

# Together we will gain from a non-toxic, resource efficient society

The Swedish Waste Prevention Programme for 2014 to 2017

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# Foreword

The EU Directive (2008/98/EC) on Waste (the Waste Framework Directive) requires member states to establish waste prevention programmes. The Swedish Environmental Protection Agency is assigned responsibility to prepare the Swedish national waste prevention programme under the Swedish Waste Ordinance (2011:927).

This programme is the first waste prevention programme developed for Sweden. It will be regularly reviewed and revised in order to prepare new future waste prevention programmes.

The authors wish to thank everyone who participated in the process of developing the programme and submitted valuable views and suggestions throughout the process. In fall 2012 and spring 2013, workshops were held with businesses, industry organisations, municipalities and other national authorities regarding the design of the objectives and in order to receive proposals on appropriate measures. The Swedish Environmental Protection Agency Waste Council has been the reference group during the working process, providing input on the vision and the objectives of the programme.

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The Waste Prevention Programme was established by the Swedish Environmental Protection Agency on December 12<sup>th</sup> 2013.

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# 1 Summary

The EU Directive (2008/98/EC) on Waste (the Waste Framework Directive) requires member states to establish waste prevention programmes. The programme shall set out waste prevention objectives, measures and targets, using indicators to determine the success of implemented measures in order to reduce the quantities of waste and hazardous substances. The programme shall also describe existing waste prevention measures. Under the Swedish Waste Ordinance (2011:927), the Swedish Environmental Protection Agency (Swedish EPA) was assigned responsibility to develop the Swedish national waste prevention programme to comply with the Waste Framework Directive.

The programme is designed to guide and inspire Swedish stakeholders in order to reach the Swedish national environmental objectives, ensure that less waste is generated, and promote that products are designed without hazardous substances, regardless of the extent of economic growth.

The programme contains 8 long-term objectives and 167 measures. The Swedish EPA will monitor the objectives and measures in the programme and establish a new programme by 2018 at the latest. The objectives in the programme are designed to contribute to achieving the Swedish national environmental quality objectives and supplement their milestone targets.

The programme has four priority areas – food, textiles, electronics, and construction and demolition. We chose these as priorities due to the significant amounts of food waste, and waste from construction and demolition generated in Sweden and moreover, these types of waste causes substantial emissions of greenhouse gases from extraction, production, and waste management processes. The climate impact of every kilogram of electronic and textile products manufactured is also significant. Considerable quantities of hazardous substances are also used in manufacturing these products – substances also often found in the finished products. Another reason to focus on food and textiles is the many waste prevention activities currently under way for these, which leads to the assessment that further support of these activities is necessary to maximise their impact.

In developing this programme, four impact assessments was initiated for measures and policy instruments. The impact assessments are designed to determine whether the measures and policy instruments are socio-economically feasible. Initially, the following measures and policy instruments were analysed:

- Repair deductions – i.e. tax deductible expenses for repair services.
- Maintaining building log books to record materials actually used in construction to preserve this information for refurbishment or demolition.
- Lower refrigeration temperatures in shops and households.
- Information campaigns to reduce food waste in households.

As one measure in this programme, the Swedish EPA will continue to study additional waste prevention policy instruments in the future. The socio-economic impact of those policy instruments will also be assessed to ensure that they are feasible to implement. As the Swedish EPA identifies appropriate policy instruments, these will be proposed for the Government to consider.

## 2 Vision

In 2050, we<sup>1</sup> live well with a high level of well-being, within the planet's ecological limits. By then, we will have created a circular economy without waste. Goods and materials will be designed to be highly resource efficient, can be reused over long life-cycles and repaired, and they will be free from hazardous substances. Sweden is a world leader in eco-innovation. Our companies have developed new business models and provide products and services that are resource efficient and free from hazardous substances. Consumers, businesses, and government authorities can access a broad supply of sustainable goods and services that doesn't increase environmental and health problems in Sweden or outside Sweden's borders.<sup>2</sup>

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<sup>1</sup> The word "we" includes all people living and working in Sweden.

<sup>2</sup> This vision is based on:

- The Generational goal set by the Swedish parliament.
- The environmental quality objectives A Non-toxic environment and A Good Built environment.
- The vision in the proposal for a seventh General Union Environmental Action Plan (COM (2012) 710 final).
- The Roadmap to a resource efficient Europe (COM (2011) 571 final).
- The sustainable consumption and production and sustainable industrial policy action plan (COM (2008) 397 final).
- The EU Eco-innovation Action Plan (COM (2011) 899 final).
- The EU Raw Materials Initiative (COM (2008) 699 final).
- Towards Green Growth OECD (2011).
- Objectives in the Waste Commission report 2012 (SOU 2012:56).
- The Nordic Environmental Action Plan (ANP 2011:717).
- Kretsloppspropositionen 2003 (government bill 2002/03:117).
- The vision of the National Waste Plan (Swedish EPA report 6502).
- The vision of Swedish Waste Management.

## 3 The Programme

**Directive (2008/98/EC) on Waste (the Waste Framework Directive) requires member states to establish national waste prevention programmes. The programme must set prevention objectives, and measures, and targets and indicators to use in determining the success of measures implemented to reduce generated quantities of waste and hazardous substances. The programme must also describe existing waste prevention measures. Under the Swedish Waste Ordinance (2011:927) the Swedish Environmental Protection Agency (Swedish EPA) was assigned responsibility to develop the Swedish national waste prevention programme.**

### 3.1 How to read the programme

The objectives and measures in the programme are described in five sections below. These describe the overarching long-term objectives and measures, and the long-term objectives and measures established for the four priority areas addressed in the programme. The objectives will be monitored using specified indicators which are also described in relation to each objective. Further, we briefly describe the methods and strategies the Swedish EPA plans to use in achieving these objectives.

### 3.2 The Programme Purpose

The programme is designed to guide and inspire all Swedish stakeholders in order to reach the national environmental quality objectives, generate less waste and have products designed to contain no hazardous substances regardless the amount of economic growth.

### 3.3 The Programme's Target Audience

Many stakeholders contribute to the entire process of manufacturing and using a product from raw material to waste. This programme concerns several important target audiences, including policy and decision-makers on various levels (political and corporate leaders), legislators, business leaders, industry associations, municipalities and governmental authorities. Each of these stakeholders must contribute to implementing measures necessary to achieve the programme objectives.

## 3.4 The Programme Status

This programme is the Swedish National Waste Prevention Programme. It is designed to guide municipalities, authorities, industry associations, and the business sector by illustrating the necessity to rise through the waste hierarchy and by identifying targets and measures that will help accomplish this. This supplements the National Waste Management Plan and develops the portion thereof that involves waste prevention. Where these have parallel prevention objectives and measures, this programme takes precedence over the waste management plan. The Swedish EPA will monitor the programme and establish a new programme no later than 2018. The long-term objectives of the programme shall contribute to attaining the Swedish environmental quality objectives and supplement the milestone targets.

## 3.5 Programme Priorities

The programme has four priority areas – Food, Textiles, Electronics, and Construction and Demolition. We chose these as priorities due to the significant amounts of food waste, and waste from construction and demolition generated in Sweden. Moreover, these types of waste also lead to substantial emissions of greenhouse gases from extraction, production and waste management. The climate impact of every kilogram of electronic and textile products manufactured is also significant. Considerable quantities of hazardous substances are also used in manufacturing these products – substances also often found in the finished products. Another reason to focus on food and textiles is the many waste prevention activities currently under way for these which leads to the assessment that further support of these activities is necessary to maximise their impact. We detail this reasoning more in describing each priority area more closely.

In addition to these priority areas, it can be noted that there are several waste types that have been considered as important, but which were not selected to be included in this first waste prevention programme. Examples include mining waste, specific industrial wastes, plastic waste, and sludge.

We chose to concentrate on pre- and post-consumer goods and waste types rather than those generated in manufacturing industries and basic materials sectors such as forestry and mining. This choice was based on the understanding that it is better to implement measures that control demand for materials like metals and plastics, instead of attempting to reduce waste in industrial processes where strong economic incentives to prevent waste already exist. Ore volumes that may be mined and subsequent management of tailings in the mining industry are also controlled by permits required for such operations. While sludge has not been singled out as a priority area, this programme may contribute to reducing levels of hazardous pollutants through the measures addressing the presence of these substances in textiles and electronics.

## 3.6 Programme delimitations

The Swedish EPA has kept to delimited objectives and measures in developing this programme. The definition of waste prevention as stated in the Waste Framework Directive was used. This is detailed further in the next section. Here, the programme delimitations are described.

Reduced volumes of waste can also reduce the environmental impact from several stages of material or product lifecycles. The largest environmental benefits from waste prevention are gained primarily from a reduced need to produce new materials. When goods are reused or otherwise have their lifecycles extended, the environmental impact from the production of new similar products is lessened. For example, this can result in lower emissions of greenhouse gases, hazardous pollutants from facilities producing textiles or plastics, or the use of water and pesticides in cultivating food or cotton.

Measures designed to reduce waste volumes, and thereby reducing the necessity to produce new materials is an important contribution to lessening the environmental impact of manufacturing processes. There are also other ways to reduce the environmental impact from the production of materials and goods, as by implementing measures directly within production facilities. Examples of this include better wastewater treatment equipment, improving energy efficiency, and measures to reduce water consumption.

Many objectives and measures in this programme are designed to indirectly reduce the environmental impact of manufacturing by reducing waste volumes. Measures to directly reduce the environmental impact of production facilities, while important, are not included in this programme since they are covered by specific direct measures and legislation. In our view, as defined in Article 3 of the Waste Framework Directive, Waste Prevention, such direct measures fall outside the scope of this programme.

Similar reasoning was applied to reducing hazardous substances in materials and products, which is included in the definition of waste prevention. Kemikalieinspektionen (the Swedish Chemical Agency, KemI) enforces many types of measures designed to reduce the use and manufacture of hazardous substances, including by applying the EU legislation and regulation of plant protection and biocide products. However, many of these measures lie outside the framework for this programme. The measures chosen for the programme address reducing the content of hazardous substances remaining in materials and products during use and subsequently as waste. For instance, these include hazardous substances used in construction products and in electronics.

Current efforts to improve waste management methods must also continue in addition to waste prevention measures. Waste generated today comes from existing

manufacturing methods and consumption patterns established over recent decades, and many challenges remain, as with increasing recycling efforts while still limiting any dispersion of hazardous pollutants into natural cycles. Measures to increase recycling are not included in the definition of waste prevention, and therefore not part of this programme. For example, measures to increase recycling in Sweden are part of the waste management plan entitled '*From waste management to resource efficiency*,' as established in 2012.

### 3.7 How the programme was developed

The programme was developed in consultation with a variety of Swedish organisations. The Swedish EPA held a series of workshops during fall 2012 and spring 2013 with businesses, industrial associations, municipalities and national authorities to design objectives, and to attract proposals for appropriate measures. The Swedish EPA Waste Council acted as reference group for this project, providing viewpoints for the programme vision and objectives. Chapter 12 ends the report with detailed consideration of some especially interesting measures and policy instruments, including the necessity of developing new instruments for policy.

### 3.8 Review of Annex IV in the Directive

The Waste Framework Directive states that national programmes for waste prevention should include evaluating "the usefulness of the examples of measures indicated in Annex IV or other appropriate measures". Member states are thereby permitted to choose the measures outlined in the annex and/or develop other measures.

The Swedish EPA conducted a first review of the measures contained in Annex IV. The conclusion was that Sweden already uses most of the proposed measures. However, many of these measures already in use can be improved or developed further. We therefore do not exclude any of the current measures contained in the annex in the ongoing study and assessment of new waste prevention policy instruments. These efforts will be included in the waste prevention programme, but will for the most part be implemented within the general Swedish EPA assignment to develop environmental policies.

## 4 This is Waste Prevention

**Waste prevention refers to advance planning for non-toxic, resource efficiency from the start, before anything becomes waste. Preventive measures are implemented at such an early stage that no waste is generated. Therefore, such activities as recycling are not considered within the concept of waste prevention<sup>3</sup>.**

The objective with waste prevention is to reduce the volumes of waste and hazardous substances in materials and products, and to reduce the impact on human health and the environment from waste that is generated.

When metal packaging is recycled, the recycled metal certainly can replace new metal production, which in turn reduces the quantity of fresh metal materials needed. This reduces the waste volume. But, since the holder of the original metal can was only interested in disposing the packaging, this must still be considered waste. Therefore, recycling is not considered as part of waste prevention. Prevention refers to measures implemented at such an early stage that such waste is not generated.

Examples of waste prevention measures include when a business designs dishwashers to use a minimum of material in production or when a property owner has a new building constructed using resource efficient processes. This can also involve reusing clothing, or creating an interesting meal using leftovers from a party the day before, instead of discarding the uneaten food in the trash.

### **Definition of waste prevention in the EU Directive (2008/98/EC) on Waste**

**Prevention:** measures taken before a substance, material or product has become waste, that reduce:

- a) the quantity of waste, including through the re-use of products or the extension of the life span of products;
- b) the adverse impacts of the generated waste on the environment and human health; or
- c) the content of harmful substances<sup>4</sup> in material and products,

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<sup>3</sup> Waste is anything that the holder thereof disposes or intends to or is legally required to dispose of, as defined in Chap. 15 § 1 of the Swedish Environmental Code.

<sup>4</sup> The waste and chemicals legislation use the terms 'hazardous substances', and 'harmful substances'. Though these may have slightly different connotations, they are used interchangeably in this document.

## 4.1 Waste Prevention is best

The EU Directive on Waste outlines a waste hierarchy whereby Swedish policy and legislation must be designed to prioritize waste prevention. Waste that is generated despite prevention efforts shall be treated as resource efficiently as possible. Preferably, this waste should be prepared for reuse, but otherwise it should be processed for material recycling. If this is not possible, the energy content of the material must be recovered by incineration, or if all else fails, the waste should be disposed in landfill. This priority order shall apply only when environmentally and economically practicable.

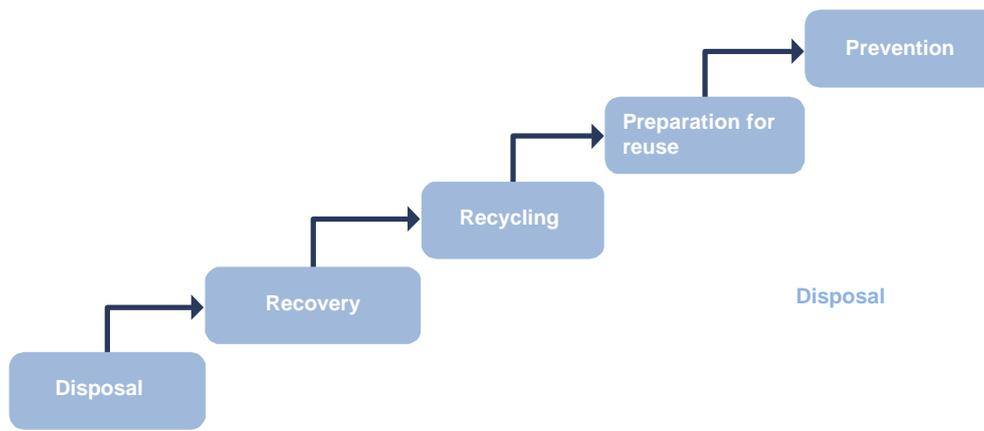


Figure1: The EU waste hierarchy

The EU waste hierarchy shows that it is most resource efficient to prevent waste generation. For example, it is ten times better, considering climate impact, to prepare a new meal from recent leftovers (reducing the need to purchase more food) than to produce biogas from the food as substitute for diesel fuel for cars<sup>5</sup>. Reusing textiles and thereby increasing their lifespan rather than throwing them away only to buy new clothing reduces consumption of new production, thereby saving raw materials, energy, water, and chemicals used in their production. The environmental benefits are also great since every kilo of newly produced textiles generates 15 kilograms of carbon dioxide equivalents (CDEs) that impact global warming<sup>6</sup>.

The reason why waste prevention is generally more resource efficient than recycling or energy recovery is that prevention saves all the energy and material required to manufacture a new product. As an example, recycling plastic will reduce the necessity of producing new raw plastics, but preparing and reusing the recycled plastic still requires added energy. Therefore, waste prevention is best.

<sup>5</sup> Food waste in Norway in a value chain perspective, (2011), Hanssen, O.J., Østfoldforskning.

<sup>6</sup> Improved waste management of textiles, (2011), Palm, D., IVL Svenska Miljöinstitutet.

Hazardous substances in materials and products can also limit resource efficient processing and make re-use or recycling more difficult. This highlights the importance of simultaneously working to reduce the content of hazardous substances in materials and products. More information about the problems with hazardous substances in articles<sup>7</sup> is available in the KemI report 'Kemikalier i varor'<sup>8</sup>.

Waste prevention can also be profitable. For example, the socio-economic benefits of reducing food waste by 20% before 2020 compared to 2010 (in Sweden) could be SEK 10 to 16 billion annually<sup>9</sup>. Another study also shows that a building developer can save nearly 1% of the production costs through waste prevention using resource efficient methods currently available<sup>10</sup>. Reuse is also often a profitable alternative to buying new production.

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<sup>7</sup> The term products refers to 'article' as defined in Article 3.3 of the EU:s Reach Regulation ((EC) 1907/2006): an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition.

<sup>8</sup> <http://www.kemi.se/Documents/Publikationer/Trycksaker/Rapporter/Rapport3-11-Kemikalier-i-varor.pdf?epslanguage=sv>

<sup>9</sup> Nyttan av att minska matsvinnet (The Benefits of Reducing Food Waste), (2012), SEPA, Report 6527.

<sup>10</sup> Att minska byggavfallet, (2012), Tyréns (Reducing construction waste).

## 5 The Challenge

**We will hand over to the next generation a society in which the major environmental problems have been solved. Part of this challenge is to ensure that materials cycles are resource efficient and free from hazardous substances as far as possible. To become resource efficient and to achieve our environmental objectives, we must reduce the total volumes of hazardous substances in products and waste. Recycling can resolve a part of this problem, but is not sufficient.**

The overall objective of environmental policy as determined by the Swedish Parliament (Riksdagen) is to hand over to the next generation a society in which the major environmental problems in Sweden have been solved, without increasing environmental and health problems outside Sweden's borders. Environmental policy should be directed towards ensuring that:

- Ecosystems have recovered, or are on the way to recovery, and their long-term capacity to generate ecosystem services is assured.
- Biodiversity and the natural and cultural environment are conserved, promoted and used sustainably.
- Human health is subject to a minimum of adverse impacts from factors in the environment, at the same time as the positive impact of the environment on human health is promoted.
- Materials cycles are resource-efficient and as far as possible free from dangerous substances.
- Natural resources are managed sustainably.
- The share of renewable energy increases and use of energy is efficient, with minimal impact on the environment.
- Patterns of consumption of goods and services cause the least possible problems for the environment and human health.

## 5.1 Focus on consumption to achieve environmental objectives

In 2012, the Swedish EPA submitted to the government its In-depth Evaluation of the Environmental Objectives and current efforts to achieve them. This included proposals for three priority areas in environmental policy:

- Ensure that decisions already taken are implemented.
- Communicate and inform more effectively about the opportunities environmental efforts represent
- Develop strategies for sustainable consumption.

Waste prevention measures often compliment other measures designed for sustainable consumption. This programme should therefore be considered as one of several strategies to attain sustainable consumption. A sustainable consumption and production from raw material to waste is necessary to achieve the environmental quality objectives.

**Three environmental quality objectives** that waste prevention can especially contribute to achieving:

- Reduced climate impact
- A Non-Toxic environment
- A Good Built Environment.

Waste prevention also contributes to achieving the following concepts in the **generational objective**:

- Materials cycles are resource-efficient and as far as possible free from dangerous substances.
- Patterns of consumption of goods and services cause the least possible problems for the environment and human health.

Consumption brings resource use, which in turn causes environmental impact throughout the entire chain from raw material to when a product becomes waste. Resource use and economic growth (GNP growth) are strongly linked<sup>11</sup>.

This programme has long-term objectives designed to reduce waste volumes regardless of economic growth, now known as absolute decoupling. The Swedish EPA takes the position that absolute decoupling of resource use, environmental impact, to economic growth are necessary to achieve the environmental quality objectives. We need to reduce both the volumes of materials and resources that enter into society, and the environmental impact caused by processing these resources. This conclusion is among all based on our In-depth Evaluation of the En-

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<sup>11</sup> See Resource Productivity in the G8 and the OECD, (2011), and more.

vironmental Objectives from 2012' (available in English as executive summary; 'Steg på vägen, Fördjupad utvärdering av miljömålen 2012').

The foundations for today's consumer society were laid as early as the 1700s. As populations grew, while social structures and institutions like the church weakened, individuals could no longer create an identity or rely on a subsistence based on an inherited plot of land. Entrepreneurship became an alternative means to obtain subsistence, and ownership a way to create an identity<sup>12</sup>.

Over time since then, the list of things that came to be considered necessary has grown longer. This has led to consumption becoming an increasingly natural part of our modern culture. This development is also partly driven by product marketing. More than \$ 640 billion was spent worldwide on advertising in 2008<sup>13</sup>.

## 5.2 Waste volumes can double

Waste management generally functions well in Sweden. However, increasing waste volumes are in fact a problem. Most of what we purchase in this country eventually becomes waste. Historically, the volume of waste has increased along with consumption<sup>14</sup>. There are scenarios that show how waste volumes in Sweden can be four times greater by 2050 if current trends are not broken<sup>15</sup>.

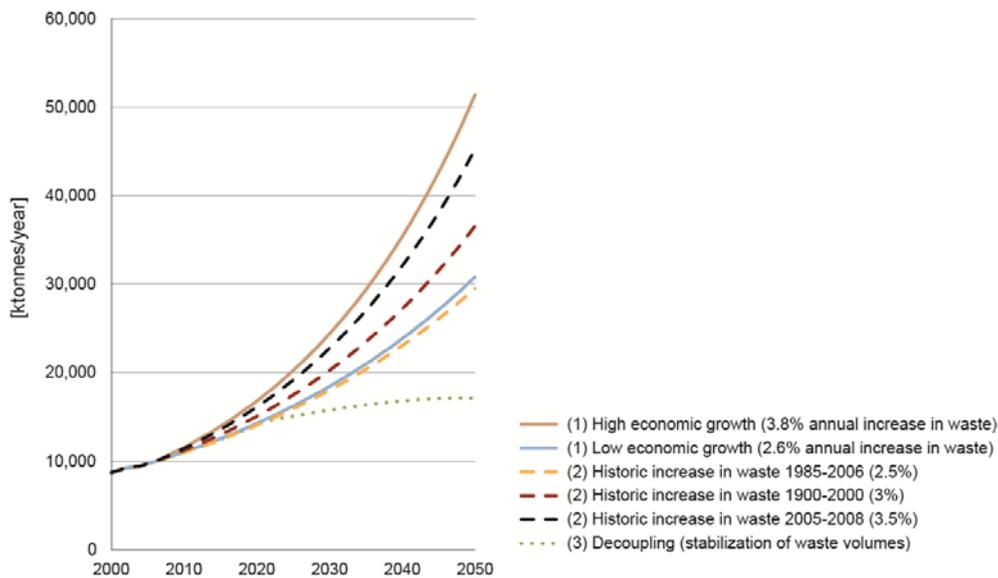


Figure 2: Future increase of waste generated in Sweden. Various scenarios for increase in waste volumes include: (1) estimated from models that correlate waste volumes to economic

<sup>12</sup> State of the World, Transforming cultures, (2010), World Watch Institute.

<sup>13</sup> For comparison, Sweden's GNP was \$486 billion in 2008, according to the World Bank.

<sup>14</sup> Preliminary reporting from the project Indikatorer för en resurseffektiv avfallshantering (*Indicators for resource efficient waste management*).

<sup>15</sup> *Utvecklingen för svensk avfallshantering – en scenarioanalys till 2050*, (2009; Trends in Swedish waste management – Scenario Analysis to 2050), Profu AB.

growth. This scenario uses the Governmental Long-term Survey and models from Profu AB (independent consultants. (2) Projections based on historical data from the Profu AvfallsAtlas® and (3) A possible decoupling scenario (Profu 2008).

The scenarios show similar results for the four priority areas in this programme (food, textiles, electronics and construction and demolition) <sup>16</sup>.

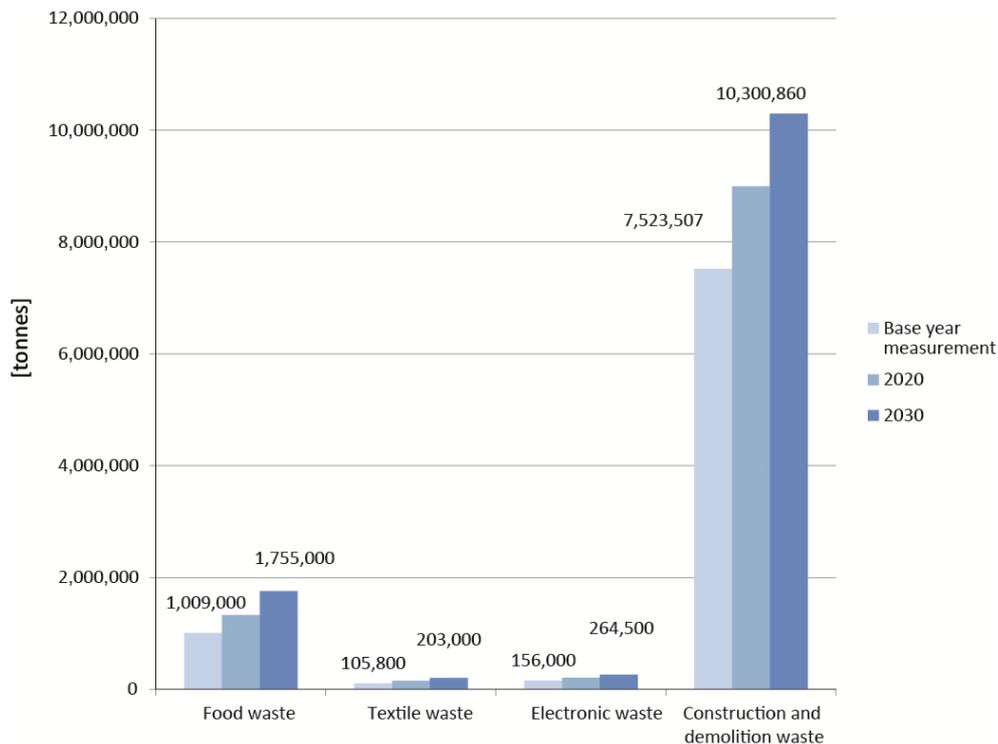


Figure 3: Increase in waste volumes (tons) from food, textiles, electronics and construction and demolition waste forecasted for 2030 with no limiting measures implemented. The figures are from the report 'PM angående framtidsprognoser för prioriterade avfallsströmmar' (2012) Jan-Olov Sundqvist, SMED (PM Regarding forecasting for priority waste streams).

Examples of how to decouple the link between growth and waste volumes include increasing resource efficiency where businesses improve production processes to increase material efficiency, design material efficient products, or manufacture products with long life-spans (which have higher quality, making repair and reuse possible). Several types of consumption patterns that also contribute to the same purpose include renting and joint ownership, which involves consuming services rather than goods, and simply considering reducing consumption <sup>17</sup>.

<sup>16</sup> PM angående framtidsprognoser för prioriterade avfallsströmmar, (2012), Jan-Olov Sundqvist, SMED (PM Regarding forecasting for priority waste streams).

<sup>17</sup> Hållbar avfallshantering – Populärvetenskaplig sammanfattning av Naturvårdsverkets forskningsprogram, (2012), Report 6523 (Sustainable Waste Management, by the Swedish EPA).

It is also important to reduce the amounts of hazardous substances in materials, products and waste. A few of the most hazardous substances are no longer used, or are used to a significantly lesser extent than previously. However, new similar substances have been introduced that show less hazardous properties or where the environmental and health properties are unknown. Still, large amounts of the most common heavy metals and environmental toxins remain in products that have not become waste. Hazardous substances in materials and products can be problematic in several ways. These can be released during production, cause hazards to humans and the environment during use of the material or product, and, in the end, cause problems when they are managed as waste. For example, hazardous substances in materials and products can also limit resource efficient processing and make re-use or recycling more difficult.

An important prerequisite to reducing the content of hazardous substances in products and to facilitate resource efficient waste management is access to information regarding the substances these materials and products contain. Measures to increase this kind of information regarding the content of hazardous substances can be expected to benefit in several ways:

- Facilitate green product development and replacement of hazardous substances.
- Facilitate placing requirements for purchasing and procurement.
- Facilitate for consumers to make informed choices.
- More efficient and safer reuse and recycling.

### 5.3 New roles and work methods

To meet the challenge of reducing waste volumes and hazardous substances in materials and products, the many stakeholders in society must establish new work methods. And, companies must develop new business models. This can involve starting a website for private individuals wanting to sell used products, set up second-hand departments in clothing shops, or renting high quality electric bicycles rather than simply selling them.

Businesses, organisations, governmental authorities and municipalities must take a broader view and collaborate more often (both internally and externally), as consumption issues cross boundaries within companies and internally among these municipalities and governmental actors. Municipalities, county councils, regions and administrative boards, for example, can all contribute to waste prevention by setting targets, conducting pilot projects and creatively utilize their roles as procurers, supervisory authorities, planners, information distributors, coordinators and operators of larger operational organisations. Purchasers and designers are key groups in such waste prevention efforts. Everyone in the chain from production to waste management needs to have greater understanding of the prerequisites and

perspectives limiting both up- and downstream actors. Waste managers need to know how manufacturers design their products and the manufacturers must understand how their products are processed as waste in order to design sustainable products.

The role of the Swedish EPA in these efforts is to take the offensive in acquiring and disseminating information and know-how, to provide the base information to contribute to establishing environmental policies and to implement these policies in collaboration with others. This includes developing methodology and expanding networking to promote waste prevention. We will also need to communicate this waste prevention programme well, and find new arenas to improve effective collaborations with businesses, organisations, authorities and municipalities to ensure the programme is conducted successfully.

## 6 What has been done so far

**The government, the parliament, and national authorities have already done quite a lot to ensure that we can reduce waste and have products that contain no hazardous substances. Examples of this include the Swedish Environmental Quality Objectives, issued laws and regulations covering environmental and chemical issues, and funding for the many research and technical development funded programmes completed and ongoing. Businesses, municipalities and organisations have also taken many initiatives. Appendix 4, provides a summary of policy instruments currently in use in Sweden.**

### 6.1 Environmental quality objectives

The Generational Objective and the Swedish Environmental Quality Objectives were enacted by the parliament starting as early as 1999. These are intended to be achieved by 2020, except the climate objective that are set to be achieved by 2050. Milestone targets were also enacted to help attain these environmental quality objectives, providing steps along the way. Preventing waste contributes the most to our attaining these national environmental quality objectives of *Reduced Climate Impact*, *A Good Built Environment* and *A Non-toxic Environment*.

There are several milestone targets that can contribute to waste prevention. These include steps to eliminate Substances of Very High Concern<sup>18</sup>, to produce information about the hazardous substances contained in articles,<sup>19</sup> and how we can attain non-toxic and resource efficient ecological cycles<sup>20</sup>. The follow-up of the environmental quality objectives will assess whether current policy instruments and measures implemented prior to 2020 are sufficient to achieve these objectives.

The Swedish EPA has been assigned by the Swedish government to propose new-milestone targets. The portion of this assignment that affects waste prevention concerns textiles and reducing the volume of food waste. The Swedish EPA monitors these activities annually to determine whether we are moving towards achieving these environmental quality objectives. The Swedish EPA also presented the 2012 In-depth Evaluation of the Environmental Objectives, and the next such assessment is planned for 2015.

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<sup>18</sup> The term Substances of Very High Concern is defined in the EU Reach-regulation. The environmental objectives system uses the terms particularly dangerous substances. Though these may have slightly different connotations, they are used interchangeably in this document.

<sup>19</sup> The term article refers to 'article' as defined in Article 3.3 of the EU Reach Regulation ((EC) 1907/2006): an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition.

<sup>20</sup> For more reading on the interim objectives for hazardous substances, see the Environmental Objectives Portal <http://miljömål.se/sv/Hur-nar-vi-malen/Farliga-amnen/>

## 6.2 Legislation

Swedish authorities and companies operate under extensive legislation covering products, waste, and chemicals. Large portions of the environmental and chemicals regulatory framework is common to all EU countries. The Swedish Environmental Code also contains general rules of consideration that apply to all operations. These require that enterprises must economize resources, use the best available technology and select products based on their environmental and health impact. When enterprises apply for permits required for operations, they must demonstrate how they meet these general rules of consideration.

## 6.3 Research and development

The Swedish government has funded and participated in many research projects related to reducing waste volumes and eliminating hazardous substances. Examples include: a multiannual programme concerning policy instruments to use in waste management and waste prevention;<sup>21</sup> research concerning indicators<sup>22</sup>, how we can achieve a more resource efficient use of materials<sup>23</sup>, how hazardous substances are dispersed from goods<sup>24</sup>, how we can achieve a more sustainable apparel industry<sup>25</sup>, insights into future waste management<sup>26</sup> and how families can conduct their lives in a more eco-friendly way<sup>27</sup>. Moreover, the Nordic Council of Ministers has financed a series of studies on good examples and policy instruments for preventing waste from textiles, electronics, food, and construction and demolition.

## 6.4 Guidance and good examples

For many years, the Swedish EPA has provided guidance as to waste prevention methods. This included publishing a report on how school cafeterias can implement waste prevention, and funding a handbook on how municipalities can establish recycling parks. The industry association, Avfall Sverige (Swedish Waste Management), also compiled good examples of how municipalities, companies, and organisations currently engage in waste prevention, and the Region Skåne (Regional Council of Skåne) commissioned two reports detailing how to reduce construction waste and a method for waste prevention within the regional government operations.

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<sup>21</sup> Towards Sustainable Waste Management, [www.hallbaravfallshantering.se](http://www.hallbaravfallshantering.se)

<sup>22</sup> For example, the project 'Indikatorer för en resurseffektiv avfallshantering', Waste Refinery.

<sup>23</sup> VINNOVA, Resurssmart materialanvändning, diarienummer 2012-01948 (Resource smart use of materials).

<sup>24</sup> <http://www.chemitecs.se/>

<sup>25</sup> Mistra Future Fashion, [www.mistrafuturefashion.com](http://www.mistrafuturefashion.com)

<sup>26</sup> 'Tio perspektiv på framtida avfallsbehandling', (2013), Waste Refinery (Perspectives on future waste treatment- waste management in Sweden from 2013 onwards).

<sup>27</sup> *Hållbara hushåll: Miljöpolitik och ekologisk hållbarhet i vardagen* (2008), (Sustainable Households: Environmental Policy and Everyday Sustainability), Naturvårdsverket, report 5899.

The Swedish EPA has also hosted many seminars, alone or with partners from other authorities or organisations, to demonstrate how to reduce waste volumes and hazardous substances. The seminars considered consumption, reuse, food waste, textiles and construction and demolition waste. The Swedish EPA has also held inspirational seminars to demonstrate good examples of how enterprises and municipalities have implemented waste prevention.

## 6.5 Networking

The Swedish EPA initiated The Swedish liasion group for prevention of food waste (SaMMa) that includes the Livsmedelsverket (the National Food Agency) and the Konsumentföreningen Stockholm (the Stockholm Consumer Cooperative Society) in 2010. This network was designed to help reduce food waste in Sweden by promoting collaboration throughout the food supply chain. By joining political representatives, researchers, authorities, organisations, and businesses concerned with food supply into a network, these stakeholders can discuss issues and share experiences and knowledge. This network holds regular meetings and all members can join a closed web forum where all participants can discuss and read reports on avoidable food waste and similar issues. This network has met over ten times since inception, and has organized many seminars and workshops.

The Swedish EPA is also part of the network for reuse and recycling of clothing and textiles runed by Borås University since 2010. Network members include authorities, researchers, charity organisations, environmental organisations, the recycling industry and textiles producers. This network also meets regularly to learn from new research findings and discuss ways to increase recycling and reuse of textiles in Sweden, including through greater collaboration.

## 6.6 Campaigns

Avfall Sverige is the national coordinating organisation for the European Week for Waste Reduction since the beginning in 2009. The Swedish EPA has a seat on the managing committee.

## 6.7 Voluntary agreements

The Swedish Chemical Agency initiated industry-wide dialogs for textiles, cosmetics, and toys to phase out hazardous substances in products<sup>28</sup>. The Swedish EPA participates in the dialog concerning textiles and common objectives and voluntary agreements have been made with companies.

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<sup>28</sup> <http://www.kemi.se/sv/Innehall/Branschdialoger/Branschdialoger/>

## 6.8 Other initiatives

There are more examples where municipalities, county councils and regional governments, and private businesses are working jointly with waste prevention. The Swedish Environmental Management Council coordinates a group of county councils to replace health and environmentally hazardous chemicals. Regions and counties also founded a Waste Council for waste prevention in 2013, with the Swedish Association of Local Authorities and Regions and among all, the waste council works with waste prevention. Another example is the Kretsloppsparken Alelyckan (Recycling Park Alelyckan), which is an expanded municipal recycling centre where it is possible to give away products for reuse and where it is also possible for people to purchase disposed products for reuse. Sweden already has many commercial second-hand shops and charity organisations that runs second hand shops, and many web sites for buying and selling used products and material. Flea markets and clothing exchanges have also become popular. Additional good examples are included in following sections for each priority area.

## 7 Reduced Waste and Products Without Hazardous Substances

**It's possible to decrease waste and to phase out hazardous substances in products. This primarily demands greater awareness, good information from reliable sources, new business models, new effective policy instruments, using well-being as a positive driving force, and stimulating people and businesses to use items longer and to recycle more.**

### 7.1 The situation today

If current trends are not reversed, the total amount of waste may quadruple by 2050<sup>29</sup>. At the same time, there are still many hazardous substances in goods and products. This programme especially prioritizes textiles, food, electronics, and construction and demolition waste, but the Swedish EPA also sees a need to decrease the amount of waste as well as the amount of hazardous substances in materials and products in general.

### 7.2 Strategies

In reducing waste volumes and the hazard it poses, the Swedish EPA will use several strategies. Resource efficient products with long life spans are important as is increasing reuse and information on hazardous substances. It is also important to stimulate sustainable consumption patterns as by studying the possibility of using well-being as a driver for change and to emphasize the benefits of sustainable living. The Swedish EPA will conduct these comprehensive strategies in guiding, collaborating, financing research, and studying and proposing policy instruments. To reduce levels of hazardous substances in materials and products KemI is working to develop regulations and other policy instruments aimed at achieving the national environmental objective '*A Non-Toxic Environment*'.

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<sup>29</sup> Utvecklingen för svensk avfallshantering – En scenarioanalys till 2050 (Development for Swedish Waste Management – a Scenario Analyses), (2008), Profu.

## 7.3 Overarching Long-Term Objectives

- Waste volumes shall decrease continuously relative to 2010 levels.
- The content of hazardous substances<sup>30</sup> in materials and products shall decrease.

The Swedish parliament and government have enacted a generational goal, an environmental quality objective, and specifications for waste prevention, as well as an environmental quality objective, a specification, and milestone targets for decreasing risks related to hazardous substances<sup>31</sup>. The seventh General Union Environment Action Programme also includes an objective to turn the EU into a resource efficient, green competitive low carbon economy.

This programme's objective to decrease total waste volumes is based on the environmental objective '*A Good Built Environment*' and its specification as follows:

- Waste management is efficient for society and easy for consumers to use, and waste is prevented, while the resources in waste produced are as far as possible made use of, and the impact of waste on and the risks it presents to health and the environment are minimised.

The objectives for hazardous substances are based on the environmental quality objective '*A Non-Toxic Environment*' and its specifications as follows:

- As far as possible, particularly dangerous substances<sup>32</sup> are no longer used.
- Information is available about substances hazardous to the environment and health that are present in materials, chemical products and articles<sup>33</sup>.

The overarching long-term objective of this program aims to achieve a general decrease in the use of hazardous substances and Substances of Very High Concern in society. There are also milestone targets concerning hazardous substances (see part 6.1) that have implications for waste prevention.

<sup>30</sup> Hazardous substances refers to substances that are classified as hazardous by the EU regulation on classification, labelling and packaging of chemical substances and mixtures (CLP) as well as those that meet the regulations criteria for hazardous substances but that have not yet been classified. Substances may be classified as hazardous to health, hazardous to the environment or as hazardous due to their physical or chemical properties (for instance, flammable). It is primarily substances with that are hazardous to health and environment that are of interest to this programme.

<sup>31</sup> <http://www.kemi.se/sv/Innehall/Giftfri-miljo/Miljokvalitetsmalet-Giftfri-miljo/>

<sup>32</sup> The term 'particularly dangerous substances' is defined in the Swedish environmental objectives system and refers to those substances that have the most problematic properties from a health and environment perspective. These are substances that are bioaccumulative, carcinogenic, mutagenic or reprotoxic, substances that are endocrine disruptors or allergenic, as well as substances with other hazardous properties that call for an equivalent level of concern. Metals such as mercury, cadmium, and lead are also considered as particularly dangerous substances. The term Substances of Very High Concern is defined in the Reach regulation and the scope of the two definitions is very similar.

<sup>33</sup> The term "article" is used here according to the definition in article 3.3. of the EU's REACH regulation ((EG) nr 1907/2006): an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition.

## 7.4 Monitoring the Overarching Objectives

- In 2010, the mining industry generated 75% of all waste in Sweden. This means that the extraction of minerals has a significant impact on the results. In order to perform relevant long-term monitoring of waste, mining waste is not included in the indicator. The Swedish EPA will monitor the objective through the amount of waste generated, based on national waste figures, and using an indicator measuring resource efficiency.
- Assessment of long-term objectives concerning hazardous substances will be done in conjunction with the yearly monitoring of the environmental quality objective 'A Non-Toxic Environment' performed by KemI.

## 7.5 General Measures

### 7.5.1 What the Swedish EPA plans to do

- Study policy instruments and conduct impact assessments on the instruments found to be best at reducing waste and hazardous substances generally and in regard to the four priority areas of the programme. This measure requires broad collaboration with other agencies and stakeholders.
- In collaboration with the Swedish Environmental Management Council (MSR)<sup>34</sup> guide about the possibilities to put requirements for waste prevention measures in public procurements.
- The Swedish EPA will monitor and evaluate how requirements for waste prevention measures are dealt with in public procurements and acquisitions and suggest measures based on this.
- Conduct a feasibility study to study the possibilities for a scaled-up and broader Live Life (Leva Livet) project in collaboration with the Swedish Association of Local Authorities and Regions, municipalities and other important stakeholders in Sweden<sup>35</sup>.
- Develop indicators and statistics for waste prevention.
- Showcase good examples of initiatives designed to prevent waste, and increase reuse for private actors, county councils, and municipalities<sup>36,\*</sup>.

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<sup>34</sup> The Swedish Environmental Management Council was subsumed into the Swedish Competition Authority in 2014.

<sup>35</sup> Utvärdering och analys av projekt Leva Livet, (2011), Chalmers (Assessment of the Leva Livet Project).

<sup>36</sup> \* Measures indicated with an asterisk are also included in the National Waste Management Plan.

### 7.5.2 What the Swedish EPA and the Swedish Chemical Agency plan to do

- Assist the government in working with the global chemicals strategy SAICM<sup>37</sup> and especially to contribute to the UNEP<sup>38</sup> effort to develop proposals for a global program for information concerning hazardous substances in goods<sup>39</sup>. The goal is for the SAICM high-level meeting in 2015 to enact a programme that, when implemented, includes principles that lead to relevant information concerning hazardous substances reaching stakeholders throughout product life cycles, including the waste stage.
- Along with representatives from the waste treatment and recycling industry, organize a workshop on the problems of hazardous substances in waste. Issues to discuss include:
  - Difficulties of reusing and recycling materials containing hazardous substances.
  - The waste sector's need for information on hazardous substances in materials and products during waste processing in order to facilitate reuse and recycling.
  - Can the problem of hazardous substances reaching the waste sector be communicated up the chain and become a driving force behind substitution of hazardous substances in materials and products?

### 7.5.3 What Swedish Chemical Agency plans to do

- Within the framework of a government commission, analyse important areas of development for the EU REACH chemicals regulation with the aim of contributing to the environmental quality objective 'A Non-Toxic Environment'.
- Draft proposals for economic policy instruments aimed at reducing the use of hazardous substances in goods and chemical products.

### 7.5.4 Examples of what other stakeholders can do

#### The Swedish Consumer Agency

- Provide legal guidance on issues such as warranties and competitive conditions when products are sold on the secondary market. The guidance should be produced in collaboration with the Swedish EPA and the Swedish Consumer Agency<sup>40</sup>.\*

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<sup>37</sup> Strategic Approach to International Chemicals Management (SAICM). Länk: <http://www.saicm.org/>

<sup>38</sup> United Nations Environment Program (UNEP) Link: <http://www.unep.org/>

<sup>39</sup> The term is used here according to the definition in Article 3.3. of the EU REACH Regulation ((EC) No. 1907/2006): an object which during production receives a special form, surface, or design which defines its use to a greater extent than its chemical composition.

<sup>40</sup> \* Measures indicated with an asterisk are also included in the National Waste Management Plan.

### **Municipalities**

- Inform households how they can prevent waste.
- Attempt to steer products and waste material that households leave at recycling stations towards reuse and preparation for reuse through private operators, municipal recycling stations/recycling parks or other systems.<sup>41\*</sup>
- Raise awareness of the environmental gains from reuse and suggest actors that accept second hand products as a part of the information on waste management to the community.\*
- Collaborate with operators that accept second-hand products and offer them locations for collection within the municipalities.\*

### **County Administrative Boards**

- Bring together and coordinate municipalities and businesses in the counties to work on waste prevention.

### **Regions and County Councils**

- Work with public procurement and set requirements designed to prevent waste.

### **Industry Associations**

- Avfall Sverige (Swedish Waste Management) can institute a working committee for waste prevention.

### **Industry Associations involving Production and Trade cooperating with The Swedish Chemical Agency**

- Find new and effective means to increase familiarity in small and medium sized companies with the rights and obligations concerning reporting information about Substances of Very High Concern according to REACH article 33.

## **7.6 Research and development needs**

The Swedish EPA and stakeholders collaborating with this programme have identified areas where there is a need for research and development. Several proposals also come from public comment. The proposals are intended for use as a basis for future efforts by the Swedish EPA and cooperating stakeholders.

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<sup>41</sup> \* Measures indicated with an asterisk are also included in the National Waste Management Plan.

- Research on reuse and consumer's desire to buy or not buy second-hand products and to repair products instead of throwing them away.
- Research to better understand the mechanism behind increased growth and how we can achieve decoupling.
- Research on policy instruments to prevent waste.
- Create a centre for resource efficiency.
- Conduct technical procurements in order to create resource efficient and non-toxic products.
- Develop methods and tools for preventing waste in businesses and the public sector.
- Research on what hazardous substances are the most problematic from a cyclical perspective.
- Create a national information centre for greater substitution.
- Research and development on sustainable business models.
- Interdisciplinary research to better understand and meet the driving forces behind increased consumption, such as identity building fashion, advertisement, technology development and income development.
- Research and development on policy instruments and measures relating to driving factors for symbolic consumption.
- Research and development into how waste prevention can become a sustainable trend that is popular among both young and old.
- Extended studies of how reuse relates to consumption of new products.
- Study the regulatory prerequisites necessary for increased reuse in the public sector.
- Study whether reuse can be increased through door to door-collection.
- Study what types of products and components are not suitable for reuse.
- Study what products are suited for reuse and that consumers are generally more inclined to buy on the second-hand market.
- Study and assessment of conflicts of interest and the producing of guidelines for municipalities concerning how spaces for the collection of textiles can be organised in collaboration with non-profit and commercial enterprises in an effective, legal, and competitively neutral way.

## 8 Reducing Avoidable Food Waste together

**We can become much better at putting food to good use instead of discarding it through better collaboration and cooperation in the food supply chain. Awareness of the problem must be raised as well as habits and attitudes changed. Knowledge about how to avoid food waste must be disseminated, and everyone working with food must take greater responsibility for reducing food waste. Avoidable food waste is any food that is thrown away but could have been eaten if handled differently.**

### 8.1 The situation today

In 2010 food waste in Sweden totalled over one million tons, excluding primary production (agriculture and fishing) as there are no statistics available for these yet. Households represent by far the largest part (670,000 tons). Analyses of sampled waste material show that food waste represented 90% of total waste material for grocery stores, 65% for restaurants, 50% for school kitchens, and 35% for households.

#### **Definition of Food Waste and Avoidable Food Waste**

**Food waste** – the total of all avoidable food waste and unavoidable food waste (inedible parts such as bones, coffee grounds, seeds, banana peels, egg shells, etc.).

**Avoidable food waste** – food that is discarded but could have been eaten had it been handled properly. Avoidable food waste also includes waste that is poured into sinks (liquid foodstuffs such as milk or foods that are washed out of packaging). For practical reasons, inedible parts such as bones on a piece of meat are sometimes counted as avoidable food waste. If a whole cutlet is discarded both the edible and inedible parts are considered avoidable food waste, the same thing applies to, for instance, a whole un-peeled banana.

Food production – from production of raw foodstuffs, primary production, refinement, outlets, and via transportation and storage, and the customers themselves – has a significant impact on the environment. Sweden imports around 40% of its total food. As it stands, our food management therefore has significant consequences beyond Sweden's borders. Even food that doesn't reach consumers impacts the environment.

Food waste from the entire supply chain, from households to the food industry, represents two million tons of greenhouse gases<sup>42</sup> or 3% of Sweden's total emissions. Food production also results in other environmental problems such as eutrophication and distribution of environmental toxins including pesticides. The food sector is also the sector that requires the most water.

Food production often entails the use pesticides during the growing phase. The amount and type of pesticide used depends on climate factors and growing techniques used. If avoidable food waste was reduced, it would lead to less food production and therefore less use of pesticides.

Causes of avoidable food waste vary for the various actors in the food supply chain. For the *food industry*, these are often diverse and tied to specific local pre-conditions in each enterprise. Examples include machine stoppage, breakdown, flawed process parameters such as for dosage of raw foodstuffs, varying quality of input foods used, spillage in connection with production changes, and insufficient knowledge on the part of machine operators, purchasers and similar. A major cause of waste is products that are discarded due to having reached the end of their shelf-life because companies produce more than they have orders for to ensure they can always deliver to their customers.

One primary cause of avoidable food waste in *Shops* is the difficulty in ordering correct volumes of products to match consumer demand.<sup>43</sup> If the food isn't sold before its sell-by date, shops often choose to discard it. The reason might also be that stores prioritise having a broad selection for their customers to choose from. It costs so little to return old bread and dairy products to wholesalers that stores can protect themselves in that regard by buying more than they can sell.

In *restaurants and institutional catering services* avoidable food waste is caused in the kitchen during storage and preparation and through serving, and from the guests' leftovers. This waste is due to imbalances between the amount of food prepared and the number of guests and how much or little they eat. Buffets and the option to choose between more than one course can also lead to greater waste. There is also uncertainty concerning to what degree regulations allow food to be saved and served later. In institutional catering, staff may have practical difficulties or unfamiliarity in preparing food in batches.

Waste in households is largely caused by spending too little time planning purchases and preparing the food. Purchasing too much or the wrong kind of food can result in it going bad before being used. Many also misinterpret best-before dates and believe that foods passed this date are not safe for consumption. Best-before dates indicate quality, while use-by dates indicate safety. Moreover, often not all parts of raw foods are used and leftovers are often not taken care of properly nor

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<sup>42</sup> The Swedish EPA's estimations based on amounts given in the report *Matavfall 2010 från jord till bord*, (2011), SMED, report no. 99 (Food Waste from Earth to Table).

<sup>43</sup> Initiatives on prevention of food waste in the retail and wholesale trades, (2011), Stenmarck, et al., B1988, IVL Svenska Miljöinstitutet.

are all store-bought packages fully emptied. Households also need to become better at storing food so it lasts longer. Food purchases are also a relatively small part of the average households' budget<sup>44</sup> and therefore the economic incentives for reducing avoidable food waste is quite small.

There is also a strong correlation between avoidable food waste and packaging shape, size, quality, and material used. Packaging is meant to protect the contents, but also to make it easy to get at.

In efforts to prevent avoidable food waste, it is important to ensure that food safety is not compromised.

### **8.1.1 Current activity in the priority area**

A lot is happening in this area. Swedish EPA was commissioned by the government to create interim objectives for decreasing avoidable food waste, and to suggest measures to reach the target. Furthermore, The Food Agency was commissioned by the government to take action to reduce avoidable food waste with the Board of Agriculture and Swedish EPA. A liaison group for prevention of food waste (SaMMA) is also operating. This group includes relevant government agencies, researchers, interest groups, and industry actors from various parts of the food supply chain. The purpose of the group is to reduce avoidable food waste by sharing information and working as a point of contact for its members.

Within the framework of the Nordic cooperation on food-related issues (MR-FJLS), priority is given to efforts to reduce avoidable food waste without negatively affecting food quality. Also, within the FAO and OECD, efforts to reduce avoidable food waste is prioritised.

Sweden has voluntarily committed to contribute to the UN ten-year framework of programs aimed at changing unsustainable consumption and production patterns. The Swedish EPA is the focal point for this programme.

The issue is also high priority in the EU. In 2012, the European Parliament adopted a resolution for taking urgent measures to reduce avoidable food waste by half before 2025. In its plan for a resource efficient Europe, the EU Commission specified that the amount of discarded edible food in the EU should be halved by 2020. Furthermore, the EU finances research project 'FUSIONS' which brings together universities, institutes, consumer organisations, and businesses with to reduce food waste. One of the project's objectives is to develop guidelines for a joint food waste policy for the entire EU.

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<sup>44</sup> In 2012 households used 12.2 % of their income on food ([www.ekonomifakta.se](http://www.ekonomifakta.se)).

## 8.2 Long Term Objectives for food waste

- Food waste in the entire food supply chain should be reduced compared to 2010 levels.

The Swedish EPA was assigned by the government to set milestone targets for reduced food waste. The report was presented in January 2014.

## 8.3 Monitoring the objective for food waste

The Swedish EPA will follow the long term objectives using an indicator based on national food waste statistics. The statistics produced in the report *Matavfall 2010 från jord till bord*<sup>45</sup> will be updated. The existing statistics will be expanded with new data from parts of the primary production from the Board of Agriculture.

## 8.4 Strategies

The Swedish EPA will use four strategies to reduce avoidable food waste:

- Increase awareness of where avoidable food waste occurs in the food supply chain and why.
- Improve coordination and consensus within the food supply chain on the need for measures to reduce total food waste.
- Continually measure avoidable food waste and supplement with measurements and studies mapping the share of avoidable food waste to enable monitoring the effects of various measures.
- Increase awareness of food safety and avoidable food waste among consumers.

## 8.5 Measures in the Food Priority Area

### 8.5.1 What the Swedish EPA will do

- Draft interim objectives for reduced food waste and measures and policy instruments related to these.
- Collaborate with other actors interested in and responsible for the issue in Sweden and other countries raise awareness of the amounts of food wasted, the causes of avoidable food waste, how it can be reduced, and what we stand to gain from it (both environmentally and economically).<sup>46\*</sup>

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<sup>45</sup> *Matavfall 2010 från jord till bord*, (2011), SMED, report no. 99 (Food Waste from Earth to Table).

<sup>46</sup> \* Measures indicated with an asterisk are also included in the National Waste Management Plan.

- Produce better statistics on the amount of food waste resulting in each stage of the food supply chain, separated into avoidable food waste and unavoidable food waste.<sup>47\*</sup>
- The Swedish EPA and the Swedish National Food Agency should work towards facilitating coordination between municipalities' implementation of the Swedish Environmental Code and food regulations.

## 8.5.2 Examples of what other stakeholders can do

### The National Food Agency

- Advise consumers about how to reduce avoidable food waste.\*
- Identify areas where changes to how food laws are implemented can lead to reducing avoidable food waste without negatively affecting food safety.\*
- Guide relevant actors (institutional catering and shops), on how current food laws can be interpreted to reduce avoidable food waste.\*
- Integrate the issue of avoidable food waste into the formulation of advice for meals in preschools, schools, healthcare, and elderly care.\*

### The Swedish EPA, the Sweden's National Food Agency and the Swedish Board of Agriculture

The Swedish National Food Agency shall together with the Swedish Board of Agriculture and the Swedish EPA conduct a three year food waste reduction project that reduce avoidable food waste in all stages and that result in better utilisation of the unavoidable food waste. This includes:

- Analyse opportunities and obstacles to reducing avoidable food waste.
- Work for greater cooperation between different actors.
- Carry out targeted information campaigns aimed at consumers.
- Showcase good examples.
- Encourage increased utilisation of unavoidable food waste for the production of biogas as well as of digestate.

A progress report was submitted to the Government Offices of Sweden (Regeringskansliet). The final report is due by 31 March 2016.

### The Swedish Board of Agriculture

- Identify total volumes and causes of waste in primary production<sup>48\*</sup>.

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<sup>47</sup> \* Measures indicated with an asterisk are also included in the National Waste Management Plan.

<sup>48</sup> This will be done within the framework of a government commission or similar. The Swedish Board of Agriculture itself does not have the means for this.

- Increase sharing of information between producers to help reduce avoidable food waste.
  - Find ways to sell fruit and vegetables being removed due to colour or shape, as with food processing.
  - Limit plant diseases and plant-harming organisms.
  - Take greater care during harvest and handling of produce.
  - Arrange for better storage conditions for vegetables.
  - Improve animal health.
  - Breed healthier animals.
  - Reduce the number of male calves in dairy breeds through sex selection of sperm.
  - Work towards better usage of horse meat as food for human consumption.
- 
- **Swedish Agency for Marine and Water Management**
  - Decrease the amount of fish by-catch.
  - Use by-catch fish for food.

### **County Councils**

- Review how food waste can be reduced in operations such as hospitals.

### **Municipalities**

- Increase resident awareness and understanding of the effect avoidable food waste has on the environment and economy. This can be done by municipalities creating lifestyle projects that include avoidable food waste. Another way is to raise awareness of the importance of reducing food waste in conjunction with introducing waste separation.<sup>49\*</sup>
- Develop plans for how municipal operations (schools, elderly care, etc.) can reduce food waste and create collaborations between school management, pedagogues, purchasers, waste management companies, etc.
- Educate and inform school kitchens and catering establishments in the municipality of the importance of reducing avoidable food waste and how to achieve it.\*

### **The Rural Economy and Agricultural Societies**

- Offer training to various operators such as institutional catering, restaurants, shops, health professionals, and teachers.

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<sup>49</sup> \* Measures indicated with an asterisk are also included in the National Waste Management Plan.

### **Industry associations in the Food Supply Chains**

- Industry associations can disseminate information related to avoidable food waste to members. They can contribute to collecting know-how on the causes of waste in their separate industries and provide proposals for measures to take.
- Industry associations can showcase good examples and thereby spread information.

### **Food Shops**

- Monitor and set targets for how much food is discarded and returned in shops and to wholesalers, and train staff in reducing avoidable food waste.<sup>50\*</sup>
- Develop order processing and sales methods that don't lead to avoidable food waste due to shops buying more than they can sell.\*
- Find creative methods and new business concepts for using products that are on the verge of passing their use-by dates. This can be food banks, in-store chefs that prepare meals from these products to be sold in the store, or donations to charity.\*
- Agree within the industry on systems that discourage ordering more than can be sold through stores being able to return unsold food to the wholesalers free of cost.\*
- Inform customers of the difference between sell-by date and use-by date and how to store perishable products at home.\*
- Take measures to ensure constant refrigeration for products that need it throughout the food supply chain.

### **Wholesalers, Transporters, Storages, and Logistics**

- Identify in each portion of the supply chain, where and why waste occurs, and based on this work towards reducing waste.
- Improve cooperation between each stage of the chain before and after their own. Cooperation between the food industry actors and shops for planning product flows.

### **Packaging Industry**

- Develop pre-packaged products with a holistic approach where the goal is for the packages to be easy to empty, protect the product throughout handling, and to be well adapted in terms of size to the consumer needs. \*
- Choose outer packaging that best protects product properties and retains quality throughout the transportation stage. Considering the product needs related to temperature and ventilation as well as of stable and secure handling during pro-

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<sup>50</sup> \* Measures indicated with an asterisk are also included in the National Waste Management Plan.

duction, transport, and storage. Create smaller deliveries/crates to avoid over-ordering of niche products such as ecological products.

### **The Food Industry**

- Identify the necessary requirements for putting food otherwise discarded to good use.
- Increase cooperation between the stages before and after their own in the supply chain, as with collaborating with agriculture on maintenance and variations in raw material quality.
- Identify where and why waste occurs (which can vary greatly between different production lines).

### **Institutional Caterers and Restaurants**

- Work towards reducing avoidable food waste and follow up on this by measuring food waste at different stages of food preparation and service.
- Prepare the right amount of food in relation to the number of guests, through better planning, preparing food in batches, and offering different portion sizes.
- Having better cooperation between different staff groups and their managers in schools, elderly care, health care and other activities.
- Provide containers or other packaging (doggy bags) for guests taking leftovers with them home.
- Collaboration between the guests and the kitchen so that the food served matches the guests' needs and expectations (as with adapting portion sizes).

### **Cooking Schools and Other Food Related Training**

- Training in the environmental impact of food and how to reduce avoidable waste, both up and downstream in the food supply chain.

### **Primary Production in Agriculture and Fishing**

- Reduced discarding of fruit and vegetables due to colour and shape.
- Find use for the fruit and vegetables that are discarded due to colour and shape, as with processing.
- Limit plant diseases and plant-harming organisms.
- Take greater care during harvest and handling of produce.
- Arrange for better storage conditions for vegetables.
- Decrease the amount of by-catching of fish.
- Use fish caught through by-catching for food.
- Improve animal health.
- Breed healthier animals.

- Reduce the number of male calves in dairy breeds through sex selection of sperm.
- Work towards better usage of horse meat as food for human consumption.
- Reduce silage waste through better storage and retrieval methods.
- Develop better systems for utilising discarded raw foods, such as biogas production or microbiological conversion to fish fodder.

## 8.6 Good Examples for Food

### 8.6.1 Personal Coaching

Coaching families to lead a more sustainable lifestyle has been shown to have good long-term results, including to reduce avoidable food waste. One example of this is the project “Leva Livet” carried out in Gothenburg in 2011.

### 8.6.2 Charity

Some shops donate food that is nearing its best before date to various charitable activities. There is also a company in Sweden that collects food from stores and wholesalers and donates it to charity organisations.

### 8.6.3 In-store Chefs

Some shops have hired chefs that prepare meals out of the food that is about to pass their use-by dates. The prepared food is then sold in the store.

### 8.6.4 Reducing Food Waste in School Kitchens – Measuring and Awareness

One school halved its avoidable food waste by measuring and displaying the waste. For every day the children threw away less food, balls were laid in a pipe representing the reduction. When the pipe was filled, the students received a surprise reward.

### 8.6.5 Restaurants

A restaurant chain succeeded in reducing its food waste by 23% partly by raising awareness among staff and guests and partly by removing the salad plate. By removing the salad plate there was less available space for food and the guests consequently took less. If they did want more they could have seconds.

### **8.6.6 Information for Schools**

Stockholm Consumer Cooperative Society has produced informative guides on how avoidable food waste can be reduced and what environmental gains it has. Read more at [www.slangintematn.se/skola](http://www.slangintematn.se/skola).

### **8.6.7 Training Dietary Managers**

The Rural Economy and Agricultural Societies funded by *Sweden – The New Culinary Nation* (Matlandet Sverige) in 2011-2012 trained municipal dietary managers in how they can reduce avoidable food waste in institutional catering. Read more at [www.mindrematsvinn.nu](http://www.mindrematsvinn.nu).

## **8.7 Research and development needs**

The Swedish EPA and actors collaborating on this programme have identified areas where research and development is needed. Several proposals also came from public comments. The proposals are meant to be used as basis for continued efforts in the area.

There is an overarching need to raise awareness of the causes, total volumes, and possible helpful measures throughout the stages of the food supply chain. Research should focus on trimming the primary flows of the food supply chain, and on making good use of any side flows that still may arise. Research is especially needed in avoidable food waste in primary production, and the role animal husbandry can have in utilising waste from later stages of the supply chain. Continued study monitoring waste and how regulatory frameworks affect waste are needed to gain a more comprehensive understanding of waste in primary production. Research is also needed to raise awareness concerning cultivation, better plant breeds and how farming can be adapted to a changing climate in future.

## 9 Textiles are a valuable Resource

**To prevent textile waste in order to reduce the environmental impact of textile consumption changed consumption and production patterns are required.**

Textiles must be designed for durability, long use, reusability, and when no longer usable, for recycling. Consumer awareness must be raised about environmental gains from reusing textiles compared to discarding for energy production through incineration. It must be easy to hand in and donate used textiles and clothes for reuse. The fashion and textile industry must take greater responsibility for producing textiles free from hazardous substances, that are reusable and recyclable, and ensuring there is a take back system for used textiles and clothes. As well, the market for reuse must be strengthened and requirements for durability in textiles set in procurement processes.

### 9.1 The situation today

Growing quantities of textiles are bought and discarded in Sweden. In 2010 more than 15 kg of textiles were consumed per person. Of these, at least 8 kg ended up in the municipal waste and were incinerated for energy recovery. This means that more than half of the textiles bought are discarded each year.<sup>51</sup> Only 3 kg were collected by charities for reuse. Of these, around 0.3 kg were resold in Sweden, the rest was exported or donated to charities outside of Sweden. Today no municipality in Sweden collect textile waste separate from other waste for recycling. However the Red Cross<sup>52</sup> and Human Bridge<sup>53</sup> charities collect and send textiles not sold in their own stores in Sweden to other countries, like the Netherlands and Belgium for sorting and, in some extent, recycling. Moreover, a number of private enterprises offer to take back used products from their customers and reuse them, but it is unclear to what extent consumers take them up on the offer.

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<sup>51</sup> Kartläggning av mängder och flöden av textilavfall, rapport nr 46, SMED (Mapping of totals and flow of textile waste, (2011), SMED).

<sup>52</sup> <http://www.redcross.se/stod-oss/skanka-till-second-hand/roda-korset-utvidgar-miljomedveten-kladatervinning/>? Info taken 2013-11-05

<sup>53</sup> Textilt avfall. En framtida resurs - Pilotprojekt i Stockholm, rapport U2013:15. Malmö. Avfall Sverige, (Textile waste, A Future Resource -Pilotproject Stockholm, (2013), Swedsh Waste Management, Avfall Sverige).

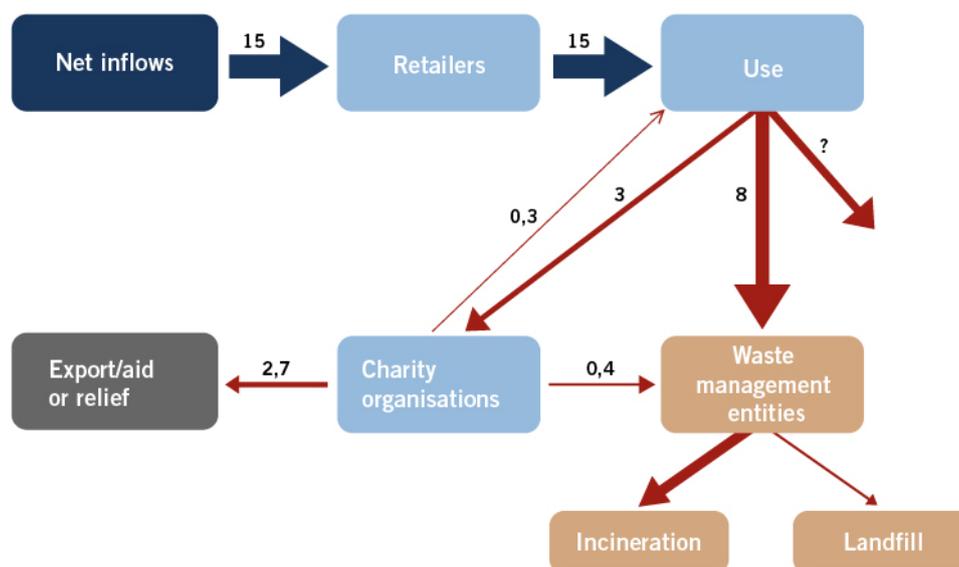


Figure 4: Flows of textile and textile waste in Sweden in 2010 (figures state total kg per person and year).

The largest amounts of used textile and textile waste are generated by households. The large clothing companies own activities only generate a small part of Sweden's total textile waste, but there are no exact numbers. But a large amount of textile waste and spillage (10-20% of the raw material<sup>54</sup>) is generated during production, though this is primarily outside of Sweden. Shops often don't have large storage facilities these days and companies strive towards having as little surplus as possible. Others who use textiles include the public sector i.e. health and elderly care, hotels, the Swedish Armed Forces, and companies<sup>55</sup>.

Within healthcare a relatively large amount of textiles are handled such as bedding, towels, and staff and patient clothing. These textiles are often handled by specialised laundry facilities. The majority of used textile and textile waste from these laundries is sent to incineration for energy recovery and only a small proportion is donated to charities.

In the past decade, consumption of clothes and textiles for private use in Sweden increased by over 40%.<sup>56</sup> Every kilogram of new textile produced affects the environment. To produce one kilogram of cotton might need as much as 29,000 litres of water depending on where the cotton is cultivated and what processes are used and about one kg chemicals is needed to make one t-shirt.<sup>57,58</sup> To produce one

<sup>54</sup> Verbal source Mia Tapio, Houdini 2013-11-05.

<sup>55</sup> Kartläggning av mängder och flöden av textilavfall, rapport nr 46, SMED (Mapping of totals and flow of textile waste, (2011), SMED).

<sup>56</sup> Kartläggning av mängder och flöden av textilavfall, rapport nr 46, SMED (Mapping of totals and flow of textile waste, (2011), SMED).

<sup>57</sup> Prevention of textile waste, (2012), TemaNord.

<sup>58</sup> Kartläggning av kemikalieanvändning i kläder, uppdragsrapport 09/52. Mölndal. Swerea IVF AB (Mapping of the use of chemicals in clothing (2009), Swerea IVF).

kilogram of textiles generates about 15 kilograms of greenhouse gases.<sup>59</sup> The production of textiles also causes environmental impacts in the form of emissions during production, transport, selling, and use. Between two and three percent of the total Swedish emissions of greenhouse gases come from textile consumption<sup>60</sup>.

Textile production, from raw material to finished product, includes several stages. Large quantities of chemicals are used in most of the processes such as pre-treatment, colouring, printing, and final processing. Conventionally grown cotton uses large amounts of pesticides. Many of the chemicals used in the production processes are washed out. Some of the substances are broken down or cleaned by water treatment plants, while others end up in lakes, watercourses or the sea. Both humans and the environment in the neighborhood of cotton plantations as well as textile production sites are being exposed to chemicals used in the production processes. Polluted water and water shortages caused by intensive textile industry can have extensive local consequences in countries of production.

In Sweden humans can come in contact with hazardous substances in textiles through skin contact or when children put the textiles in their mouths. Some substances may be added to give the textiles a specific function during use, which will remain in the finished product. Examples of functional chemicals are fireproofing agents, antibacterial treatment, or waterproofing. Sometimes remnants of process chemicals (i.e. nonylphenol ethoxylates) can also be present in the finished product.<sup>61,62</sup> Some substances, present in the finished product, may also spread to the environment during washing.

Given that textiles are mostly produced outside of Europe makes it difficult to control the use of chemicals since the supply chains are often long and complex.

### 9.1.1 Impacts of Increased Textile Waste

There are social, economic, and cultural drivers behind increased consumption of textiles. Put simply, clothes and other textiles are not bought to cover basic needs, but for other reasons. Textiles are a way to show who we are, or who we want to be, so called symbolic consumption. Generally speaking we also have more money to spend and textiles have become cheaper, relative to other goods.<sup>63,64</sup>

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<sup>59</sup> Miljöpåverkan från avfall, Underlag för avfallsprevention och förbättrad avfallshandling, rapport B1930. IVL Svenska Miljöinstitutet (Environmental impact of waste, (2010), David Palm and Jan-Olov Sundqvist, IVL).

<sup>60</sup> Varför återanvända textil? Europa minskar avfallet 2011, (Why reuse textile? Europe reduce waste 2011, in Swedish), Presentation material, David Palm.

<sup>61</sup> Kartläggning av kemikalieanvändning i kläder, uppdragsrapport 09/52. Mölndal. Swerea IVF AB (Mapping of the use of chemicals in clothing (2009), Swerea IVF).

<sup>62</sup> Nonylphenol ethoxylates are used in detergents and paints. When it breaks down, it turns into nonylphenol which is toxic to aquatic organisms and is suspected to have negative effects on reproductive abilities.

<sup>63</sup> Nätverk, trådar och spindlar, (2012), Karin M Ekström and Niklas Salomonson (Networks, Threads, and coordinators).

Another reason why more textiles are bought is an increased focus on interior design and that the clothing industry has developed a range of concepts based on cheap clothing with short life spans.<sup>65</sup> Two major reasons for discarding clothes and textile are that the owner got tired of the item and might need to make space in their drawers<sup>66</sup>. Today most textile and textile waste ends up in the combustible waste and goes to energy recovery due to a lack of separate collection system for textiles.

Since previously no technological solutions for large-scale textile recycling existed, there are presently only a few municipalities that collect textile waste for recycling. However, most municipalities grant space near recycling centres to charity organisations collecting textiles. Some municipalities also provide space for charities near recycling points for packaging and newspaper collection. The collection system in place today is provided by non-profit actors. Together, they collect about 26,000 tons of textiles and clothing per year from over 500 shops and collection bins. The material is sorted and 3,000 tons of textiles are sold in their second hand shops in Sweden, 4,000 tons are sent to incineration for energy recovery and the remaining 19,000 tons is exported for reuse and sale in other countries. But what actually happens with the exported textiles must be investigated further.<sup>67</sup>

There might be other reasons for the limited amount of clothing being reused such as, consumers are not aware that clothes can be donated for reuse or do not know who they can rely on for donating. It may also be that clothes are seen as very personal and people simply don't want someone else to wear them, and instead throw them away<sup>31</sup>.

### 9.1.2 On-going activities in the textile area

#### New milestone targets

The Swedish EPA was assigned by the government to draft proposals for a milestone target in the National Environmental Objectives System for textile and textile waste. This includes reporting which measures and policy instruments are needed to achieve the milestone target and to conduct an impact assessment. The proposal was handed over to the government in December 2013.

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<sup>64</sup> Effekterna på importpriser, konsumentpriser och handelsmönster av tekoavregleringen mellan WTO-länder, (2006), Kommerskollegium.

<sup>65</sup> Nätverk, trådar och spindlar, (2012), Karin M Ekström and Nicklas Salomonson (Networks, Threads, and coordinators).

<sup>66</sup> Improved waste management of textiles, B1976, (2011), David Palm.

<sup>67</sup> Prevention of Textile Waste, Material flows of textiles in three Nordic countries and suggestions on policy instruments, (2012), Naoko Tojo, Beatrice Kogg, Nikola Kiørboe, Birgitte Kjær and Kristiina Aalto, Tema Nord och Kartläggning av mängder och flöden av textilavfall, (2011), SMED.

### **Nordic Council of Ministers Green Growth Initiative**

“The Nordic Region – leading in green growth” is the Nordic Prime Ministers shared green growth initiative under the auspices of the Nordic Council of Ministers. The green growth initiative has a vision to strengthen a number of areas and waste is one of the areas needing attention.

Therefore, three textile projects were initiated in 2013 with the overall aim to increase reuse and recycling of textiles in order to reduce the environmental impact from textile consumption and increase the competitiveness of the Nordic region. The projects include proposals of policy instruments and new business models for increased reuse of textile as well as prevention of textile waste and increased recycling of textile waste. A joint Nordic strategy will be developed for a more sustainable handling of textile and textile waste. Finally a Nordic voluntary commitment including a code of conduct will be developed for actors who collect, sort, reuse and recycle textiles.

### **Sweden sees the need for stricter legislation on hazardous substances in the EU**

Sweden has proposed to the EU Commission to impose stricter EU rules requiring phasing out hazardous substances in textiles. This initiative is supported by Swedish textile and apparel companies through their association.

### **The Swedish Chemicals Agency Textile Industry Dialog**

The Swedish Chemicals Agency<sup>68</sup> has started a dialog process with the textile industry to hasten efforts to replace hazardous substances in consumer goods and products without waiting for detailed legislative controls. Companies, industry associations, producers and distributors are invited to meetings several times annually. In joint discussions the actors try to identify the measures that are needed to minimize the risks with hazardous substances in textiles. The main focus is to raise awareness and knowledge about hazardous substances in textiles, trying to develop a joint statement of requirements in relation to suppliers of these substances that should not be present in the finished products, and to generally work towards reducing the content of hazardous substances in textiles.

### **The Mistra Future Fashion Research Programme**

Mistra Future Fashion is a planned four year research programme<sup>69</sup>. The vision is to achieve a systemic change in the Swedish apparel industry that will bring sustainable growth in both the industry and society, including waste prevention. This

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<sup>68</sup> <http://www.kemi.se/sv/Innehall/Branschdialoger/Branschdialoger/>

<sup>69</sup> The research consortium include researchers from Chalmers University of Technology, Copenhagen Business School, Stockholm School of Economics, Innventia, University College of Arts Crafts and Design, Malmö University, SP, Swerea IVF, University of the Arts London. Also included are H&M, SOEX, Fabric Retail Global AB, F.O.V. Fabrics, I:Collect, Kiram AB, Myrorna (Salvation Army in Sweden), Stockholm County Council, Södra Skogsägarna and Sustainable Fashion Academy.

is also intended to strengthen the competitiveness of the apparel industry. The research projects included are:

- Changes to markets and business models: For sustainable innovation in the apparel industry.
- Clarification of what sustainability in fashion is.
- Combination of design considerations including processes for sustainable textiles and apparel.
- For eco-efficient textile materials and processes.
- Reuse, recycling and 'end of life' issues.
- Apparel for the public sector.
- Sustainable consumption and consumer behaviour.
- Policy instruments.

### **Network for reuse and recycling of clothing and textiles (NÅÅ)**

The network was established in January 2011 on the initiative of the The Swedish School of Textiles (Borås University) as part of a research project about how complex environmental problems can be addressed through a network collaboration. The network includes representatives of charity organisations, recycling companies, clothing retailers, industry associations for recycling, shops and textiles, transport companies, consumer and environmental organisations, municipalities, authorities and researchers.

The network is currently drafting a statement of their programme that will include objectives to achieve within three years in regard to reuse and recycling of clothing and textile. An action plan will also be prepared. The network has contributed to initiating collaborative efforts between interested actors. It has also been a meeting place for participants to discuss good examples of new initiatives related to recycling and reuse of textile, and spreading information and research findings.

### **Training project for efficient chemical management in clothing**

From fall 2012 to spring 2013 the Sustainable Fashion Academy (SFA) has conducted a feasibility study for The Swedish Chemicals Agency, the Swedish Trade Federation and Swedish Textile and Clothing Industries Association (TEKO). The main finding of the study is that the most important issue for the Swedish textile industry is related to the chemical content in the textiles. The problem is difficult to address due to the long, complex supply chains involved. Many textile companies also highlight lack of time to work with these issues. Based on the findings a new project is to be conducted through research funding from Vinnova. This educational project is intended to provide common understanding and knowledge regarding the problems related to chemical management in the clothing supply chain. The project will continue to the end of 2015.

### **Roadmap towards zero emissions**

In 2011 the international programme 'Joint roadmap towards zero discharge' was established for the purpose of reducing emissions of hazardous substances throughout the product life cycle by Zero Discharge of Hazardous Chemicals (ZDHC). The joint roadmap is a plan that sets a new standard for environmental performance for the global apparel and shoe industries. The roadmap is a first step towards achieving zero emissions of hazardous substances by 2020. The long-term objective is to provide high quality products and goods that contain no hazardous substances. These efforts address substances that are used throughout the distribution chain, but are especially concerned with chemicals that are not included in the company's restricted substances lists (RSL).

## **9.2 Long-term objectives for Textiles**

The Swedish EPA was assigned by the government to submit proposals for milestone targets for textiles and textile waste. This was reported in December 2013. In this waste prevention programme, the following long-term objectives were proposed.

- Textile waste from households shall be reduced compared to 2010.
- The share of second-hand goods of total sales of textiles shall increase compared to 2014.
- The knowledge regarding content of hazardous substances in textiles will increase in the textile and fashion industry<sup>70</sup> compared to 2014.

See also the overarching long term objectives for phasing out particularly dangerous substances and access to information regarding health and environmentally hazardous substances in section 7.3.

## **9.3 Monitoring the objectives for Textiles**

The Swedish EPA will follow up on these objectives. The objective to reduce textile waste from households compared to 2010 will be followed up by random inspections of textile and textile waste in household waste. Monitoring the share of second-hand goods sales of the total sales of textiles will be based on Statistics Swedens (SCB) national statistics of consumption and indicators based on updated flows for textiles. The Swedish Chemicals Agency is responsible for monitoring the objective for increased knowledge base within the textile industry, in the framework of their textile dialog programme.

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<sup>70</sup> Producers, importers and retailers.

## 9.4 Strategies

The Swedish EPA plans to use five strategies for the prevention of textile waste:

### 9.4.1 Reduce the volumes of textile waste through changing consumption patterns

The time apparel remains with the first consumer must be extended. This can be done through greater efforts to provide information about the environmental impact of textile production. This will also include guidance as to what is sustainable consumption and how to recondition and care for textiles to maintain their quality longer. Lending wardrobes and other business models are other possibilities.

### 9.4.2 Increase the life span (physical and esthetic) of textile placed on the market

Textiles should keep a high quality from the beginning to maintain a long life span. Textiles should also be designed for durability and be able to be reconditioned, repaired and reused. As well, they should be designed for material recycling. The producers should already when designing their products consider all these aspects. This could be done by introducing an extended producer responsibility. Other actions could be voluntary agreements and dialogs within the industry, and to establish networks. Another way to achieve this is using green procurement.

### 9.4.3 Increase reuse

To increase reuse, better infrastructure for collecting textile is needed. More sites for collection are needed, which can be provided by retailers receiving returns in their shops for second-hand sale, or they can fund a collection system in cooperation with local authorities and second hand retailers. Equally, households and other users of textiles must have greater understanding of the collection systems that are available, where these are located, and how textiles should be sorted. As well, households should be informed of the environmental benefits that reuse provides in relation to incineration. It is also important that they receive information about how they can donate to reuse or sell their apparels through other channels, as with trading sites on the web. Finally, the Swedish market for second hand textiles must be strengthened through informational campaigns and similar.

### 9.4.4 Reduce the content of hazardous substances in textiles

Producers must reduce the use of hazardous substances in manufacturing, handling in shops, use and through to recycling. Substances of Very High Concern must be phased out from use. Certain allergenic substances (for skin conditions) are unsuitable for clothing worn tight to the skin and aeroallergens should not be used in clothing or indoor textiles. Biocides and other residual chemicals have been shown to leak out during washing. Hazardous substances can also cause problems when reused or recycled. A significant problem connected with reuse or recycling is the

lack of accessible information about which substances are in the clothing in the first place.

#### **9.4.5 Improve information about the content of textiles**

Currently, there are labelling requirements for textiles to identify the material they are made of, such as cotton, polyester, elastane and others. The Reach candidate list of substances also has certain requirements for information regarding Substances of Very high Concern<sup>71</sup>, but currently, this information is provided only for a few of the hazardous substances that can be found in textiles. Greater transfer of information in every phase of the textile's life cycle would improve the ability to impose requirements and enable consumers to avoid textiles with these substances. And, this would increase the possibilities in regard to reuse and recycling textiles.

## **9.5 Measures for the textiles area**

### **9.5.1 What the Swedish EPA plans to do**

- Inform interested actors regarding the waste prevention programme and the role they should take in contributing to achieve the objectives.
- Draft proposals for milestone targets for preparation of reuse and material recycling for textile waste including measures and policy instruments linked to these targets.
- Investigate the possibilities to implement a roadmap for sustainable textiles, as with WRAP in the UK that has an action plan for this (Sustainable Clothing Action plan). For more information, see: <http://www.wrap.org.uk/content/sustainable-clothing-action-plan-1>.
- Take part in the Nordic collaboration focused on reuse and recycling of textiles, including through use of the findings from the textile projects under the Nordic Council of Ministers Green Growth Initiative (see section 10.1.2, above).
- Participate in campaigns, research projects and networks to promote reuse and contribute to making textiles more sustainable<sup>72</sup>.\*
- Develop better statistic covering the material flows of textiles.\*

### **9.5.2 What The Swedish Chemical Agency plans to do**

- Continue working to promote common EU legislation that restricts the content of hazardous substances in textiles. This is based on a government assignment to promote a coherent EU legislative framework for chemicals

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<sup>71</sup> See the KemI website for more information on the Reach candidate list of substances: <http://www.kemi.se/sv/Innehall/Lagar-och-andra-regler/Reach/Kandidatforteckningen-i-Reach/>

<sup>72</sup> \* Measures indicated with an asterisk are included in the National Waste Plan.

in textiles that the Swedish Chemical Agency has produced in consultation with the Swedish EPA and the Swedish Consumer Agency<sup>73</sup>.

- Under the *Action plan for Non-toxic Daily Environment*, continue the dialogue with the textile industry on how to phase out hazardous substances through greater knowledge and understanding, and training within the industry. the Swedish EPA participates in the dialogue.

### 9.5.3 Examples of what other stakeholders can do

#### Municipalities and County Councils

- Establish collection bins or other collection systems for textiles at all recycling centres in collaboration with second hand actors<sup>74</sup>.\*
- Establish easily accessible collection systems for textiles for households, by permitting second-hand actors to place collection bins for textiles at other locations throughout the municipality and ensure the collectors full-fill requirements that are imposed to ensure a serious handling of textiles.\*
- Inform households about what to do with their textile waste and about the environmental benefits of reuse.\*
- Establish requirements for sustainable textiles in procurement processes and consider aspects such as whether the products can be laundered, repaired, or the material recycled. Reduce amounts of single-use articles.
- Investigate the possibilities of reusing or recycling textiles that are no longer used within the local operations (ie. hospitals) prior to sending textiles for energy recovery.
- Investigate if there are unused functional textiles held internally prior to purchasing new.
- Develop and include objectives and measures for collecting textiles to increase reuse and material recycling in the municipal waste plan.\*

#### Collection operators – Commercial and volunteer

- Develop collection systems in cooperation with municipal and clothing companies and offer households a simple efficient collection system.
- Review existing collection structures involving both volunteer organisations and commercial operators to determine if these can be supported in any way.
- Provide authorities and municipalities statistics as needed to monitor proposed objectives and measures.
- Work to ensure that actors volunteer as well as commercial follow the waste hierarchy.

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<sup>73</sup> Hazardous chemicals in textiles, Report of a government assignment, (2013), Kemikalieinspektionen.

<sup>74</sup> \* Measures indicated with an asterisk are included in the National Waste Plan.

- Developed new concepts for reuse, such as 'Remake and redesign'.

### **The Textile Industry**

- Manufacture, develop, purchase and sell textiles that are designed for longer life spans with no hazardous substances and enable reuse and recycling.\*
- Take greater producer responsibility where worn clothing can be handed in for preparation to reuse, or to recycle<sup>75</sup>.\*
- Develop new business models that promote reuse, e.g in-store second hand departments.
- Actively work to minimise textile waste and spillage in production, transport, and sales. Promote new business models for the textile spillage that still arise to be processed in accordance to the waste hierarchy, such as to produce alternative products.
- Prevent waste by informing consumers of appropriate ways to maintain and repair your products.

## **9.6 Good examples in the Textile field**

### **9.6.1 Volunteer second-hand**

Sweden currently has about 500 shops run by volunteer second-hand actors where consumers can purchase second-hand textiles and hand-in used textiles rather than discarding them. In total, volunteer second-hand actors collect about 25,000 tons of textiles annually.

### **9.6.2 Clothing libraries**

A clothing library is similar to a library but where you can borrow clothes rather than books. The idea is based on enabling people to change their wardrobe without contributing to increased consumption. Clothing libraries have been established in Stockholm and Umeå.

### **9.6.3 Volunteer initiatives to recycle and reuse clothing**

Several companies voluntarily take a producer responsibility for clothing by promoting reuse. Some apparel labels let their customers return used clothing in their shops. In return, the customer is offered a discount on any new purchase. The returned garment is eco-labelled and re-sold in-store or in selected second-hand stores. Other companies offer commission based second-hand sales of garments of their own brand in-store or on the web. Several outdoor apparel companies produce new cloths from recycled polyester.

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<sup>75</sup> \* Measures indicated with an asterisk are included in the National Waste Plan.

Other companies have introduced a recycling system where the consumer can hand-in worn out clothing to special bins in their shops and the material are send for recycling. The customer is rewarded with a voucher to use in the shop. Some actors in the textile industry cooperate with other actors to find solutions to managing the textile waste they generate. Their objective is to achieve a closed loop for clothes and textiles, that cannot be reused, in a circular economy.

#### **9.6.4 County Councils**

Some Swedish county council donates clothing and clean textiles from hospitals (that are whole but not suitable to use in their operations), to hospitals in developing countries. Charity organisations are involved in this activity.

Single-use material generates huge waste volumes causing significant climate and environmental impact. A Swedish county council has formulated environmental objectives to reduce climate impact, including reducing the use of these single-use material. Decreased material consumption and waste prevention are stimulated by increased use of multiple-use products and revised working processes.

#### **9.6.5 Rent rather than buy**

An apparel company offer customers shell garments to rent rather than buy a new item. The consumer advantages of this include not having garments hanging in closets year-round when only rarely used, which also reduces the use of resources and the environmental impact. The garments for rent are also developed using the 'Cradle to Cradle' principle.

#### **9.6.6 Collections with longer durability**

Several apparel chains have introduced apparel collections having longer life spans, both physically and aesthetically.

#### **9.6.7 Sustainable Fashion Initiative**

Sustainable Fashion Academy (SFA) is a non-profit organisation working to accelerate change, and inspire innovations necessary for the textile industry to become more sustainable. SFA works closely with actors who are interested in taking the lead in innovation and sustainability, including training of employees in these issues. Another important part of the work for a more sustainable textile industry is educating, providing advice to, and collaborating with industry associations, authorities, NGOs, journalists and media.

The '**Cradle to Cradle**' is based on the principle that already in the designing phase of products consider how to use, reuse, and recycle the products. The principle can be seen as part of a new circular economy where material – just as in nature – is never destroyed or accumulated, and where growth, production, and consumption actually can be for the good.

## 9.7 Need of research and development

The Swedish EPA has in collaboration with stakeholders identified the following areas needing research and development when drafting this programme. Several proposals also came from public comments. These proposals will be used as a base for continuing efforts of the Swedish EPA and other interested parties.

- Research and study of economic policy instruments, such as extended producer responsibility.
- Research on consumption behaviour and how to encourage to a more sustainable consumption.
- Sustainability need to be integrated in the programs at universities and textile design schools.
- Research about new business models in the textiles industry including how to create additional jobs.
- Research about the environmental impact of various textile materials, which would enable assessing which materials that can be prioritized.
- Research to stimulate development of new fibres and material, and development of technologies that are more resource efficient and decrease production spillage and prevent waste and emissions.

# 10 Resource efficient and non-toxic construction

It is possible to construct both non-toxic, resource efficient and reducing the amounts of waste. What is needed, though, is know-how, good planning, proper documentation, well-considered logistics, and specific areas for storing material, along with greater reuse of everything from kitchen fixtures to brick and cement – which is often landfilled today.

## 10.1 The situation today

Each year during the last decade, nearly 10 million tonnes of construction and demolition waste was generated in Sweden<sup>76</sup>. This means that the construction sector produces over one-third of all waste in Sweden (not including mining waste). Moreover, one-fourth of all hazardous waste in the country is generated in the construction industry. Many materials like cement and steel are highly energy demanding to produce thereby adding to the substantial climate impact from construction.

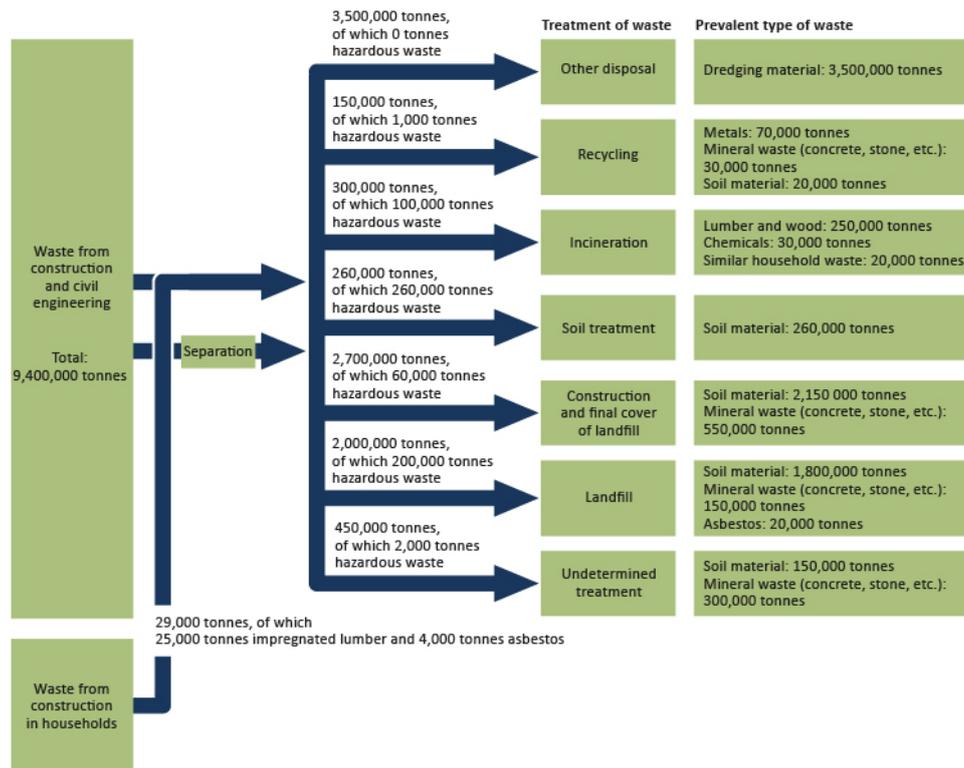


Figure 5: Waste flows from the construction and engineering sector in 2010.

<sup>76</sup> Avfall i Sverige 2004 (Waste in Sweden 20XX) (Rapport 91-620-5717-0), Avfall i Sverige 2006 (Rapport 978-91-620-5868-5), Avfall i Sverige 2008 (Rapport 978-91-620-6362-7), Avfall i Sverige 2010 (Rapport 978-91-620-6520-1)

The primary reason why we don't already build with the most resource efficient methods, and why we generate such an excess of waste, is that building materials are much less expensive than labour. In many situations, extra volumes of materials are ordered simply to prevent construction delays that cause workers to wait for delivery of materials. The unused materials are often disposed off as waste. To avoid accidental damage to building materials (which is quite common), the construction project must be thoroughly planned in advance to ensure safe handling of all building materials.

To increase reuse of building materials, it is necessary for more developers to demand or look for used construction materials. This, in turn, requires that landfilling of construction waste becomes more expensive, that the material can be stored, and that during demolition, materials and products that can be sold or reused are inspected for quality assurance. Therefore, information to those conducting the demolition must be correct regarding the material in the buildings and what the material contains, for example hazardous substances that would prevent its reuse.

Hazardous substances in building and construction products may pose increased health and environmental risks during production, use, and demolition. Hazardous substances can be dispersed indoors causing health risks for those using the premises. Hazardous substances can also be dispersed into the environment through demolition and waste management.

In this context, when building materials contain hazardous substances, their long life span is problematic. Materials currently being demolished may have been manufactured many decades ago and may therefore contain substances that are now banned from use in new products. In the same way, we might be using materials today in new productions that are later found to have hazardous properties. Well-known examples of hazardous substances in building materials, which have later caused society substantial expenses to decontaminate and dispose off, include fireproofing with asbestos insulation, and PCBs in jointing compounds. Documenting the materials used in construction today is therefore essential, and this information should also be kept updated for future renovations and demolitions.

It may take up to two years from when a building is inventoried prior to demolition until the actual demolition is complete. This can result in that the documentation from the inventory is lost or incomplete at the time of demolition due to alterations to the building made in that time. Another problem is insufficient communication between those who conducted the inventory and those performing the demolition. This can lead to reusable material being disposed off as waste. Large amounts of materials in the construction sector that could be reused are currently sent for landfilling, such as bricks and cement.

An increase in the reuse of materials requires that authorities design appropriate and clear regulations, provide guidance, inspect and enforce, and collaborate with each other and with all actors subject to such regulation. But, this also requires that construction companies and industry associations take responsibility for information and preparing guidelines for all those involved. We can all be better at de-

manding that the volume of waste and hazardous substances is reduced when a building is constructed, renovated or demolished.

As of July 1<sup>st</sup> 2013, all construction products covered by a harmonized standard or European Technical Assessment (ETA) must have a Declaration of Performance and be CE marked in order to be marketed in Sweden and other EU member states. This is regulated under the EU Construction Products Regulation No. 305/2011. This regulation is intended to facilitate trade and marketing of these products between member states. By ensuring that all manufacturers within the EU are using the same methods to assess and describe the essential characteristics of the products and also have an organized production control, allows the products to be marketed in all member states without undergoing additional testing or certification.

As a basis for CE marking, manufacturers must issue a Declaration of Performance for each product. This must state the results of product testing, the standards used, the intended use of the product and information about the manufacturer. The declaration must also state whether the construction product meets the various basic requirements for construction works – such as hygiene, health, and environment – which includes information on emissions of hazardous substances from construction works and the sustainable use of natural resources. Here, consideration should be given to the possibility to recycle construction parts, the durability of the building, and the usage of raw materials and recycled materials. The Declaration of Performance must also be complemented by information regarding hazardous substances according to the EU Reach Regulation ((EC) 1907/2006) for chemicals<sup>77</sup>.

### **10.1.1 Current activity in the priority area**

The Swedish EPA is currently conducting a supervision guidance campaign together with the Boverket (the Swedish National Board of Housing, Building and Planning) intended to increase the supervision of construction and demolition operations.

The EU Waste Framework Directive sets a target for preparation for reuse, recycling and other recycling (excluding energy recovery) of non-hazardous construction and demolition waste to 70% by weight to 2020<sup>78</sup>. A Nordic team of researchers is currently studying the consequences of this target for resource management and diffuse emissions of pollutants in the Nordic countries. The EU Commission will assess the 70% target no later than December 31<sup>st</sup> 2014 and, if necessary, revise and reinforce it. The Swedish EPA considers it highly important to be able to contribute with data in order to make an impact through the suggestions and comments Sweden may make regarding the target formulations etc.

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<sup>77</sup> Registration, Evaluation, Authorisation and Restriction of Chemicals (Reach). EC 1907/2006.

<sup>78</sup> Article 11. point 2b, (2008/98/EG, the Waste Framework Directive).

During 2013 a first review will be made of the regulations on Environmental reporting (NFS 2006:9) in regard to collecting data on construction and demolition waste from facilities subject to permit authorisation that receive such waste. The intention is to increase the data reporting by implementing a new emission questionnaire in the Svenska Miljörapporteringsportalen (SMP; Swedish Environmental Reporting Portal). This will result in more detailed waste data of higher quality starting in the reference year 2015. This review was necessary in order to improve the capabilities for statistical follow-up on the 70% target, which is also a milestone target in the National Environmental Objectives System<sup>79</sup>.

## 10.2 Long-term objectives for construction

- By 2020, less waste is generated per m<sup>2</sup> of construction compared to 2014.

Also, see the overarching long-term objectives to phase out particularly dangerous substances, and increasing access to information about substances that are hazardous to health and the environment in section 7.3.

## 10.3 Monitoring the objective for construction

The Swedish EPA will follow up on the objective using indicators comprising of total volumes of hazardous waste and non-hazardous waste generated in new production, renovations, and demolition. This will be based on national waste statistics in relation to the total amount of m<sup>2</sup> built, GNP, and the total turnover in the sector. This follow-up will also include comparing used volumes of non-metallic mineral construction materials to GNP and the total amount of m<sup>2</sup> built.

## 10.4 Strategies

The Swedish EPA plans to use several strategies to pursue the objectives to reduce the volumes of construction waste, and to reduce the content of hazardous substances in building materials and products. This includes replacing hazardous substances with less hazardous ingredients in building products, and ensuring that there is documentation on the material that is actually built into the constructions. Developers and builders also need to acquire more competence regarding their responsibilities for following up on demolition projects. The environmental inspection and enforcement of the construction sector needs to increase.

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<sup>79</sup> Miljörapporter som källa för förbättrad avfallsstatistik – med fokus på bygg- och rivningsavfall”, SMED Rapport Nr 2013:113, (Environmental reporting as a source for better waste – construction and demolition). Link: <http://www.smed.se/avfall/rapporter/rapportserie-smed/2883> (in Swedish).

Another important strategy is to increase the reuse of construction products (such as bricks) and to design building products that can be disassembled in a way that enables easy reuse. Moreover, the Swedish EPA will work to have more stakeholders gain the insight that reusing material rather than demolishing it is more resource efficient, and that when the same stakeholders work on new production, renovations, or demolitions, they set requirements on waste prevention. Also, the Swedish EPA needs to contribute by disseminating information about the benefits of waste prevention and by increasing the general understanding of material flows, waste flows and strategic work on prevention activities.

## 10.5 Measures for the construction sector

For measures related to waste prevention in the construction and engineering sector, see the section ‘*Waste generated during construction works*’ in the National Waste Plan. Those measures are designed primarily for recycling, though many also have waste preventive effects.

### 10.5.1 What the Swedish EPA plans to do

- Establish better statistical data for construction and demolition waste that is divided into more fractions – both for non-hazardous and hazardous waste<sup>80</sup>.\*
- Prepare guidance for how the general rules of consideration in the Environmental Code and the waste hierarchy should be applied in inspection and enforcement of the management of construction and demolition waste, and how to improve collaboration between municipal building committees and environmental committees.\*

### 10.5.2 Examples of what other stakeholders can do

#### **The Swedish EPA in collaboration with the National Board of Housing, Building and Planning**

- Conduct a supervision guidance campaign for the purpose of increasing the inspection and enforcement of how waste is managed in construction and demolition operations.

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<sup>80</sup> \* Measures indicated with an asterisk are included in the National Waste Plan.

**The Swedish EPA sees the need of collaboration with the National Board of Housing, Building and Planning in**

- Investigating whether the PBL (the Swedish Planning and Building Act) must be amended to ensure that waste prevention measures can be required throughout the construction process.

**The Swedish EPA and the Swedish Chemical Agency see the need that**

- A study is conducted to determine how the documentation on hazardous substances in buildings can be improved in order to increase the possibilities for greater reuse of construction materials, inter alia.

**The Swedish EPA in collaboration with the Swedish Transport Administration**

- The General Directors of both the Trafikverket (Swedish Transport Administration) and the Swedish EPA have a formalized agreement for cooperation. This involves allowing waste prevention measures to be added as a point of discussion.

**The Swedish Chemical Agency sees the need to collaborate with the National Board of Housing, Building and Planning on**

Studying the possibilities related to adding requirements to current legislation, including:

- Act for extended information about hazardous substances in building products, adding to current requirements for Declaration of Performance in the Construction Products Regulation Article 6.5.
- Investigate whether stricter, more precise requirements on hazardous substances in the construction sector are necessary.
- Investigate which hazardous substances or substance groups that are present within the construction sector that should be included in the Candidate list of substances.
- Enforce restrictions and authorisations under Reach.

**The National Board of Housing, Building and Planning sees the need to**

- Develop guidance for preparing control plans in conjunction with planning or demolition permit applications.

- Develop guidance on new requirements in the Planning and Building Act regarding management of construction and demolition waste<sup>81</sup>.\*

### **Municipalities**

- Establish a procedure for internal communication and processing of planning and demolition permit applications between the council committees responsible for inspection and enforcement according to the Building and Planning Act and for inspection and enforcement according to the Environmental Code.
- Reserve land in city spatial planning (both comprehensive planning and detailed planning) for reuse operations<sup>82</sup>.
- Investigate whether requirements can be included in implementation agreements stating that space must be made available for reuse operations near shopping centres where building products are sold.
- Perform inspection and enforcement on management of construction and demolition waste, and establish procedures where local environmental authorities are notified of the building inventory and when the demolition is started.\*
- Set requirements in public procurement so that building products containing hazardous substances are avoided (for example in schools and pre-schools).

### **The Construction and Property Sector Industry Associations**

- Keep guidelines for the sector updated including clear requirements for waste prevention and reuse<sup>83</sup>.\*
- Study how quality requirements and type approvals can be assured for the reuse of building products.
- Disseminate good examples and experiences from projects where waste prevention measures were successfully implemented. Use a benchmarking system for registration of 'Best Practice'.

### **The Construction Contracts Committee (Byggandets kontrakttskommitté, BKK)**

- Investigate which requirements for waste prevention that may be imposed using construction law.

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<sup>81</sup> \* Measures marked with an asterisk are also included in the National Waste Plan.

<sup>82</sup> Sida 29-30 Avfallshantering - tillgänglig, säker och estetisk, (2011), Boverket (Waste Management).

<sup>83</sup> \* Measures marked with an asterisk are included in the National Waste Plan.

### **Developers<sup>84</sup> (usually the developer is also the property owner)**

It should be stated that measures can be considered also for circumstances where the construction or demolition operations are not subject to mandatory permits under the Building and Planning Act. Certain measures in this section can also be applied to building contractors.

- Document the building products used in new production projects and save and update this documentation to ensure that the information is available throughout the buildings life span for use when renovating or demolishing the building.
- Strive for an increased use of environmental certification systems for buildings and demolition projects, and to continuously contribute to improving related criteria.
- Use systems for environmental assessment of building products.
- Impose requirements on suppliers to new production and renovation projects for minimizing or taking back packaging, and for just in time delivery.
- Impose requirements on suppliers of building materials to take back the excess material.
- Properly store the material that must be stored on site – rain protection, collision protection, etc.
- Disseminate good examples and experiences from projects where waste prevention measures were successfully implemented. Use a benchmarking system for development of ‘Best Practice’.
- Provide guidance and support for how developers can require waste prevention measures (to minimize waste volumes and hazardous properties).
- Investigate economic advantages/cost savings gained from waste preventive measures to promote these efforts (as for example reduced material costs, storage, transport, and waste management costs).
- Utilize modular and prefabricated parts to a greater extent in order to minimize waste generation and build more flexibly, and in order to facilitate rebuilding and disassembly where reuse of different parts is enabled.
- Set clear competency requirements for those who perform inventory of buildings prior to demolition<sup>85</sup>.\*
- Require material inventories of buildings prior to demolition, including an inventory of reusable material.
- Establish prerequisites for material inventories that provide sufficient information prior to demolition through planning, and ensure that the results are disseminated as necessary throughout the full demolition process.\*
- Include requirements on management of construction and demolition waste in the procurement and ensure that these requirements are followed.\*

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<sup>84</sup> As defined in the Planning and Building Act (2010:900).

<sup>85</sup> \* Measures marked with an asterisk are included in the National Waste Plan.

- Require that building materials do not contain hazardous substances that can hinder recycling and treatment of construction and demolition waste.\*
- Develop methods for source separation and solutions for how excess building materials can be reused, for example by returning it to a common receiver or other retailer rather than to waste recycling.\*
- Plan demolition and use efficient logistics to facilitate reuse of materials.

### **Demolition operations**

- Ensure that the information from the inventory and instructions for the demolition are disseminated to everyone concerned, and develop methods that encourages correct source separation of the waste.\*

### **The building material industry**

- Invest in development of building materials that are easy to reuse or recycle, including by simplifying separation, and avoiding especially hazardous substances.\*
- Require that the Declaration of Performance contain information about how the building products can be disassembled and reused.

### **Certification bodies and developers of environmental classification systems**

- Improve existing systems to include waste prevention related measures.
- Assess certification requirements for environmental inventories of properties.\*

### **Public Procurement**

- Establish stricter requirements for building contractors to ensure that building materials do not contain Substances of Very High Concern.

### **Managers for construction and architectural education and training**

- Ensure that all education and training in the architectural and construction fields include education on hazardous substances in building materials and tools that can be used in order to avoid the use of these substances. Long-term resource efficiency, the life-cycle perspective and the 'Cradle to Cradle' concept should also be covered by the curriculum<sup>86</sup>.

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<sup>86</sup> Cradle to Cradle: Remaking the Way We Make Things (2002), Michael Braungart och William McDonough.

## The recycling industry

- Develop systems for re-use of construction and demolition material<sup>87</sup>.\*

The 'Cradle to Cradle' concept involves ensuring that all materials are designed for re-use or recycling from the start. This principle can be considered as standing for a new circular economy where material – just as in nature – are never destroyed nor accumulated, and where growth, production and consumption can actually be for the good.

## 10.6 Good examples in the construction field

### 10.6.1 Demolition and reuse

Some demolition contractors have retailer operations for reuse of materials from their demolition operations. This kind of business concept provides greater opportunities for reusing products from demolition due to direct access to an outlet and a market. These contractors can review building inventories and directly determine what material can be sold for reuse and they also have the logistical means to handle the products and materials.

In certain parts of the country, there are enterprises that trade material, waste and products from construction and demolition operations in order to sell this for reuse. This sometimes includes accepting bricks from demolition and subsequently process and clean these so that the bricks can be sold and reused in a new building.

### 10.6.2 Updating industry guidelines

The industry association Sveriges Byggindustrier (the Swedish Construction Federation) has taken over Kretsloppsrådets resource and waste guidelines during construction and demolition. This has included an update of the guidelines together with the recycling and demolition enterprises in order to be in line with current legislation. This has also included supplementing the guidelines with sections regarding how waste can be prevented during construction and demolition.

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<sup>87</sup> \* Measures marked with an asterisk are included in the National Waste Plan.

### **10.6.3 Systems for documentation**

There are several certification systems that address organising documentation of products built into new production (including product characteristics and content). These voluntary systems include various levels on how extensive the documentation may be. These allow choosing to document the products used in construction, or to go a little further and also document exactly where in the building a specific product or item is located.

## **10.7 Research and development needs**

The Swedish EPA and the various actors involved in the development of this programme, have identified the needs for research and development. Some of the proposals are also originating from the stakeholder consultations. The proposals will be used as a foundation for the continuing efforts of the Swedish EPA and other stakeholders involved.

- Develop new techniques and tools for demolition and disassembly.
- Research and development related to so called 'repurpose' during demolition and renovation – which involves reusing material for a different purpose.

# 11 Networking in the Electronics Industry

**The environmental impact of the electronics industry can be reduced. This requires high-quality electronics that contain less quantities of hazardous substances – products that can be repaired, and can be easily upgraded to extend their life span.**

## 11.1 The situation today

Electronics<sup>88</sup> of all kinds are currently part of everyday life, and many times are a prerequisite for both daily and working life in our modern world. Sweden has, in comparison to other countries, a high recycling rate of electronic waste. It's good that this material is utilized, but still, our present consumption of electronics is unsustainable. We can do better by using these products longer. A consequence of the current fast pace of the technological development and intensive marketing is the significant amounts of electronics that are discarded long before the products have become unusable. In Sweden, roughly 23 kilograms electronics are purchased annually and about 18 kilograms<sup>89</sup> per person becomes waste. Every year not less than 160.000 tonnes of electronic waste is collected.

Each new electrical and electronics product that is purchased causes an environmental impact – throughout the whole lifecycle chain until the waste treatment stage. Production of electronics is highly resource intensive requiring significant amounts of raw materials, fossil fuels, chemicals and water. Every kilogram of newly produced electronic equipment generates nearly 24 kilograms of climate gases<sup>90</sup>. Much of this production also takes place in countries with weak environmental regulations, and where clean water is a scarce resource. Electronics are also a complex type of waste due to the varied types of hazardous substances and components they contain. Electronics can contain various plastics, metals, glass fibre, rubber and more. Moreover, these materials are often combined in a way that makes separating them from each other very difficult when the product is discarded and must be processed as waste. Therefore, even though most of the electronic waste generated in Sweden is collected, the resources this waste contains cannot be

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<sup>88</sup> The programme defines electronics as both electrical and electronic equipment.

<sup>89</sup> Electronic waste is defined in the programme as waste from both electrical and electronic equipment.

<sup>90</sup> Miljöpåverkan från avfall, Underlag för avfallsprevention och förbättrad avfallshantering, rapport B1930. IVL Svenska Miljöinstitutet (Environmental impact of waste, (2010), David Palm and Jan-Olov Sundqvist, IVL). The range of greenhouse gases released from manufacturing electric and electronic products varies widely depending on the type of product. Production of some products generates little, while other products generate many times the amounts.

reused or recycled to an appropriate extent. These resources must be recovered in some way to reduce the need for virgin raw materials.

There are many combining driving factors that has effect on the electronics. One of these drivers is that electronics have become cheaper, which combined with rising disposable household incomes, makes these products more affordable.

Three additional significant incentives also contribute to such buying<sup>91</sup>. The most important of these is that social pressures basically require us to maintain a minimum domestic technical standard – such as common functions like ordering travel tickets or declaring income taxes. As well, electronics enable us to obtain new experiences like watching movies online, search for information, or find out what a distant friend did at the weekend using social media. The third incentive is that for many people electronics is used for expressing their personality, and who we want to be in relation to others. In that way, we reinforce our identity by buying electronics.

Chemical substances, many with hazardous properties, are used to provide these electronics with their specific function. Examples of substances used in electronics include various metals and brominated flame retardants. Cases and other parts made of plastic may contain plasticisers. In particular, when these electronics turn into waste, the substances can become a hazard to human health or the environment, especially if the waste is not properly treated. The Arbetsmiljöverket (Swedish Work Environment Authority) has found that employees of pre-treatment and recycling facilities for electronics in Sweden may be exposed to such levels of lead, cadmium, and mercury that require periodic medical testing<sup>92</sup>.

Using hazardous substances can also make recycling more difficult and result in hazardous substances in secondary raw material. Both humans and the environment may be exposed to hazardous substances during production. Also, users of the products may come into contact with hazardous substances, for example when products emit brominated flame retardants into indoor air or when a low-energy lightbulb breaks, releasing mercury.

### **11.1.1 Current activity in the priority area**

#### **Amended WEEE Directive and new ordinance**

The government assigned the Swedish EPA to determine how to implement into Swedish legislation the amended Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE). The purpose of the directive is for product design

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<sup>91</sup> Drivkrafter bakom uppkomsten av elavfall, Ett produkt- och konsumtionsperspektiv, rapport 6675, Naturvårdsverket (Drivers behind passage of the WEEE Product and Consumption Perspective regarding the turnover of electrical and electronic products, (2013), Conrad Luttröpp, Miriam Börjesson Rivera and Greger Henriksson).

<sup>92</sup> Kemisk exponering och hälsorisker vid hantering av elavfall, kunskapsöversikt, (2012), Arbetsmiljöverket report 2012:17 (Chemical exposer and health hazards in processing e-waste).

and production to be resource efficient and prevent waste as well as imposing producers to take responsibility for their equipment when it becomes waste. An amended ordinance covering electronics producer responsibilities is expected to come into effect in 2014.

### **Review of the RoHS Directive**

The EU Directive 2011/65/EU<sup>93</sup> on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) bans the use of lead, mercury, cadmium, hexavalent chromium and the brominated flame retardants PBB and PBDE in electronics. Sweden has proposed to restrict additional substances. A review of the substances restricted in the directive is under way and the commission is expected to pass the legislation in July 2014 regarding additional substances to be covered under the directive.

### **Eco-design and energy marking**

The EU Eco-design Directive for Energy-related products and the Energy Labelling Directive are important tools to reduce energy use by 20% by 2020. The requirements for eco-design<sup>94</sup> state that future products must have a specified energy and resource efficiency to be used in the EU. The energy labelling requirements provide clear consumer information about the energy efficiency of electronics, enabling customers to make an active choice. These directives address ‘energy-related products’, which has until now highlighted the energy consuming characteristics of these products during use.

These directives also enable regulation of other environmental parameters, such as resource efficiency, chemical content, and information concerning waste management. Such parameters have also been included in the implementing measures, as with the requirement concerning information about mercury (in the household lamp ordinance)<sup>95</sup> and requirements on life span in the vacuum cleaner<sup>96</sup> and the lamp regulations.

The EU Commission is working on several initiatives to formulate requirements for resource efficiency in relation to eco-design, which may be related to waste prevention. The extent to which the resource efficiency parameters will be included

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<sup>93</sup> The restrictions in the first RoHS Directive (2002/95/EG) came into force in 2006. As of 2013, the entire directive was replaced with a new version (2011/65/EU), which was implemented in Swedish regulation through the Ordinance (2012:861) on hazardous substances in electrical and electronic equipment and the KemI Regulations (KIFS 2008:2) Regarding Chemical Products and Biotechnical Organisms.

<sup>94</sup> In waste prevention contexts and efforts, the term eco-design is generally used. For example, in the Waste Framework Directive Appendix IV, this is defined as: systematic integration of environmental aspects in the design of products in order to improve environmental performance throughout their life cycle. Another way to describe eco-design as ‘green product development’. This section refers to the EU Eco-design Directive, but related efforts are not limited to the products and environmental aspects stated in this directive.

<sup>95</sup> Commission Regulation (EC) No. 244/2009.

<sup>96</sup> Commission Regulation (EU) No. 666/2013.

in future product regulation under the Eco-design Directive is still unclear. Taking Commission initiatives into account, the reasonable assumption is that there is a relatively strong interest in expanding these considerations.

## 11.2 Long-term objective for electronics

- No later than 2020, pre treatment operators and recyclers of e-waste will have access to appropriate information regarding product composition and their content of hazardous substances as compared to 2014.

See the overarching long-term objectives for phasing out substances of very high concern and access to information about health and environmentally hazardous substances in section 7.3.

**Comment:** Setting a target for reducing volumes of e-waste is desirable, but the current statistical basis for this is inadequate. Waste prevention efforts for e-waste are in their early stages and additional targets and measures will be drafted in the next waste prevention programme.

## 11.3 Monitoring the objective for e-waste

Monitoring these objectives will be followed up using questionnaires to pre treatment operators and recyclers of e-waste regarding their needs for and access to information regarding composition of electronics products and their content of hazardous substances. The Swedish EPA is responsible for monitoring these indicators.

## 11.4 Strategies

The Swedish EPA plans to use five strategies in waste prevention of e-waste.

### 11.4.1 Improve information regarding the content of electronics

Information is needed regarding the performance and content of hazardous substances in electronic equipment. Supervisory authorities need to be enabled to set requirements for purchasing and procurement, and to ensure safe processing throughout the product lifecycle. Currently, producers are required<sup>97 98</sup> to provide information on the location of hazardous substances within the equipment. Producers also must provide information about the equipment's content and composition

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<sup>97</sup> § 19 Ordinance on producer responsibility for electrical and electronic products (2005:209), Article 15.1 Directive 2012/19/EU on waste of electrical and electronic equipment (WEEE).

<sup>98</sup> Producers of electrical and electronic products are those who manufacture and/or import such products to place them on the Swedish market. These have what is defined as producer responsibility.

as far as it is needed from an environmental and health perspective to facilitate maintenance, upgrades, repairs, and reuse and waste management.

This information must be made accessible to professional waste treatment facilities and others who will reuse these products. Requirements also hold resellers liable to notify whether the products contain more than 0.1% of any Substances of Very High Concern (those included in the Candidate List of substances in the EU Reach Regulations). Producers must be better in compiling and providing this kind of information in order to increase awareness of the products' contents and to ensure the information is available for use in other contexts. It is still important to ensure that the information is appropriate for this purpose.

#### **11.4.2 Pursue the issue of waste prevention in appropriate EU legislation for electronic products**

Examples of important areas for development include resource efficiency, product design and further phasing out of hazardous substances and should be pursued in efforts to develop EU legislation.

#### **11.4.3 Increase life span (technical life span and actual time of use)**

More companies in the electronics industry must use eco-design, that is, green product development, when designing their products. Electronics should have a high quality from the beginning and be designed to have longer life spans, enabling upgrades and repair, and when they are finally discarded, the material must be recoverable. For greater resource efficiency, users must be steered toward becoming better at not discarding or replacing products that still function.

#### **11.4.4 Increase reuse**

It is important to make public agencies and enterprises aware of the possibilities and advantages of reusing products and improve structures for collecting electronics for reuse, from businesses to organisations and households. As well, markets and business models must be developed for selling used electronics. To encourage reuse of electronics, criteria are needed for assessing used products to determine their suitability for reuse, as in regard to energy consumption, electrical safety and the content of hazardous substances and components.

#### **11.4.5 Reduce the content of hazardous substances in electronics**

In order to reduce the environmental impact electronics cause, they must be designed free from hazardous substances. More of these substances must be phased out from use, through either regulatory measures or through voluntary initiatives of the industry. New materials and components must be developed using the substitution principle, in which hazardous substances are replaced with non-hazardous. Strategies to achieve this include supporting EU efforts to restrict additional sub-

stances under the RoHS Directive, support international efforts within CiP (Chemicals in Products) led by the UNEP, and maintain open dialog with the electronics industry.

## 11.5 Measures for electronics

### 11.5.1 What the Swedish EPA plans to do

- Draft additional objectives and measures for the electronics field.
- Determine the information needs of the recycling industry from producers regarding products' content of hazardous components and substances. Use these results to guide producers regarding the substances they must provide information on and how that information must be made available<sup>99</sup>.
- Survey public attitudes toward reusing electronic.
- Increase cooperation between agencies, like the Swedish EPA, Swedish Chemicals Agency, and Swedish Energy Agency, to coordinate efforts in preventing e-waste.
- Consider starting a network of actors and authorities involved with electronics products to increase awareness and know-how regarding waste prevention, support innovative efforts and disseminate information of good examples.
- Arrange a workshop for actors and related authorities to cover the concept of waste prevention of e-waste.
- Develop better statistics on volumes of e-waste generated, as through reviewing the possibilities to collect voluntary information from pre-processors on the volumes they run annually.
- Pursue measures within the EU to ensure that environmental aspects such as longer durability, repairs, and content of hazardous substances are considered in the design of new products<sup>100</sup>.\*

### 11.5.2 What the Swedish Chemical Agency plans to do

- Contribute by providing basic data to EU Commission reviews of restricted substances under the RoHS Directive. The analysis of these substances must also include health and environmental hazards, and aspects related to improving reuse and material recycling. The Swedish EPA can contribute in this with their views.

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<sup>99</sup> This measure is linked to the requirements in § 19 Ordinance on producer responsibility for electrical and electronic products (2005:209) and Article 15.1 Directive 2012/19/EU on waste of electrical and electronic equipment (WEEE).

<sup>100</sup> \* Measures marked with an asterisk are included in the National Waste Plan.

- In the Action Plan for a Non-toxic Daily Environment, engage industry in dialog to identify and reduce health and environmentally hazardous substances in electrical and electronic products.

### **11.5.3 Examples of what other stakeholders can do**

#### **Companies that manufacture or import electronic**

- Make/import equipment with longer durability which can be upgraded and repaired.
- Phase out hazardous substances, even those not covered under law.
- Improve internal information regarding the hazardous substances content in components and material as required under § 19 Ordinance on producer responsibility for electrical and electronic products (2005:209), and develop systems that enable this information to be disseminated throughout the entire distribution chain, including to waste processing.
- Develop new sustainable business models for e-waste prevention.

#### **Public Agencies**

- Provide a good example in regard to reusing electronics.

#### **Public authorities, companies and other organisations**

- Establish internal procedures to ensure functional products are reused internally or externally immediately after they are replaced or not used.
- Find partners to manage discarded electronics for restoration and reuse.

## **11.6 Good examples in electronics**

### **11.6.1 The Håpla Project (Sustainable Recycling of Flat Panel Displays)**

The Håpla research project involves collaboration between over ten partners from the electronics and recycling industries, and researchers to create systematic solutions for sustainable recycling of flat panel displays. The project also developed guidelines for eco-design, environmental labelling, and laws for LCD products.

### **11.6.2 Design for recycling**

Current efforts include developing methods for electronics designers to use in product design to facilitate recycling. This is a collaborative project between recycling enterprises and universities.

### **11.6.3 Renting**

Several companies have rental operations for electronics products, such as gardening equipment and tools. It is better to rent or borrow equipment used only rarely rather than buying something that must be stored unused.

### **11.6.4 Internal reuse and recycling programmes**

Several larger electronics producers have their own internal exchange programmes where replaced products are treated and assessed either for reuse or recycling.

### **11.6.5 Sustainable IT – new business models**

There are several companies specializing in buying used electronics, primarily computers, and extend their life span by upgrading them and reselling.

## **11.7 Research and development needs**

The fields where research and development are needed have been identified by the Swedish EPA and collaborating actors in drafting this programme. Several proposals were submitted from public comment. The proposals are intended for use as a basis for the continuing efforts of these parties.

- More collaborative research between the electronics industry, the recycling industry, and researchers into eco-design, or green product development, for the purpose of reducing environmental impact throughout product life cycles.
- More courses covering eco-design of electronics and higher educational institutes.
- Establish criteria to assess used electronics to avoid conflicting objectives in regard to differing environmental aspects, as between life span and energy efficiency.
- More research on what steers consumer consumption patterns, and how to make consumption more sustainable.

## 12 New Policy Instruments needed

**National policy instruments are needed as drivers to encourage development toward continued improvement. In developing this waste prevention programme, the Swedish EPA studied several policy instruments to determine whether they are suitable for reducing the amounts of waste and content of hazardous substances in waste. One of the measures proposed in this programme is further investigation of policy instruments. As the Swedish EPA identifies suitable policy instruments, these will be presented to the government.**

Waste policy and current policy instruments is moving waste from landfills towards energy and material recovery. Future policy instruments must be aiming higher in the waste hierarchy, towards waste prevention.

### 12.1 Measures and Policy Instruments – different approaches

**Measure** – physical or behavioural change aimed at achieving a specific objective.

**Policy instruments** – governmental tools for implementing these measures.



Figure 6: Schematic intervention chain<sup>101</sup>.

Figure 6 illustrates how political decisions on policy instruments are implemented. The first stage is identifying the desired objective or the problems to resolve. Next, policy instruments that can encourage or force these changes must be identified. Lastly, assessment is needed of the physical or behavioural changes (i.e. measures) required to reach the objective. The chain can be explained with this example on reusing and repairing furniture:

- **Objective:** Reduced environmental impact from housing through increased reuse of furniture (better resource management and less use of

<sup>101</sup> Steg på vägen - Fördjupad utvärdering av miljömålen, (2012), Naturvårdsverket. Rapport 6500. In-depth Evaluation of the Environmental Objectives (2012).

chemicals and materials, reducing environmental impact through decreased production).

- **Policy instrument:** Tax deductions for labour costs in repairing furniture. The policy instrument is meant to encourage consumers to have their furniture repaired instead of discarding them.
- **Measure:** More individuals shall repair and reuse furniture.
- **Effect:** Assessing the effects of policy instruments can be difficult, especially when no previous information for similar policy instruments is available. It is therefore important to follow up and evaluate those implemented.

## 12.2 Types of Policy Instruments

Policy instruments can be divided in different categories. We will use the same categories as in the in-depth evaluation of the environmental objectives from 2012<sup>102</sup>:

- **Legal or administrative policy instruments** – can be objectives, threshold values, regulations, considerations of applications and inspection and enforcement.
- **Economic policy instruments** – include taxation, fees, grants, subsidies, container deposits, and trading licensing rights.
- **Information** – is used both to achieve results and to give feedback on results, e.g. eco-labelling, guidance, education, and advocacy.
- **Research** – research, development, evaluations of technology and systems.

It is often difficult to create a policy instrument that encourages or compels all the measures required to achieve an objective. Often a combination of different types of instruments is needed, along with voluntary initiatives.

## 12.3 Synergies and Conflicts in Objectives

Policy instruments are used in many areas e.g. to create jobs, a safer work environment, economic growth, and environmental protection. There can be both synergies and conflicts between objectives in different areas. Policy instruments can therefore have a reinforcing effect, but also work against each other. The examples below illustrate these examples of synergies and conflicts between different objectives and policy instruments.

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<sup>102</sup> Steg på vägen - Fördjupad utvärdering av miljömålen, (2012), Naturvårdsverket. Report 6500 (Steps on the road – Detailed assessment of the environmental objectives).

### **12.3.1 Waste amounts**

Waste prevention often has synergies with objectives on energy savings and decreased impact on climate. If less new material is produced, then less energy is used and emissions from production decrease. One example of a conflict between objectives is that newer electronic goods is generally more energy efficient. Therefore emphasis on durability in these products isn't necessarily the most environmentally friendly option.

Our consumption of electronics affects our use of resources and impacts the environment. There are (political) initiatives that may both increase and decrease society's impact on the environment. Two examples are the increased availability of e-services, which in essence requires every household to have computer and long distance communication equipment, which reduces the need to travel.

### **12.3.2 Hazardous Substances**

When amounts of waste are reduced, this can lead to a reduced need for producing new material. This, in turn, reduces the amount of chemicals needed to produce the corresponding amount of material. Therefore there is often a synergy between efficient material use and reduced emissions of hazardous substances.

Waste prevention also means reducing levels of hazardous substances in materials and products. Here, there may be conflicts with other areas. An example is the use of pesticides in treatment of fruits and vegetables. This can give a longer shelf life and reduce food waste, but still, these pesticides may have properties that are hazardous to both human health and the environment, and these may remain at residual levels in the food we eat.

## **12.4 Shaping Policy Instruments**

Swedish waste management policy has successfully reduced the environmental impact from waste treatment. Results from the research program Towards Sustainable Waste Management (section 12.5) illustrates the difficulties in designing policy instruments for waste prevention. Waste prevention requires policy instruments aimed at both production and consumption. When designing such, other political objectives, international trade agreements etc. must be considered.

The final desing of a political instrument is often a trade-off between several interests and given preconditions.

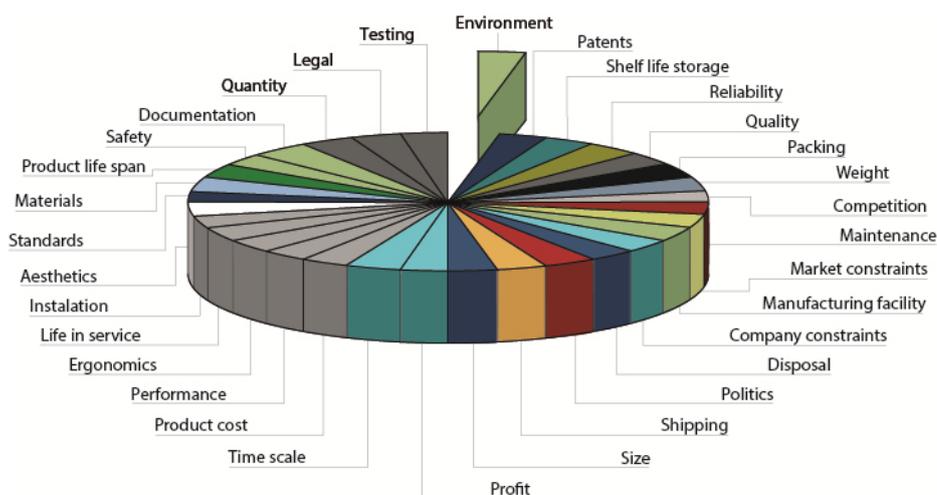


Figure 7: Graph illustrating the choices a product developer faces. They can be compared to the considerations and compromises necessary for the development of new policy instruments. (Source: Luttropp and Lagerstedt, 2006).

In our culture and society, **economic growth** has long been the highest priority. Therefore, environmental aspects are often weighted too lightly, as the full costs of environmental impact from production is not included in the price of a product.

Coordinating between policy areas is important to avoid unwanted side effects and/or to avoid that instruments aimed at waste prevention conflict with other policies or vice versa. Current efforts in the EU and other organisations to place a value on natural resources (such as environmental footprint) are important in achieving sustainable development,<sup>103</sup> from an ecological, economical, and societal perspective.

## 12.5 New Policy Instruments studied by the The Swedish EPA

Towards Sustainable Waste Management (*Hållbar avfallshantering*) is a six year long research programme financed by the Swedish EPA<sup>104</sup>. The researchers have developed a list of some sixty policy instruments that can contribute to better waste management and waste prevention.<sup>105</sup> Fifteen of these have been assessed in four forecasting scenarios. The policy instruments examined concern both waste prevention and increased recycling. The following list includes both types of policy

<sup>103</sup> Sustainable development: Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Our Common Future/Brundtland report, 1987).

<sup>104</sup> <http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6523-2.pdf>

<sup>105</sup> Nya styrmedel inom avfallsområdet?, (2009), Bisailon et al., KTH Arkitektur och samhällsbyggnad, rapport 2009:7.

instruments. Policy instruments evaluated by *Hållbar avfallshantering* (bold, indicates the researchers consider them interesting to pursue):

- Tax on raw materials.
- Tax on hazardous substances.
- Recycling certificates.
- **‘Advertising, yes please!’**
- **Reduced VAT for services.**
- **Negative labelling** of products containing hazardous substances.
- **Requirements/support for waste reduction** in companies.
- **Improved inspection and enforcement** of operations.
- **Weight based waste fees** (municipal policy instrument).
- Environmentally differentiated waste fees (municipal policy instrument).
- Consumer oriented collection systems.
- Climate tax on combustion of fossil fuels.
- Weight based tax on incineration of waste material.
- Electricity certificates for incineration of waste material.
- **Requirements on recycling of recyclable materials.**

The assessments show that each policy instrument alone can give 1 to 1.5% reduction in total amount of waste. The most important conclusion from the research program is therefore that we must use several policy instruments, preferably in combinations, and involve relevant stakeholders. Information is a necessary complement to almost all these policy instruments. But information alone is not enough to create change.

Even if the effects on total waste volumes were limited according to the assessments in *Hållbar avfallshantering*, the researchers believe it may be useful to develop some of them further.<sup>106</sup> The interdisciplinary collaboration has also led to proposals for new policy instruments that were not assessed in the research programme (such as taxing hazardous substances). The Swedish EPA will continue to investigate the proposals from *Hållbar avfallshantering* within our assignment to contribute to developing environmental policy.

The Swedish EPA has also commissioned reports on interesting policy instruments for preventing textile waste and waste from construction and demolition as part of the work of the Nordic Council of Ministers<sup>107,108</sup>.

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<sup>106</sup> These are marked above in bold.

<sup>107</sup> Material flows of textiles and suggestions on policy instruments for the prevention of textile waste, (2012), Tema Nord 2012:545.

<sup>108</sup> Assessment of initiatives to prevent waste from construction and construction sectors, (2011), Tema Nord 2011:533.

## 12.6 New Policy Instruments – Impact Assessments

While preparing this program, four impact assessments of measures and policy instruments were initiated. The impact assessments are meant to show whether these are socio-economically reasonable or not. The measures and political instruments assessed are:

- Tax deductions for repair services.
- Log books for buildings to show what types of materials are used in construction and saving this information for when the building is renovated or demolished.
- Lowered refrigeration temperatures in shops and households.
- Information campaigns for reducing food waste in households.

The measures and policy instruments that the Swedish EPA examined are more specific than those examined by *Hållbar avfallshantering*. The idea is to put together an palette of potential general and more specific policy instruments that could complement each other well into the future.

### 12.6.1 Lower Refrigeration Temperature in Stores and Households

Within the framework of this program, the Swedish EPA examined two ways of implementing this temperature change: 1) Shops using refrigerated display cases they already have; 2) Shops add doors to refrigerated displays, that don't have them already, or replace the display cases. If the shops replace their refrigerated display cases with newer, more energy efficient ones, it will benefit the environment.

In addition to the studies carried out in drafting this programme, the Swedish EPA further assessed the effects of lowering refrigerating temperatures in shops and households within the framework of the government assignment to reduce food wastage.<sup>109</sup> The results show that lowered refrigeration temperatures alone have little effect. To decrease avoidable food waste, the food supply chain also needs to change best-before dates, which must be controlled through regulations. Based on the four criteria used, lowering refrigeration temperatures alone does not have a significant effect in achieving the stated objective. The Swedish EPA will therefore not continue investivateing this policy instrument at this point (but possibly in a longer perspective).

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<sup>109</sup>The assessment was done by SP under the working name 'What effect can lower temperatures in the refrigeration chain have on avoidable food waste?' under the governmental assignment no. NV-00475-13.

### **12.6.2 Information campaigns**

The Swedish EPA has also assessed the socio-economic benefits of reducing food wastage through informational campaigns. Such campaigns can be carried out in connection with a reduction in refrigeration temperatures. A UK study shows that food wastage was reduced 13% during the three years a government information campaign was run.

The cost of a similar campaign in Sweden would be around 7 000 000 SEK/peryear. That is only a fraction of the yearly socio-economic gain from reducing avoidable food waste 13%, estimated at 6-8 billion Swedish crowns.

### **12.6.3 Tax Deduction for Repair Services**

The Swedish EPA has started to investigate the consequences of introducing tax deductions for repair services to make lower costs for households to have clothes and other items repaired instead of throwing them away to buy new ones. This could include items like bicycles, shoes, leather products, furniture, and electrical appliances. The impact assessment shows that it probably would be cheaper for households to repair if the price reduction comes from a tax deduction for repairs as opposed to lowering the VAT. It would also be beneficial if maintenance was included in the tax deduction, since it can be difficult to define what constitutes maintenance and as opposed repairs.

It is difficult to tell how much waste will be reduced given such a deduction. The waste reduction will likely be small since the types of waste included generate relatively small volumes. The socio-economic gains however would probably be large since the production of textiles and leathers, for example, have a larger environmental impact.

### **12.6.4 Building Log books**

For several years, KemI (the Swedish Chemical Agency) has discussed with industry stakeholders regarding the need for and consequences of introducing building log books. The Swedish EPA has continued studying the impact of adding requirements for the construction industry to document the materials used in construction. Several operators in the field already do this voluntarily. The log book is intended to make information from the construction phase available when the buildings are remodelled or demolished, to help identify the hazardous substances contained and which materials can be recycled. The Swedish EPA has not yet concluded the study, but will continue discussions about a log books with the industry and other central authorities.

## 12.7 How to Proceed

As one of the measures resulting from this program, the Swedish EPA will continue investigating options for policy instruments for waste prevention in coming years. This will be especially important if waste amounts and content of hazardous substances do not decrease as expected. We will analyse what policy instruments are most suited to achieve changes that we have identified as desired and/or needed in this program. We will also carry out impact assessments of the policy instruments to determine their socio-economic benefits.

Decisions on policy instruments concerning e.g. regulations and taxation are made by the government and the parliament. Suitable policy instruments will be presented to the government as they are identified by the Swedish EPA. During 2013, the Swedish EPA has presented proposals for milestone targets for reducing food wastage and textile waste. As a part of that work, the Swedish EPA has made impact assessments of the targets and measures.