sandals" (14,900 pictures), "PVC slippers (28,700 pictures), "PVC boots" (34,700 pictures), "PVC flip-flops" (48,300 pictures). The content of PVC is estimated to vary from approx. 30% PVC for flip-flops to approx. 60% for lady shoes, all figures based on weight (Høibye *et al.*, 2011).

In a recent survey of products marketed in Denmark, 16 out of 60 tested flip-flops, girl sandals, ladies shoes and lady slippers of plastics contained DEHP with an average concentration of 22%. Approximately 50% of the tested products were made of PVC.

A Swedish investigation of 27 flip-flops purchased in many countries around the world demonstrates that 67% of the flip-flops were made of PVC and 95% of these contained DEHP (SSNC, 2009). The concentration of DEHP ranged from 0.07% to 23% with an average content of 9.6%. In both surveys DEHP was typically used together with other phthalates.

Sandals, flip-flops and the like of plastics are covered by specific commodity codes and 97% of the tonnage is imported from Asia. It is based on Høibye *et al.* (2011) estimated that approximately 34% of the weight is PVC and the plasticiser content is 20-30%. The total import is on this basis estimated at 74-111 tonnes.

Plastic boots and waders are not covered by specific commodity numbers. Høibye *et al.*

(2011) estimate the import of PVC with thermo boots to Denmark at approx. 260 - 380 tonnes per year. Information from dominant suppliers to the Danish market indicates that thermo boots of PVC is mainly imported to EU from Asian countries. If it is assumed that the import to Norway resembles the import to Denmark, that 20-30% of the PVC is plasticiser and 60% of the plasticiser is DEHP, the total import of DEHP can be estimated at 30-45 tonnes.

5.7.2 Soles of other footwear

Shoe soles are frequently manufactured from plasticized PVC. Its advantages include low cost as well as reduced weight and material usage in the case of foamed soles (Lanxess, 2011). A search on the Internet revealed the following type of footwear specifically indicated having PVC soles (the footwear in general is not made of plastics): wooden shoes, Tyvek overshoes, skates ("leather look PVC soles"), slippers, men's leather shoes, boots, sandals, and moccasins.

Guidelines from the Danish EPA regarding PVC-free footwear indicate that flexible PVC was in particular used in low-end shoes (Miljøstyrelsen, 2002). An exception is running shoes with a gel made of flexible PVC.

No data are available for an estimate of the import of DEHP in soles of footwear, but the data on the use of DEHP for footwear in the EU indicates that the import could likely be in the range of 50-300 tonnes.

5.8 Other articles with PVC parts

PVC with DEHP may be used for a variety of other products, some of which are briefly described below.

Balls of PVC for playing and physical exercises

The product group covers balls made entirely of PVC, PVC- film and coated fabrics for playing and physical exercises. Balls for fitness also known as balls for body training are marketed by fitness centres as well as retail shops (sports equipment etc) and on the Internet.

Recent surveys found that 2 out of 10 tested fitness balls marketed in Denmark contained DEHP in a concentration around 44% (w/w) (Table 3.2).

Most soccer balls today are manufactured of polyurethane (Høibye et al, 2011). Cheap balls as the so called "street soccer balls", however, are often manufactured of PVC. Based on information from the manufacturers, European production of large plastic balls seems to be made of PVC without phthalates (Høibye *et al.*, 2011).

Inflatable balls are covered by a specific commodity code. Of the total import of 394 tonnes, 86% originated from Asia. Data has not been available for estimating the amount of DEHP imported in balls.

Other toys

As consequence of the restriction of DEHP in toys, it is assumed that DEHP will be present in a relatively small percentage of the imported toys. A study jointly performed in Germany, Austria and Switzerland screened and analysed for all possible plasticisers in 252 samples from 172 toy and childcare products collected in these countries in 2007 (Biedermann-Brem *et al.*, 2008. Eleven percent of the samples contained DEHP. The average DEHP content of these samples was 29% (w/w).

In the Netherlands, compliance checks of toys and childcare articles have demonstrated that the percentage of toys containing DEHP above the limit of 0.1% decreased from 36% of the PVC parts in 2007 to 17% of the PVC parts in 2009 (FCPSA, 2008 ; FCPSA, 2010). The DEHP concentration of the toys is not indicated. As most of the toys are imported from Asia a similar pattern is likely found in Norway.

In Denmark in 2000, the total consumption of phthalates in toys (apart from swimming pools) was estimated at 180 tonnes (Skarup and Skytte, 2003). The methodology for estimating the import using import statistics is considered not to be applicable because the commodity groups are much aggregated different in Norway and Denmark and major changes since 2001 are expected.

No actual data on the total DEHP consumption in toys in any country have been identified.

Based on the available data no estimate of the DEHP import in toys has been established. The possible import is included in the “other products” category addressed below.

Carpet tiles/squares produced with PVC-foam as back cover.

The product group covers carpet tiles and squares produced with PVC, foamed or not, as back cover. The market is today dominated by carpet tiles with other backing materials than PVC. Høibye *et al.* (2011) estimate that 10-15% of marketed carpet tiles contain PVC. Contrary to the commodity groups used in the EU, Norwegian statistics has no specific commodity groups for the tiles except for tiles of felt and no attempt has been done to estimate the possible import.

Electrical and electronic products

Some DEHP may be included in flexible PVC in electronic products. Maag *et al.* (2010) estimates that electrical and electronic equipment marketed in the EU in 2007 contained 5,000-20,000 tonnes DEHP; first of all in cables and wires. If the per capita consumption in Norway is similar to the EU average, and the majority of the products are imported, then some 50-200 tonnes DEHP are imported with electrical and electronic equipment. This is a quite large quantity compared with the import with cables and wires, but the cables are mainly imported from the EU and in particular from Sweden and Denmark which have a relatively small consumption of DEHP.

Other products

All in all, it is estimated that the import with products not covered above is of a magnitude of 10-30% of the total corresponding to about 100-400 tonnes.

5.9 Assessment of similarities between DEHP content of articles marketed in Norway and the EU

Mixtures

For DEHP in mixtures registered in the Norwegian Product Register, it seems to be evident that the per capita consumption of DEHP in paints/coatings, adhesives and sealants is significantly lower in Norway than the EU average. If the consumption in Norway was similar to the average EU per capita consumption for this substance, the consumption in Norway in 2007 would be 85 tonnes DEHP, while the actual registered consumption for 2009 was 2.4 tonnes.

PVC articles

Extrapolated on a per capita basis from the figures for DEHP consumption for production of articles in the EU, the consumption in Norway would be approximately 2,800 tonnes DEHP in 2007 and about 2,000 tonnes in 2009. For flexible PVC, which accounts for more than 95% of the DEHP in the EU ending up in articles, the import of flexible PVC in different articles to Norway is of a magnitude that could justify that the DEHP consumption in PVC could be of a size similar to the EU average.

Import statistics for product groups estimated to account for 70-90% of the import of flexible PVC, show that of the total tonnage of products, 78% was imported from the EU and Switzerland while 20% was imported from Asia (mainly China). The available market data indicate that DEHP use in Asia for PVC is significantly higher than in the EU and DEHP account for about 60% of the plasticiser use in Asia compared to 16% of the plasticiser market in Western Europe.

The use of DEHP in Sweden and Denmark is known to be lower than the EU average and as import from Denmark and Sweden account for 37% of the total import (48% of the import from the EU Member States) to Norway it is estimated that in articles imported from the EU, DEHP account for less than the EU average.

In articles of flexible PVC imported from Asia it is assumed that DEHP account for 60% of the plasticiser content, and articles from Asia is estimated to account for 49% of the total import of DEHP in articles covered by the statistics.

Data obtained from companies supplying PVC flooring and wall covering as well as cables indicate that the DEHP import with these products may be relatively low but responses have not been received from all importers.

The total import with articles are here estimated at 1,200 -2,500 tonnes as indicated in Table 5.2. The estimates are mainly based on data for the import statistics and the estimated PVC, plasticiser and DEHP content (indicated as "statistics" in the table). For product groups where this method was not applicable, and where the consumption pattern in Norway is probably close to the general EU consumption pattern, the likely consumption in Norway has been estimated on a per capita basis from the EU consumption or the consumption in Denmark. For each product group the most likely consumption is indicated as a range, but it should be noted that for some of the product groups the "true" value can be outside the range. It is, however, estimated that the total most probably will be within the indicated range.

Surveys of products marketed in Norway have only included a few samples analysed for DEHP, but a number of surveys have been undertaken in Denmark, and it is assumed that the products marketed in Denmark within the relevant product groups, are more ore less the same in Denmark and Norway.

The surveys of DEHP in products (from 2006-2011) in Denmark have identified DEHP in samples of fabric from bags and backpacks, swimming equipment, swimming pools, oilcloth and dinner mats, shower curtains, fitness balls, furniture with artificial leather, airbeds, packaging for shampoo, plastic sandals and flip/flops, sex toys, toys for animals and erasers. The surveys confirm that DEHP is actually present in many of these products where it is expected to find DEHP. DEHP was not identified in any of 31 samples of floor covering and vinyl floor which indicates that the percentage of these products marketed in Denmark (and probably Norway) that contain DEHP would be relatively low.

Summary

In summery, the import of DEHP with PVC to Norway is most likely of the same size as the average EU per capita consumption.

Although the consumption of DEHP in Norway is of the same size as the EU consumption, the import is not directly linked to the use of DEHP for manufacturing PVC articles in the EU. Even import from Asia account for only 20% of the total tonnage of the product groups concerned, nearly 50% of the imported DEHP in articles originates from Asia. The reason is that DEHP account for about 60% of the plasticisers in the flexible PVC compared to a few percent in articles imported from Sweden and Denmark and about 16% in articles imported from the rest of the EU.

The situation that the per capita consumption in Norway in 2009 probably was at the same size as the consumption of DEHP for production of mixtures and articles in the EU is a consequence of two mechanisms working in two different directions:

- DEHP accounts for a significantly higher percentage of the plasticisers in articles imported in Asia as compared to the EU average.
- DEHP accounts for a significantly lower percentage of the plasticisers in articles imported from Sweden and Denmark as compared to the EU average. About 50% of the PVC articles imported from the EU are imported from Sweden where DEHP largely has been phased out

The use of DEHP for production of mixtures and articles in the EU is decreasing these years, while the consumption of the substance in Asia is stable. More than 80% of the global consumption of DEHP is used in Asia today. In fact import from Asia in articles will also take up an increasing part of the consumption of DEHP in articles in the EU. However, this import is in general not estimated and the data on DEHP use in the EU concern the consumption for production of mixtures and articles in the EU.

The consumption of DEHP in articles in Norway will consequently increasingly be dependent on the use of the substance in Asia. Even if the use of DEHP for production of mixtures and articles in the EU ceased the coming years, the total import to Norway in articles would only be halved.

Table 5.2 *Best estimate of the consumption of DEHP in Norway 2009 in mixtures and articles*

Application area	Consumption in 2009, tonnes	Percentage of total	Estimation method
Flooring and wall-cover	93-154	7%	Statistics *1
Wall paper	9-13	1%	Statistics
Cables	268-402	18%	Statistics
Sheets and foils of PVC	98-148	7%	Statistics
Inflatable mattresses	32-45	2%	Statistics
Sporting equipment and pools	41-57	3%	Statistics
Office articles	12-16	1%	Statistics
Medical equipment	31-44	2%	Statistics
Textiles with PVC coating	19-26	1%	Statistics
Bags	40-56	3%	Statistics
Clothing of plastics	114-160	7%	Statistics
Clothing with coating	25-42	2%	Statistics
Car undercoating	20-80	3%	EU consumption *2
Hoses and tubes	112-156	7%	Statistics
Slippers, flip/flops, etc.	93-130	6%	Statistics
Shoe soles	50-300	9%	EU consumption
Boots	30-45	2%	DK consumption *2
Electrical and electronic equipment	50-200	7%	EU consumption
Other applications	100-400	14%	EU consumption
Mixtures	2	0.1%	Product register
Total	1,200-2,500		

*1 Using import statistics and the methodology described in section 1.3.4.

*2 Estimated from per capita consumption in the EU or Denmark, respectively

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Appendix 1: Companies contacted

Cables and wires

An overview of the most important suppliers of cables to the Norwegian market has been established, and most of these have been contacted. Some of these have production in Norway. The following companies have been contacted:

- Draka
- Nexans
- NKT Cables
- General Cable
- Malmbergs

Vinyl flooring wall covering, carpets/carpet tiles

There is no production of vinyl flooring products in Norway. An overview of the most important importers of vinyl flooring products to the Norwegian market has been established, and they have all been contacted. Some of these also import other relevant products, namely wall cowering (/wall paper) or carpets/carpet tiles, and an inquiry was also made if these products contain MCCP. The following companies have been contacted:

- Tarkett
- Forbo
- Armstrong
- Gerflor
- IVC
- Beaufloor (importer: Storeys)
- Teppeabo (supplier of Tarkett, BIG, Beaufloor, Forbo and Gerflorr)

Vinyl wallpaper

- Storeys
- Borge

Outdoor equipment of coated fabric

The following producers of bags, water resistant clothing, etc. have been contacted:

- Bergans
- HellyHansen
- Norrøna
- Stormberg

Toys

- BR
- Eurotoys
- Extra leker

Appendix 2: Statistical data

Import statistics from Statistics Norway's online database" 03057: Imports and exports, by commodity number and country (1999-2009)" at http://statbank.ssb.no/statistikkbanken/

The commodity codes follows for the first 6 digits the Combined Nomenclature (CN) used in the EU, whereas the last two digits are specific for the Norwegian trade statistics. In practice it means that for many product groups the products are aggregated slightly differently.

Table A2.1 *Import of PVC products by commodity codes and regions (in tonnes)*

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
39181000 (m1=kg, m2=nei) Golvbelegg-, vegg- el takkledning av polymer av vi-nylklorid	463	455	8	5	3	0
39181001 (m1=kg, m2=nei) Golvbelegg-, vegg- el takkledning av polymer av vi-nylklorid, tykkelse u 1,5 mm	469	382	69	29	58	-
39181009 (m1=kg, m2=nei) Golvbelegg-, vegg- el takkledning av polymer av vi-nylklorid, tykkelse min 1,5 mm	11,265	10,772	5,772	444	36	13
39191090 (m1=kg, m2=nei) Plater, duk ,folier, tape, o.l. prod av plast, i ruller bredde maks 20 cm, i.e.n.	1,700	1,390	377	195	97	18
39199090 (m1=kg, m2=nei) Plater, duk ,folier, tape, o.l. prod av plast, i ruller bredde o 20 cm, i.e.n.	4,109	3,673	1,217	282	107	48
39204300 (m1=kg, m2=nei) Plater, ark, film o.l. av polymerer av vinylklo-rid,inneh minimum 6 vektprosent myk-ner...	1,430	1,392	231	36	1	0
39204900 (m1=kg, m2=nei) Plater, ark, film o.l. av polymerer av vinylklorid ikke skumplast, uten andre mat...	1,465	1,427	559	36	2	0
39211200 (m1=kg, m2=nei) Plater, ark, film, bånd o.l. skumplastprod av vinyl-klorid, ikke selvklebende	-	-	-	-	-	-

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
39211201 (m1=kg, m2=nei) Plater, ark, film, bånd o.l. skumplastprod av vinyl-klorid, ikke selvklebende, med...	-	-	-	-	-	-
39211209 (m1=kg, m2=nei) Plater, ark, film, bånd o.l. skumplastprod av vinyl-klorid, ikke selvklebende, ute...	478	461	166	16	1	1
85442000 (m1=kg, m2=nei) Koaksialkab-ler og andre koaksialledere	1,306	888	189	215	184	18
85443000 (m1=kg, m2=nei) Tenningska-belsett og andre kabel-/ledningssett til bruk i kjøretøyer, luftfartøye...	260	148	29	103	5	4
85444100 (m1=kg, m2=nei) Isolerte elektriske ledere for spenninger på høyst 80 V, med forbindelsesdeler	-	-	-	-	-	-
85444200 (m1=kg, m2=nei) Isolerte elektriske ledere for spenninger på høyst 1000 V, med forbindelsesdeler	3,497	1,683	524	1,748	64	2
85444901 (m1=kg, m2=nei) Isolerte elektriske ledere for spenninger på høyst 80 V, 1 par, uten forbindelses...	-	-	-	-	-	-
85444902 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, fra 2 til 10 par, uten forbin...	-	-	-	-	-	-
85444903 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, fra 11 til 50 par, uten forbi...	-	-	-	-	-	-
85444904 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, mer enn 50 par, uten forbinde...	-	-	-	-	-	-
85444909 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, uten forbindelsesdeler og par...	-	-	-	-	-	-
85444911 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger på høyst 80 V, max 10 par, uten fo...	1,465	1,382	708	65	8	10

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
85444912 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger på høyst 80 V, mellom 10 og 50 par...	159	153	38	4	1	0
85444919 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger på høyst 80 V, i.e.n., uten forbin...	3,704	3,243	1,165	221	158	82
85444921 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 80 V, max høyst 500 V, høyst...	3,212	3,028	1,327	111	6	67
85444922 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 80 V, max høyst 500 V, med m...	759	703	470	26	6	24
85444931 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 500 V, ikke over 999 V, med h...	887	849	228	30	7	0
85444932 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 500 V, ikke over 999 V, med m...	972	962	526	5	4	-0
85444941 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenning 1000 V, med høyst 4 ledere, med lede...	1,345	1,341	135	3	1	0
85444942 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenning 1000 V, med høyst 4 ledere, med lede...	638	623	505	9	3	3
85444943 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenning 1000 V, med mer enn 4 ledere	13,438	12,969	8,478	388	68	12
85445100 (m1=kg, m2=nei) Isolerte elektriske ledere, for spenninger over 80 V, maks 1000 V, med forbindels...	-	-	-	-	-	-
85445901 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn høyst 500 V, med høyst 4 ledere, uten for...	-	-	-	-	-	-

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
85445902 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn høyst 500 V, med mer enn 4 ledere, uten f...	-	-	-	-	-	-
85445903 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn over 500 V, ikke over 999 V, med høyst 4 ...	-	-	-	-	-	-
85445904 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn over 500 V, ikke over 999 V, med mer enn ...	-	-	-	-	-	-
85445905 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn 1000 V, med høyst 4 ledere, med ledertver...	-	-	-	-	-	-
85445906 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn 1000 V, med høyst 4 ledere, med ledertver...	-	-	-	-	-	-
85445909 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn 1000 V, med mer enn 4 ledere	-	-	-	-	-	-
85446001 (m1=kg, m2=nei) Isolerte elektriske ledere med merkespenning over 1000 V, maks 10 kV	1,592	1,520	713	10	60	2
85446002 (m1=kg, m2=nei) Isolerte elektriske ledere med merkespenning over 10 kV, maks 30 kV	474	473	359	1	0	1
85446009 (m1=kg, m2=nei) Isolerte elektriske ledere med merkespenning over 30kV	4,217	4,070	2,330	123	24	0
39173110 (m1=kg, m2=nei) Bøyelige plastrør og -slanger, av kondensasjons-, polykondensasjon-, el polyaddis...	27	20	6	7	0	-
39173120 (m1=kg, m2=nei) Bøyelige plastrør og -slanger, av addisjonspoly-merisasjonsprodukter, tåler trykk ...	26	2	2	24	-	-

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
39173190 (m1=kg, m2=nei) Bøyelige plastrør og -slanger, tåler trykk på min 27,6 MPa, i.e.n.	891	647	272	228	16	0
39173210 (m1=kg, m2=nei) Bøyelige rør og slanger, ikke forsterket, uten forbin-delsesdeler, av kondensasjon...	535	529	453	5	1	-0
39173220 (m1=kg, m2=nei) Bøyelige rør og slanger, ikke forsterket, uten forbin-delsesdeler, av addisjonspol...	125	109	78	8	2	6
39173290 (m1=kg, m2=nei) Bøyelige rør og slanger, ikke forsterket, uten forbin-delsesdeler, i.e.n.	2,367	2,284	1,436	36	7	40
39173300 (m1=kg, m2=nei) Bøyelige rør og slanger, av plast, ikke forsterkede men med forbindelsesdeler	404	368	175	35	0	0
39173900 (m1=kg, m2=nei) Rør og slanger, av plast, i.e.n.	1,663	1,455	573	170	16	22
59031010 (m1=kg, m2=nei) Tekstilstoff, til fremstilling av tåkapper, impregnert, overtrukket, belagt el la...	7	6	2	1	-	1
59031091 (m1=kg, m2=nei) Tekstilstoff, til bordduk, impregnert, overtrukket, belagt el laminert med PVC	33	17	1	16	0	0
59031092 (m1=kg, m2=nei) Tekstilstoff, til presenningsduk, impregnert, over-trukket, belagt el laminert med...	505	64	13	441	0	0
59031099 (m1=kg, m2=nei) Tekstilstoff, impregneret, overtrukket, belagt el la-minert med PVC, ikke til tåka...	299	218	47	78	2	0
95069908 (m1=kg, m2=stykk) Apparater og utstyr med tilbehør for alminnelig fysisk trening, heru badebassen...	5,817	3,735	1,597	1,974	102	6
95069909 (m1=kg, m2=stykk) Apparater og utstyr med tilbehør for alminnelig fysisk trening, heru badebassen...	-	-	-	-	-	-

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
64019910 (m1=kg, m2=par) Vanntett fottøy, som ikke dekker ankelen, med yttersåle og overdel av plast	10	3	2	7	0	0
48142000 (m1=kg, m2=nei) Tapet o.l. veggbekledning av papir, plastbelagt på rettsiden m kornet, preget, fa...	463	455	8	5	3	0
64029110 (m1=kg, m2=par) Fottøy (unnt sports-), som dekker ankelen, med yt-tersåle og overdel av plast, (he...	617	15	2	601	1	1
64022010 (m1=kg, m2=par) Fottøy, med overdel av stropper og remmer, med yttersåler og overdel av plast	105	2	1	103	0	0
64029910 (m1=kg, m2=par) Fottøy (unnt sports-), som ikke dekker ankelen, med yttersåle og overdel av plast...	1,127	30	8	1,093	1	3
42021201 (m1=kg, m2=stykk) Skoleran-sler m ytterside av plast el tekstilmateria-le	66	16	9	50	0	-0
42021202 (m1=kg, m2=stykk) Doku-mentmapper og attachekofferter m ytterside av plast el tekstilmateriale	35	9	3	26	0	0
42021209 (m1=kg, m2=stykk) Gardero-be/hånd/toalettkofferter m ytterside av plast el tekstiler	2,265	587	110	1,671	7	0
42022200 (m1=kg, m2=stykk) Håndves-ker m ytterside av plast el tekstilmateri-ale	712	112	34	593	6	0
42023200 (m1=kg, m2=stykk) Futteraler, lommeetuier o.l., m ytterside av plast el tekstilmateriale	182	39	14	143	0	0
42029201 (m1=kg, m2=stykk) Ryggsek-ker m ytterside av plast el tekstilmateri-ale	973	32	7	935	5	0

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
42029202 (m1=kg, m2=stykk) Sykkel-vesker m ytterside av plast el tekstilma-teriale	55	9	1	46	0	0
42029209 (m1=kg, m2=stykk) Diverse etuier, vesker, dåser, skrin m ytterside av plast el tekstilmateriale	1,913	260	81	1,634	14	5
61161091 (m1=kg, m2=par) Arbeids-hansker og -votter, trikotasje, impreg-nerte, overtrukkede el belagte med p...	210	2	0	207	2	0
61161099 (m1=kg, m2=par) Hansker, vanter og votter, trikotasje, impregner-te, overtrukkede el belagte med p...	43	2	1	40	1	-0
63064000 (m1=kg, m2=stykk) Luftma-drasser	245	9	4	234	2	-0
95066200 (m1=kg, m2=stykk) Oppblås-bare baller	394	55	15	338	1	0
48142000 (m1=kg, m2=nei) Tapet o.l. veggbekledning av papir, plastbelagt på rettsiden m kornet, preget, fa...	463	455	8	5	3	0
90183900 (m1=kg, m2=stykk) Katetre, kanyler og liknende, unnt sprøyter, rør-formede metallnåler og suturnåler	977	766	462	106	100	4
39262000 (m1=kg, m2=nei) Klær og tilbehør til klær (heru hansker), av plast	3,285	823	704	2,427	29	6
39261000 (m1=kg, m2=nei) Kontor- og skoleartikler, av plast	4,496	3,699	906	668	115	14
62102000 (m1=kg, m2=stykk) Frakker, kapper,o.l., for herrer el gutter, av over-trukket, belagt, laminert o....	166	8	1	158	0	0
62103000 (m1=kg, m2=stykk) Frakker, kåper, kapper o.l., for damer el piker, av overtrukket, belagt, lamine...	143	2	0	141	0	0
62104000 (m1=kg, m2=stykk) Klær, kon-feksjon (ikke trikotasje), for herrer el gutter, impregnert, overtrukk...	1,171	49	9	1,113	6	3

Commodity	Total	EU + Switzer-land	DK and SE	Asia	Ameri-cas	Rest of world
62105000 (m1=kg, m2=stykk) Klær, kon-feksjon (ikke trikotasje), for damer el piker, impregnert, overtrukket...	1,167	22	5	1,139	6	1
61161091 (m1=kg, m2=par) Arbeids-hansker og -votter, trikotasje, impreg-nerte, overtrukkede el belagte med p...	210	2	0	207	2	0
61161099 (m1=kg, m2=par) Hansker, vanter og votter, trikotasje, impregner-te, overtrukkede el belagte med p...	43	2	1	40	1	-0

KLIMA- OG FORURENSNINGS-DIREKTORATET

Klima- og forurensningsdirektoratet
Postboks 8100 Dep, 0032 Oslo
Besøksadresse: Strømsveien 96
Telefon: 22 57 34 00
Telefaks: 22 67 67 06
E-post: postmottak@klif,no
Internett: www,klif,no

Utførende institusjon: COWI A/S, Denmark	ISBN-nummer

Oppdragstakers prosjektansvarlig	Kontaktperson i Klima- og forurensningsdirektoratet	TA-nummer 2845/2011
Carsten Lassen	Pia Linda Sørensen	SPFO-nummer

	År	Sidetall	Kontraktnummer
	2011	62	

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Forfatter(e) Carsten Lassen og Ulla Kristine Brandt
Tittel - norsk og engelsk Kartlegging av ftalaten DEHP i produkter som importeres til Norge Survey of the phthalate DEHP in articles imported to Norway
Sammendrag – summary Basert på informasjon om bruken av DEHP i EU og i verden og data på norsk import av relevante produktgrupper som inneholder DEHP er forbruket av DEHP i Norge i 2009 i produkter grovt anslått til 1.200-2.500 tonn DEHP. Beregningen indikerer at forbruket av DEHP i Norge er i samme størrelsesorden som i EU. Based on information on the use of DEHP in the EU and the world and data on the Norwegian import of relevant DEHP-containing product groups, the consumption of DEHP in Norway in 2009 in mixtures and articles is roughly estimated at 1,200-2,500 tonnes DEHP. The estimate indicates that the consumption in Norway is of the same magnitude as in the EU.

4 emneord DEHP, PVC, ftalater, prioritert miljøgift	4 subject words DEHP, PVC, phthalates, priority substance

Klima- og forurensningsdirektoratet
Postboks 8100 Dep,
0032 Oslo
Besøksadresse: Strømsveien 96

Telefon: 22 57 34 00
Telefaks: 22 67 67 06
E-post: postmottak@klif.no
www.klif.no

Om Klima- og forurensningsdirektoratet

Klima- og forurensningsdirektoratet (Klif) er fra 2010 det nye navnet på Statens forurensningstilsyn. Vi er et direktorat under Miljøverndepartementet med 325 ansatte på Helsfyr i Oslo. Direktoratet arbeider for en forurensningsfri framtid. Vi iverksetter forurensningspolitikken og er veiviser, vokter og forvalter for et bedre miljø.

Våre hovedoppgaver er å:
redusere klimagassutslippene
redusere spredning av helse- og miljøfarlige stoffer
oppnå en helhetlig og økosystembasert hav- og vann-forvaltning
øke gjenvinningen og redusere utslippene fra avfall
redusere skadevirkningene av luftforurensning og støy

TA-2845/2011