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Chemicals in products

Medium chained chlorinated paraffins (MCCPs): A survey of products in Norway

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Summary

The main objective of this study is to investigate to what extent the consumption of medium chained chlorinated paraffins (MCCPs) in articles in Norway reflects the consumption patterns for these substances in the EU.

For MCCPs in preparations, which are registered in the Norwegian Product Register, it seems to be evident that the consumption of MCCPs in metal working/cutting fluids, paints/coatings, adhesives and sealants is significantly lower than the EU average. Estimating the Norwegian consumption, by assuming that the consumption resembles the average EU per capita consumption for these applications would result in a total consumption in Norway in 2006 of 201 tonnes MCCPs, while the actual registered consumption in 2009 in these preparations is only 35 tonnes.

For articles, the main use of MCCPs within the EU is as secondary plasticiser in PVC and as flame retardant in rubbers and other polymers. The registered consumption in Norway for these applications was according to the Product Register 12 tonnes in 2009, whereas the consumption with articles can be estimated at 395 tonnes if it is assumed that the consumption in Norway resembles the average EU per capita consumption.

Based on data from the trade and production statistics it is estimated that the import of flexible PVC in articles to Norway is of a magnitude that could justify that the MCCP consumption with PVC in articles could be of a size similar to the EU average. More than half of the imported articles with flexible PVC are, however, imported from Germany, Denmark, Sweden and Finland which have a use of MCCPs for production of PVC significantly below the EU average. For the main group, PVC flooring and wall covering, information obtained from suppliers furthermore indicates that the presence of MCCPs in articles within this group is below the EU average. For other product groups, the data have been too limited to make any conclusion regarding MCCPs in articles on the Norwegian market vs. the EU market. The same is the situation for the other major application areas within the EU: rubbers and other polymers.

Based on the available data, the consumption of MCCPs in Norway in 2009 in preparations and articles is roughly estimated at 205-409 tonnes MCCPs. Compared to the estimate based on the data from the Product Register (48 tonnes), the estimated consumption is 4-8 times higher.

Norsk sammendrag

Målet for dette prosjektet er å kartlegge bruk og forekomst av mellomkjedete klorparafiner (MCCP) 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 MCCP på det norske markedet.

Ut fra registreringer i det norske Produktregisteret synes det klart at omsetningen av MCCP i skjærevæsker, maling, lim og fugemasser er vesentlig mindre i Norge enn det gjennomsnittlige omsetningen i EU. Dersom det antas at norsk omsetning i slike produkter tilsvarer den i EU, kan norsk omsetning i 2006 beregnes til 201 tonn MCCP. Registrert mengde i produktregisteret i 2009 var 35 tonn.

Hovedbruksområder for MCCP i EU er som sekundær mykner i PVC og som flammehemmer i gummi og andre polymerer. I det norske Produktregisteret er det registrert en omsetning på 12 tonn i slike materialer i 2009. Dersom norsk omsetning beregnes på grunnlag av gjennomsnittlig forbruk i EU, gir dette 395 tonn.

Data i handels- og produksjonsstatistikk viser at import av fleksibel PVC til Norge er i en størrelsesorden som tilsier at omsetningen av MCCP i PVC-materialer kan ligge på samme nivå i Norge som gjennomsnittet i EU. Imidlertid er mer enn halvparten av importen fra Tyskland, Danmark, Sverige og Finland. Disse landene har vesentlig lavere bruk av MCCP til PVC enn gjennomsnittet i EU. Videre indikerer informasjon fra leverandører av PVC-gulvbelegg og -tapet at bruk av MCCP i slike materialer er lavere enn EU-gjennomsnittet. Disse materialene utgjør hovedmengden av importerte PVC-materialer til Norge. For andre PVC-materialer er det ikke tilstrekkelig datagrunnlag for å konkludere med hensyn til MCCP-bruk i Norge i forhold til EU-gjennomsnitt. Det samme gjelder for gummi og andre polymerer, som er det andre hovedbruksområdet i EU.

Basert på tilgjengelige data er omsetningen av MCCP i Norge i produkter og materialer anslått til 205 - 409 tonn i 2009, som er 4 - 8 ganger høyere enn registrert omsetning i Produktregisteret (48 tonn).

1. Introduction

1.1 Identity of the substance

This report concerns the following substance:

Chemical Name:	Medium chained chlorinated paraffins
Abbreviations:	MCCPs, MCCP
EC Number:	287-477-0
CAS Number:	85535-85-9
IUPAC Name:	Alkanes, C ₁₄₋₁₇ , chloro

1.2 Background and objectives

Medium chained chlorinated paraffins (MCCPs) are priority hazardous substances and Norway has national targets for the reduction of the releases of these substances.

MCCPs are according to the Regulation on classification, labelling and packaging (CLP Regulation) classified with the hazard statement codes H362: “May cause harm to breast-fed children”, H400: “Very toxic to aquatic life, and H410: “Very toxic to aquatic life with long lasting effects” (EC, 2009). The CLP Regulation entered into force in Norway December 1, 2010 and remains in force in parallel with the regulations on classification, labeling, etc. of dangerous chemicals (FOR, 2002) until June 1, 2015.

MCCPs do not occur naturally in the environment. However, significant levels of MCCPs have been detected in the Norwegian environment, both in biological materials (e.g. in fish) and in sediments from freshwater and marine environments (among others, in Mjøsa, the largest lake in Norway, which is an important source of drinking water). MCCPs are found in leachate from waste disposal sites and soil and sediment samples from disposal sites that shows that products constitute a significant source of MCCP discharges into the environment. MCCPs have also been detected in sediments in the Arctic. MCCPs are measured in the environment and are detected in breast milk, cow’s milk, freshwater and some marine fish and marine mammals. Absorption of MCCPs via food is important, since higher values are found than what one would expect from the bioconcentration levels.

The existing data on the consumption of MCCPs in Norway is based on data from the Norwegian Product Register which register the consumption of MCCPs in Norway in

preparations. No data are currently available on the consumption of MCCPs in articles.

The registered MCCP 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 would yield a Norwegian consumption of some 600 tonnes, contrary to the 48 tonnes actually registered in 2009 (the data are further discussed in the following sections). The main differences concern MCCPs in additives for PVC, metal working fluids and additives for rubber/polymers (other than PVC). Metal working fluids are registered in the Norwegian Product Register, and the differences in the use of MCCPs in metal working fluids are assumed to reflect an actual difference due to the partial phase-out of MCCPs in metal working fluids in Norway.

As concerns the use of MCCPs in the production of plastics and rubber, the Norwegian data reflect that MCCPs are only used to a small extent in the production of these products. The majority of PVC and rubber articles sold on the Norwegian market, are however not likely of domestic production, and imported articles may contain MCCPs. Surveys of MCCPs in marketed products in Norway have demonstrated that MCCPs can be found in a variety of products, but the pattern is scattered – some products within a product group contain MCCPs, others do not (further discussed in section 2.3).

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

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

Application area	Consumption, tonnes MCCPs per year		
	EU, 2006 *1	Norway, if average EU 2006 per capita consumption is applied *2	Norway, 2009 *3
Additives for PVC	34,676	328	0
Metal working/cutting fluids	9,907	94	3
In paints/coatings, adhesives and sealants	11,323	107	32
Additives for rubber/polymers (other than PVC) *3	7,077	67	12
In leather fat liquors	708	7	0
In carbonless copy paper	0	0	0
Other uses (unknown)	0	0	>1
Total	63,691	603	48

*1 Source: Entec (2008). Indicates the amount of MCCPs used for production in the EU, and do not include

import and export with articles. Import and export with articles is assumed to approximately outbalance each other at the aggregated level shown in this table.

*2 Estimated quantities of MCCPs in preparations and articles sold in Norway.

*3 Source: Klif 2010. Based on data from the Norwegian Product Register.

1.3 Methodology

Data on MCCP consumption in the EU

The description of the consumption of MCCPs in the EU is mainly based on a detailed assessment of 2006 consumption data for the EU and consumption data for selected Member States (Entec, 2008). In order to obtain more updated data and a more detailed breakdown of the EU consumption into the different applications, a number of European trade organisations have been contacted.

Data on MCCPs in preparation

The consumption of MCCPs in Norway as a pure substance and in formulations is registered in the Norwegian Product Register. The data from 2009 is based on the volumes registered by the registrants. Due to inadequate registration the data are encumbered with some uncertainty. In 2005 a study was undertaken where the registered volumes for MCCPs were evaluated by contact to users of MCCPs and market actors (Weholt, 2005). As a result of the evaluation, some of the data in the Product Register were reassessed, and the mistakes were corrected. Such evaluation has not been done for the 2009 data, but as the number of registrants is limited, it is assumed that the data are still quite certain as consequence of the reassessment in 2005.

Statistics

Data on import of relevant commodity groups by import 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. It is in this study assumed that the import country is identical with the country of origin. Statistics Norway has confirmed that the registered import country would in general also be the country of origin. i.e. if the import country is France the products in general origin from France (Statistic Norway, 2010). A check of commodity number 44039908, covering timber of tropical woods (Norwegian: "tømmer af tropiske tresorter"), showed that the main import country was Denmark which obviously is not the country of origin of the wood. However, it is not possible to determine whether the wood has been processed in Denmark before re-export. 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. 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 import country is in general also the country of origin.

Data on production in Norway has been retrieved from the online Prodcom database of Eurostat. The Norwegian production statistics use the Prodcom nomenclature used in the EU. The Prodcom commodity groups are more aggregated than the CN8 commodity groups meaning that production volumes can only be retrieved at a more aggregated level. In addition, the Prodcom data are confidential for many commodity groups because the commodities, in countries with a small population like Norway, are produced only by a few companies.

PVC 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 commodity groups. The commodity numbers used in the Danish study was the combined nomenclature (CN8) with 8 digits. 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 whereas for other groups, e.g. cables, the average content of PVC is based on the estimates from the Danish study. These estimates 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 have changed over time due to an increasing demand for PVC-free products. At least for some application, PVC coated textiles and cables, there may to some extent have been a shift to PVC-free products. 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 for most commodity groups the percentages still are within an acceptable uncertainty.

2. Usage and supply of MCCPs

2.1 Usage and supply of MCCPs in the EU

The trend in MCCP demand in the EU from 1994 to 2006 distributed on major use categories is summarised in Table 2.1. The trade organisation Euro Chlor has been contacted in order to obtain updated data, but the organisation has not been in as position to provide new data.

The major use of MCCPs in articles is as co-plasticiser used together with phthalates in PVC. A detailed assessment of the EU-extra import and export of the phthalate DEHP within the main use categories indicated that the import to the EU was of the magnitude of 15% of the EU consumption and was approximately outbalanced by the export (COWI et al., 2009). On this basis, and considering the size of the EU market, the MCCPs demand in the EU is taken as reasonably good estimates of the overall distribution of the total MCCP content of end-products (articles and preparations) assuming that import and export may approximately outbalance each other.

MCCPs are produced by a five companies within the EU. The chlorinated paraffins sector group of Eurochlor has four members from France, Slovakia, Germany and Spain. Besides these, MCCPs are manufactured by a manufacturer in the UK. The web-sites of the companies contain very limited information on the actual applications of the MCCPs.

Table 2.1 Trends in MCCP demand by overall application categories (Source: Entec, 2008)

Application	EU 1994 ^{*1} Tonnes	EU 1997 ^{*1} Tonnes	EU 2003 ^{*2} Tonnes	EU 2006 ^{*3} Tonnes	EU 2006 % of total
Additives for PVC	45,476	51,827	32,450	34,676	54%
Metal working/cutting fluids	2,611	5,953	8,113	9,907	16%
In paints/coatings, adhesives and sealants	3,079	3,541	8,236	11,323	18%
Additives for rubber/polymers (other than PVC) ^{*3}	2,497	2,146	3,521	7,077	11%
In leather fat liquors	1,614	1,048	1,411	708	1%
In carbonless copy paper	1,296	741	89	-	-
Total	56,573	65,256	53,820	63,691	100%

Notes from Entec (2008):

*1: ECB (2005),

*2: Cefic (2004). Data for 2003 included 2,894 t categorised as 'other'. This is understood to relate to unidentified sales through distributors and not to different uses. This has been distributed amongst the other applications on a pro-rata basis.

*3: Euro Chlor (2008a; EU25). Data are for the EU-25 whereas previous estimates are assumed to be for the EU-15. The data listed as "rubber/polymers" are referred to as "flame retardant textiles and rubber" in the 2006 data. Data for 2006 include 9% categorised as "other and unknown" which has been assumed to be distributed proportionately amongst the other uses.

Use in individual Member States

Examples of the use of MCCPs in individual Member States are shown in Table 2.2. Though not explicitly reported as such, these data should all likely be considered as demand for MCCPs as chemicals, not including MCCPs in imported articles.

It is notable that the use of MCCPs for production of PVC in Germany, Austria, Sweden and Norway account for a significant smaller percentage of the total than the EU average, whereas the percentage of the total used for production of PVC, is significantly higher in the UK. The EU Risk Assessment Report (ECB, 2005) indicates that the main user countries in 1999 were Italy and the UK, with the use in the UK accounting for just over 25% of the total EU use. However, according to the data presented in Table 2.1 and Table 2.2 UK accounted for 18% in of the total EU consumption in 2003 and on a per-capita basis, the use in the UK is only slightly over the EU average.

The data indicate that there might be some regional differences in the use of MCCPs as co-plasticizer in PVC, which may be correlated with a shift in the use of the phthalates from DEHP to the heavier types of phthalates DINP and DIDP as the primary plasticizers (see further below). The regional differences are of importance for the assessment of the import of MCCPs with articles to Norway.

Table 2.2 Examples of national demand for MCCPs by application categories (Source: Entec, 2008).

Application	Germany & Austria (2006) ^{*1} Tonnes	Sweden (2005) ^{*2} Tonnes	Norway (2005) ^{*3} Tonnes	UK (2003) ^{*4} (approximate) Tonnes
PVC	1,136	3.5		8,000
Metalworking fluids	1,136	65.8	5	1,500
Paints, sealants and adhesives	2,272	22.8	31-36	300
Rubber/polymers other than PVC	1,670		15-20	100
Leather fat liquors	<66.81			0
Other and unknown	401	2	3	100
Total	6,681	94.1	54-64	9,968
Notes from Entec (2008):				
*1: Eurochlor (2008). The data listed as "rubber/polymers" are referred to as "flame retardant textiles and rubber" in the source data.				
*2: Kemi (2008). Note that the 3.5 t indicated as used in PVC is cited as used in "plastics" in the reference.				
*3: SFT (2007).				
*4: MCCP User Forum 2003 (sales data, extrapolated from data up to September 2003).				

2.1.1 MCCPs use in PVC

MCCPs are used as secondary plasticisers in flexible PVC formulations providing partial replacement of the more expensive phthalates. They do not impart flexibility to the PVC resin alone but, when combined with a primary plasticiser, will act in such a way as to add flexibility to the final product. The majority of secondary plasticisers in use are chlorinated paraffins, which are hydrocarbons chlorinated to a level of 30-70%. The MCCPs impart flame retardancy, improved water and chemical resistance and better viscosity ageing stability together with a reduction in formulation cost (ECB, 2005). If the main function is flame retardancy, usually long chained chlorinated paraffins (LCCP) with high chlorine content are used.

Use of MCCPs with different chlorination

The EU Risk Assessment Report, RAR (ECB, 2005) reports that MCCPs with different chlorine content are used for different applications:

- For soft PVC products that require a high flexibility at normal and low temperatures, MCCPs with chlorine contents around 40-45% wt. Cl are used as secondary plasticiser. Examples of applications for this type of PVC include coatings, some types of flooring, garden hose and shoe compounds. The secondary plasticiser is added at 10-15% by weight of the total plastic.

- MCCPs with higher degrees of chlorination (typically around 50-52% wt. Cl) are more compatible with PVC and have a lower volatility than lower chlorinated analogues. They are used as secondary plasticisers in calendered flooring, cable sheathing and insulation and in general purpose PVC compounds. In heavily filled products, such as some types of calendered flooring, they can be used as the sole plasticiser at levels of around 10% in the finished product
- The more highly chlorinated MCCPs (e.g. 56-58% wt. Cl) are less volatile still and are used for softening plastics that are subject to higher temperatures during processing (not further specified).

Trends in consumption

As shown above, the demand for MCCPs for PVC is generally declining in EU. The reason may be that MCCPs are less compatible with primary plasticisers such as DINP (MCCP User Forum, 2003, as cited by Entec, 2008). The decrease in the use of MCCPs may likely be a consequence of the gradual substitution of DEHP by DINP and other heavier phthalate plasticisers. As of 2007, DEHP constituted only about 17% of the total European plasticiser demand, whereas globally it still took up about 50% of the demand (Eurochlor, 2010). This indicates that MCCPs in flexible PVC articles may perhaps be more prevalent in articles produced outside the EU.

Consumption pattern

Entec (2008) reports typical PVC applications of MCCPs to include cables (1/6 of the demand), flooring (1/3), wall coverings (1/3; "wallpaper") and unspecified extruded and moulded articles (1/6). The numbers on parenthesis are the breakdown of demand reported by Entec based on information from the sole UK producer of MCCPs (RPA, 2002 as cited by Entec, 2008). The breakdown is based on rather old data and should be interpreted with care.

According to Entec (2008), flooring, wall coverings and cables accounted for 5/6 of the MCCP use in PVC. The same product groups accounted for about 37% of the end use of DEHP in 2006 (COWI et al., 2009).

Based on a typical MCCP concentration in PVC of some 10-15 parts per hard resin (phr)(Entec, 2008), and a total MCCP consumption of 34,676 tonnes, the total amount of PVC resin with MCCPs can be estimated at 231,000 to 347,000 tonnes per year.

According to ECVM, the total European PVC resin consumption in 2007 was 6.5 million tonnes (ECVM, 2010) while the production of PVC products was about 8 million tonnes.

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. Based on this it can be estimated that PVC with MCCPs account for about 10-15% of the total PVC resin consumption for flexible PVC.

Data on the total tonnage of PVC plastics, after addition of plasticisers, fillers, etc. has not been identified. About 900,000 tonnes plasticisers are used to plasticise PVC in the EU (ECPI, 2010), and to this adds the MCCPs, other non-phthalate plasticisers, pigment, fillers, etc. The total tonnage of flexible PVC plastics is probable in the range of 3.5-4.0 million tonnes per year. A load of 10-15 parts per hard resin of MCCPs corresponds approximately to a concentration in the final PVC plastics of 6-10 %.

If the 34,676 tonnes MCCPs were equally distributed on the 3.5-4.0 million tonnes flexible PVC for flexible PVC, the average concentration would be 0.9-1.0%, which can be used as a default factor for estimating quantities of MCCPs from data on PVC plastics used, if nothing else is known.

According to Entec (2008), PVC flooring containing MCCPs represented 9-14% of PVC flooring sales while PVC cable compounds containing MCCPs represented around 5-7% of cable sales in 1999.

In 2007 the consumption of PVC flooring accounted for 5% (411,000 tonnes) of the total PVC resin use (corresponding to about 18% of flexible PVC use) while cables account for 8% (548,000 tonnes resin) (EVCM, 2010). Combined with the information in the paragraph above about the percentages of flooring and cables containing MCCP, and the total use of MCCPs for PVC, the assumptions from Entec (2008) that flooring, wall covering and cables should account for 5/6 of the market seems not to be reflect the entire EU market.

MCCPs and DEHP

Until more specific information on the use of MCCPs is available it must be assumed that MCCPs to some extent may be used together with DEHP for any of the major uses of DEHP. The EU RAR for MCCPs assumes in some calculations that the use pattern of PVC (and other polymers) containing MCCPs is similar to that of PVC containing DEHP, because the MCCPs are typically used as secondary plasticiser to DEHP and other phthalates.

The EU consumption of DEHP by product group in 2007 is shown in Table 2.3. 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 (10%), and coated

fabric and other products from plastisol (16%). The latter may include coated fabric used in bags, suitcases, etc. as discussed further in section 2.1.3.

According to the table, shoe soles account for some 7 % of the total consumption of DEHP. The EU RAR indicates, as mentioned above, that MCCPs may be used in shoe compounds. Personal experience based on visits to supermarkets and shoe shops in Denmark indicates that as an average for flip flops, girl sandals, ladies shoes and lady slippers approx. 50% of the shoes include PVC. A Swedish investigation of flip-flops purchased in many countries around the world demonstrates that a major part of the flip-flops contain DEHP, but the study did not include analysis of MCCPs (SSNC, 2009).

Table 2.3 EU consumption of DEHP by product group in 2007 (Source: COWI et al., 2009)

Product group	Consumption Tonnes	Percentage of total
Flooring, wall covering, roofing	47,600	18
Wires and cables	64,100	24
Film/sheet and coated products made by calendering	44,000	16
Coated fabric and other products from plastisol	43,800	16
Hoses and profiles	34,700	13
Moulded products	3,000	1
Shoe soles	19,400	7
Other polymer applications	12,300	5
Total	268,900	100

2.1.2 MCCPs in rubbers

MCCPs are used in different types of rubbers such as nitrile rubber, natural rubber and styrene-butadiene rubber. In rubbers, the primary function of the MCCPs is to impart flame retarding properties to the polymers (Entec, 2008). Both short chained, medium chained and long chained paraffins are (or have been) used as flame retardants in the rubber industry (Brooke *et al.*, 2009). The short chained chlorinated paraffins are today banned in Norway.

The European Tyre & Rubber Manufacturers Association, ETRMA has on the basis of a survey among their member companies for this study informed that MCCPs are used as flame retardants in all rubber applications in the mining industry (ETRMA, 2010). One example of application in the mining sector is conveyor belts (on chloroprene, styrene-butadiene rubber, nitrile rubber, or butadiene rubber polymer basis). In the mining sector the concentration of MCCPs can vary from 2-3% up to 5-10% w/w depending on the specific application/article.

According to ETRMA, other applications of MCCPs as flame retardant in rubber include:

- Rubber tapes for road markings in concentrations of 3-4%. The road markings are applied on the road by means of adhesives. They are used for marking the road, for instance the yellow lines applied on the road in case of roadwork.
- Offshore hoses in concentrations of approx 9%.
- Sheeting in concentrations of approx 9%. The sheets with MCCPs are used for applications where fire protection is required. An example mentioned is rubber flooring in buildings.

ETRMA furthermore informs that MCCPs are not used in tyres.

According to Entec (2008) identified examples of MCCP uses in end-products included conveyer belts, tubes for compressed air in the mining industry, bellows for busses, metros and trains, and rubber profiles for fireproof doors (Entec, 2008). The chlorinated paraffins used in general have high chlorine content and are present at concentrations up to 15% w/w (ECB, 2005).

A survey of the use of chlorinated paraffins (short, medium and long chained) in the rubber industry in the UK identified the following uses of MCCPs (Brooke *et al.*, 2009):

- Cable cover in concentration of 3.8%
- Rubber hoses in concentration of 6.2%
- In pipe seals in concentration of 4%
- Industrial rollers in concentrations of up to 20%
- Flame retardant items for railway use in concentration of 7.2% MCCPs

The surveys of MCCPs in products marketed in Norway found MCCPs in concentration of 11% and 2.6%, respectively, in two of three rubber cables. (see section 2.3)

The EU consumption of MCCPs as additives for rubber and polymers other than PVC increased from 1994 to 2006 from of about 2,500 tonnes (EU15) to about 7,000 tonnes (EU27). The consumption in Germany was on the EU per capita average whereas the consumption in the UK was considerably lower.

No breakdown of the consumption by application area has been available.

2.1.3 MCCPs in textiles and fabric

Flame retardant textiles have been mentioned as an application of MCCPs (Euro Chlor, 2008,

as cited by Entec, 2008), but no further details on the application have been available.

According to the EU RAR (ECB, 2005) information provided from a supplier of MCCPs indicated that around 6.6% of the total supplied for PVC applications was used in textiles and coated products. The risk assessment assumed for the calculation of releases an average thickness for this type of product of 1 mm and a MCCP content of 10-15%.

According to a Danish study on alternatives to phthalates in the textile and clothing industry, PVC with phthalates plasticisers were at that time used for PVC coated textiles such as tents, tarpaulins, rainwear and work clothes (Hansen and Høg Lejre, 2002). According to the study, chlorinated paraffins (the type not specified) may be used as secondary plasticisers in the products because they reduce overall material costs (MCCPs are cheaper than phthalates), provide improved fire properties, and improve the resistance against microbial degradation.

MCCPs have been identified in a number of textile products in Norway (see section 2.3). For those applications most likely the purpose of the MCCPs has been as plasticiser in PVC coatings. The concentration in the fabric (including both the textile and the coating) was on average 0.5%. The explanation for the relatively low concentration may likely be that the MCCPs are present only in the thin coating, but at higher concentrations. Chlorinated paraffins may also be used in impregnation to provide water proofing (other function than the water proofing provided by the PVC coating) and fire proofing, but for these applications long-chained chlorinated paraffins have mainly been used (Brooke *et al.*, 2009).

PVC coated textiles and fabric may either consist of an outer surface of textile with a PVC backcoating (e.g. used in bags) or with the coating forming the outer surface with a textile back (e.g. used in rainwear or imitation leather fabric).

Four manufacturers or/and major suppliers of bags, backpacks and water resistant clothing for the Norwegian market have been contacted for collection of information on MCCP usage in the products. The companies were also asked whether, to their knowledge, MCCPs had functions in these types of products apart from the function as plasticiser in PVC coatings (see Annex 3). The general picture is that PVC, with a few exemptions, is not used in the products of these companies. To the knowledge of the companies MCCPs were not used in their products and they did not have specific information on the function of MCCPs in products from other suppliers. It is more common to use polyurethane coating for water resistance in clothing, at least in the high-end products on the market. It has not been possible to find any information indicating that MCCPs are present in polyurethane coating, but it cannot be ruled out entirely.

The MCCPs has been demonstrated to be present in the lower-end products within these product groups e.g. sold in supermarkets, DIY centres (do it yourself centres) and department stores.

Examples of PVC coated textile products is shown below. For some of the products groups the surveys of MCCPs in products in Norway have demonstrated that MCCPs are present at least in some products (indicated with an *), whereas for other products no evidence of the use of MCCPs has been identified.

- Bags*, backpacks*, briefcases, purses* and suitcases
- Rainwear and water resistant gloves*
- Shoes, boots and waders
- Table cloths and aprons
- Venetian blinds, curtains, shower curtains and similar items
- Tents
- Camping chairs*
- Air mattresses
- Imitation leather fabric used in clothing, bags and furniture
- Awnings, canopies and tarpaulins

2.1.4 MCCPs in other polymers than PVC

A survey of the use of MCCPs in Norway in 2005 indicated a use of 15-20 tonnes MCCPs as plasticisers and flame retardant in polyester (Weholt, 2005). One Norwegian manufacturer used 14 tonnes MCCPs for the production of polyesters. The application of the polyester seems mainly to be flame retardant gelcoats and topcoats for marine vessels. This application is likely the same as indicated as “marine coatings” in the section 2.1.6 on MCCPs in paints.

No other information on the use of MCCPs in polymers other than PVC has been identified.

2.1.5 Leather fat liquors

MCCPs are used in high-end leather products to provide light-fastness, strong binding to the leather and a dry surface feel. Alternatives are natural oils. MCCPs are used for this purpose in some EU countries, but has been abandoned in others, e.g. in the UK (MCCP User Forum, 2002, as cited by Entec, 2008). Around 2006, up to 10% of the total EU production of leather may have contained MCCP. That year, 84% of the EU leather production took place in Italy. Other major producers were Spain and Germany. Around 12 kg MCCPs are used per tonne of "wet blue" (wet, freshly tanned leather (Entec, 2008)). If all the added MCCPs are absorbed into the finished leather, this corresponds to a concentration of 1.2% in the leather products.

About 30% of the EU production of leather fat liquors is used within the EU. The rest is exported (Entec, 2008).

According to COTANCE/UNIC (in: Entec, 2008), the chlorinated paraffins most used for leather are the heavier LCCPs (chain length above 17).

For this study, COTANCE (2010) has informed that when used in the leather industry, chlorinated paraffins are/were part of chemical preparations marketed by major chemicals suppliers for certain process steps. Precise content of MCCPs in such preparations is generally not known to the user. COTANCE does not hold any specific information on MCCP use.

2.1.6 Paints

MCCPs are used in paints based on various types of resin. The MCCPs acts as a plasticiser to reduce cracking and detachment of the paint. Typical applications are reported to be chlorinated rubber-based paints used in aggressive marine and industrial environments, and vinyl-copolymer paints used on exterior masonry. Concentrations of MCCPs in paints are typically 1-5%, but may be up to 25%. Other specific uses reported are paints for concrete sealing/coating, primers and coatings for structural steel, roof coatings, above waterline marine coatings, antifouling paints, acrylic and epoxy underwater primers, swimming pool paints, masonry paints, chemical resistant coatings, high humidity resistant coatings, security fencing paints, damp-proof paints, floor coatings and flame retardant coatings for wood and paper (Entec, 2008, and various sources therein). This indicates that any import to Norway may likely primarily be with the paints and coatings themselves, i.e. as preparations and to a much lesser extend with imported articles. Entec (2008) roughly estimates the market for paint/coating types containing MCCPs at around 1% of the total paint market in the EU (based on 2001 paint demand).

For this study, CEPE (2010) has confirmed that MCCPs are used mainly in industrial coatings including e.g. marine coatings and protective (anti-corrosion) coatings. The organisation states that, to their knowledge, no simple substitutes for the MCCPs uses in these coatings are available. CEPE adds that the only articles with coating/paint/sealant containing MCCP, which is traded across borders in significant amount, are possibly vessels.

2.1.7 Sealants and adhesives

Primary uses in this category seems to be sealant-type products (which are also used as adhesives), such as polysulphide sealants, polyurethane sealants, acrylic sealants and butyl sealants used in building and construction. This includes use in double and triple glazed

windows. They are primarily used for their plasticising and flame retarding properties (Houghton, 2003, as cited by Entec, 2008).

2.1.8 Carbonless copy paper

This use of MCCPs is reported to have ceased in the EU (Entec, 2008).

2.2 Usage and supply of MCCPs outside the EU

MCCPs in flexible PVC articles may perhaps be more prevalent in articles produced outside the EU, because there, the phthalate DEHP constitute a major part of the PVC plasticisers. As mentioned above, as of 2007 DEHP constituted only about 17% of the total Western European plasticiser demand, whereas globally it still constituted about 50% of the demand.

A market survey of production of and the market for chlorinated paraffins in China shows that the chlorinated paraffins (probably mainly MCCP) accounted for about 10% of the plasticizer market in China (CCM Chemicals, 2006 – only a part of the report has been available). In the EU at the same time MCCPs took up about 6% of the plasticizer market. The differences in the percentages reflects the differences in the consumption pattern for the phthalates, where DEHP took up 79% of the total market in China, while it in the EU DEHP accounted for less than 30%. Furthermore, the market survey mentions that many down stream users replace a larger proportion of the DEHP with chlorinated paraffins, because of their lower price (CCM Chemicals, 2006).

The data indicate that MCCP may be found in a larger proportion of products of flexible PVC produced in China as compared to products produced in the EU. Furthermore, the concentration in the products may also be higher.

Table 2.4 Consumption of plasticizers in China in 2005 (source: CCM Chemicals, 2006)

	Consumption, tonnes	Percentage, %
DEHP (indicated as DOP)	816,000	78.7
DBP	59,000	5.6
Chlorinated paraffins	119,000	10.4
Other	56,000	5.3
Total	1,050,000	100

No data have been available for other parts of the world, but as shown in Chapter 4, import from the EU and Asia (mainly China) accounts for nearly 100% of the import to Norway of the product groups concerned.

2.3 Surveys of MCCPs in products marketed in Norway

A number of surveys of MCCPs (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 the substances. Due to the low number of spot tests and the targeted sampling, the results do not provide a comprehensive view of the presence of MCCPs in products on the market, but can be used as indications of where the MCCPs can be found in products and the concentration of MCCPs in the different products.

The table below shows the results of surveys of MCCPs in products marketed in Norway for the years 2005, 2006, 2008 and 2009. The table shows the results of products with demonstrated MCCP content. The indicated concentration is the concentration in the main material. For textile bags and gloves the data show the concentration in the coated fabric i.e. the concentration may likely be higher in the coating itself if the MCCPs are present only in that part. For cables the material tested was the insulation sheathing. The samples from different years were analysed by different laboratories and different detection limits have been applied. For the 2005 survey, the detection limit has not been reported. For the 2006 survey, the detection limit was 1 g/kg and concentrations in the range 0.1-1 g/kg would consequently not be reported in this survey.

2005 survey: MCCPs were detected in 4 out of 19 samples of various PVC materials.
(detection limit: not reported)

2006 survey: MCCPs were detected in 8 out of 42 samples of various products including sealants, rubber cables, PVC materials, maintenance products and oils
(detection limit 1 g/kg = 0.1%)

2008 survey: MCCPs were detected in 2 out of 28 samples of various products
(detection limit 0.1 g/kg = 0.01%)

2009 survey: MCCPs were detected in 1 of 2 samples.
(detection limit 0.1 g/kg = 0.01%)

Table 2.5 *MCCP content of products tested positive 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
Rubber cable	n.a.	n.a.	n.a.	11	2008
Sealant foam*(polyurethane)	n.a.	n.a.	n.a.	12.5	2008
Cable, for car (PVC)	n.a.	n.a.	n.a.	0.14	2006
Cable, extension cord (rubber)	n.a.	n.a.	n.a.	2.6	2006
Cable, extension cord (PVC)	n.a.	n.a.	n.a.	7.8	2006
Backpack, coated textile	some	n.a.	some	0.88	2006
Backpack, coated textile	some	n.a.	some	0.36	2006
Purse, coated textile	some	n.a.	some	0.45	2006
Backpack, coated textile	some	n.a.	some	0.035	2006
Leather working gloves	n.a.	n.a.	n.a.	0.073	2006
PVC wall cover	n.a.	n.a.	n.a.	1.3	2005
PVC wall cover	n.a.	n.a.	n.a.	0.7	2005
Camping chair, coated textile	n.a.	n.a.	n.a.	1.6	2005
Picnic bag, coated textile	n.a.	n.a.	n.a.	0.47	2005

n.d.: not detected ; "some" – actual concentration not specified ; n.a. not analysed

For the product groups of particular interest for this study, the following results were found. The presence of MCCPs in sealant would be covered by the data from the Norwegian Product Register shown and further discussed in Chapter 3.

Table 2.6 Results of surveys by product groups

Product group	Number of products analysed	Products with MCCP	Concentration in main material of products with MCCP, %
Flooring and wall covering	6	2	0.7; 1.3
Cables and wires, plastic isolation	3	2	0.14, 7.8
Cables and wires, rubber isolation	3	2	11, 2.6;
Textiles in bags, gloves and chairs	15	6	0.47, 0.88*; 0.36*; 0.45; 0.035;1.6; 0.12
PVC products of foils (inflatable toys, pools, etc.)	5	0	
Sealants	16	1	12.5**

* Different parts of the same product

** Polyurethane based sealant

It is notable that the MCCP concentration of the PVC products is significantly lower than the typical concentration reported elsewhere. In the PVC wall covers a concentration around 1% was found, whereas the concentration in PVC-cables ranged from 0.14 to 7.8. For nearly all products, the concentration in the analysed material was below the reported typical concentration of 6-10%. For the wall paper and textiles the reason for the low concentration may be that MCCPs are only present in a coating of the fabric or paper. The concentration in rubber cables is within the range reported elsewhere.

2.4 Summary regarding MCCPs in articles

In summary, it must based on the available information be assumed that MCCPs used as secondary plasticiser in PVC account for the major part of MCCPs imported into Norway with articles. The available data indicate that flooring/wall coverings, wires and cables may account for a major part, but these data are relatively old and unless these data are confirmed by an ongoing update undertaken by the industry, it is likely that MCCPs may be found in a wider range of PVC products, to a larger extent reflecting the current uses of the phthalate DEHP. The presence of MCCPs in PVC wall coverings and in PVC sheathing of cables has been confirmed by surveys of products marketed in Norway, but the concentrations found were relatively low compared to the concentrations reported in the literature. As concerns rubbers, MCCPs may be used in a wide range of applications. The presence of MCCPs in rubber cables imported to Norway has been confirmed for two of three products. For other polymers, only very limited information is been available. The reported use of MCCPs as flame retardants in polyesters for gelcoats and topcoats in Norway seems to identical to other reported uses of MCCPs in industrial and marine coatings. The cross border trading with MCCPs in coatings on articles is assumed to be small compared to the trade with articles containing flexible PVC and rubber parts.

3. MCCPs in preparations in Norway

The consumption of MCCPs in Norway as a pure substance and in formulations is registered in the Norwegian Product Register. The Product Register does not include information on consumption of substances in processed articles such as plastic and rubber products. The registered consumption by product group in 2005 and 2009 is shown in Table 3.1.

The declaration to the Product Register is mandatory for all preparations 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.

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

For the 2005 survey the information from the Product Register was supplemented with information from industrial users and importers which could clarify some of the uncertainties regarding the registered uses (Weholt, 2005). This information has been used for later updates of the survey.

The registered quantities in 2009 were about 20% lower than the 2005 consumption. The use of MCCPs as softeners and/or flame retardants in polyester/plastics was more than halved.

In 2005, 15-20 tonnes MCCPs were used as flame retardant in polyesters, of this 14 tonnes was registered in the Product Register as used for manufacturing of polyesters in Norway. The flame retarded polyester was mainly used for the production of vessels. The application is probably in the surveys of the uses in the EU (Table 2.1) included in the category “paints/coatings, adhesives and sealants” as the polyester is used in flame retarded topcoats. The same is expected to be true for the 2009 consumption for this application area.

Table 3.1 Consumption of MCCPs as a pure substance and in formulations according to data from the Norwegian Product Register

Product	Registered consumption of MCCP	
	2005, tonnes *	2009, tonnes
Softeners, flame retardants and fillers in polyester/plastics	15 - 20	9
Insulation materials and adhesives	30 - 35	16
Sealants and fillers		16
PVC	0	0
Cables	0	0
Lubricants	5	3
Paints and lacquers	1	1
Other uses (confidential)	3	3
Total	54 - 64	48

* Source: Weholt, 2005

In total 16 tonnes MCCPs were used in sealants in 2009. Further, a part of the products in the category “Insulation materials and adhesives” may in fact be some foam materials quite similar to foam sealants. As mentioned in section 2.1.7 MCCPs are used particularly in polysulphide, polyurethane, acrylic and butyl sealants for use in building and construction, including double and triple glazed windows. They are primarily used for their plasticising and flame retardant properties. In 2005, the main MCCP-containing sealants marketed in Norway were polyurethane foams used in the building industry and by private users (Weholt, 2005). It has not been investigated whether this is still true.

Examples of MCCPs in sealants marketed in the EU (and in Norway for at least some of the sealants) are shown in Table 3.2 on the basis of an Internet search for Material Safety Data Sheets. In two-component sealants the MCCPs may be present in either one of the components only, or in both components.

Table 3.2 *Examples of MCCP-containing sealants*

Sealant type	MCCP content	Source (accessed 27 Nov. 2010):
One-component polyurethane foam	2.5-10 %	http://hms.cobuilder.no/hmsdoc/217396840950503318.pdf
Two-component high-elastic sealant for floors in industries, garages, etc. – component A	10-30 %	http://www.dinesider.no/customer/983817/archive/files/HMS-datablader/colpor%20200pf,%20komp.%20a.pdf
Two-component polysulphide joint sealant - component A - component B	10-30% 60 - 100%	http://www.geocel.co.uk/dynpdfs/670.pdf http://logichem.netpower.no/datasheet.aspx?ild=36479&iDelpId=7
Two-component polysulphide joint sealant - component A - component B	<10% 25-50%	http://www.mc-bauchemie.com/download.aspx?file=/datasheets/safety/837_-_Mycoflex_4000_VE_(Komponente_A)_(GB).pdf http://www.mc-bauchemie.com/download.aspx?file=/datasheets/safety/639_-_Mycoflex_4000_(Komponente_B)_(GB).pdf
Protective sealer of insulated piping, ducting, etc.	5-10%	http://www.woodsinsulation.co.uk/COSHH/Idenden%20ET-10.pdf
Two-component pavement joint sealant – curing agent	60-100%	http://www.resapol.com/new/safetysheets/safety379.pdf
Acrylic flame retarded sealant	5-10%	http://www.ikl.dk/Sikkerhedsblade/Brandfogmassa%20Akryl.pdf
One-component polyurethane foam	10-25%	http://www.crcind.com/wwwcrc/msds/AB4036018-24.htm
Polyurethane expanding foam to block gaps and cavities in buildings	10-<30%	http://msds.orica.com/pdf/shess-en-cds-010-00000005818.pdf
Metallic and mineral pigment filled co-polymer resin solution for lap joint sealer for metal cladding	5-<10%	http://www.temati.com/95-55-1.aspx

4. MCCPs in articles imported into Norway

Based on the assessment of the main uses of MCCP, it is estimated that MCCPs may mainly be imported into Norway with the following articles:

- Articles of flexible PVC or with parts made of flexible PVC– the majority is deemed to be in flooring and wallpaper, cables and wires, hoses and tubes, sheets (or articles with sheets) and textiles with PVC coatings (e.g. in bags and clothing)
- Articles with rubbers, flame retarded among others, and possibly other plasticised plastics
- Leather products

MCCPs in paints/coatings, adhesives and sealants may be imported in preparations for use in Norway, but will in this case be registered in the Norwegian Product Register. The only articles which may include such materials as part of the article and which would likely be traded across borders are paints on ships. It is deemed that it would be very uncertain to estimate the possible import of MCCPs in paints on ships, on the basis of the tonnage of imported ships, and no attempt has been done to estimate this import.

4.1 PVC articles

As mentioned in the previous sections, it can be estimated that on average some 9-13% of all flexible PVC produced in the EU in 2006 contained MCCP. For some product groups the percentage may be higher. The data further indicated some major regional differences in the use of MCCPs with a relatively low use of MCCPs in e.g. Sweden and Germany and high use in the UK and Italy.

Import to Norway of articles with flexible PVC

Import to Norway of the main products groups with flexible PVC are shown in Table 4.1. Data on travel goods and clothes of coated textile is shown in Table 4.5 and discussed separately. Data for the commodity groups included in each product group are shown in Appendix 4.

Based on estimates of the content of flexible PVC in the product groups (see the notes to Table 4.1) it is estimated that the total content of flexible PVC in imported articles within all the product groups in 2009 was around 28,000 tonnes.

Flooring and wall paper, cables, and hoses and tubes

The main part of the flexible PVC is in flooring and wall paper, cables, and hoses and tubes

which will be discussed further in the next sections. For these three product groups as well as for sheet and foils of PVC about 90% of the import is from EU Member States and Switzerland. Of the total tonnage of products (not PVC), 84% is imported from the EU and Switzerland.

For the product groups flooring and wall paper, cables, hoses and tubes, and sheets and foils of PVC more than 50% of the import (68% for cables) is from Denmark, Finland, Sweden and Germany with Sweden as the major import country. The use of MCCPs in Sweden and Germany is low compared to the EU average and the same is assumed to be true for Denmark and Finland (as indicated by data from the product registers reported in SPIN). This may indicate that the MCCPs in imported products would be below the average for the EU.

Textiles, swimming pools and slippers and the like

For these three product groups the pattern is different from the other groups with a significant import from Asia, first of all China. For the slippers and flip-flops the import from Asia represent as much as 97% of the total. As mentioned in section 2.2, MCCPs may likely be found in a higher percentage of products from China than from the EU.

Import of flexible PVC into the EU

For the EU it has been demonstrated that import with articles from countries outside the EU accounted for about 20% of the EU phthalate consumption in PVC containing articles - the percentage being lower for flooring and cables and higher for film, sheets and coated products and a group of “other applications” (COWI *et al.*, 2009). The import of products with flexible PVC from countries outside the EU to Norway seems to follow the pattern seen for the EU.

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.

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 medical equipment, some toys, in wires and other parts of electronic and electrical equipment (apart from the wires included here), in parts of vehicles, balls for playing, water and air mattresses, shoe soles (apart from those included her, carpets with PVC foam, curtains and tarpaulins. In total these product groups may represent a significant part of the total PVC import (estimated 10-30% of the total import).

First estimate of MCCPs in imported PVC articles

For a first estimate, to be discussed further in the following sections, it can be assumed that the MCCPs in imported articles resemble the EU average i.e. on average the flexible PVC contains 0.87-0.99 % MCCPs. The 28,000 tonnes flexible PVC in the listed product groups would under this assumption contain 244-279 tonnes MCCP. If the MCCP use in Norway alternatively is assumed to resemble the average EU per capita MCCP consumption, the total MCCP content in flexible PVC of marketed articles in 2009 would be some 328 tonnes (further discussed in section 4.4) which is a little higher. The difference may be accounted for by the 10-30% of total import of flexible PVC not included in the 28,000 tonnes.

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 MCCPs with flexible PVC is at the same level as the EU average.

The main question to be discussed in the following sections is consequently to what extent the MCCP concentration of the imported products can be considered to be similar to the EU average.

Medium chained chlorinated paraffins (MCCPs) in products in Norway

Table 4.1 Import to Norway of main product groups containing flexible PVC

2009 *1	Flooring and wallpaper		Cables		Hoses and tubes		Sheets and foils of PVC		Textiles with PVC coating		Swimming pools and other equipment for physical exercise		Slippers, flip/flops, and the like.		
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	
Total import	11,734	100	37,923	100	6,038	100	2,895	100	844	100	5,817	100	1,242	100	
EU + Switzerland	11,146	95	33,215	88	5,390	89	2,820	97	303	36	3,006	50	35	3	
- Denmark, Sweden, Finland, Germany *1	6,753	58	25,953	68	3,670	61	1,532	53	119	14	2,051	33	11	1	
Asia	474	4	3,064	8	512	8	72	2	536	63	1,974	38	1,203	97	
- China *1	386	3	1,984	5	159	3	57	2	312	37	1,749	31	982	79	
PVC content															
PVC of total weight, % *2	90%		24%		50%		100%		20%		30%		34%		
Weight of PVC, tonnes	10,561		9,102		3,019		2,895		169		1,745		422		

*1 Note that Denmark, Sweden, Finland, Germany is a subgroup of "EU + Switzerland" and China is a subgroup of "Asia".

*2 The percentages of PVC of the total weight are based on data from Denmark around 2000 (Skårup and Skytte, 2003). Skårup and Skytte provides estimates on the percentage of flexible PVC for about 120 commodity groups and these data are here used to make average estimated for the different product groups. The percentage both reflects the percentage of the products made up of flexible plastic materials and to what extent the flexible plastic material is flexible PVC. For some product groups it is specifically indicated in the statistics that the flexible plastic material is PVC (flooring and wall paper and sheets and foils). For these product groups the percentage is considered very certain, whereas for the other product groups it is more uncertain to what extent PVC has been replaced with other plastics. The general trend during the period has been to replace some plasticisers with other plasticisers but still to a large extent use flexible PVC for the products within these product groups.

4.1.1 Flooring, wall covering and roof covering

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 (Table 4.2). The reported export, however, indicates that the manufacturing of these products in Norway is very small. According to the survey of MCCP use in Norway (see Chapter 3) MCCPs are not used for production of these products in Norway.

Import of flooring, wall covering and roof covering by main import countries is shown in Appendix 4 (Table A4.1).

In total 58% of the import originates from Sweden, Finland, Germany and Denmark. The imported products from these countries most likely do not contain MCCP, however it cannot be ruled out. Data for each commodity code are further shown in Appendix 4 (Table A4.2.).

The rest of the imported products, containing an estimated 4,400 tonnes of PVC, are imported from different countries with France (19% of total) and UK (11%) as the main import countries. Other import countries are the Netherlands (4%), China (3%) and Belgium (1%).

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 MCCPs in flooring and wall covering. According to the answers, covering six major brands, none of the products contain MCCP. Several of the manufacturers have manufacturing facilities in various European countries so it is difficult to assess to what extent the answers reflect import from the different countries. The contacted companies together likely represent most of the import from Belgium, France, Sweden, Germany, UK, Switzerland and the Netherlands.

No data are available on the 4% of the import originating from Asia and the minor import from other EU countries.

The 2005 survey of MCCPs in products on the Norwegian market tested 4 wall covering products and found MCCPs in 1 wet-room wall covering and in 1 vinyl wall covering. The MCCP concentration was 0.7 and 1.3 %, respectively. MCCPs were not found in two analysed PVC floorings. The wet-room wall coverings are relatively thick PVC membranes and probably included in the commodity codes addressed here whereas the vinyl wall coverings are likely included in commodity code 4814.2000 covering plastic coated wallpaper (not specified that it is PVC coating, but this is dominating the market). Total import in 2009 was 463 tonnes with Germany and the Netherlands representing 64% of the import. 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 a leading supplier of wall-paper, PVC wall paper (Norwegian: “vinyltapet”) is the most sold wall-paper type on the Norwegian market. PVC wall paper typically consists of a layer of PVC covering a layer of paper, textile, fiber glass or similar backing material.

If it is assumed that 5% of the imported flooring and wall covering contain 6-10% MCCPs in the PVC part, the total amount of MCCPs in imported products in 2009 would be 32-52 tonnes. It cannot be excluded that MCCPs are not present at all in the flooring, but it is likely that it is present in at least some of the flooring and wall covering/wall paper. However, the content is likely well below the EU average.

Table 4.2 *Import, export and manufacturing of flooring, wall covering and roof covering*

Import/export to/from Norway *1			
	Tonnes	Value (1000 Euro) *3	Comments
Import			
39.18.10.01	469	1,850	Flooring, wall covering and roof covering of PVC < 1.5 mm;
39.18.10.01	11,265	41,966	Flooring, wall covering and roof covering of PVC > 1.5 mm
Total import	11,734	43,816	
Export			
39.18.10.01	1	5	Flooring, wall covering and roof covering of PVC < 1.5 mm
39.18.10.01	122	443	Flooring, wall covering and roof covering of PVC > 1.5 mm
Total export	123	448	
Net import	11,611	43,368	
Manufacturing in Norway *2			
Prodcom code			
22.23.11.55	Confidential	Confidential	PVC with backing (textile etc)
22.23.11.59	0	0	PVC only (no backing)

*1 Source: Statistics Norway, database 03057: Imports and exports, by commodity number and country (1999-2009)

*2 Source: Eurostat, Prodcom database, Statistics on the production of manufactured goods

*3 Value recalculated from NOK; 1 NOK = 0.127 EUR

4.1.2 Cables and wires with PVC

Cables and wires with PVC isolation is reported to be one of the major uses of MCCPs in the EU. In the Norwegian surveys of MCCPs in products MCCPs were identified in 2 of the 3 analysed cables with plastic isolation in concentrations of 0.14 and 7.8 %.

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 (Table 4.3) 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 MCCP use in Norway (see Chapter 3) and information from the main supplier of PVC in Norway, manufacturers of cables in Norway do not use MCCPs in the production of cables.

Import of wires and cables to Norway by main import country is shown in Appendix 4 (Table A4.1.). In total, 68% of the total import originates from Sweden, Finland, Germany and Denmark. The imported cables from these countries most likely do not contain MCCP, although it cannot be excluded.

The rest of the imported cables, containing estimated 3,000 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 MCCP.

Four major manufactures of cables represented on the Norwegian market, and a supplier of cables and wires, have been contacted to collect information on MCCPs in the products. The companies together have production facilities all over Europe. One manufacturer has responded that none of its products contain MCCPs while three companies did not answer the request. The major supplier informs that none of the products supplied by this company contain MCCP, but the cables and wires are not specifically marketed as MCCP-free.

If the MCCP content of the imported cables resembled the EU average, in total 79-90 tonnes MCCPs would be imported in 2009. The fact that 68% of the import originates from Sweden, Finland, Germany and Denmark indicates that the actual import may be lower, but the obtained information from market actors is too limited to actually confirm that the total MCCP content of products should be below the EU average.

Table 4.3 Import, export and manufacturing of cables and wires

Import/export to/from Norway *1			
	Tonnes	Value (1000 Euro)	Comments
Total import *1	37,923	243,829	Commodity codes 85.44.20.00 through 85.44.60.09. Value recalculated from NOK; 1 NOK = 0.127 EUR;
Total export *1	28,636	249,070	Commodity codes 85.44.20.00 through 85.44.60.09. Value recalculated from NOK; 1 NOK = 0.127 EUR;
Net Import	9,287	-5,241	
Manufacturing in Norway *2			
Prodcom code			
27.32.12.00	0	0	Insulated coaxial cables and other coaxial electric conductors for data and control purposes whether or not fitted with connectors
27.32.13.40	16,863 (sold volume)	(sold 105,361	Other electric conductors, for a voltage <= 1000 V, fitted with connectors
27.32.13.80	confidential	189,545	Other electric conductors, for a voltage <= 1000 V, not fitted with connectors
27.32.14.00	confidential	Confidential	Insulated electric conductors for voltage >1000V (excluding winding wire, coaxial cable and other coaxial electric conductors, ignition and other wiring sets used in vehicles, aircraft, ships)
Manufacturing, total	16,863 confidential	+ 294,904 confidential	

*1 Source: Statistics Norway, database 03057: Imports and exports, by commodity number and country (1999-2009)

*2 Source: Eurostat, Prodcom database, Statistics on the production of manufactured goods

4.1.3 Travel goods and gloves/mittens

The surveys of marketed products in Norway mentioned in section 2.3 shows that a significant part of the bags made of textile material contain MCCPs in low concentrations. Furthermore, some winter gloves made of quite similar material also contained MCCP.

As discussed in section 2.1.3 the MCCPs are most probably present in PVC coating of the fabric. According to contacted Norwegian manufacturers of bags, backpacks and water resistant clothing, PVC is not present in the products with a few exemptions and to the knowledge of the manufacturers, MCCP were not present in any of the products. The answers from the manufacturers clearly indicate that MCCP containing PVC is not present in many products of the high-end brands.

However, most likely PVC coating is present in a substantial part of the low-end (“no name”)

products on the market and these products may take up a significant part of the total tonnage of these product groups. The examples of detected MCCPs in bags were of this category.

Data on manufacturing of relevant travel goods in Norway are indicated as confidential in the Prodcom database.

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, etc. as well as gloves of textiles, which are impregnated or covered with plastics, is shown in Table 4.4. The major part of the import (83%) was from Asia (mainly China) while some 16% was imported from the EU. Data for each commodity code is shown in Appendix 4.

Table 4.4 *Import of suitcases, trunks handbags, backpacks, etc. with an outer surface of plastic or textile material and gloves covered by plastics (see details in Appendix 4)*

	Total (tonnes)	Percentage
Total	6,456	100%
EU + Switzerland	1,053	16%
- Denmark, Sweden, Finland, Germany *1	348	5%
Asia	5,346	83%
- China *1	4,362	68%

*1 Note that Denmark, Sweden, Finland, Germany a subgroup of "EU + Switzerland" and China is a subgroup of "Asia".

The total figure includes trunks of hard plastic, but it is here assumed that the trunks account for a relatively small part of the total.

In order to obtain a first estimate of the potential import of MCCPs with these products it is, on the basis of the available results of Norwegian market surveys (Appendix 1), assumed that 50% of the product contain MCCP, the average MCCP concentration in the textile material is 0.5% and the textile material account for on average 50% of the total weight of the product group, see Table 4.5. For some of the product made of textiles, the textile material takes up 60-80% of the products, but the commodity groups includes as well products not produced from textile material (e.g. trunks).

On this basis, the total potential MCCP import in 2009 with these product groups can be estimated at 8.1 tonnes (see Table 4.5). Compared to the potential import with PVC products

such as flooring and cables, the total potential import with the bags seems in any case to be relatively small. On the other hand, as the MCCP is included in the thin coatings, the total surface is large and the risk of releases to the environment may be relatively high for these product groups.

Table 4.5 *Potential import of MCCPs with suitcases, trunks handbags, backpacks, etc. with an outer surface of plastic or textile material and gloves covered by plastics*

Total import	6,456 tonnes
Textile material of total weight	50%
Percentage of products with MCCP	50%
MCCP concentration in textile, %	0,5%
Import of MCCP	8.1 tonnes

4.1.4 Other articles of PVC

MCCPs may be imported with a variety of other articles of PVC or articles containing PVC parts. Product groups with specific commodity codes include hoses and tubes, sheets and foils, textiles with PVC coating, sporting equipment and pools, and slippers/flip flops (see Table 4.1). The total flexible PVC content of the imported products is estimated at some 8,300 tonnes.

For these product groups as a whole 69% of the import was from EU and Switzerland, while import from China accounted for 19%. Import from Denmark, Sweden, Germany and Finland accounted for 44% of the import. As mentioned above, the import pattern was very different among the product groups; 97% of the sheets and foils was imported from EU and Switzerland while 97% of the slippers and flip/flops was imported from Asia.

Within the limits of this study it has not been possible to contact importers of the products to verify whether the MCCP content of products imported to Norway differed from the EU average. Apart from the fact that the 44% of the import comes from countries with an expected use of MCCPs below the EU average, there is no reason for assuming that the products should be different. In general, it is not a marketing parameter that the products are MCCP free.

If, for a first estimate it is assumed that the EU average applies, the total MCCP import in 2009 with these product groups can be estimated at 72-82 tonnes.

Further, flexible PVC may be used in smaller quantities in a wide range of articles not included in this assessment such as medical equipment, some toys, in wires and other parts of electronic and electrical equipment (apart from the wires included here), in parts of vehicles,

balls for playing, water and air mattresses, shoe soles (apart from those included her), carpets with PVC foam, curtains and tarpaulins.

In total, these product groups may likely represent 10-30% of the total import of flexible PVC import with articles considering the breakdown of the consumption of DEHP in the EU. The products are typically either aggregated with other products in the statistics, or data on the PVC content of the products is very uncertain.

4.2 Articles with rubbers and other polymers

As concerns MCCPs in rubbers and polymers other than PVC, parts with MCCPs may be found in a variety of products. Rubbers and other polymers accounted for 11% of the total EU consumption of MCCPs in 2006 and about 20% of the MCCPs ending up in articles.

Identified examples of MCCPs in rubber parts of articles includes conveyer belts, tubes for compressed air in the mining industry, bellows for busses, metros and trains, rubber profiles for fireproof doors, hoses for off-shore applications, rubber sheets e.g. for flooring, cable sheathing, pipe seals, rubber tapes for road signing, industrial rollers and items for railways. Most of which may likely be designed in flame retarded qualities.

MCCPs are used as flame retardants in the rubbers, and the MCCPs seem in particular to be present in articles used in the mining sector and the off-shore sector. For these sectors the consumption in Norway could likely be similar to the EU average or even higher. In the mining sector, in particular the coal mining is an activity with high risk of fire and probably significant use of flame retarded rubbers. Norway has a significant coal production in mines on Svalbard of about 2 million tonnes/year (EIA, 2010) as compared to the EU hard coal production of about 147 million tonnes in 2008 (Rapid 2010). Off-shore activities in Norway are significantly higher than the EU average.

The external trade statistics include a large number of commodity codes for relevant product groups such as tubes, pipes and hoses, conveyer belts and transmission belts, but for none of the product groups specific commodity codes exist for flame retarded products. The imported quantities of rubber products are quite significant. As an example the total import of conveyer belts (apart from V-belts), covered by seven commodity codes, was 1,013 tonnes. Of the total, 91% was imported from the EU and Switzerland with Sweden (40% of total) and Germany (22%) as main import countries. If just a minor part of the conveyer belts contain MCCPs at 5-15%, the import with the conveyer belts could be significant.

Data on the manufactured volume of conveyer belts of rubber in Norway (Prodcom code 22.19.40.50) is confidential in Prodcom. For other relevant rubber products (Prodcom codes

22.19.20.85 through 22.19.40.90; 22.19.72.00 and 22.19.73.47) the production is 0.

The market survey found MCCPs in 2 of the 3 cables with rubber isolation analysed in concentrations of 11 and 2.6 % (section 2.3).

A major supplier of cables rubber cables, has been contacted. The rubber cables from the supplier are produced in Norway and do not contain MCCP. The supplier estimates that rubber cables account for approximately 10% of the cables market in Norway, with the main import from the Netherlands, Italy and Poland. A part of the rubber cables are manufactured by the same manufacturers producing cables with plastic isolation (and consequently also covered by the request to manufacturers of cables with PVC coating), whereas other rubber cables are produced by manufacturers specialised in these cables. The information indicates that the import of MCCP with rubber cables may be significant. The cables are both used in the building industry and by consumers.

One contacted supplier of rubber floors informs that antimony trioxide is used as flame retardant in the floors. Rubber floors may likely be supplied by other suppliers and it cannot be ruled out that the imported rubber floors for specific purposes contain MCCPs.

As no data are available for a distribution of the total EU consumption of MCCPs for rubbers by application area, it is deemed not to be realistic to make any estimates of the potential import of MCCPs to Norway. Considering that the relevant rubber products, apart from conveyer belts, seems not to be produced in Norway, it must be assumed for a first estimate that the consumption in rubber products in Norway resemble the average EU per capita consumption. There are no data available to indicate that the content of MCCPs in rubber in articles should be lower than the EU average and as a first estimate the EU per capita average is used with an uncertainty range of $\pm 50\%$.

4.3 Leather products

The use of MCCPs for leather products accounted for about 1% of the EU consumption in 2006. MCCPs are used in high-end leather products in some Member States, but not in others.

According to Prodcom, the production of leather clothing in Norway is 0 whereas the production of leather shoes is confidential. Production of leather bags is included in an aggregated group with all types of bags. However, it is assumed that the majority of the consumption of leather products is based on imported articles.

Import of clothing of leather (including belts), shoes with leather upper and leather bags is shown in Table 4.6. For all product groups the major part is imported from Asia with China as the major import country. Of the EU Member States, Italy was the main import country representing 4% of the total import of leather clothing and 9% of the shoes and 3% of the bags. No information is available on the possible use of MCCPs for leather products in Asia.

The total content of leather in the products is estimate at approximately 5,400 tonnes. The estimates on the amount of the commodity groups being leather are quite uncertain. If the Norwegian consumption of MCCPs with leather products should be 7 tonnes (resemble the EU per capita average), and the MCCP concentration in the leather containing MCCPs 1.2 % then about 11% of the imported products should contain MCCP. Around 2006, up to 10% of the total EU production of leather may have contained MCCPs (Entec, 2008), so it is not unlikely that 11% of the imported leather contain MCCP. The surveys of MCCPs in products in Norway have not included any leather products except for some working gloves of leather, and no data are available to confirm or disconfirm the presence of MCCPs in imported leather products. In the absence of actual data on MCCPs in imported products, the EU average with an uncertainty of $\pm 50\%$ is used as the best estimate.

Table 4.6 Import of clothing and footwear of leather in 2009

	Clothing of leather		Footwear with leather upper		Bags of leather and artificial leather	
	Tonnes	%	Tonnes	%		
Total import	2,048	100%	6,742	100%	1,168	100%
EU + Switzerland	498	24%	2,764	41%	203	17%
- Denmark, Sweden, Finland, Germany	195	10%	1,001	15%	94	8%
Asia	1,503	73%	3,681	55%	933	80%
- China	1,005	49%	1,996	29%	756	65%
Percentage leather of commodity group	70%		50%		50%	
Total import of leather, tonnes	1,433		3,371		584	

4.4 Assessment of similarities between MCCPs content of articles marketed in Norway and the EU

Preparations

For MCCPs in preparations registered in the Norwegian Product Register, it seems to be evident that the per capita consumption of MCCPs in metal working/cutting fluids, 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 these substances the consumption in Norway in 2006 would be 201 tonnes MCCPs while the actual

registered consumption is only 35 tonnes.

PVC articles

For flexible PVC, which accounts for 81% of the MCCPs 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 MCCP consumption in PVC could be of a size similar to the EU average. Extrapolated on a per capita basis, the consumption in Norway would be 328 tonnes. 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, 84% was imported from the EU and Switzerland while 9% was imported from China. The available market data indicate that MCCP use in China for PVC may be higher than in the EU. For the major groups in terms of flexible PVC: Flooring/wall covering and cables 95% and 88%, respectively, was imported from EU and Switzerland.

The main question is whether the percentage of the products containing MCCPs imported to Norway is lower than the EU average of 10-15% of the PVC products containing MCCP. The fact that only 10-15% of the flexible PVC in the EU contains MCCPs illustrates that it will be necessary to test a very large number of products or to collect information from a large number of importers in order to obtain an overview of some statistical significance.

A significant percentage of the products are imported from countries known or expected to have a relatively small use of MCCPs for PVC production: Sweden, Germany, Denmark and Finland. In total, these countries account for 60% of the import which indicates that the MCCP content in imported products may likely be somewhat lower than the EU average. Data obtained from companies supplying PVC flooring and wall covering indicate that the MCCP import with these products may be relatively low whereas it has not been possible to obtain enough responses from suppliers of cables to have any indications of the MCCP import with these products.

The surveys of MCCPs in products in Norway have identified MCCPs in a large percentage of samples of fabric from bags, backpacks, camping chairs and similar products of coated textiles. The estimates on the basis of import statistics indicate that the total potential import with these product groups is relatively small compared to the potential import with other products of PVC. For these product groups 16% is imported from EU and Switzerland while 85% is imported from Asia; first of all China. MCCPs in articles on the Norwegian market do consequently not reflect the use of MCCPs in EU-based manufacturing, but rather the use of MCCPs in Chinese manufacturing. Similarly, the main part of the leather products are imported from Asia and MCCPs in the imported leather would reflect the use of MCCPs for leather products in Asia.

As a rough estimate it is assumed that the MCCP consumption with all PVC articles in Norway is at a level of approximately 40 – 80% of the EU per capita consumption.

Rubbers

MCCPs are used as flame retardant in rubbers for many different applications. Only a limited number of rubber products are produced in Norway and the main part of the rubber is imported either as rubber products, such as conveyer belts and tubes, or as rubber parts in other articles, such as vehicles and trains. As no data are available for a breakdown of the total EU consumption of MCCPs for rubbers and other polymers, and the trade statistics does not include specific commodity groups for flame retarded rubber products, it is deemed not to be realistic to make any estimates of the potential import of MCCPs to Norway with these articles. It must be assumed for a first estimate that the consumption with rubber products and other polymers in Norway resemble the average EU per capita consumption. We have added an uncertainty range $0 \pm 50\%$.

Summary

In summary, the import of MCCPs with PVC is most likely below the EU per capita average, but it is only for flooring and wall coverings that sufficient data from suppliers have been available to indicate that this is actually the situation. In general, the articles are not marketed as MCCP free.

Data on the EU consumption for 2009 has not been available but as the total MCCP consumption in the EU has been relatively stable from 1994 – 2006 it is assumed that the 2009 consumption is of the same size as the 2006 consumption.

The best estimate of the consumption of MCCPs in Norway 2009 in preparations and articles is shown in Table 4.7. Compared to the data previously used for estimating releases from products in Norway, based on the data from the Product Register only, the consumption estimated in this study is 4-8 times higher.

Table 4.7 *Best estimate of the consumption of MCCPs in Norway 2009 in preparations and articles*

Application area	Consumption, tonnes MCCPs per year		
	EU, 2006	Norway, if average EU 2006 per capita consumption i used	Norway, 2009, best estimate *1
Additives for PVC	34,676	328	130-260
Metal working/cutting fluids	9,907	94	3 *1
In paints/coatings, adhesives and sealants	11,323	107	32 *1
Additives for rubber/polymers (other than PVC) *3	7,077	67	34-101
In leather fat liquors	708	7	3-10
In carbonless copy paper	0	0	0
Other uses (unknown)	0	0	3 *1
Total	63,691	603	205-409

*1 Actual data from the Norwegian Product Register.

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Appendix 1: Industry and trade organisations contacted

CEPE: European Council of producers and importers of paints, printing inks and artists' colours

COTANCE: Confederation of National Associations of Tanners and Dressers of the European Community - The European Leather Association

ECPI: The European Council for Plasticisers and Intermediates (part of CEFIC)

ERFMI: European Resilient Flooring Manufacturers' Institute

ETRMA: European Tyre & Rubber Manufacturers' Association

EuPC: European Plastics Converters

Euro Chlor: Chlorinated Paraffins Sector Group (part of CEFIC)

EVCM: The European Council of Vinyl Manufacturers (part of PlasticsEurope)

FEICA: Association of European Adhesives and Sealants Manufacturers

PlasticsEurope (the trade association representing polymer producers in Europe)

Appendix 2: 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 covering (/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 Gerflor)

Outdoor equipment of coated fabric

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

- Bergans
- HellyHansen
- Norrøna
- Stormberg

Appendix 3: 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.

Table A4.1 *Import of PVC products by main EU import countries*

2009	Flooring and wallpaper		Cables		Hoses and tubes		Sheets of PVC		Textiles with PVC coating	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%
Total import	11,734	100	37,923	100	6,038	100	2,895	100	844	100
EU Member states										
Denmark	64	1	2,394	6	794	13	329	11	60	7
Belgium	124	1	541	1	86	1	27	1	71	8
Estonia	7	0	822	2	24	0	0	0	0	0
Finland	58	0	4,992	13	190	3	19	1	92	11
France	2,238	19	1,638	4	327	5	145	5	56	7
Germany	853	7	3,236	9	483	8	723	25	190	22
Italy	13	0	737	2	333	6	44	2	74	9
Poland	4	0	199	1	488	8	36	1	12	1
Sweden	5,777	49	15,331	40	2,203	36	461	16	158	19
Switzerland	19	0	418	1	84	1	235	8	8	1
The Netherlands	423	4	846	2	80	1	149	5	42	5
UK	1,322	11	931	2	189	3	407	14	197	23
Other EU countries and Switzerland	243	2	1,131	3	108	2	245	8	74	9

Table A4.2 *Import of PVC products by commodity codes and regions (in tonnes)*

2009	Total	EU + Switzer- land	DK,SE, FI, DE	Asia	China
39181000 (m1=kg, m2=nei) Golvbelegg-, vegg- el takkledning av polymer av vinylklorid	0	0	0	0	0
39181001 (m1=kg, m2=nei) Golvbelegg-, vegg- el takkledning av polymer av vinylklorid, tykkelse u 1,5 mm	469	382	74	29	25
39181009 (m1=kg, m2=nei) Golvbelegg-, vegg- el takkledning av polymer av vinylklorid, tykkelse min 1,5 mm	11,265	10,764	6,679	444	362
39204300 (m1=kg, m2=nei) Plater, ark, film o.l. av polymerer av vinylklorid, inne minimum 6 vektprosent mykner...	1,430	1,392	403	36	32
39204900 (m1=kg, m2=nei) Plater, ark, film o.l. av polymerer av vinylklorid ikke skumplast, uten andre mat...	1,465	1,427	1,129	36	25
85442000 (m1=kg, m2=nei) Koaksialkabler og andre koaksialledere	1,306	888	429	215	149
85443000 (m1=kg, m2=nei) Tenningskabelsett og andre kabel-/ledningssett til bruk i kjøretøyer, luftfartøye...	260	148	72	103	48
85444100 (m1=kg, m2=nei) Isolerte elektriske ledere for spenninger på høyst 80 V, med forbindelsesdeler	0	0	0	0	0
85444200 (m1=kg, m2=nei) Isolerte elektriske ledere for spenninger på høyst 1000 V, med forbindelsesdeler	3,497	1,678	1,113	1,748	1,484
85444901 (m1=kg, m2=nei) Isolerte elektriske ledere for spenninger på høyst 80 V, 1 par, uten forbindelses...	0	0	0	0	0
85444902 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, fra 2 til 10 par, uten forbin...	0	0	0	0	0
85444903 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, fra 11 til 50 par, uten forbi...	0	0	0	0	0
85444904 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, mer enn 50 par, uten forbinde...	0	0	0	0	0
85444909 (m1=kg, m2=nei) Isolerte elektriske ledere for spenn på høyst 80 V, uten forbindelsesdeler og par...	0	0	0	0	0
85444911 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger på høyst 80 V, max 10 par, uten fo...	1,465	1,369	993	65	26
85444912 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger på høyst 80 V, mellom 10 og 50 par...	159	153	92	4	4
85444919 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger på høyst 80 V, i.e.n., uten forbin...	3,704	3,227	2,154	221	113

Medium chained chlorinated paraffins (MCCPs) in products in Norway

2009	Total	EU + Switzer- land	DK,SE, FI, DE	Asia	China
85444921 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 80 V, max høyst 500 V, høyst...	3,212	3,008	2,794	111	30
85444922 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 80 V, max høyst 500 V, med m...	759	703	589	26	25
85444931 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 500 V, ikke over 999 V, med h...	887	588	324	30	0
85444932 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenninger over 500 V, ikke over 999 V, med m...	972	962	904	5	0
85444941 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenning 1000 V, med høyst 4 ledere, med lede...	1,345	854	804	3	3
85444942 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenning 1000 V, med høyst 4 ledere, med lede...	638	623	583	9	5
85444943 (m1=kg, m2=nei) Isolerte elektriske ledere for merkespenning 1000 V, med mer enn 4 ledere	13,438	12,952	10,569	388	63
85445100 (m1=kg, m2=nei) Isolerte elektriske ledere, for spenninger over 80 V, maks 1000 V, med forbindels...	0	0	0	0	0
85445901 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn høyst 500 V, med høyst 4 ledere, uten for...	0	0	0	0	0
85445902 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn høyst 500 V, med mer enn 4 ledere, uten f...	0	0	0	0	0
85445903 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn over 500 V, ikke over 999 V, med høyst 4 ...	0	0	0	0	0
85445904 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn over 500 V, ikke over 999 V, med mer enn ...	0	0	0	0	0
85445905 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn 1000 V, med høyst 4 ledere, med ledertver...	0	0	0	0	0
85445906 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn 1000 V, med høyst 4 ledere, med ledertver...	0	0	0	0	0
85445909 (m1=kg, m2=nei) Isolerte elektriske ledere m/merkespenn 1000 V, med mer enn 4 ledere	0	0	0	0	0
85446001 (m1=kg, m2=nei) Isolerte elektriske ledere med merkespenning over 1000 V, maks 10 kV	1,592	1,520	876	10	9

Medium chained chlorinated paraffins (MCCPs) in products in Norway

2009	Total	EU + Switzer- land	DK,SE, FI, DE	Asia	China
85446002 (m1=kg, m2=nei) Isolerte elektriske ledere med merkespenning over 10 kV, maks 30 kV	474	473	380	1	1
85446009 (m1=kg, m2=nei) Isolerte elektriske ledere med merkespenning over 30kV	4,217	4,070	3,276	123	24
39173110 (m1=kg, m2=nei) Bøyelige plastrør og -slanger, av kondensasjons-, polykondensasjon-, el polyaddis...	27	20	10	7	0
39173120 (m1=kg, m2=nei) Bøyelige plastrør og -slanger, av addisjonspolymerisasjonsprodukter, tåler trykk ...	26	2	2	24	19
39173190 (m1=kg, m2=nei) Bøyelige plastrør og -slanger, tåler trykk på min 27,6 MPa, i.e.n.	891	647	390	228	52
39173210 (m1=kg, m2=nei) Bøyelige rør og slanger, ikke forsterket, uten forbindelsesdeler, av kondensasjon...	535	529	499	5	4
39173220 (m1=kg, m2=nei) Bøyelige rør og slanger, ikke forsterket, uten forbindelsesdeler, av addisjonspol...	125	109	97	8	3
39173290 (m1=kg, m2=nei) Bøyelige rør og slanger, ikke forsterket, uten forbindelsesdeler, i.e.n.	2,367	2,274	1,701	36	9
39173300 (m1=kg, m2=nei) Bøyelige rør og slanger, av plast, ikke forsterkede men med forbindelsesdeler	404	368	204	35	11
39173900 (m1=kg, m2=nei) Rør og slanger, av plast, i.e.n.	1,663	1,441	766	170	61
59031010 (m1=kg, m2=nei) Tekstilstoff, til fremstilling av tåkapper, impregnert, overtrukket, belagt el la...	7	5	3	1	1
59031091 (m1=kg, m2=nei) Tekstilstoff, til bordduk, impregnert, overtrukket, belagt el laminert med PVC	33	17	12	16	16
59031092 (m1=kg, m2=nei) Tekstilstoff, til presenningsduk, impregnert, overtrukket, belagt el laminert med...	505	64	13	441	271
59031099 (m1=kg, m2=nei) Tekstilstoff, impregneret, overtrukket, belagt el laminert med PVC, ikke til tåka...	299	217	92	78	25
95069908 (m1=kg, m2=stykk) Apparater og utstyr med tilbehør for alminnelig fysisk trening, heru badebassen...	5,817	3,006	2,051	1,974	1,749
95069909 (m1=kg, m2=stykk) Apparater og utstyr med tilbehør for alminnelig fysisk trening, heru badebassen...	0	0	0	0	0

Medium chained chlorinated paraffins (MCCPs) in products in Norway

2009	Total	EU + Switzer- land	DK,SE, FI, DE	Asia	China
64019910 (m1=kg, m2=par) Vanntett fottøy, som ikke dekker ankelen, med yttersåle og overdel av plast	10	3	2	7	7
64022010 (m1=kg, m2=par) Fottøy, med overdel av stropper og remmer, med yttersåler og overdel av plast	105	2	1	103	73
64029910 (m1=kg, m2=par) Fottøy (unnt sports-), som ikke dekker ankelen, med yttersåle og overdel av plast...	1,127	30	8	1,093	903

Table A4.3 *Import of bags and gloves by commodity codes and regions (in tonnes)*

	Total	EU + Switzerla nd	DK,SE, FI, DE	Asia	China
42021201 (m1=kg, m2=stykk) Skoleransler m ytterside av plast el tekstilmateriale	66	16	10	50	50
42021202 (m1=kg, m2=stykk) Dokumentmapper og attachekofferter m ytterside av plast el tekstilmateriale	35	9	4	26	20
42021209 (m1=kg, m2=stykk) Garderobe/hånd/toalettkofferter m ytterside av plast el tekstiler	2,265	586	131	1,671	1,520
42022200 (m1=kg, m2=stykk) Håndvesker m ytterside av plast el tekstilmateriale	712	112	36	593	554
42023200 (m1=kg, m2=stykk) Futteraler, lommeetuier o,l,, m ytterside av plast el tekstilmateriale	182	38	16	143	130
42029201 (m1=kg, m2=stykk) Ryggsekker m ytterside av plast el tekstilmateriale	973	32	16	935	784
42029202 (m1=kg, m2=stykk) Sykkelvesker m ytterside av plast el tekstilmateriale	55	9	4	46	27
42029209 (m1=kg, m2=stykk) Diverse etuier, vesker, dåser, skrin m ytterside av plast el tekstilmateriale	1,913	247	129	1,634	1,186
61161091 (m1=kg, m2=par) Arbeidshansker og -votter, trikotasje, impregnerte, overtrukkede el belagte med p,,,	210	2	0	207	73
61161099 (m1=kg, m2=par) Hansker, vanter og votter, trikotasje, impregnerte, overtrukkede el belagte med p,,,	43	2	2	40	19



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Oppdragstakers prosjektansvarlig	Kontaktperson i Klima- og forurensningsdirektoratet	TA-nummer
Carsten Lassen	Pia Linda Sørensen	2735/2010
		SPFO-nummer

	År	Sidetall	Kontraktnummer
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Forfatter(e)
Carsten Lassen, Ulla Kristine Brandt og Astri Huse
Tittel - norsk og engelsk
Medium chained chlorinated paraffins (MCCPs): A survey of products in Norway
Mellomkjedete klorparafiner (MCCP): Kartlegging av produkter i Norge
Sammendrag – summary
Forbruket av MCCP i produkter og materialer i Norge er anslått til 205-409 tonn i 2009. Anslaget er basert på informasjon om forbruk i EU og data om import av relevante produkttyper. Anslaget er 4 - 8 ganger høyere enn det forbruket som er registrert i Produktregisteret (48 tonn).
Based on information on the use of MCCPs in the EU and data on the Norwegian import of relevant MCCP-containing product groups the consumption of MCCPs in Norway in 2009 in preparations and articles is roughly estimated at 205-409 tonnes MCCPs. Compared to the total based on the data from the Product Register (48 tonnes), the estimated consumption is 4-8 times higher.

4 emneord	4 subject words
MCCP, PVC, klorparafiner, prioritert miljøgift	MCCPs, PVC, chlorinated paraffins, priority substance

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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 Helsefyr 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 vannforvaltning
- øke gjenvinningen og redusere utslippene fra avfall
- redusere skadevirkningene av luftforurensning og støy

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