There are a wide variety of different chemicals being used in common articles to obtain certain properties, functions and quality. There have been concerns about the hazardous properties of certain chemicals found in articles, e.g. brominated flame retardants used in electronics and furniture upholstery, perfluorinated compounds used in stain- and water proof coating of textiles such as outdoor clothing, as well as phthalates used in soft PVC plastics such as toys. Hazardous substances are being spread to the environment from the production, use and disposal of articles. Many of these chemicals have been found to be persistent and toxic in the environment, accumulating in the organisms and transporting long distances from where they have been released. International trade of articles also affects the transport of hazardous chemicals among regions.

Management of chemicals in articles is included in the EU legislation concerning product safety, waste management, product design and chemicals, with the aim to reduce hazardous effects of chemicals in articles. Besides legislative management measures, there are also other instruments, including environmental labelling, international co-operation, industry initiatives, work of the non-governmental organizations as well as e.g. national programmes and registers.

According to the recommendations of the National Programme on Dangerous Chemicals, more information is needed about chemicals in articles. Also their management measures should be improved. The issue of chemicals in articles and their releases has also been discussed by international organizations (e.g. OECD) and conferences (e.g. ICCM2). The aim of this preliminary report is to review how hazards and risks from chemicals in articles could be controlled, throughout the life cycles of the articles. This report describes the current legislative situation and voluntary management measures for chemicals, and the possible need for further development.
Control of chemicals in articles

Preliminary report

Piia Häkkinen
PREFACE

This study was commissioned and financed by the Ministry of the Environment and was done at the Finnish Environment Institute (SYKE) Chemicals Division. Persons involved in the project from the Chemicals Division were Jaana Heiskanen, Mervi Leikoski and Kaija Kallio-Mannila. Magnus Nyström from Contaminants Unit, Kimmo Silvo, Ari Nissinen and Kristina Saarinen from the Environmental Performance Unit, as well as Risto Saarinen from the Waste and Effluent Unit participated in the development of the study. Timo Seppälä and Susan Londesborough from the Contaminants Unit, Timo Assmuth from the Environmental Governance Studies Unit, Riitta Leinonen, Birgit Kemiläinen, Heikki Salonen, Tiina Tuusa and Kaarina Repo from the Chemicals Division, as well as Pirkko Kivelä and Eliisa Irpola from the Ministry of the Environment have commented on the study.

Draft study on releases from products by Kristina Saarinen was used as a reference material in this report. The data in the study has been reviewed till June 2010. Legislation and the responsible authorities may have changed after that.
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>3</td>
</tr>
<tr>
<td>Contents</td>
<td>5</td>
</tr>
<tr>
<td>Summary</td>
<td>7</td>
</tr>
<tr>
<td>Tiivistelmä</td>
<td>9</td>
</tr>
<tr>
<td>List of abbreviations</td>
<td>11</td>
</tr>
<tr>
<td>1 Introduction</td>
<td>13</td>
</tr>
<tr>
<td>1.1 Background to the study</td>
<td>13</td>
</tr>
<tr>
<td>1.2 Aim of the preliminary report</td>
<td>13</td>
</tr>
<tr>
<td>1.3 Definition and focus of the subject</td>
<td>14</td>
</tr>
<tr>
<td>2 Control of chemicals in articles – review of the current situation</td>
<td>15</td>
</tr>
<tr>
<td>2.1 Product based legislative control instruments</td>
<td>16</td>
</tr>
<tr>
<td>2.1.1 Product safety</td>
<td>16</td>
</tr>
<tr>
<td>2.1.2 Waste legislation</td>
<td>18</td>
</tr>
<tr>
<td>2.1.3 Product design</td>
<td>22</td>
</tr>
<tr>
<td>2.1.4 Examples of other national and non-EU legislation</td>
<td>23</td>
</tr>
<tr>
<td>2.2 Chemical based legislative control instruments</td>
<td>25</td>
</tr>
<tr>
<td>2.2.1 REACH Regulation</td>
<td>26</td>
</tr>
<tr>
<td>2.2.2 Classification, labelling and packaging</td>
<td>28</td>
</tr>
<tr>
<td>2.2.3 Water Framework Directive</td>
<td>28</td>
</tr>
<tr>
<td>2.2.4 Biocidal products</td>
<td>29</td>
</tr>
<tr>
<td>2.2.5 Persistent organic pollutants</td>
<td>29</td>
</tr>
<tr>
<td>2.2.6 PIC-notification system</td>
<td>29</td>
</tr>
<tr>
<td>2.2.7 Examples of other national and non-EU legislation</td>
<td>30</td>
</tr>
<tr>
<td>2.3 Other policy instruments</td>
<td>32</td>
</tr>
<tr>
<td>2.3.1 Environmental labelling</td>
<td>32</td>
</tr>
<tr>
<td>2.3.2 International co-operation</td>
<td>34</td>
</tr>
<tr>
<td>2.3.3 Industry initiatives</td>
<td>37</td>
</tr>
<tr>
<td>2.3.4 Work of the non-governmental organizations</td>
<td>40</td>
</tr>
<tr>
<td>2.3.5 Examples of other national management measures</td>
<td>41</td>
</tr>
<tr>
<td>3 Deficiencies of measures for the management of chemicals in articles</td>
<td>43</td>
</tr>
<tr>
<td>3.1 Comparison of legislative measures</td>
<td>43</td>
</tr>
<tr>
<td>3.2 Comparison of legislative and other policy measures</td>
<td>44</td>
</tr>
<tr>
<td>3.3 Need for information on chemicals in articles</td>
<td>45</td>
</tr>
<tr>
<td>3.4 Notification of dangerous articles and the surveillance</td>
<td>47</td>
</tr>
<tr>
<td>3.5 Waste management</td>
<td>48</td>
</tr>
<tr>
<td>3.6 Green design and substitution of hazardous chemicals in articles</td>
<td>49</td>
</tr>
<tr>
<td>4 Conclusions</td>
<td>51</td>
</tr>
<tr>
<td>References</td>
<td>53</td>
</tr>
<tr>
<td>Legislation</td>
<td>57</td>
</tr>
<tr>
<td>Documentation page</td>
<td>62</td>
</tr>
<tr>
<td>Kuvailulehti</td>
<td>63</td>
</tr>
<tr>
<td>Presentationsblad</td>
<td>64</td>
</tr>
</tbody>
</table>
SUMMARY

There are a wide variety of different chemicals used in common articles. Many hazardous substances are being spread to the environment from the production, use and disposal of articles. However, management of chemicals in articles is included in EU legislation concerning product safety, waste management, product design and chemicals, with the aim to reduce hazardous effects of chemicals in articles. Besides legislative management measures, there are also other instruments, e.g. environmental labelling, international co-operation, industry initiatives, work of the NGOs and national programmes and registers. According to the recommendations of the National Programme on Dangerous Chemicals, more information is needed about chemicals in articles. The recommendations also highlight the importance of life cycle approach in risk management of articles.

The aim of this preliminary report is to review how hazards and risks from chemicals in articles could be controlled, throughout the life cycles of the articles. This report describes the current legislative situation and voluntary management measures for chemicals, and their possible need for further development. This is done by reviewing the management measures used also in other countries. The aim of the preliminary report is to present a proposal for the target and definition of the actual report, which will be prepared later.

In this report, articles are regarded as e.g. furniture, textiles, vehicles, toys, books, electrical and electronic equipment, batteries and accumulators as well as packaging. Cosmetics are also included in this report, although they do not fill the article definition. However, they present possible significant source of chemical releases to the environment and their legislation differs from that of other products. Medicinal products, paints and detergents etc. are not included in this report because they are not articles but substances or mixtures.

On the basis of this preliminary report, the legislation concerning chemicals in articles is very scattered, targeted to certain product groups and substances. Environmental risks are not covered in all product related legislation. EU’s new chemicals regulation, REACH is the most comprehensive legislation on chemicals in articles, because it is applied to all chemicals.

There are differences in the requirements of legislation and other policy measures. For example, environmental labelling can include more stringent restrictions of chemicals in articles than in legislation. International agreements can be either binding or give recommendations.

There is a general lack of information on the content of chemicals in articles. More information is also needed about the environmental effects of chemicals used in articles and the possible risks to the environment, especially about new chemicals not yet regulated. The lack of labelling requirement is affecting to the consumers’ and companies’ level of knowledge about chemicals in articles.

One big gap in the legislation of chemicals in articles is goods imported to EU. For example, in most cases there is no need to register substances in articles coming outside EU according to REACH. The surveillance by the authorities is very often based on notifications of dangerous articles and spot checks. These however only reveal a small proportion of articles on the market containing hazardous chemicals.

Hazardous waste is not always collected properly and the producer responsibility covers only some of the consumer articles in Finland. Illegal trade of electronic waste to countries outside EU is also globally a significant and increasing problem. The recycling and re-use of waste should also be considered in the restrictions of substances in articles.
The use of most hazardous chemicals in articles has been targeted to be replaced by safer alternatives. There is also a need for new and innovative technology to replace the current use of hazardous substances in articles, already at the design phase.

The control of chemicals in articles could be enhanced e.g. by adding more restricted chemicals or product groups to individual legislation, by including more environmental aspects in product safety legislation or by adding more restrictions concerning chemicals in articles to the REACH Regulation. In order to supervise the compliance with chemicals legislation, more resources are needed, especially on imported articles coming outside EU. The new Waste Framework Directive and the reform of national waste legislation will enhance the control of chemicals in articles by e.g. the end-of-waste criteria, material efficiency and increased recycling targets. However, the collection, recycle and re-use of e.g. electrical and electronic equipment, end-of-life vehicles and other chemical containing articles should be further developed. Information on chemicals in articles could be increased by e.g. developing an information system through the supply chain. Also, the criteria of environmental labelling should be more easily available to consumers. The role of product design should be highlighted in the future when aiming to substitute the current use of hazardous chemicals in articles.

On the basis of this preliminary report, textiles as chemical containing articles will be studied more closely in the actual report prepared later.
TIIVISTELMÄ


Tämän esiselvityksen tarkoituksena on kartoittaa, miten esineiden sisältämien kemikaalien vaaroja ja riskejä pystytään hallitsemaan esineiden elinkaaren eri vaiheissa. Työssä kuvataan lainsäädännöllisten ja vapaaehtoisten ohjauskeinojen nykytilaa sekä niiden mahdollisia kehittämistarpeita. Tämä tehdään kartoittamalla myös muiden maiden hallintokesinoita. Esiselvityksen tavoitteena on esittää ehdotus tavoitteeksi ja rajoiksi varsinaiselle selvitykselle, joka tehdään myöhemmin.


Esiselvityksen perusteella voidaan todeta, että lainsäädäntö esineiden kemikaaleista on hyvin hajanaista, keskittynyt tiettyihin tuoteryhmiin ja kemikaaleihin. Ympäristöriskejä ei oteta mukaan kaikkien tuotelähtööisiin lainsäädäntöihin. EU:n uusi kemikaaliasetus REACH on kattavin tuotteiden kemikaaleihin liittyvistä lainsäädännöistä koskien kaikkia kemikaaleja.

Lainsäädännön ja muiden ohjauskeinojen vaatimukset poikkeavat toisistaan. Esimerkiksi ympäristömerkinnän vaatimukset tuotteiden kemikaaleille voivat olla tiukempia kuin lainsäädännön määraamia. Kansainväliset sopimukset voivat olla joko sitovia tai suosituksia antavia.

Esineiden sisältämistä kemikaaleista on yleisesti vähän tietoa saatavilla. Tietoa tarvitaan myös esineissä käytettävien kemikaalien ympäristövaikutuksista ja mahdollisista ympäristöriskeistä, erityisesti uusista kemikaaleista, joita ei vielä ole rajoitettu. Merkintävaatimuksen puuttuminen vaikuttaa kuluttajien ja yritysten tietämysteen esineiden kemikaaleista.


Haitallisimpiä esineissä käytettäviä kemikaaleja on pyritty korvaamaan haitattomammilla vaihtoehtoilla. Tarvitaan myös uutta ja innovatiivista teknologiaa korvamaan nykyisten haitallisten kemikaalien käyttö esineissä jo tuotesuunnittelussa.

Tämän esiselvityksen pohjalta valittiin tekstiilit tuoteryhmäksi, jonka elinkaareen liittyvää kemikaalien käyttöä selvitetään tarkemmin jatkohankkeessa.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAFA</td>
<td>American Apparel &amp; Footwear Association</td>
</tr>
<tr>
<td>AQSICQ</td>
<td>General Administration of Quality Supervision, Inspection and Quarantine of China</td>
</tr>
<tr>
<td>AIS</td>
<td>Article Information Sheet</td>
</tr>
<tr>
<td>BBP</td>
<td>Butyl benzyl phthalate</td>
</tr>
<tr>
<td>BPA</td>
<td>Bisphenol A</td>
</tr>
<tr>
<td>BPD</td>
<td>Biocidal Products Directive</td>
</tr>
<tr>
<td>CFC</td>
<td>Chlorofluorocarbon</td>
</tr>
<tr>
<td>CiP</td>
<td>Chemicals in Products</td>
</tr>
<tr>
<td>CLP</td>
<td>Classification, Labelling and Packaging of substances and mixtures</td>
</tr>
<tr>
<td>CLRTAP</td>
<td>Convention on Long-Range Transboundary Air Pollution</td>
</tr>
<tr>
<td>CMR</td>
<td>Carcinogenic, Mutagenic and toxic for Reproduction</td>
</tr>
<tr>
<td>CPA</td>
<td>Clean Production Action</td>
</tr>
<tr>
<td>CPD</td>
<td>Construction Products Directive</td>
</tr>
<tr>
<td>DBP</td>
<td>Di-n-butyl phthalate</td>
</tr>
<tr>
<td>DEHP</td>
<td>Di(2-ethylhexyl) phthalate</td>
</tr>
<tr>
<td>DINP</td>
<td>Di-isononyl phthalate</td>
</tr>
<tr>
<td>DMF</td>
<td>Dimethylfumarate</td>
</tr>
<tr>
<td>ECHA</td>
<td>European Chemicals Agency</td>
</tr>
<tr>
<td>EIA</td>
<td>Electronic Industries Alliance</td>
</tr>
<tr>
<td>EICTA</td>
<td>European Information &amp; Communications Technology Industry Association</td>
</tr>
<tr>
<td>ELV</td>
<td>End-of-Life Vehicles</td>
</tr>
<tr>
<td>ELY</td>
<td>Centre for Economic Development, Transport and the Environment</td>
</tr>
<tr>
<td>EPR</td>
<td>Extended Producer Responsibility</td>
</tr>
<tr>
<td>EOW</td>
<td>End-of-waste</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>EPEAT</td>
<td>Electronic Product Environmental Assessment Tool</td>
</tr>
<tr>
<td>ERP</td>
<td>Energy-Related Product</td>
</tr>
<tr>
<td>ETUC</td>
<td>European Trade Union Confederation</td>
</tr>
<tr>
<td>EuP</td>
<td>Energy-using Product</td>
</tr>
<tr>
<td>e-waste</td>
<td>Electronic waste</td>
</tr>
<tr>
<td>EWG</td>
<td>Environmental Working Group</td>
</tr>
<tr>
<td>GADSL</td>
<td>Global Automotive Declarable Substances List</td>
</tr>
<tr>
<td>GDSN</td>
<td>Global Data Synchronisation Network</td>
</tr>
<tr>
<td>GHS</td>
<td>Globally Harmonized System for classification and labelling</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Product Strategy</td>
</tr>
<tr>
<td>GPSD</td>
<td>General Product Safety Directive</td>
</tr>
<tr>
<td>GSPN</td>
<td>Global Sustainable Product Network</td>
</tr>
<tr>
<td>HBB</td>
<td>Hexabromobiphenyl</td>
</tr>
<tr>
<td>HBCDD</td>
<td>Hexabromocyclododecane</td>
</tr>
<tr>
<td>HBN</td>
<td>Healthy Building Network</td>
</tr>
<tr>
<td>HCB</td>
<td>Hexachlorobenzene</td>
</tr>
<tr>
<td>HCBD</td>
<td>Hexachlorobutadiene</td>
</tr>
<tr>
<td>HCFC</td>
<td>Hydrochlorofluorocarbon</td>
</tr>
<tr>
<td>HCWH</td>
<td>Health Care Without Harm</td>
</tr>
<tr>
<td>HELCOM</td>
<td>Helsinki Commission</td>
</tr>
<tr>
<td>HFC</td>
<td>Hydrofluorocarbon</td>
</tr>
<tr>
<td>HPV</td>
<td>High Production Volume</td>
</tr>
<tr>
<td>IARC</td>
<td>International Agency for Research on Cancer</td>
</tr>
<tr>
<td>ICCA</td>
<td>International Council of Chemical Associations</td>
</tr>
<tr>
<td>ICCM</td>
<td>International Conference on Chemicals Management</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 Background to the study

There are a wide variety of different chemicals used in common articles to obtain certain properties, functions and quality. There have been concerns about the hazardous properties of certain chemicals found in articles. For example, brominated flame retardants are used in articles such as electronics and furniture upholstery. Perfluorinated compounds are used in stain- and water proof coating of e.g. outdoor clothing and cooking ware. Heavy metals (e.g. lead and mercury) can be found in articles such as electronics and batteries. Phthalates are used as plasticizers in soft polyvinyl chloride (PVC) plastics used e.g. in toys and electronics. Nanomaterials are used in increasing number of articles such as electronics, vehicles, textiles and clothing, as well as cosmetics and hygiene products.

Many hazardous substances are being spread to the environment from the production, use and disposal of articles. Many of these chemicals have been found to be persistent and toxic in the environment, accumulating in the organisms and transporting long distances from where they have been released. For example, brominated flame retardants and perfluorinated substances have been found in the wildlife of the arctic area. For some of the chemicals (e.g. phthalates) or product groups (e.g. textiles) majority of the releases comes from the use and end-of-use phases of the articles. International trade of articles also affects to the transport of hazardous chemicals among regions (Massey et al. 2005).

Management of chemicals in articles is included in EU legislation concerning product safety, waste management, product design and chemicals, with the aim to reduce hazardous effects of chemicals in articles. Besides legislative management measures, there are also other instruments, including environmental labelling, international co-operation, industry initiatives, work of the non-governmental organizations (NGOs), as well as e.g. national programmes and registers.

According to the recommendations of the National Programme on Dangerous Chemicals, more information is needed about chemicals in articles. Also their management measures should be improved. In chapter 4.4 of the programme (Ministry of the Environment 2006, p. 74-79) there are 11 recommendations, which highlight the significance of information about chemicals in articles and preparations, as well as the importance of life cycle approach in risk management.

The issue of chemicals in articles and their releases has been discussed by international organizations and conventions. In the second session of the International Conference on Chemicals Management (ICCM2) held in Geneva May 2009, chemicals in products was identified as one of the emerging issues. Another emerging policy issue decided was electronic waste (e-waste).

1.2 Aim of the preliminary report

The aim of the preliminary report is to review how chemicals in articles could be controlled, through out the life cycles of the articles (from raw material and production, to marketing and use as well as waste handling, reuse and disposal). This report describes the current situation of legislative and voluntary management measures for chemicals in articles, and their possible need for further development. This is done
by reviewing the management measures used also in other countries. The aim of the preliminary report is to present a proposal for the target and definition of the actual report, which will be prepared later.

1.3 Definition and focus of the subject

In this preliminary report, articles are regarded as e.g. furniture, textiles, vehicles, toys, books, as well as electrical and electronic equipment. An article is defined in the Article 3(3) of the EU chemicals regulation, REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals), as “an object which during production is given a special shape, surface or design which determines its function to a greater degree than its chemical composition” (ECHA 2008). Also batteries and accumulators are considered as articles in REACH. Although their chemical composition is relevant to their function, they could not operate without a container. Packaging, containing substances, preparations or articles, is also considered as an article under REACH. Cosmetics are also included in this report, although they do not fill the article definition, but because they present possible significant source of chemical releases to the environment and because their legislation differs from that of other products. Medicinal products, paints and detergents, etc. are not included in this preliminary report as they are not articles but substances or mixtures.
2 Control of chemicals in articles – review of the current situation

The current management measures for chemicals in articles can be divided into product and chemical based legislative control instruments as well as other policy instruments (e.g. environmental labelling). The legislative control instruments cover those used in EU and Finland, as well as examples of other national and non-EU legislation. The EU directives are implemented into national legislation while the regulations are binding as soon as they are passed. Table 1 presents EU legislation concerning product safety, waste management, product design and chemicals, covered in this report. List of abbreviations can be found on pages 11-12.

<table>
<thead>
<tr>
<th>Table 1. Overview of EU legislation related to chemicals in articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product safety</td>
</tr>
<tr>
<td>GPSD</td>
</tr>
<tr>
<td>Emergency Decision</td>
</tr>
<tr>
<td>CPD</td>
</tr>
<tr>
<td>Cosmetics</td>
</tr>
<tr>
<td>Waste legislation</td>
</tr>
<tr>
<td>Waste Framework Directive</td>
</tr>
<tr>
<td>Hazardous waste</td>
</tr>
<tr>
<td>Shipments of waste</td>
</tr>
<tr>
<td>WEEE</td>
</tr>
<tr>
<td>RoHS</td>
</tr>
<tr>
<td>ELV</td>
</tr>
<tr>
<td>Batteries &amp; accumulators</td>
</tr>
<tr>
<td>Packaging</td>
</tr>
<tr>
<td>Product design</td>
</tr>
<tr>
<td>EuP and eco-design</td>
</tr>
<tr>
<td>Chemicals legislation</td>
</tr>
<tr>
<td>REACH</td>
</tr>
<tr>
<td>CLP</td>
</tr>
<tr>
<td>WFD</td>
</tr>
<tr>
<td>BPD</td>
</tr>
<tr>
<td>POPs</td>
</tr>
<tr>
<td>PIC</td>
</tr>
</tbody>
</table>

1 The parts of the new Toys Directive concerning chemical content will come into force on 20 July 2013.
2 The new Cosmetics Regulation will replace the Cosmetics Directive in 2013.
4 The new Eco-design Directive will be implemented in national legislation during year 2010.
2.1 Product based legislative control instruments

The product based legislative control instruments cover directives and regulations relating to product safety, waste management and product design.

2.1.1 Product safety

The product safety legislation covered in this chapter includes:

- General Product Safety Directive
- Toys Directive
- Construction Products Directive
- Cosmetics Directive and Regulation

General product safety

The aim of the General Product Safety Directive 2001/95/EC (GPSD) is to ensure the safety of all articles sold on the EU market. The Directive is applied to consumer products that are not covered by sector-specific product safety legislation. The sector specific legislation includes e.g. toys and cosmetics. The GPSD is also complementing sector legislation, which is lacking certain matters (e.g. producer responsibilities and the authorities’ tasks). The Directive includes obligations for producers and distributors as well as for the Member States. The producers must inform the consumers about the risks associated with the articles. They must also take measures to prevent the risks and be able to trace dangerous articles. The GPSD does not consider environmental risks. (EUROPA 2009a)

Under the GPSD, the EU Commission may take emergency measures adopting formal decisions that require the Member States to ban a dangerous article, recall it from consumers and withdraw it from the market. The decision is only valid for a maximum of one year and can be continued after that for one year at a time. Examples of emergency measures are a Decision on phthalates in toys and childcare articles in 1999 (which later became an EU directive and is now included in the REACH Annex XVII) and in 2009 a Decision 2009/251/EC on dimethylfumarate (DMF), which is used as an anti-mould agent in consumer products (e.g. furniture). The decision on DMF was continued until 15 March 2011. It has been proposed to be included in the REACH Annex XVII. (EUROPA 2009a)

The GPSD also presents the Rapid Alert System for non-food consumer products (RAPEX), which is an EU wide information exchange channel to alert consumers on dangerous products. National authorities are obligated to make notifications of dangerous products to the system. The RAPEX system includes consumer products (e.g. toys, textiles, electronics, cosmetics and motor vehicles), but not food, pharmaceuticals or medical equipments. (EUROPA 2009a, 2010d; Tukes 2010a) Weekly published notifications can be found at: http://ec.europa.eu > Consumer Affairs > Consumer Safety: Products and Services > Unsafe products.

In Finland, the GPSD has been implemented by the Act on safety of consumer products and services (75/2004). The supervising of product safety was transferred from the Consumer Agency to the Safety Technology Authority (Tukes) as from the beginning of 2010. Also the national RAPEX contact point was relocated to Tukes. Tukes informs consumers and stakeholders about the notifications of dangerous products, also through their web sites. They also test randomly selected products for possible safety risks. Notifications of products removed from the market can be found at: http://www.tukes.fi > Kuluttajaturvallisuus > Ohjeita ja vaatimuksia yrit...
Toys
The original Toys Directive 88/378/EEC concerning safety of toys was adopted in order to harmonize the toy safety legislation between the Member States. The Directive includes a definition of a toy, as well as a list of products not regarded as toys. There are several safety criteria, including chemical properties, such as bioavailability limits for certain chemicals (e.g. lead and cadmium) in toys. The Directive also includes warnings used in toys as well as principles of the CE marking. (European Commission 2009a) In Finland, the original Toys Directive has been implemented by the Act on safety of toys (287/1997). The supervisory authority in Finland is Tukes.

The new Toys Directive 2009/48/EC, which came into force at the end of July 2009, replaces the old Directive. The new Directive includes more stringent restrictions for chemicals in toys, e.g. prohibiting the use of substances that are carcinogenic, mutagenic and toxic for reproduction (CMR, category 1A, 1B and 2), and 55 allergenic fragrances. Also the allowable migration limits of heavy metals are lower in the new legislation and there are more regulated chemicals than in the original legislation. The overall aim of the Directive is to protect the health of a child. Environmental risks from toys are covered in the RoHS (Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment) and WEEE (Waste Electrical and Electronic Equipment) legislation for electrical and electronic toys. Cosmetic toys are covered by the legislation on cosmetic products. The parts of the new Toys Directive concerning chemical content will come into force on 20 July 2013. Member States had to implement the Directive into their national legislation by January 2010. (European Commission 2009a)

Construction products
The aim of the Construction Products Directive 89/106/EEC (CPD) is to ensure the free movement of construction products, with respect to the requirements of health and safety. The essential requirements listed in Annex 1 of the CPD include mechanical resistance and stability; safety in case of fire; hygiene, health and the environment; safety in use; protection against noise; and energy economy and heat retention. Products with the CE-marking must fulfil these requirements. The requirement for hygiene, health and the environment states that the construction work must be designed and built in such a way that it will not be a threat to the hygiene or health of the occupants or neighbours, especially as a result of: the giving-off of toxic gas; the presence of dangerous particles or gases in the air; the emission of dangerous radiation; pollution or poisoning of the water or soil; faulty elimination of waste water, smoke, solid or liquid wastes; as well as the presence of damp in parts of the works or on surfaces within the works. (European Commission 2009e)

The CPD does not regulate production, working environment or waste. There are no limit values for hazardous substances in it. The CPD includes standardization of testing methods for the chemical releases from construction products, but it does not prevent releases of hazardous substances. (KemI 2007) There is an ongoing revision of the CPD in order to simplify it (European Commission 2009e). In Finland the CPD has been implemented by the Land Use and Building Act (132/1999), as well as the Act (230/2003) and the Decree (1245/2003) on the approval of building products. The supervisory authority of CE-labelled construction products in Finland is Tukes. Construction products that are not CE-labelled are supervised by the Ministry of the Environment.
Cosmetics
The Cosmetics Directive 76/768/EEC relating to cosmetic products is aiming for the safety and free circulation of cosmetic products. The Directive restricts the use of certain chemicals in cosmetics, e.g. allergenic substances and CMR substances. There are over 1,300 prohibited substances and over 150 restricted substances in the Cosmetics Directive. It also includes a list of allowed substances (colouring agents, preservatives and UV filters) in cosmetic products, as well as labelling requirements (INCI-list, International Nomenclature of Cosmetic Ingredients). The Directive does not consider environmental risks, only health risks. (Auranmaa & Uusitalo 2009; EU-Japan Centre for Industrial Cooperation 2009) In Finland the Cosmetics Directive is implemented by the Act (22/2005) and Decree (75/2005) on cosmetic preparations. The supervisory authority of cosmetic products in Finland is Tukes.

The Cosmetics Directive has been amended several times and was revised into the Regulation (EC) No 1223/2009 on cosmetic products, which was adopted on 30 November 2009. This will replace the old Directive in 2013. The new Regulation includes new restrictions on e.g. CMR substances and nanomaterials. Newly classified CMR category 1A and 1B substances are prohibited with some exemptions (e.g. if there are no suitable alternatives). The new CMR restrictions in Cosmetics Regulation will apply from December 2010. The new Regulation includes definition, assessment and labelling requirements of nanomaterials used in cosmetic products (e.g. sunscreens). Cosmetic products that contain nanomaterials must be notified to the EU Commission from January 2013. The aim of the Regulation is the protection of human health. Environmental risks related to substances used in cosmetic products are covered in the REACH. (European Commission 2009b; EU-Japan Centre for Industrial Cooperation 2009)

2.1.2 Waste legislation

There are many restrictions in the EU regulating the chemical content of different product groups at the waste stage. National waste legislation is based on EU legislation, but in some cases includes stricter standards and limits. There is also some national waste legislation in Finland, e.g. Government Decree concerning the recovery of certain wastes in earth construction (591/2006). The impacts of waste are also covered by the Environmental Protection Act (86/2000) and Decree (169/2000). (Ministry of the Environment 2008a)

The waste legislation covered in this chapter includes:
- Waste Framework Directive
- Hazardous Waste Directive
- Regulation on shipments of waste
- WEEE Directive
- RoHS Directive
- ELV (End-of-Life Vehicles) Directive
- Batteries Directive
- Packaging Directive

Waste Framework Directive
The new Waste Framework Directive 2008/98/EC replaced the Waste Directive 2006/12/EC in December 2008. The aim of the new Directive is to reduce the production of waste and to promote the reuse and recycling of waste and thus to reduce releases to the environment. The differentiation of a product and a waste (end-of-waste criteria) as well as the definition of a by-product are improved in the new legislation. The waste will stop being a waste when it fulfils certain criteria for
re-use (e.g. construction and demolition waste, metal scrap and wastepaper). The waste hierarchy applies in the order of: prevention, re-use, recycle, other recovery (e.g. using as energy) and finally disposal to landfills. According to the Directive, the proportion of re-use should be 50 % for paper, metal, plastic and glass waste and 70 % for non-hazardous construction and demolition waste, by year 2020. The national implementation of the new Directive has to come into force by 12 December 2010. (EUROPA 2010b)

There is an ongoing overall reform of the waste legislation in Finland in order to implement the new Waste Directive. The reform is also included in the current government programme. The current Waste Act (1072/1993) and Waste Decree (1390/1993) are from 1993. The aim of the new legislation is to create policy instruments for waste prevention, recycling, exploitation of energy, as well as to improve the producer responsibility. The reform will take into consideration the new Waste Directive, amendments from the changed constitution law, national waste plan until 2016, different programmes concerning environmental and product policies (e.g. KULTU, a national programme to promote sustainable consumption and production) as well as the possible amendments in the Waste Tax Act (495/1996). Background information for the reform work is gathered through several surveys concerning e.g. producer responsibility procedure, waste prevention and the economic aspects of waste handling. The new legislation will also include the promotion of material efficiency (i.e. the design of competitive products with minimum material input and thus reducing the hazardous effects during the life cycle of the product), as well as the increased recycle targets for packaging material. The promotion of material efficiency and the prevention of waste will also be included in the amendment of the Environmental Protection Act. The new waste legislation is scheduled to come into force at the end of 2010. (Ministry of the Environment 2009a)

**Hazardous waste**

The Directive on hazardous waste 91/689/EEC lays down the properties, which make the waste hazardous. It aims to prevent risks of hazardous waste to the environment and human health. Hazardous wastes are defined in the national Waste Act as waste, which poses danger or harm to health and to the environment, even at low levels. The properties that make the waste hazardous (e.g. toxic, irritant or carcinogenic) and the limit values are defined in the Annex 4 of the Waste Decree. For example, the limit value for the waste to be considered very toxic to health is 0.1 % (w/w). Types of waste defined as hazardous waste can be found at the Ministry of the Environment Decree on the list of the most common wastes and of hazardous wastes (1129/2001). Examples of hazardous waste are electrical and electronic equipment (e.g. TV- and computer displays, as well as refrigeration devices), batteries with heavy metals, and fluorescent lamps. Hazardous waste has to be labelled and separately collected for treatment. (SYKE 2009c; Dahlbo 2002; EUROPA 2010c)

The Directive has been integrated into the new Waste Framework Directive, where Annex III defines properties of hazardous waste (H 1-15). The Directive on hazardous waste will be repealed as from 12 December 2010. (EUROPA 2010c)

**Shipments of waste**

International shipments of waste are covered by the EU Regulation (EC) No 1013/2006, aiming to control the import, export and trans-shipment of wastes and to protect the health and the environment. The Regulation defines the supervision and needed licences for waste shipments. The shipments of hazardous waste are more strongly controlled than waste classified as non-hazardous. The Regulation is based on the Basel Convention on the control of transboundary movements of hazardous wastes and their disposal by the United Nations as well as the OECD Decision

In Finland, the EU Regulation has been supplemented by a Government Decision on the part of the National Waste Plan concerning transfrontier waste movements (495/1998). The decision sets out the conditions under which the authorities may approve waste shipments to, from and through the country. Provisions for the shipment of waste have also been made in the Waste Act and Waste Decree. The competent authority in Finland is the Finnish Environment Institute (SYKE). (Ministry of the Environment 2008a, SYKE 2010c)

**Waste electrical and electronic equipment**

The Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) includes producer responsibility of waste electrical and electronic equipment. The aim of the Directive is to reduce the environmental impacts of electronic waste (e-waste) and to optimize the collection, re-use and recycling. The WEEE is applied to following groups of equipments (Annex IA): large and small household appliances; information technology and telecommunications equipment; consumer equipment; lighting equipment; electrical and electronic tools; toys, leisure and sports equipment; medical devices; monitoring and control instruments as well as automatic dispensers. (Ministry of the Environment 2008b; COM 2009; EUROPA 2010a)

According to the producer responsibility, the producer (manufacturer or importer) is obligated to organise the reuse, recovery, suitable treatment or waste disposal of the products that the company has put on the market. The producer will also cover the related costs. The waste management responsibility includes both households’ and companies’ waste equipment. The aim is to encourage the producers to consider the whole life cycle of their products and the environmental aspects. Producer responsibility covers in Finland besides electronic and electrical appliances, also batteries and accumulators, tyres from motor vehicles and equipment, cars, vans and comparable vehicles, newspapers, magazines, copy paper, and other comparable paper products as well as packaging. (Pirkanmaa ELY 2009; Ministry of the Environment 2008b) WEEE is not applied to components of the articles, only to whole articles. Thus e.g. the importers of spare parts are not included in the producer responsibility (Ignatius et al. 2009). In Finland, the producer responsibility is included in the national Waste Act.

The WEEE is a minimum directive and the Member States can take stricter requirements. In Finland, the Directive is implemented by the Government Decree on waste electrical and electronic equipment (852/2004) and the Amendment in the Waste Act (452/2004) including producer responsibility. The supervisory authority of producer responsibility in Finland is the Pirkanmaa Centre for Economic Development, Transport and the Environment (ELY). (Ministry of the Environment 2008b)

The WEEE Directive is currently being revised. The aim is to increase the amount of e-waste that is properly treated and also to ensure coherency with newer legislation, such as REACH. The revision includes mandatory collection targets for individual Member States (65 % of the average weight of electrical and electronic equipment placed on the market over two previous years). The targets also include re-use of whole appliances, the increase of weight based targets by 5 %, as well as targets for the recovery of medical devices. The collection targets would be more ambitious to high consumption equipment than for those with lower consumption levels. The Commission has also considered product-specific collection targets for small appliances, mercury-containing lamps and freezing equipment under the revision of the Directive. (Ministry of the Environment 2008b; COM 2009; EUROPA 2010a; European Parliament 2010a, b)
Hazardous substances in electrical and electronic equipment

The aim of the Directive 2002/95/EC on the Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) is to reduce the content of hazardous substances in electronics, and also to promote the substitution of hazardous substances by safer alternatives. The RoHS will contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment. According to the Directive, new equipment (placed on the market after July 2006) may not contain lead, mercury, chromium(VI), cadmium or the fire retardants polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE). The limit value for lead, mercury, chromium(VI), PBB and PBDE is 0.1 % (w/w) and for cadmium 0.01 % (w/w). The RoHS is applied to following groups of equipment (categories 1-7 and 10 in Annex IA of the WEEE Directive): large and small household appliances; information technology and telecommunications equipment; consumer equipment; lighting equipment; electrical and electronic tools; toys, leisure and sports equipment; automatic dispensers and in addition to electric light bulbs, and luminaires in households. (Ministry of the Environment 2008b; EUROPA 2010a)

Exemptions are included in the Annex of the Directive. The exemptions are being reviewed at least every four years taking into account the scientific and technical progress. Six new exemptions for applications of lead, cadmium and mercury were adopted in June 2009. These include e.g. exemption to plasma television screens containing up to 30 mg of mercury. The RoHS is a harmonisation directive, which means that the restrictions of the Member States cannot differ from the directive. In Finland, the RoHS Directive has been implemented by the Government Decree controlling the use of certain hazardous substances in electrical and electronic equipment (853/2004) and the Government Decree amending the Annex (325/2010). The supervisory authority in Finland is Tukes. (Ministry of the Environment 2008b; EUROPA 2010a; European Parliament 2010c, d)

There is an upcoming review of the RoHS Directive. There has been proposals to include all brominated and chlorinated flame retardants, PVC, chlorinated plasticisers, as well as phthalates DEHP (di(2-ethylhexyl) phthalate), BBP (butyl benzyl phthalate) and DBP (di-n-butyl phthalate) in the Directive. The scope of the revised RoHS Directive may also cover medical equipment and industrial monitoring and control devices. There have even been proposals to include all electronic articles under the Directive. (Ministry of the Environment 2008b; EUROPA 2010a; European Parliament 2010c, d)

End-of-life vehicles

The aim of the Directive 2000/53/EC on End-of-Life Vehicles (ELV) is to make the vehicle dismantling and recycling more environmentally friendly, by reducing the amount of hazardous waste, increasing recycling and re-use, and reducing releases and related risks. The ELV bans the use of lead, mercury, cadmium and chromium(VI) in materials and components of new vehicles (placed on the market after July 2003). There are some exemptions, concerning e.g. mercury containing lighting and lead containing batteries. The Directive also includes minimum technical requirements for the waste treatment of vehicles. In Finland, the ELV is implemented by the Government Decree on end-of-life vehicles (581/2004), the Decree controlling the use of certain hazardous substances in vehicles (572/2003) and the Decree amending the Annex I (328/2010) (Ministry of the Environment 2008a). The supervisory authority of producer responsibility in Finland is the Pirkanmaa ELY.
Batteries and accumulators
The Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators replaced in 2008 the old Directive 91/157/EEC on batteries and accumulators containing certain dangerous substances. Aim of the Directive is to maximize the separate collection of waste batteries and accumulators and to increase the recycling level. It applies to certain hazardous chemicals in batteries and accumulators. According to the Directive, it is prohibited to place on the market batteries and accumulators containing over 0.0005% (w/w) of mercury. Exemption is granted to button batteries not containing over 2% of mercury. It is also prohibited to place on the market portable batteries or accumulators (including those incorporated into appliances) containing more than 0.002% (w/w) of cadmium. Exemptions include portable batteries and accumulators intended for use in emergency and alarm systems (including emergency lighting), medical equipment or cordless power tools. The EU Commission is considering including cadmium containing cordless power tools into the Directive. Labelling requirements of substances include articles containing more than 0.0005% of mercury, 0.002% of cadmium and 0.004% of lead. The Directive also includes recycling requirements. In Finland, the Directive is implemented by the Government Decree on batteries and accumulators (422/2008) (Ministry of the Environment 2008a). The supervisory authority in Finland is Tukes and the Pirkanmaa ELY for the producer responsibility.

Packaging and packaging waste
The Directive 94/62/EC on packaging and packaging waste is aiming to prevent and reduce the environmental impacts of packaging material. The Directive regulates the production, recycling and re-use of packaging waste, as well as the arrangement of proper collection. It also includes concentration limits for certain heavy metals. According to the Directive, the sum concentrations of lead, cadmium, mercury and chromium(VI) in packaging or packaging components must not exceed 100 ppm by weight. This does not apply to packaging entirely made of lead crystal glass. (COM 2009) In Finland, the Directive is implemented by the Government Decision on packaging and packaging waste (962/1997) (Ministry of the Environment 2008a). The supervisory authority of producer responsibility in Finland is the Pirkanmaa ELY.

2.1.3 Product design

Energy-using products / Eco-design
The EuP (Energy-using Products, i.e. products which use, generate, transfer or measure energy) Directive, 2005/32/EC establishing a framework for the setting of eco-design requirements for energy-using products, is aiming to ensure the free movement of energy-using products on the market, as well as to increase protection of the environment, energy efficiency and the security of energy supply. The aim is also to include environmental views and life cycle approach in the product development. The assessed environmental aspects include anticipated emissions to air, water or soil, as well as the use of substances classified as hazardous to health or the environment. The EuP is applied to energy-using products, which are sold in the EU area over 200,000 pieces. The products will have to have significant environmental impacts, for which reduction is possible without unreasonable costs. Also, the components and sub-assemblies of these articles are included in the Directive, as well as products used for the production, transfer and measurement of energy. Means of transport for persons or goods are exempted. (Kautto et al. 2007; TEM 2010; European Commission 2009d)
The EuP is a framework directive and thus there are no direct responsibilities for the producers of products. The Commission will give product group specific implementation measures. These product requirements are set in Commission regulations, which will be applied to the national law. The products must fulfil the requirements in order to be placed on the market. Implementation measures have already been adopted to nine product groups (standby and off-mode losses, simple set top boxes, domestic lighting, tertiary sector lighting, external power supplies, electric motors, circulators, televisions and domestic refrigerators). There are also labelling requirements for hazardous substances used in articles. For example, the manufacturers of television have to provide information about the presence of mercury and lead in the product. The working plan of the Commission for 2009-2011 includes implementing measures for following product groups: air-conditioning and ventilation systems; electric and fossil-fuelled equipment; food-preparing equipment; industrial and laboratory furnaces and ovens; machine tools; network, data processing and data storing equipment; refrigerating and freezing equipment; sound and imaging equipment; transformers; as well as water using equipment. In Finland, the EuP is implemented by the Act (1005/2008) and Decree (1/2009) for the eco-design and energy labelling requirements of products. The supervisory authority in Finland is Tukes. (Kautto et al. 2007; TEM 2010; European Commission 2009d)

The EuP was revised at the end of 2009 with a new Eco-design Directive 2009/125/EC in order to extent the scope to all energy-related products (ERPs), i.e. products which do not necessarily use energy, but have an impact on energy consumption (e.g. windows). The revised Directive will also consider wider the use of hazardous substances in products. The Eco-design Directive came into force on 20 November 2009 and it will be implemented in national legislation during year 2010. (TEM 2010; European Commission 2009d)

2.1.4

Examples of other national and non-EU legislation

Product based legislation on chemicals in articles varies between countries. There are respective legislation as RoHS and WEEE in many countries outside EU, e.g. in China, Japan, Korea and Turkey.

China
The "RAPEX-CHINA" system, established in 2006, is providing rapid transmission of data between the EU and the Chinese authorities on dangerous Chinese made products reported through the RAPEX system. Co-operation is conducted between the Health and Consumer Protection Directorate General of the European Commission (DG SANCO) and the General Administration of Quality Supervision, Inspection and Quarantine of China (AQSIQ). AQSIQ investigates all the notifications and if necessary, adopts measures to prevent or restrict further export of the products to the EU. (EUROPA 2010d)

The China RoHS Act, "Management Measures for the Prevention and Control of Pollution from Electronic Information Product" came into force in March 2007 as a response to the EU RoHS Directive. The restricted hazardous chemicals are same as in the EU RoHS (lead, mercury, chromium(VI), cadmium, PBB and PBDE). The China RoHS is applied to a wide range of articles and components (e.g. communication equipments and products, computer industry products, household electronic products and electronic application products). (Design Chain Associates 2009; Massey et al. 2008)

The implementation of the China RoHS will be done in stages. In the first phase, all electronic products to which the legislation is applied must be labelled and the
hazardous substances notified. The presence of the targeted hazardous substances must be labelled in the article, and also to indicate the number of years during which the product will not release these substances under normal use conditions. More detailed information will be provided in the product instructions. In the later phase, specific restrictions for hazardous substances are applied to certain products, which will be notified in a separate Catalogue. The proposed first list of articles in the Catalogue includes mobile phones, fixed and wireless telephones, and printers connected to computers. Products that do not fulfil the requirements will be prohibited to be placed on the market in China. The China RoHS includes standards determining the maximum concentrations, labelling and notification requirements as well as testing methods. (Massey et al. 2008; Design Chain Associates 2009)

Japan
Cosmetic products are regulated in Japan by Article 2-3 and Article 42-2 (standards) of the Pharmaceutical Affairs Act. The Act prohibits the use of approximately 30 substances. The content of the prohibited and allowed substances lists differ from that of the EU legislation. The Japanese legislation (Article 2-2) has an additional category, Quasi Drug, which means an “item that shall have mild effects on the human body”. (EU-Japan Centre for Industrial Cooperation 2009)

The Japanese RoHS, J-moss (“The marking for presence of the specific chemical substances for electrical and electronic equipment”) is based on the Japanese Law for the Promotion of Effective Utilization of Resources. J-moss is defined in the Japan Industry Standard JIS C 0950, which includes labelling requirements for seven product groups (personal computers, unit-type air conditioners, television sets, refrigerators, washing machines, clothes dryers and microwave ovens) and six chemical substances (same as in the EU RoHS Directive: lead, mercury, chromium(VI), cadmium, PBB and PBDE). The Red label indicates the presence and the Green label the absence of these substances in an article. The requirements of J-Moss are mandatory for these product groups. (JEITA 2008)

The Japanese Home Appliance Recycling Law is aiming for the sound waste management and increased recycling of household electronics. The law includes the producer responsibility for the collection and recycle of specific post-consumer home appliances (air conditioners, refrigerators, television sets and washing machines). (Ministry of the Environment, Japan 2009)

Norway
In Norway the Product Control Act and Product Regulations are restricting chemicals in articles (SFT 2009). The Product Regulations are concerning the production, import, export, sale and use of chemicals and products which are hazardous to the health and the environment. This does not include e.g. consumables, food packaging, fertilizers, tobacco and medicines because they are regulated in specific legislation (SFT 2008a). The restricted substances and preparations include e.g. polychlorinated biphenyl (PCB), lead, mercury, arsenic, organic tin compounds, cadmium, short-chained chlorinated paraffins (SCCP), penta- (pentaBDE) and octabromodiphenylether (octaBDE), asbestos and perfluorooctane sulphonates (PFOS). The restricted product groups include e.g. textile and leather goods, toys, batteries, vehicles, as well as electrical and electronic equipment.

The Norwegian Pollution Control Authority (SFT) has proposed stricter national restrictions on the limit values of hazardous chemicals than the legislation in force. The aim is to remove the most harmful products from the Norwegian market. This would make Norway’s product legislation the most extensive in the world. The original proposal of the SFT included a ban of 18 hazardous substances in consumer products. For some of the substances (phthalate DEHP, organotins and brominated
flame retardant tetrabromobisphenol A (TBBP-A)) decision was made to wait for the ongoing EU legislation. Musk ketone and tensides were decided to be left out of the evaluation, because based on current consumption they do not pose a risk in Norway. The proposed ten regulated chemicals are: medium-chain chlorinated paraffins (MCCP), bisphenol A, musk xylene, triclosan, perfluorinated compound perfluorooctanoic acid (PFOA), brominated flame retardant hexabromocyclododecane (HBCDD), pentachlorophenol (PCP), as well as heavy metals lead, cadmium, arsenic and their compounds. They are so-called prioritized hazardous substances, which have PBT (persistent, bioaccumulative and toxic) characteristics and many of them are also toxic to reproduction. (SFT 2008a)

The ban would include the production, import, export and trade of consumer products containing one or more of the ten chemicals, if the established limit value is reached. The new restrictions would be established as a new chapter in the Product Regulation. SFT recommends that the ban would not include means of transport, rigidly mounted equipment in them, tyres or similar fittings. It will also not include those chemicals and articles that have been covered in other EU legislation, e.g. RoHS Directive. (SFT 2008a) The product safety legislation in Norway covers environmental risks and is thus wider than in other Nordic countries (TEM 2009).

United States
There are restrictions on individual chemicals in specific product groups in many states of the country, e.g. legislation to ban the use of bisphenol A in baby bottles, and prohibition on phthalates in toys and child care articles intended for children under three years of age (Costner et al. 2005).

The California Senate Bills (SB) 20 and 50, which came into force in 2007, include RoHS and WEEE like legislation. The legislations cover fewer articles than the EU legislation. SB 20 is applied to CRT-, LCD- and plasma displays, which are bigger than four inches (diagonally measured). SB 50 also covers articles that have been refurbished by the manufacturer for retail sale. The restricted chemicals are lead, mercury, cadmium and chromium(VI). Devices that do not fulfil the criteria cannot be manufactured, sold or imported into California.

2.2 Chemical based legislative control instruments

The most important pieces of legislation concerning chemicals in articles are the EU’s new chemical regulation REACH and the classification and labelling regulation CLP (Classification, Labelling and Packaging of substances and mixtures). The chemicals legislation in Finland consists primarily of harmonised EU legislation, implemented in the national legislation.

Chemical based legislative control instruments covered in this chapter include:
- REACH Regulation
- CLP Regulation
- Water Framework Directive
- Directive and Regulation on biocidal products
- POPs (Persistent Organic Pollutants) Regulation
- PIC (Prior Informed Consent) -notification system
2.2.1

REACH Regulation

REACH is a new EU wide chemicals regulation (EC) No 1907/2006 dealing with the Registration, Evaluation, Authorisation and Restriction of Chemical substances. The aim of REACH is to ensure high level of protection for human health and the environment through earlier and better identification of relevant properties of substances. It will give greater responsibility for the companies about the risk management of chemicals and providing safety information on their substances. The REACH Regulation came into force on 1 June 2007 and its requirements will be implemented in stages between 2007 and 2018. The manufacturers and importers are required to gather information about the properties of the substance to allow safe handling and to register the information to the European Chemicals Agency (ECHA). ECHA will make some of the data registered available (excluding for example confidential business information) through its website from where consumers and professionals can find information about the hazardous properties of the substances. REACH also requires substitution of the most dangerous substances if there are suitable alternatives available. The REACH Regulation covers also substances in articles. The competent authorities of REACH in Finland are SYKE and the National Supervisory Authority for Welfare and Health (Valvira). (ECHA 2009; REACH & CLP helpdesk 2009; EUROPA 2010e)

Registration requirement for substances in articles

Registration is required in order to place a substance on the EU market. Registration means submission of a technical dossier to ECHA with information about the relevant properties of a substance. Chemical safety report may also be required. Registration of a substance is required from the producer or importer of an article, if the substance is intended to be released from the article under normal or reasonably foreseeable use conditions, and if the total volume of the substance in all articles produced or imported to the EU region is over one tonne annually. Registration is not required if the substance has already been registered for the same use by another company. ECHA may still require registration if there is a suspicion that the substance is released from the article and the amount of the substance is more than one tonne per year. There is a phased registration scheme. If a producer or importer of an article has made a pre-registration by 1 December 2008, there will be a later registration deadline for the substance in an article. If the pre-registration has not been made in time the production or import of the article have had to cease by 1 December 2008 and may continue after the registration has been made to the ECHA. (ECHA 2009; REACH & CLP helpdesk 2009)

Candidate list of Substances of Very High Concern

Substances of Very High Concern (SVHC) are those that might have serious effects on human health and/or the environment. These include substances, which are carcinogenic, mutagenic or toxic to reproduction (CMR, category 1 and 2), persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB), as well as those from which there is scientific prove for similar concern. The SVHC substances are included in the so-called candidate list for authorisation, which is regularly updated. (ECHA 2008; 2009) In June 2010, there were 38 substances on the candidate list and seven of these have been given the highest priority. ECHA has proposed that these seven substances would be the first substances subject for authorisation. Member States can suggest new SVHC substances for the list (Article 59). Also ECHA can make proposals if requested by the Commission.
Notification requirement

Notification means the submission of certain information about a substance and its use in articles to ECHA. Notification of a substance is required from a producer or an importer of an article, if articles contain SVHC substances included in the candidate list for authorisation, at a concentration of more than 0.1 % (w/w), and the total amount of the substance in all articles produced or imported by a producer or an importer is more than one tonne annually. Notification is not required if the substance has already been registered for the same use, if the exposure of humans or the environment to the substance under normal or reasonably foreseeable use conditions (including disposal) can be excluded, or if the article has only been produced or imported before the substance has been added to the candidate list. The threshold 0.1 % applies to the whole article, not to homogenous materials or parts. The notification has to be made within six months after the substance has been included in the candidate list, starting from July 2011. (ECHA 2009)

There has been discussion whether the 0.1 % limit of the REACH Regulation should be applied to the whole article or individual components. Six Member States (Austria, Belgium, Denmark, France, Germany and Sweden) have notified dissenting views questioning the application of the 0.1 % threshold to the entire article. (ECHA 2008)

Communication of information

The suppliers of articles have a responsibility to provide relevant safety information about the substance in article to the recipients (i.e. industrial or professional users and distributors), if the articles contain SVHC substances at concentrations of more than 0.1 % (w/w). This information has to be provided after the substance has been included in the candidate list and as a minimum the name of the substance must be given. Available safety information must also be provided for consumers, upon request and within 45 days. The requirement to communicate information, to both the recipients and consumers, also applies to substances below one tonne per year, to packaging materials and also to articles produced or imported before the substance has been included in the candidate list and are supplied after the inclusion. The threshold 0.1 % applies to the whole article. (ECHA 2009)

Safety data sheet is a tool for information transfer to ensure the safe use of chemical substances. According to REACH, the supplier of chemicals must provide a safety data sheet to his customer when supplying a dangerous substance or mixture, substances that are PBT or vPvB, or mixture containing such substances. (ECHA 2010) Safety data sheets are provided only on chemicals used in the manufacturing or finishing of articles, not to the finished articles on the market.

Restrictions

Annex XVII of the REACH Regulation contains restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles. This contains restrictions on e.g. the use of asbestos in products; mercury used in the preservation of industrial textiles; mercury compounds, arsenic and organotins as pesticides; nickel in jewellery; creosote in preservation of wood; azocolourants in textile and leather articles; certain phthalates in toys and child care articles; nonylphenols and nonylphenol ethoxylates in textiles and other products; as well as cadmium as a stabilizer in PVC plastics, surface treatment or colouring agent (Regulation 552/2009). There are also restrictions on the use of organotins in articles (Regulation 276/2010). National exemptions to the Annex XVII are given in the Government Decree (647/2009). ECHA Forum has gathered a list of available EU and international testing methods for the enforcement of restrictions. The methods can be used for studying the presence of substances included in Annex XVII from different materials.
2.2.2

Classification, labelling and packaging

With the CLP Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of substances and mixtures, the United Nations’ Globally Harmonized System of classification and labelling of chemicals (GHS) is implemented in the EU. The aim of the Regulation is to protect the health and the environment and to ensure the freedom of movement for chemicals by harmonizing the classification and labelling of hazardous chemicals in the EU area. The CLP applies to all chemicals but the labelling requirement concerns only substances and mixtures classified as hazardous. Unlike in REACH, there is no tonnage limit in the CLP Regulation. (REACH & CLP helpdesk 2009)

The CLP includes central parts of the GHS and also parts from the old classification and labelling directives, the so-called Dangerous substances Directive (67/548/EEC) and the Dangerous preparations Directive (1999/45/EC). The new Regulation will amend and eventually replace these Directives. The CLP Regulation came into force on 20 January 2009 and it will be applied in stages. The old Directives are also in force during the transition period, until 1 December 2010 for substances and until 1 June 2015 for mixtures. (REACH & CLP helpdesk 2009)

There are quite many changes in the CLP Regulation compared to the old Directives. Signalwords “danger” and “warning” are introduced in CLP, as well as the new H (hazard) and P (precautionary) statements that will replace the old R- and S-phrases. The Regulation also includes new hazard classes and categories, classification criteria and limit values. The classification of mixtures changes and the old symbols will be changed into new hazard pictograms. (REACH & CLP helpdesk 2009)

The classification, labelling and packaging requirements of the CLP Regulation concern also some explosive articles. Additionally the classification requirement concerns substances in articles under registration or notification requirements of REACH. CLP is not applied to e.g. waste or cosmetics. According to the Regulation, the producers and importers must notify ECHA about the classification and labelling of a substance within one month after placing on the market. For substances that are placed on the market on 1 December 2010, the notification must be done on 3 January 2011. The competent authorities for CLP in Finland are SYKE and Valvira. (REACH & CLP helpdesk 2009; SYKE 2009b)

2.2.3

Water Framework Directive

The aim of the Water Framework Directive (WFD) 2000/60/EC is to reduce the pollution of ground and surface waters by reducing releases of certain priority substances. The priority substances are identified and listed as those presenting significant risk to the aquatic environment (Annex X). There is an ongoing update of the Annex X, in order to add new priority substances to the WFD. Annex II of the Directive 2008/105/EC on environmental quality standards will replace the Annex X containing the list of priority substances. Annex III of the Directive includes 13 substances (e.g. bisphenol A and PFOS) subject to review when updating the list of priority substances. The priority substances listed in Annex II include e.g. heavy metals lead, mercury and cadmium, as well as nonylphenol and DEHP (phthalate). The goal is that the releases to the environment, from the 20 most hazardous of the total of 33 priority substances, will cease by year 2020. These 20 substances include e.g. pentaBDE, mercury, nonylphenol and tributyltin. There are no requirements for specific product groups. In Finland, the WFD has been implemented by the Act on water resources management (1299/2004), Decree on water resources management
2.2.4 Biocidal products

The Directive 98/8/EC on placing of biocidal products on the market (BPD, Biocidal Products Directive) is regulating the use of 23 different types of biocides (e.g. disinfectants, preservatives and pest control products). The aim of the Directive is to harmonise the European market for biocidal products and to provide high level of protection of health and the environment. Only biocidal products containing active substances included in the Annex I of the BPD can be authorised. The active substances are evaluated at the EU level by Member States and acceptable substances are included in the Annex I. (SYKE 2010b, 2009e)

Biocidal products are evaluated and authorised at national level. In Finland the BPD is implemented by the Amendment in the Chemicals Act (1198/1999) and Decrees on biocidal products (466/2000), applications and notifications (467/2000) and the packing and labelling of biocidal products (422/2000). The Biocidal Products Decree (466/2000) contains regulations on the division of tasks between the authorities. The authorisation of the 23 biocidal products is divided to the authorities by product type. The competent authorities in Finland are SYKE and Valvira. (SYKE 2010b, 2009e)

The BPD will be revised and replaced in the future by the new Biocides Regulation. The BPD only regulates treated articles when the biocide is released for external effects, e.g. mosquito nets, socks and sleeping bags treated with biocides. It does not regulate e.g. carpets and wood treated with preservatives for which the effect is internal. Thus articles can be imported to EU even if they contain substances, which are not authorised under the Directive. The new Regulation would also apply to these products. (EUROPA 2009d)

2.2.5 Persistent organic pollutants

The Regulation (EC) No 850/2004 on persistent organic pollutants (POPs) implements the Stockholm Convention and the UNECE CLRTAP POPs Protocol aiming to protect health and the environment by prohibiting, phasing out, or restricting the production, placing on the market and use of certain harmful substances. The Regulation also includes waste management provisions of waste containing these substances. The POPs Regulation also covers placing on the market of articles containing POPs. Prohibited substances include many old pesticides and industrial chemicals e.g. aldrin, mirex, PCBs and DDT. There are however, certain exempted time-limited uses of PCB, DDT and lindane. For example, PCB containing articles, which were already in use when the Regulation came into force, are allowed to be used until the end of 2010 (according to Directive 96/59/EC on the disposal of PCB/PCT). New substances, added to the Stockholm Convention and the POPs Protocol, are implemented in the POPs Regulation. The Stockholm Convention requires National Implementation Plans to assist countries in implementation. (SYKE 2010a)

2.2.6 PIC-notification system

The PIC (Prior Informed Consent) Regulation (EC) No 689/2008 implements the Rotterdam Convention aiming to regulate the import and export of banned or severely
restricted chemicals. The PIC-notification system requires that exporters notify the authorities of the importing countries about the hazardous chemicals before the export. The notification has to be done once in a year for each listed chemical. Annex I of the Regulation includes list of chemicals that are within the notification system. The Annex has been amended twice in 2010 (regulations 15/2010 and 196/2010). (SYKE 2010d)

2.2.7

Examples of other national and non-EU legislation

In addition to the EU legislation, there may be some specific national chemical based legislation relating to articles. Some countries have also initiated demonstration projects on safer alternatives for hazardous chemicals.

Sweden

The Swedish Environmental Quality Objectives includes 16 objectives to be attained by 2020. One of these is “a non-toxic environment”. Interim targets of this goal include e.g. information on dangerous substances in products, and phase out of substances of very high concern in newly manufactured products. According to the Swedish authorities, the objective will be very difficult to achieve. (Miljömål 2009; Söderholm 2009)

The substitution principle is included in the Swedish Environmental Code legislation. According to the Code, chemicals that pose a risk to human health or the environment must be replaced with less harmful alternatives (Höök & Blom 2009).

There are some specific restrictions for certain substances (e.g. mercury, cadmium and trichloroethylene) in the Swedish Chemical Products (Handling, Import, and Export Prohibitions) Ordinance (1998:944) and chapter 5 of the Chemical Products and Biotechnical Organisms Regulations (KIFS 2008:2) (KemI 2009b).

Denmark

National Chemical Substances and Products Act concerns articles (e.g. toys, jewellery and refrigerators) that are produced, imported, or sold. There are specific legislation for certain chemicals, e.g. Statutory Order for lead (with exemptions) and a tax on PVC and phthalates. The producer is responsible for the products that are manufactured in Denmark, while the importer is responsible for the products that have been manufactured outside the country. (Danish EPA 2009b, c)

The second Chemical Action Plan (2006-2009) of Denmark focused on three priorities, from which one was consumer products. This included strengthening controls on toys, cosmetics, jewellery and other products to ensure that they do not contain chemicals that could pose risk. Long-term objective of the national action plans is to remove products containing PBT or CMR substances from the market by 2020. (Danish EPA 2009c)

Norway

The Product Control Act includes requirement to apply the substitution principle. According to the principle, companies have to evaluate the possibility to replace hazardous chemicals with less hazardous alternatives. The less hazardous alternative must be used if there are no unreasonable costs or inconvenience. This applies to all companies and users (not private consumers) that use chemicals, which may be hazardous to health or the environment. The principle is applied to all substances that have properties causing possible environmental or health risks, and to all products containing these substances at all life cycle stages. The undesirable properties are defined by the authorities. (SFT 2008b)
China
The Chinese chemicals regulation “Measures on Environmental Management of New Chemical Substances” was adopted on 19 January 2009. This is an amendment to Regulation from 2003 and it has been considered as China REACH. The legislation will also address chemicals in articles and it will come into force on 15 October 2010. (Young & Global Partners 2010)

Japan
There are many laws in Japan relating to chemicals in articles, e.g. (Ministry of the Environment, Japan 2009):

• Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. (Chemical Substances Control Law)
• Law Concerning Special Measures against Dioxins
• Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes (PCB Special Measures Law)
• Law Concerning the Protection of the Ozone Layer Through the Control of Specified Substances and Other Measures
• Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management
• Standard for elution of lead from dish and toy, established under the Food Sanitation Law

United States
The Safe Drinking Water and Toxic Enforcement Act of California (Proposition 65) from 1986 provides annually a list of approximately 775 chemicals “known to the state of California to cause cancer or reproductive toxicity”. The Proposition requires that businesses provide warnings when a product is exposing people to the chemicals on the list. Due to the Proposition some articles in the California are labelled as “This product contains chemicals known to the state of California to cause cancer or reproductive toxicity”. (Massey et al. 2008)

Bills AB 1879 and SB 509 were established in California in 2008 as a framework for a “green chemistry” program. The aim of the Bills is to reduce or phase out toxic substances in consumer products and the environment as well as to manage information on toxic chemicals. Bill AB 1879 makes it possible for the authorities to regulate chemicals in consumer products and Bill S.B. 509 will increase consumer knowledge about the risks relating to everyday chemicals. (Massey et al. 2008)

There are several other legislative instruments in different states relating to chemicals in articles. These include e.g. (Massey et al. 2008):

• Maine’s Act to Protect Children’s Health and the Environment from Toxic Chemicals in Toys and Children’s Products
• Washington’s Children’s Safe Products Act
• The Interstate Chemicals Clearinghouse
• Mercury Management Act of Massachusetts
• Interstate Mercury Education and Reduction Clearinghouse (IMERC) and Mercury-Added Products Database

There are also restrictions on individual substances (e.g. penta- and octaBDE and certain phthalates) in articles in many states.
2.3 Other policy instruments

Besides legislative management measures, there are also other policy instruments. These can be voluntary, binding or give recommendations.

Other policy instruments covered in this chapter include:
- Environmental labelling
- International co-operation
- Industry initiatives
- Work of the non-governmental organizations
- Examples of other national management measures

2.3.1 Environmental labelling

Many products can be claimed to be ecological or toxics-free. Environmental labelling can be used to show that the products are among the most environmental friendly products in the group and fulfil the criteria required by the label.

Environmental labelling is based on the International Standards Organization (ISO) 14020 standard. In the standard, the labels are divided into three categories. Type I labels are eco-labels, which are voluntary programs based on multiple criteria and verified by third party. The program awards licenses, authorizing the use of the label on products, based on life cycle assessment. Type I labels include e.g. the Nordic “Swan”, the EU “Flower”, the Blue Angel of Germany (first eco-label program) and the North-American “Green Seal”. Type II labels are informative environmental self-declarations of manufacturers, often applying to one aspect of the product. These labels include e.g. the Energy Star label and the recycling symbol. Type III labels are voluntary third party environmental declarations (e.g. report cards and information labels) based on life cycle assessment, providing quantified environmental information of pre-set categories of parameters of products. Type III labels include e.g. the EcoLeaf label of the Japan Environmental Management Association for Industry (JEMAI). The product categories include e.g. photocopiers, digital cameras and scanners. (Massey et al. 2008; ISO 2009)

Other, unofficial labels include e.g.:
- Öko-Tex 100 testing and certification system for textile products
- TCO-label for electronics
- Bra Miljöval by the Swedish Society for Nature Conservation (e.g. textiles and electronics)
- Organic labels, e.g. BDIH certificate for organic cosmetics

Nordic eco-label “the Swan”

The Nordic Eco-label (Figure 1) was introduced by the Nordic Council of Ministers in 1989. The aim of the label is to guide the consumers and professional buyers in their product choices and also to encourage the manufacturers to provide more environmentally friendly products. There are currently approximately 70 product groups within the Nordic eco-label. These include e.g. cleaning products, furniture, hygiene products, electronic equipment, cosmetics, floor coverings, paper products, batteries, gardening tools, shampoos and soaps, and textile detergents. For example, the criteria for audiovisual equipment (e.g. televisions) state that the products (exemption printed circuit boards) must not contain lead, cadmium, phthalates and halogenated flame retardants. Displays must not contain cadmium and the mercury content must not exceed 1 mg of mercury per lamp. Cosmetics must not contain...
e.g. CMR or sensitizing substances or potential endocrine disruptors. (Auranmaa & Uusitalo 2009; SFS 2010a)

The criteria for eco-label are set so that only a maximum of 20-30% of the products in the product group can fulfil them. There should be some kind of environmental problem related to the product group, to achieve environmental benefits from the label. In order to affect the consuming patterns of the product group, there should be better and worse products in the market concerning the environmental aspect. Criteria for labelling are evaluated for the whole life-cycle of the product. Several factors are included, e.g. harmful chemicals, hazardous effluents and waste. The companies can apply for a right to use the label. The right to use the label is temporary because the criteria need to be revised approximately between three to five years due to the changes in raw materials, production methods and legislation. For example, the criteria for cosmetics are being revised to strengthen the criteria and to include also shampoos and soaps. The fulfilment of the criteria is being checked by e.g. samples, certificates and control visits. In Finland the Nordic eco-label is administered by Finnish Standards (SFS). The eco-label committee is working to promote the operation of both the Nordic and EU eco-labels in Finland. (Auranmaa & Uusitalo 2009; SFS 2010a)

EU eco-label “the Flower”
The EU Eco-label (Figure 2) certification scheme was established in 1992. The aim of the label is to encourage businesses to market more environmentally friendly products and services as well as to help the consumers to identify them. Food and medicine are excluded from the certification. There are currently 26 product groups with several hundred products having licenses to use the label. These include e.g. cleaning products, soaps and shampoos, computers and televisions, paper products, textiles and footwear, mattresses, and garden products. Criteria are set so that only 5-30% of the products in the product group can be granted the eco-label. The criteria for each product group, which are usually valid for three years, are based on studies analyzing the impact of the whole life cycle of the product. They are the same in all the EU Member States for the same product. According to the criteria, the eco-label is not awarded to products containing hazardous substances. The fulfilment of the criteria is checked by independent bodies. (SFS 2010b; EUROPA 2009b)

The general EU eco-label criteria have been revised (Regulation (EC) No 66/2010) to include higher environmental standards. These include e.g. banning products containing substances or mixtures classified as toxic, hazardous to the environment, carcinogenic, mutagenic or toxic to reproduction (CMR). Also, the label will not be awarded to products containing substances referred to in Article 57 (SVHC) of the REACH Regulation. The general requirements include substitution of hazardous substances by safer chemicals, or by the use of alternative materials or design, if technically possible. Exemptions to the ban may be granted to substances that do not meet the criteria in Article 57. The new rules entered into force on 20 February 2010. (EUROPA 2009b)

The EU agreed at the end of 2009 on the first eco-label criteria for wooden furniture (2009/894/EC), wooden floor coverings (2010/18/EC) and textile floor coverings e.g. carpets (2009/967/EC). The criteria include restrictions on the use of chemicals e.g. formaldehyde, flame retardants, phthalates, heavy metals and biocidal products. There are also limit values on volatile organic compounds (VOC) released from articles. The new criteria will be valid for four years. Target for the EU eco-label is 40-50 product groups by 2015. (EUROPA 2009b) In Finland, the EU eco-label is administered by SFS and supervised by the Ministry of the Environment (SFS 2010b).
2.3.2

International co-operation

There are many different international conventions, protocols and agreements, which consider chemicals in articles. They may be voluntary giving recommendations or binding after ratification.

Strategic Approach to International Chemicals Management

The Strategic Approach to International Chemicals Management (SAICM) is an international non-binding policy framework, working under the United Nations Environment Programme (UNEP). It was founded at the International Conference on Chemicals Management (ICCM) in 2006 at Dubai, ICCM being the administrative body of SAICM. SAICM is aiming for the sustainable use of chemicals in their whole life cycle so that by year 2020 chemicals are used and produced in a way that minimizes significant adverse health and environmental effects. Global Plan of Action states that articles and products containing hazardous substances should all be accompanied by relevant information for users, workplaces and at disposal sites. (UNEP 2006)

The Informal Workshop on Stakeholders’ Information Needs on Chemicals in Articles/Products was held in 9-12 February 2009 at Geneva. The results of the workshop were introduced at the second session of the ICCM (ICCM2) in 11-15 May 2009 at Geneva. Emerging policy issues decided in the conference were:

- nanotechnology
- chemicals in products
- electronic waste (including old electronics)
- lead based paint

Additional issue presented by the United States was perfluorinated substances. It was decided to start a UNEP led project on Chemicals in Products (CiP) with the aim of addressing the information needs of chemicals in products for the ICCM3, which will be held in 2012.

Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants was adopted in 2001 and came into force on 2004. The Convention, which is administered by UNEP, is aiming to eliminate or reduce the production, sale, use and releases, as well as unintentional formation of POPs. In the first stage 12 most toxic POPs were included in the Convention. Eight of these are pesticides (aldrin, dieldrin, endrin, DDT, heptachlor, chlordane, mirex and toxaphene), two are industrial chemicals (PCB and hexachlorobenzene HCB) and two are industrial by-products (dioxins and furans). An exemption has been granted for DDT to control malaria. Nine new substances were added to the Convention at the meeting of the parties in May 2009 at Geneva. The substances are lindane and its isomers alfa- and betaHCH; PFOS; flame retardants penta- and octaBDE, and hexabromobiphenyl (HBB); pesticide chlordecon; and pentachlorobenzene (PeCB) used in the production of pesticides and as a flame retardant. The new restrictions come into force as they have been ratified, by 26 August 2010. It has also been considered listing e.g. SCCP and HBCDD in the Convention. There are 170 parties in the Convention, which is implemented through National Implementation Plans. Finland has ratified the agreement in 2002. (SYKE 2010a; Stockholm Convention... 2009; Steiner et al. 2003)

Basel Convention

The shipments of hazardous waste to non-OECD countries. However, the Convention has not been ratified by sufficient number of countries. (Basel Convention 2009)

**Montreal Protocol**
The Montreal Protocol on substances that deplete the ozone layer is restricting the production and use of ozone depleting chemicals. The Protocol, which was signed in 1987, is binding with certain substances banned and others having a phase out plan. By now, 196 countries have ratified the Protocol, including Finland. Controlled substances include e.g. chlorofluorocarbons (CFC) and hydrochlorofluorocarbons (HCFC). Products containing controlled substances include e.g. refrigeration, air conditioning and heat pump equipment; aerosol products; portable fire extinguishers; insulation boards, panes and pipe covers; as well as pre-polymers. (UNEP 2009a; SYKE 2009a) In the EU, Montreal Protocol has been implemented by Regulation (EC) No 1005/2009.

**UNECE CLRTAP Protocols**
The Protocol on Heavy Metals was adopted in 1998 in Aarhus, Denmark under the United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP). The Protocol is aiming to limit the emissions of lead, mercury and cadmium in Europe and North America. The parties of the Protocol have to reduce these emissions below their 1990 levels. The Protocol includes measures for reducing emissions from products, such as mercury containing batteries, electrical components, measuring devices and fluorescent lights. (UNECE 2009a; KemI 2009d)

The Protocol on Persistent Organic Pollutants (POPs) was adopted in 1998 in Aarhus, Denmark under the UNECE CLRTAP and came into force on 2003. The aim of the Protocol is to eliminate any discharges, emissions and losses of 16 POPs included in the Protocol (11 pesticides, two industrial chemicals and three by-products or contaminants). For some POPs the production and use is banned while the use of others is restricted and these will be phased out in later stage. The Protocol also includes dealing with wastes of the eliminated POPs and it obligates the parties of the Protocol to reduce their emissions of dioxins, furans, polycyclic aromatic hydrocarbon (PAH) and HCB below their 1990 levels or an alternative year between 1985 and 1995. Also, work to identify new candidates is included in the Protocol and seven new substances were added to the Protocol in December 2009. These are hexachlorobutadiene (HCBD), penta- and octaBDE, PeCB, PFOS, polychlorinated naphthalenes (PCN) and SCCP. Three of these (HCBD, PCN and SCCP) have not been included in the Stockholm Convention. HCBD, PeCB and PCN will be phased out, but for the other four substances there are exemptions concerning e.g. recycling. There are 29 parties to the Protocol, including Finland. (UNECE 2009b, 2010; KemI 2009d)

**UNEP Mercury programme**
The UNEP mercury program, which was established in 2003, was based on a voluntary action. The aim of the program is to reduce the global mercury releases and the associated risks to humans and the environment. In order to strengthen the mercury program, an establishment of a framework was proposed at the UNEP Governing Council in February 2009. Negotiations were launched on internationally binding convention on mercury in order to reduce the global mercury emissions. First negotiations will be held before summer 2010. The Convention would include measures on prioritized areas including mercury containing products and waste handling. Some countries have supported an idea that it should be possible to add other substances of global concern in the Convention in the future. (UNEP 2009b; KemI 2009c)
HELCOM
The Helsinki Commission (HELCOM), which is the governing body of the Helsinki Convention, is working on the protection of the marine environment of the Baltic Sea. The work of HELCOM includes preventing all sources of releases of hazardous substances (e.g. PCB, PBDE, SCCP and heavy metals). HELCOM has recommendations to reduce releases of certain chemicals in articles, e.g. mercury in light sources, as well as electrical equipment and batteries containing mercury, cadmium or lead. The HELCOM Baltic Sea Action Plan is a programme aiming to restore the good ecological status of the Baltic marine environment by 2021. Reducing inputs of hazardous substances to the Baltic Sea is one part of the programme. (HELCOM 2009)

OSPAR
The Oslo/Paris Commission (OSPAR) works on the protection and conservation of the marine environment of the North-East Atlantic. The work of the Commission includes preventing releases of hazardous substances from diffuse sources, such as consumer products. The OSPAR Action Plan includes two lists of substances. The List of Chemicals for Priority Action currently includes 42 substances or groups of substances (e.g. heavy metals, PFOS, brominated flame retardants, PCB, SCCP, phthalates and pesticides) representing the highest concern, based on their hazardous properties and occurrence in the marine environment. The List of Substances of Possible Concern currently includes 315 substances (e.g. PAH, synthetic musks and pesticides) chosen on the basis of their hazardous properties. These substances are used for updating the List of Chemicals for Priority Action. (OSPAR 2009; Söderholm 2009)

Marrakech Process
The Marrakech Process on sustainable consumption and production was promoted by the Johannesburg Plan of Implementation, which was signed at the United Nations World Summit on Sustainable Development in 2002. The Marrakech Process is the international collective effort developing a 10-year framework of programmes to fulfil the aim of the Plan on sustainable consumption and production. The Marrakech Task Forces are government-led voluntary initiatives. One of the seven Task Forces is Sustainable Products, which is hosted by the United Kingdom. Finland is hosting the Task Force on Sustainable Buildings and Construction. Planned outcomes of the Task Force on Sustainable Products include e.g. product eco-design, fewer hazardous substances and less problematic waste. Progress on specific products is achieved by The Global Sustainable Product Networks (GSPN), which are international networks of experts. The GSPN have already been set up to cover lighting, home entertainment and electronic motors. (Ministry of the Environment 2007; UN 2009)

Work of the OECD
The Organisation for Economic Co-operation and Development (OECD) has projects relating to chemicals in products, e.g. the management of perfluorinated chemicals and manufactured nanomaterials. The organization is also working to include product based releases to the Pollutant Release and Transfer Registers (PRTR). Extended Producer Responsibility (EPR) is, according to the OECD (2010), an environmental policy approach in which the producer’s responsibility to a product is extended to the post-consumer stage of the life cycle of the product. The OECD has published several reports relating to EPR.
2.3.3 Industry initiatives

There are many different voluntary industry initiatives concerning chemicals in articles, including e.g. established systems, databases and registers and lists of restricted or preferred substances. These are usually created in order to manage the use of substances and materials in products, to comply with the legislation and to be prepared for upcoming legislation, as well as to fulfil the requirements of customers, NGOs and other stakeholders (Massey et al. 2008).

Established systems

There are some general and industry specific international systems regarding substances in articles.

Global Product Strategy

The Global Product Strategy (GPS) program was developed by the International Council of Chemical Associations (ICCA) and launched in 2006 at the ICCM in Dubai. The aim of GPS is to enhance product stewardship and also to improve the protection of human health, safety and the environment. GPS includes e.g. sharing of best practices, risk management of chemicals and greater transparency of the industry. (ICCA 2010)

Responsible Care

Responsible Care is a global voluntary initiative of the chemical industry managed by the ICCA. It was started in 1985 at Canada and is currently implemented in 53 countries.

The aim of the Responsible Care is to commit companies for working together in order to enhance the health, safety and environmental performance of their products. The Responsible Care Global Charter (RCGC) was developed by the ICCA and launched in 2006 in order to extent the original Responsible Care program. RCGC focuses on effective management of chemicals, greater industry transparency and greater global harmonization of the national Responsible Care programs. (ICCA 2010)

High Production Volume Chemicals Initiative

The High Production Volume (HPV) Chemicals Initiative was launched by the ICCA in 1998. HPV chemicals are those which are produced more than 1000 tonnes per year. The aim of the programme is to complete data sets and hazard assessments for HPV chemicals. The initiative is carried out in partnership with the HPV Chemicals Programme of the OECD. (ICCA 2010)

Japanese industry initiatives

There are many voluntary industry initiatives in Japan, especially in electronic industry. These are usually affected by the requirements e.g. in EU. The Japan Green Procurement Survey Standardization Initiative (JGPSSI) is a Japanese voluntary system of the electrical and electronic industry. It was started in 2001 under the Japan Electronics and Information Technology Industries Association (JEITA). JGPSSI published the Joint Industry Guide for Material Composition Declaration for Electronics Products (JIG) in 2005 in co-operation with the Electronic Industries Alliance (EIA) of the United States and the European Information & Communications Technology Industry Association (EICTA) of Europe. The JIG-101 was revised in 2007 (JIG-101A) and in April 2009 (JIG-101 Ed. 2.0). JIG contains standardized lists of materials and substances for which the suppliers must provide information when present in articles and components. JIG is intended for the information flow between
companies. The lists include declarable materials and substances subject to bans or restrictions as well as those materials and substances that can not be banned or restricted, but are relevant to the material declarations. (JGPSSI 2009; Massey et al. 2008)

The Joint Article Management Promotion-consortium (JAMP) is a Japanese industrial system started in 2006 by the Japan Electrical Manufacturers Association (JEMA) as a reaction to REACH. It consists of representatives from e.g. vehicle and electronic industry. The aim of JAMP is to manage information on chemicals in articles. The JAMP is using Material Safety Data Sheets (MSDS), MSDSplus and Article Information Sheet (AIS) for the management of information. The MSDSplus is concentrated in materials and chemicals. The AIS is an information format developed for the management of information on chemicals in articles. (JAMP 2009; Bentsson 2009)

Labelling requirements of products are mostly voluntary systems in Japan. They are developed for large household appliances and include identification of plastic parts and labelling for the presence of specific chemical substances (Bengtsson 2009).

Databases and registers

Industry specific databases and registers of chemicals in articles have been established by e.g.:

- Vehicle industry: The International Material Data System (IMDS), The Global Automotive Declarable Substances List (GADSL) and International Dismantling System (IDIS)
- Construction industry: Swedish BASTA project and database (http://www.bastaonline.se)
- Retail: The Global Data Synchronisation Network (GDSN)

The International Material Data System (IMDS) is an online database of the automotive industry designed for the information flow through the production supply chain. The suppliers use the database (with over 8,000 substances) to provide information on substances in the components they sell to the vehicle manufacturers. The Global Automotive Declarable Substance List (GADSL) is a list included in the IMDS. GADSL contains 111 substances expected to be present in a vehicle and listed as “prohibited” or “declarable”. (IMDS 2010; Massey et al. 2008) International Dismantling System (IDIS) is an information system developed by the vehicle manufacturers to inform the dismantling companies about the substances in car components, restricted by the ELV Directive as well as their proper recycling (ECHA 2008).

The Swedish Construction Federation, the Swedish Environmental Research Institute and the four biggest construction companies in Sweden developed a joint project called BASTA, funded by the EU’s environmental fund LIFE. BASTA is aiming to speed up the phasing out of dangerous substances from construction products. Construction products are assessed by their chemical ingredients. The self-declaration is made by the suppliers to meet the requirements of health and environmental properties. The substances to be registered must not be carcinogenic, mutagenic, toxic to reproduction, persistent in the environment or bioaccumulative. Only products meeting the requirements can be registered and included in the BASTA system. The system includes a database of more than 33,000 registered materials. (BASTAonline 2010; Massey et al. 2008)

The Global Data Synchronisation Network (GDSN) is a platform for companies to manage product information. According to Massey et al. (2008), the retail company Wal-Mart is creating a data management system, contained within the GDSN, aiming for tracing information on chemical ingredients of products provided by
the suppliers. The system will first include chemical products (such as cleaning and personal care products) and later possibly also articles.

**Restricted and preferred substances lists**

Many industry sectors and individual companies have created lists of chemicals that are restricted or preferred in their articles, e.g.:

- **Vehicle industry:** Scania (http://www.scania.com > Scania Group > Sustainability > Environment > Our operations > Hazardous-substances), General Motors and Volvo
- **Textile and footwear industry:** American Apparel & Footwear Association (AAFA) (http://www.apparelandfootwear.org > Resources > Restricted Substances List (RSL))
- **Retail:** Wal-Mart and Kesko (http://www.kesko.fi > Sijoittajat > Taloudellinen kehitys > Vuosikertomukset > Vuosikertomus 2008)

Scania, Swedish company producing trucks, buses and engines, has created “black” and “grey” lists of restricted chemicals. The “black” list contains chemicals that should not be used in any condition and the “grey” list includes chemicals that can only be used in limited circumstances. They also provide information to the customers about the environmental impact during the vehicles life cycle. (Massey et al. 2008)

Microsoft is aiming to phase out the use of substances posing a risk to health and the environment in its consumer hardware electronics. The company has created a list of substances restricted in hardware and batteries sold to the company. The list is provided to the suppliers, which must not use these substances above certain threshold. The company is planning to phase out the use of brominated flame retardants and phthalates in their products by the end of 2010. (Massey et al. 2008)

Sony Ericsson has created lists of banned and restricted substances. The company has phased out e.g. the use of halogenated flame retardants in boards, casings and cables, the use of PVC, and the use of chlorinated polymers. Sony Ericsson is also planning to phase out the remaining use of halogenated flame retardants, beryllium and antimony compounds, as well as bisphenol A residues found in polycarbonate and epoxy. The company has a material declarations database system, which calculates the legal and environmental compliance for each component and the entire article. (Sony Ericsson 2010)

Dell has listed e.g. halogenated plastics and PVC for phase out. Besides PBDE, the company has also phased out the use of all other brominated flame retardants (including TBBP-A and HBCDD) in plastic parts. Dell has also restricted or eliminated other substances (e.g. cadmium, SCCP, chromium(VI), lead, mercury and PCB) from certain applications. (Dell 2010; Costner et al. 2005)

The American Apparel & Footwear Association (AAFA) has created lists of restricted substances in finished textile, apparel, and footwear products. The list includes only those materials, chemicals, and substances that are covered by a regulation or law, excluding regulations relating to the production processes. The California Proposition 65 requirements for labelling and the US EPA requirements for labelling of ozone-depleting compounds are not included in the list. (AAFA 2010; Massey et al. 2008)

Wal-Mart has the so-called Preferred Chemical Principles policy for product ingredients. According to the policy, the company favours products that do not
contain carcinogens, mutagens or reproductive toxicants and are not persistent, bioaccumulative or toxic in the environment. The company has identified three priority chemicals (pesticides permethrin and propoxur, as well as nonylphenol ethoxylates) and is also developing a screening tool to identify more chemicals of concern and possible alternatives. (Massey et al. 2008) In Finland, the retail company Kesko (2008) has created a list of chemicals that are prohibited or restricted in their products. The products include home textiles, clothing, leather products and upholstered furniture that are manufactured for the company. The company is monitoring these restrictions by visiting the manufacturers in China.

2.3.4

Work of the non-governmental organizations

Non-governmental organizations (NGO) have e.g. projects, databases and guidance materials relating to chemicals in articles, as well as lists of substances to be restricted.

Projects related to chemicals in articles

Many NGOs have projects and research related to chemicals in articles and product based releases, e.g.:

- Clean Production Action (CPA): Safer Products Project
- Environmental Working Group (EWG): e.g. safe cosmetics and toxic flame retardants
- The Healthy Building Network (HBN): toxic building materials
- Health Care Without Harm (HCWH): toxic materials in health care
- Greenpeace: Guide to Greener Electronics
- Toxics Link: e.g. about electronic waste

Databases and guidance materials

NGOs have some databases and guidance materials, directed to consumers, about chemicals in articles, e.g.:

- The Ecology Center, Michigan: Healthy Stuff shopping tool, including data on hazardous substances in e.g. cars, car seats, apparel and accessories, toys and children’s products, as well as pet products (http://www.healthystuff.org)

Lists of substances to be restricted

The Trade Union Priority List contains substances which, according to The European Trade Union Confederation (ETUC), should be included in the candidate list of REACH and potentially in the authorisation list. The aim of the list is to contribute to the implementation of REACH and to encourage industry to develop safer alternatives. The proposed SVHC substances include sensitizers and category 1,2 or 3 CMRs listed in Annex I of Directive 67/548/EEC on dangerous substances, category 1, 2A or 2B carcinogens by International Agency for Research on Cancer (IARC), PBT substances listed in the OSPAR convention, known and suspected endocrine disruptors listed in Community Strategy for Endocrine Disruptors as well as neurotoxic substances listed by Vela et al. (2003). High production volume has been used as a basis to the occupational and environmental exposure to these
substances. All the chemicals in the list (total of 306) meet the criteria for HPV chemicals. (ETUC 2009)

The SIN (Substitute It Now) List is another NGO driven project. The List currently includes 356 (October 2009) chemicals that are fulfilling the criteria for the SVHCs of the REACH Regulation (ChemSec 2009). The list is aiming to speed up the legislation by providing a tool for the substitution of hazardous chemicals by safer alternatives.

2.3.5
Examples of other national management measures

Besides the above mentioned management measures, many countries have e.g. product registers, research programmes and reports, information campaigns and guidance materials.

Product registers
The KETU register is a Finnish product register of chemicals. The companies, which are placing a chemical (substance or mixture) on the market or for use in Finland, have to make declarations about their chemical. The register is based on the Decree (553/2008) by the Ministry of Social Affairs and Health concerning providing information about chemicals. There are no requirements for articles or cosmetics. The register is maintained by Valvira. Public database can be found at: https://www.ketu.fi (Valvira 2009)

SPIN database (Substances in Preparations in Nordic Countries) is a Nordic joint chemicals register based on the national product registers of Finland (KETU), Sweden, Norway and Denmark. There are no requirements for solid processed articles, such as textiles. However, the raw materials of articles may be declared, if the articles are produced in the Nordic countries. (SPIN 2009)

Other management measures
N- and H-Class are databases developed by the Nordic Council of Ministers. They are based on the old EU Directives on dangerous substances (67/548/EEC) and preparations (1999/45/EC). Both H-Class and N-Class are related to dangerous chemicals listed in Annex I of the substance Directive. Information contained in the database reflects the discussions in Expert Groups for Classification and Labelling. N-Class deals with environmental classification and H-Class with human health classification issues. Although databases are based on recessive legislation they contain useful information for manufacturers, importers, downstream users, distributors and authorities during transitional period and afterwards. (Nordic Council of Ministers 2008)

EU and individual countries, e.g. Denmark and Norway, have research programmes, information campaigns and guidance materials, as well as annual reports related to chemicals in articles.

Denmark
The Danish Environmental Protection Agency (EPA) has a programme concerning the identification and substitution of hazardous chemicals in consumer products (Danish EPA 2009a). Studies have been conducted on e.g. toys, textiles and electronics. Through the programme, they will provide information about problematic substances in consumer products to the EU, and thus contribute to improving EU legislation. The Danish EPA also has an information bank on chemicals, and they organize meetings with the importers and manufacturers of e.g. toys, cosmetics and impregnated wood, to inform them about avoiding problematic substances.
Norway
The Norwegian Pollution Control Authority (SFT) has made guidance for constructors about the substitution of hazardous substances in construction products with less hazardous ones, as well as a check list of the hazardous chemicals in construction products (SFT 2007). The SFT publishes annually reports (Miljøgifter i produkter) of the product based releases of certain prioritized chemicals, as well as their estimates (SFT 2004).
3 Deficiencies of measures for the management of chemicals in articles

3.1 Comparison of legislative measures

On the basis of this preliminary report, the legislation on chemicals in articles is very scattered, targeted to certain product groups or substances. Some legislation restricts only few chemicals while others regulate certain type of chemicals. The legislation concerning product safety does not usually consider environmental risks. For example, there are several substances restricted in the new Toys Directive and the Cosmetics Regulation, but these are chosen based on possible health risks. However, the waste legislation usually concerns both health and the environmental risks. For example, the substances covered by the RoHS Directive have been scientifically evaluated and found to pose risks to the health and the environment. The RoHS restricts the use of heavy metals lead, mercury, cadmium and chromium(VI), and fire retardants PBDE and PB. The ELV (end-of-life vehicles) and the Packaging Directives restrict only the use of lead, mercury, cadmium and chromium(VI) in these product groups. The substances are chosen based on environmental impacts of the resulting waste and releases. The Directive on batteries and accumulators restricts only the use of mercury and cadmium in these articles. In addition, there are labelling requirements also for lead. The substances have been chosen based on environmental impact of the waste batteries and accumulators.

There have been concerns about the overlapping of the REACH Regulation and the RoHS Directive. REACH applies to all substances, but RoHS includes only the above mentioned six chemicals. In order to avoid any conflict of laws, there are exclusions in the REACH Annex XVII for substances (e.g. penta- and octaBDE) used in electrical and electronic equipment within the scope of RoHS (European Commission 2009f). There are many exemptions in the RoHS Directive, largely resulting from the lack of alternative substitutes or technology. The China RoHS, which is implemented in stages, applies only to electronic equipment, while the EU RoHS applies to both electric and electronic equipment. Unlike in the EU RoHS Directive, there are no exemptions in the first phase of the implementation of the China RoHS. For the later phase, the proposed exemptions are part of the EU RoHS exemptions. The China RoHS may require that the products are tested to prove that they are actually free of the targeted substances. The EU RoHS relies on self declaration by the manufacturers or importers. (Design Chain Associates 2009; Massey et al. 2008)

According to the study by the Nordic Council of Ministers on economic instruments in chemicals policy (Söderholm 2009), restrictions of chemicals in the Nordic countries are primarily based on the substitution principle and the precautionary principle. According to the substitution principle, hazardous chemicals (and articles) must be substituted with less hazardous alternatives if possible. The Finnish Chemicals Act (744/1989) includes obligation to choose chemicals, which cause least danger, when possible (16 a §). Therefore the users of chemicals are obligated to assess whether they could prevent the risks from the use of harmful chemicals by replacing them with other substitutes or methods (SYKE 2009d). The precautionary principle means that preventive measures should be taken even though the risks might not be fully known. The use of certain chemicals in articles has been restricted in the EU based on the precautionary principle, e.g. phthalate DINP (di-isononyl phthalate) in toys and certain brominated flame retardants in articles. Other management measures used in Nordic countries include education, technical assistance, taxes and fees, and
chemical phase outs. Lists of chemicals of concern have been used to guide businesses and government decision-making.

Nanoproducts are usually covered in the legislation (e.g. REACH or Biocidal Products Directive) by the same requirements as the corresponding large-scale particles and materials. The Cosmetics Regulation is yet the only EU legislation requiring notification of nanomaterials in products. Canada is the first country to introduce a mandatory reporting system on nanomaterials. (Kemi 2010)

3.2

Comparison of legislative and other policy measures

There are differences in the requirements of legislation and other policy measures, e.g. environmental labelling, international conventions and industry initiatives, concerning chemicals in articles. The restrictions for chemicals used in articles may be stricter in the environmental labelling than in legislation. For example, the EU Cosmetics Directive and the new Regulation prohibits the use of category 1 and 2 (new CLP category 1A and 1B) CMR substances in cosmetic products. However, category 3 (new CLP category 2) CMR substances can be used in cosmetics if they have been evaluated by the EU Scientific Committee on Consumer Products and approved to be safe to use in cosmetics. In the criteria of the Nordic environmental label for cosmetics, all CMR substances are prohibited (Auranmaa & Uusitalo 2009). There are also differences in the criteria of different eco-labels. For the Nordic and EU eco-labels the criteria are same for some of the product groups (e.g. household appliances). However, the criteria of the Nordic eco-label restrict also substances with only health effects, as the EU eco-label does not. The Nordic eco-label is also wider with 70 product groups compared to the EU eco-label’s 26. The companies usually choose between the two labels on the basis of their market area and some companies have applied for both of the labels. (SFS 2009)

International co-operation regarding chemicals in articles consists mainly of non-binding conventions, such as the SAICM, HELCOM and OSPAR. Binding agreements include e.g. the Stockholm Convention, Montreal Protocol and the UNECE CLRTAP Protocols. Chemicals in articles are especially covered in SAICM, Stockholm Convention and the POPs Protocol. New POPs added to the Stockholm Convention and the UNECE CLRTAP Protocol are used in many consumer products, e.g. brominated flame retardants in plastics and PFOS as coating in textiles and leather. When the new substances will be added to the EU POPs Regulation, PFOS and pentaBDE will be removed from the REACH Annex XVII, in order to avoid double legislation. The limit value for allowed traces of BDEs and PFOS will be lowered from the REACH limit of 0.1 % to 0.001 % (remaining at present level for articles made of recycled materials).

The phase out of hazardous chemicals may lead to the increased use of alternatives that also have an adverse impact to the environment. For example, the accelerated phase out of ozone-depleting substances, hydrochlorofluorocarbons (HCFC), under the Montreal Protocol has lead to the increased use of hydrofluorocarbons (HFC), powerful greenhouse gases, used in applications such as refrigeration, mobile air conditioning units and foams (UNEP 2009c). There have been discussions whether to include HFC in the revised Protocol.

Voluntary industry initiatives are often created as a response to legal requirements, such as REACH and RoHS. Some companies have also restricted the use of a larger group of substances than what is required by law, anticipating future restrictions. The industry initiatives regarding chemicals in articles usually vary between industry and company. The electronics industry has established many different databases and registers for the communication of information in the supply chain. Also textile and
apparel industry has some similar systems, e.g. lists of restricted substances. There are also some individual companies (e.g. in furniture industry) that have a management system for chemicals in their articles.

NGOs have many different projects, databases and guidance on chemicals in articles, available to the consumers. Information campaigns and guidance materials can be use to influence the product choices of the consumers and thus reducing the effects of product based releases. Some countries, e.g. Japan, Norway and Denmark, have legislation that includes more restrictions on chemicals in articles than in EU legislation. In Japan there are also many voluntary initiatives by the industry. Denmark has conducted many studies on chemicals in consumer products. National product registers (e.g. KETU) do not usually include chemicals in articles.

3.3 Need for information on chemicals in articles

There is a lack of information on different chemicals in articles. The companies selling the articles may not know what chemicals their articles contain. The lack of labelling requirement is also affecting to the consumers level of knowledge about the chemical content of articles. For example, nanomaterials must be labelled in cosmetic products, according to the new Cosmetics Regulation. However, there are no similar labelling requirements for nanos in other product groups. Thus, the consumers can not be aware of if e.g. the antibacterial socks they have bought contain nanosilver. The labelling of ingredients used in cosmetic products by using the INCI-list differs from that of other products. It may be difficult or almost impossible for the consumers to know what substances the product contains. For example, the term “Parfum” may indicate a number of different substances used as a perfume.

There can be many different environmental labels granted for one article, e.g. the Nordic and EU eco-labels as well as Øko-Tex 100 label. The consumers may not know the criteria behind the label. The labelling of chemicals in articles should be certified and controlled. There are articles on the market with labels that are not supervised at all, claiming the articles to be e.g. phthalate-free or BPA (bisphenol A) -free. The consumers are not always aware that the CE-label does not ensure the safety of the article regarding chemicals. The label is used for the free movement of product in the EU market and it is only assurance of the company that the product fulfils all safety requirements set in the EU product legislation. The use of the label is not usually controlled by third party testing. Currently the label is used e.g. in toys, electrical and electronic equipment, construction products, as well as equipments used in the health care sector. (Tukes 2010b)

Most of the producers of impregnated wood in Finland have committed to label treated wood on the market with the impregnation class (A, AB or B), the name of the wood impregnation product and the name of the producer (SYKE 2009f). The decision of SYKE defines the use of treated wood according to the impregnation class. The labelling does not, however, concern articles made from treated wood, e.g. playground equipment. The surveillance of biocides used in articles has been evaluated in the preparation of the new Biocides Regulation. According to the proposal of the new EU Regulation, the active substances (or biocidal products) used in an article should be labelled. How this would be done is not clear yet. There have also been discussions about the labelling of the presence of SVHC substances in articles under REACH Regulation.

The amount of articles purchased through the internet has increased significantly in recent years. The consumers might not always know what substances these articles contain. It is possible, for example, that electronics purchased from the United States contain more flame retardants than those sold in Europe, due to stricter fire protection
requirements in USA. This should be considered in product legislation and labelling requirements.

Additionally, information regarding environmental fate and effects as well as toxicological effects of those chemicals may be missing or scarce. A large number of different chemicals have been produced, placed on the market in Europe and used in articles for many years without sufficient information about the risks they may pose to health and the environment. The measures of REACH Regulation will provide more information on properties of chemicals. The benefits of REACH will come gradually, as more and more substances will be registered. Besides this, REACH will help to identify the Substances of Very High Concern (SVHC) used in articles. The notification and communication of substance information applies to articles containing more than 0.1 % (w/w) of SVHC substances included in the candidate list. However, the number of such substances is still limited (38 substances in June 2010). One big gap in the Regulation is articles imported outside EU. In most cases there is no need to register substances in articles coming outside EU. Also the authorisation of SVHC substances does not include these substances present in articles imported to the EU. It is neither possible to get information on substances with import or production volume below one tonne annually as they are outside the scope of registration. Same applies to SVHC substances that are used in articles less than one tonne per year i.e. they are not subject to notification requirements. The restrictions in the Annex XVII of the REACH Regulation concerns in principle articles coming outside EU, but there are only a few restricted substances in articles. Despite of some deficiencies, REACH is expected to produce more information on the hazards and risks of substances. (EUROPA 2010e)

According to the report by the Nordic Council of Ministers (2010), for complex articles (e.g. shoes and toys), applying the 0.1 % SVHC threshold to the whole article instead of applying the threshold to separate parts of the article could diminish the SVHC approach. For example, shoes containing up to 900 tonnes of one SVHC could be imported into Europe every year without information requirements. Also 42 tonnes of one SVHC could be imported in desktop computers and 3.5 tonnes in pliers. This means loss of information in the supply chain. In a Swedish study on hazardous chemicals in shoes (Hök & Blom 2009), the Swedish Society for Nature Conservation (SSNC) investigated how shoe making companies were responding to consumer requests about SVHC substances in their products. The companies were not always aware of their obligations in REACH and one company claimed their products did not contain SVHC although the SSNC had analysed that these substances were present in some of the shoes the company sold. These companies could face sanctions for failing to respond to the request.

The difficulty of environmental effect assessments should also be noted. It is not always clear what substances should be measured and where. Also, the type of a product, way of using and the use volume has an effect on the risks. More information is especially needed about the possible risks to the environment from new chemicals, not yet regulated, and used in consumer products. A Spanish study by Muñoz et al. (2008) on wastewater pollutants, revealed that 15 from 98 studied chemicals were found to be ecotoxic and 10 from these 15 were non-regulated. These substances are used in everyday pharmaceuticals and personal care products (e.g. soaps and perfumes). The study concludes that if the effects of these chemicals to the environment are unknown, it will be very difficult to regulate them.
### Notification of dangerous articles and the surveillance

There have been lately many withdrawals of unsafe articles from the market. According to the annual RAPEX reports 2008 (EUROPA 2009c) and 2009 (European Commission 2010), the number of consumer products that were withdrawn from the market through the RAPEX system increased in 2008 (total of 1,866 notifications) by 16% from year 2007 and in 2009 (total of 1993 notifications) by 7% from year 2008. This is a result of e.g. more effective product safety enforcement by national authorities and greater awareness of companies on their obligations thus recalling their unsafe products more often than formerly. The most notifications were made in 2009 on toys; clothing, textiles and fashion items; motor vehicles; electrical appliances and cosmetics. Countries that made most of the notifications were Spain, Germany, Greece, Bulgaria and Hungary. Authorities in Finland made 58 notifications (e.g. phthalates in toys) to the RAPEX system in 2009. Notifications on Chinese made products increased from 52% in 2007 to 60% in 2009, according to the report. This is a result of number of factors, including increasing amount of products imported to the EU from China, focused enforcement actions on Chinese made products by national authorities and more effective cooperation between the EU and China. According to the report, the Chinese authorities are increasingly taken restrictive measures on their market on the basis of information provided through the “RAPEX-CHINA” application. Since the establishment of the application in September 2006, 56% of the investigated RAPEX notifications (total of 1007) have resulted in preventive or restrictive measures by the Chinese authorities.

In general, consumer protection concerns more physical than chemical risks. Lately, however, there have been increasing notifications of chemicals in articles, especially in toys (e.g. phthalates and heavy metals). According to the annual RAPEX report 2009 (European Commission 2010), chemical risks represented 26% (total of 493 notifications) of all risk types, as in 2008 the proportion was 19%. The RAPEX system may contribute to the REACH implementation. The system will be expanded with REACH to include also environmental risks as well as products used by the industry. RAPEX could thus be probably used in the enforcement of the restrictions of SVHC substances. The RAPEX system is applied to products posing serious risk to the health and safety of consumers. The requirements of REACH do not necessarily mean the same. Companies can make the RAPEX notifications of dangerous products with a form found in the Tukes websites and send to Tukes by mail or e-mail. Consumers may also make notifications of dangerous products they have bought by an online form found in the Tukes websites.

The surveillance alone cannot guarantee that only articles complying with the legislation are on the market, because articles are supervised mainly by notifications from consumers or companies and by spot checks, due to economic reasons. The spot checks of the authorities only reveal a small proportion of dangerous products on the market. The customs duty is making pre-surveillance of articles on borders. The main responsibility on the safety of the article is on the producer and distributor of the product. The economic effects on the inspections by authorities must also be taken into account. For example, there is not necessary enough money to supervise the presence of certain substances in products, e.g. ozone depleting substances in insulation materials or phthalates in toys. There is also a need for know how and resources for inspections. The authorities need more resources in order to examine the chemical content of consumer products.
Waste management

The recycling and re-use of waste should be considered in the restrictions of chemicals in articles. The criteria for end-of-waste (EOW), included in the new Waste Directive, are important as REACH is applied to material (substances or mixtures), which are no longer wastes. EOW means that the waste stops being a waste when it turns into raw material or a product. The Annex XVII of REACH Regulation allows certain uses of restricted substances in articles that were in use before certain date, e.g. restrictions on pentaBDE do not apply to articles that were in use before 15 August 2004.

There have been discussions whether the presence of brominated flame retardants should be allowed in recycled plastics. Majority of the plastic casings of old electronics contain these substances. For example, the recycling of products containing penta- and octaBDE is exempted from restrictions under the UNECE POPs Protocol and the Stockholm Convention (UNECE 2010; Stockholm Convention... 2009). The issue has also been discussed in the EU POPs Regulation where new substances have to be included. There is not enough information about the presence and concentration of BDEs in plastics and the separation of BDE containing plastics in recycling is difficult. There is also not enough information about PFOS in articles. The banning of BDEs from recycling of plastics could possibly result to the end of all plastics recycling if the articles containing these substances can not be identified or the concentration limits are very low. The limit value of BDEs in recycled material will be 0.1 % in the Regulation. There will be concentration limits for the new POPs in waste management in order to define if the material can be recycled or is it necessary to treat it as hazardous waste.

Hazardous waste is not always collected properly. Although the rules on collection and recycling are stated in the RoHS and WEEE legislation, only one third of the e-waste is being separately collected and properly treated in the EU (EUROPA 2010a). Part of the e-waste is still going to landfills and sub-standard treatment sites in or outside the EU. The revision of the RoHS and WEEE Directives is aiming to affect these problems. It can also be difficult for the producers of waste to identify hazardous waste. There are some instructions for identification of hazardous waste from e.g. construction materials. Often the age of the material can be relevant, because different substances have been used in different time and for different use.

The legislative producer responsibility covers only some of the consumer articles in Finland. These include electronic and electrical appliances; batteries and accumulators; tyres from motor vehicles and equipment; cars, vans and comparable vehicles; newspapers, magazines, copy paper, and other comparable paper products; as well as packaging (Pirkanmaa ELY 2009). Waste batteries and accumulators are collected besides in separate collection places, also in the biggest supermarkets. End-of-life vehicles are also collected but often they end up in wrong places. In an official collection point (Virallinenvastaanotto 2010), the vehicles are disassembled and steel and other metals are melted and re-used. Plastics, rubber and textiles are either re-used or disposed off. There was a campaign in 2008 to collect end-of-life vehicles more efficiently. The owner of the vehicle would get a discount when buying a new or used car when he brings his end-of-life vehicle to the collection point. Fluorescent lamps are also included in the producer responsibility programme. Stores, such as furniture (e.g. Ikea), electronics and hardware stores collect them. Most of the stores collect the same amount and type of old lamps than what the customer is buying new lamps. The Ministry of the Environment has been considering to defining in the new Waste Act the obligation of grocery stores to collect fluorescent lamps. Waste fluorescent and compact fluorescent lamps are considered as hazardous waste and
also as waste electrical and electronic equipment (Lampputieto 2010). Waste LED lamps are considered as waste electrical and electronic equipment. There have been discussions about adding furniture in the producer responsibility system. Some stores already collect and recycle e.g. old mattresses and coaches when the customer has bought a new similar product with home delivery. Waste treated wood is collected in hardware stores. Textiles may end up in landfills or be given in charity in Finland or imported to developing countries. Some of the waste textiles will be recycled and re-used as material for e.g. industrial towels. The collection and recycling of waste is dependent on economic trends, e.g. the price of metal.

Illegal trade of electronic waste (e-waste) to countries outside EU is globally a significant and increasing problem (EUROPA 2010a). According to a German study by the Federal Environmental Agency (UBA 2010), more than 155,000 tonnes of e-waste (from which 50,000 tonnes are PC and television monitors) are annually exported from Germany to non-European countries. Electronics are shipped to developing countries, especially Africa, India and China. These countries usually lack of proper waste handling and safe recycling techniques. When articles are donated to re-use (e.g. computers, printers, televisions, mobile phones and refrigerators) they are supposed to work, but many of them are actually useless. Different materials are separated from the product and used in making new articles. For example, low-cost jewellery can contain high amounts of lead due to the use of recycled metal from e-waste. According to a study by Schluep et al. (2009), the rapidly rising sales of electronics can lead to the build up of huge amounts of hazardous e-waste in developing countries over the next 10 years. Waste from computers is predicted to be five times higher in India and two to four times higher in China and South Africa by 2020 compared to the 2007 levels. There is a need for tighter legislation in order to prevent the risks to health and the environment from hazardous substances in articles, and also to recover the valuable materials for re-use. More stringent restrictions have been proposed as part of the revision of the WEEE Directive.

3.6 Green design and substitution of hazardous chemicals in articles

The EuP (Energy-using Product) Directive has been described as innovative environmental policy instrument with several new aspects. According to Kautto et al. (2007), the EuP has potential to significantly reduce the environmental impact of articles. The health impacts are also expected to reduce because, according to the Directive, eco-design products should not pose risks to health or product safety. The number of products within the scope of the EuP and the new Eco-design Directive is increasing and the legislation will encourage to more environmentally friendly design of these products. Although the EuP Directive will address toxicity, it was not meant to restrict the use of individual substances in energy-using products. The measures on hazardous substances will thus be applied under the RoHS Directive (European Commission 2009f).

There is a need for new and innovative technology to replace the current use of hazardous substances in articles (e.g. cadmium in LED displays). For example, certain flame retardants used in the manufacturing of styrofoam are included in the list of SVHC substances. One result to this problem could be replacing the insulating material with e.g. mineral or pulp wool, in order to stop the use of hazardous chemicals. Certain companies manufacturing electrical and electronic equipment (e.g. Apple, Toshiba and NEC) have started to replace flammable materials with nontoxic flame resistant materials (e.g. metal, polyphenylene sulphide plastics and
bio based plastics) (McPherson et al. 2004). Many companies (e.g. Sony Ericsson and Fujitsu) have also created so-called “green” products containing e.g. bio plastics and recycled plastics (Sony Ericsson 2010; Fujitsu 2010). For example, Fujitsu has created a keyboard made of 45 % of renewable materials containing lignin mixed with natural fibres and additives. It has to be noted that the replacement of the material is not always possible. Also the environmental effects of the alternative chemical or material should be studied before the substitution.
4 Conclusions

The legislation concerning chemicals in articles is generally targeted to address only certain product groups and restricting only a limited number of chemicals. REACH is the most comprehensive chemicals legislation also applying to articles, but the amount of restrictions of substances listed in Annex XVII that actually concern articles is still quite low. The draft Biocides Regulation will probably address biocides in articles and will help the legislation of these products. Individual legislation could be completed by adding more restricted chemicals or product groups, e.g. in the revision of RoHS. Product safety legislation could also be further developed by including more environmental aspects.

There is a need for information on chemicals used in articles, the hazardous properties of these chemicals and the related environmental risks. This applies especially to new chemicals and chemicals used as alternatives for restricted substances. The knowledge level of producers or importers of articles as well as consumers making product choices should be enhanced. Information systems that cover chemicals in articles through the whole supply chain should be developed, especially a joint system to cover all industry areas. The criteria of environmental labelling should be more easily available to consumers. Existing product registers (e.g. KETU) could also include requirement to notify chemicals in articles.

One big problem is the surveillance of imported articles coming to the EU. The surveillance by the authorities is very often based on notifications by consumers or companies. The spot checks of the authorities only reveal a small proportion of dangerous articles on the market. More resources are needed in supervision of product safety, especially on imported articles.

The new Waste Framework Directive and the reform of national waste legislation will also enhance the control of chemicals in articles by e.g. the end-of-waste criteria and material efficiency as well as by increasing the recycling target of packaging material. However, no new product groups will be added to the producer responsibility of articles. Also, the collection, recycle and re-use of articles, such as electrical and electronic equipment as well as end-of-life vehicles, should be further developed.

The use of most hazardous chemicals in articles has been targeted to be replaced by safer alternatives. There is also a need for a new and innovative technology to replace the current use of hazardous substances in articles, already at the design phase. The EuP and the Eco-design Directives will contribute to the environmental design of articles.

On the basis of this preliminary report, textiles as chemical containing articles will be studied more closely. The product group was selected because of the high volume of use of textile articles (e.g. clothing and interior textiles) and the releases to the environment from washing and through the waste water treatment plants. The study will consider the availability and management of information on chemicals in articles, responsibility issues, legislative and voluntary control mechanisms, as well as the available supervisory techniques of the authorities during the whole life cycle of the articles. The aim is to describe observed deficiencies, as well as to propose means for the improvement of risk management and possible guidelines for following procedures.
REFERENCES


BASTAonline. 2010. http://www.bastaonline.se/english/bastaonline/aboutbasta.43d9f1711160ef70e98003862e.html [22.3.2010.]


The Finnish Environment 14 | 2010


The Finnish Environment 14 | 2010


Legislation

EU legislation


National legislation


There are a wide variety of different chemicals used in common articles. Many hazardous substances are being spread to the environment besides from the use of articles, also from their production and disposal. Management of chemicals in articles is included in EU legislation concerning product safety, waste management, product design and chemicals. There are also other instruments for the management of chemicals in articles, e.g. environmental labelling, international co-operation, industry initiatives, work of the non-governmental organizations as well as national programmes and registers. According to the recommendations of the National Programme on Dangerous Chemicals, more information is needed about chemicals in articles. The aim of this preliminary report is to review how hazards and risks from chemicals in articles could be controlled, through out the life cycles of the articles. This report describes the current legislative situation and voluntary management measures, as well as their possible need for further development. Articles are regarded as e.g. textiles, toys, electrical and electronic equipment, batteries and accumulators as well as packaging. Cosmetics are also included in this report, because they present possible significant source of chemical releases to the environment.

On the basis of this preliminary report, the legislation concerning chemicals in articles is very scattered, targeted to certain product groups and substances. EU’s new chemicals regulation, REACH, is the most comprehensive legislation on chemicals in articles, because it is applied to all chemicals. There is a general lack of information on the content of chemicals in articles as well as the environmental effects and risks of those chemicals. The lack of labelling requirement is affecting to the consumers’, manufacturers’ and importers’ level of knowledge about chemicals in articles. The surveillance by the authorities is based on notifications of dangerous articles and spot checks. These however only reveal a small proportion of articles on the market containing hazardous chemicals.

The management of chemicals in articles could be enhanced e.g. by adding more restricted chemicals or product groups to individual legislation, by including more environmental aspects in product safety legislation or by adding more restrictions concerning chemicals in articles to the REACH Regulation. In order to supervise the compliance with chemicals legislation, more resources are needed, especially on imported articles coming outside EU. The new Waste Framework Directive and the reform of national waste legislation will enhance the control of chemicals in articles, but the collection, recycling and re-use should be further developed. Information on chemicals in articles could be increased by e.g. developing information systems covering the whole supply chain. The role of product design should be highlighted in the future when aiming to substitute the current use of hazardous chemicals in articles.

Keywords: chemicals, harmful substances, articles, waste, legislation, environment, environmental safety, consumers.

Asiasanat:
kemikaalit, haitalliset aineet, esineet, jäteet, lainsäädäntö, ympäristö, ympäristöturvallisuus, kuluttajat

Rahoittaja/toimeksiantaja
Suomen ympäristökeskus SYKE
**Sammandrag**


På grund av förundersökningen kan man konstatera att lagstiftningen gällande kemikalier i varor är väldigt oenighet, med en koncentration på vissa produktgrupper och kemikalier. EU:s nya kemikalieförordning REACH är den mest omfattande lagstiftningen i varor eftersom den gäller alla kemikalier. Det finns i allmänhet mycket lite information om kemikalieinnehållet i varor, eller om kemikalier och deras miljöeffekter och -risker. Avsaknaden av märkningskrav och informationssystem påverkar konsumenternas och tillverkarna och importörernas kunskap om kemikalierna i varorna. Myndigheternas övervakning bygger på anmälningar om farliga produkter och på stickprov. Dessa avslöjar endast en liten del av de varor på marknaden som innehåller farliga kemikalier.

Kontrollen av kemikalier i varor kunde förbättras till exempel genom att man tillägger de kemikalier eller produktgrupper som ska begränsas i individuella lagstiftningar, genom att man beaktar miljöaspekten bättre i lagstiftningen om produktssäkerhet eller genom att man i REACH-forordningen tillägger flera begränsningar gällande kemikalier i varor. För att man effektivt ska kunna övervaka att kemikaliebegränsningarna följs måste övervakningen få mera resurser, särskilt beträffande varor som kommer från länder utanför EU. Den nya avfallslagen kommer för sin del att förbättra kontrollen av kemikalier i varor, men man måste fortsättningsvis utveckla uppsamlings- och avfallshanteringssystemen. Man kunde öka informationen och kunskapen om kemikalieinnehållet i varor genom att utveckla informationssystem som täcker hela produktionskedjan. För att kunna effektivt övervaka kemikalier i varor kan man sträva efter att ersätta användningen av nuvarande farliga kemikalier i varor.

**Nyckelord**
kemikalier, farliga ämnen, varor, avfall, lagstiftning, miljö, miljössäkerhet, konsumenter
There are a wide variety of different chemicals being used in common articles to obtain certain properties, functions and quality. There have been concerns about the hazardous properties of certain chemicals found in articles, e.g. brominated flame retardants used in electronics and furniture upholstery, perfluorinated compounds used in stain- and water proof coating of textiles such as outdoor clothing, as well as phthalates used in soft PVC plastics such as toys. Hazardous substances are being spread to the environment from the production, use and disposal of articles. Many of these chemicals have been found to be persistent and toxic in the environment, accumulating in the organisms and transporting long distances from where they have been released. International trade of articles also affects to the transport of hazardous chemicals among regions.

Management of chemicals in articles is included in the EU legislation concerning product safety, waste management, product design and chemicals, with the aim to reduce hazardous effects of chemicals in articles. Besides legislative management measures, there are also other instruments, including environmental labelling, international co-operation, industry initiatives, work of the non-governmental organizations as well as e.g. national programmes and registers. According to the recommendations of the National Programme on Dangerous Chemicals, more information is needed about chemicals in articles. Also their management measures should be improved. The issue of chemicals in articles and their releases has also been discussed by international organizations (e.g. OECD) and conferences (e.g. ICCM2). The aim of this preliminary report is to review how hazards and risks from chemicals in articles could be controlled, throughout the life cycles of the articles. This report describes the current legislative situation and voluntary management measures for chemicals, and the possible need for further development.