

WEEE Directive in Sweden – Evaluation with future study

In the report “WEEE Directive in Sweden – Evaluation with future study” by the Swedish Environmental Protection Agency (2009) (The Swedish EPA) we have evaluated how the Swedish system for collection and recycling of E-waste works and why it works the way it does. The report also contains a future study describing the effects in case of conceivable developments for waste from mobile phones.

An overall conclusion is that the Swedish system works very well today. The collection level is among the highest in Europe with 16.3 kg collected waste per inhabitant and year. The level has increased substantially since 2002 (figure 1). In the report we establish that the cooperation between municipalities and producers, recycling centres and also the Swedish waste culture with households’ high awareness of waste sorting, represent the strong points of the Swedish system.

In the report we also identify a number of areas where there is a potential for improvement. They are: information, collection of small electric waste, collection in blocks of flats and small businesses, collection points at the producers, marking and follow-up, harmonised treatment requirements, additional contacts between producers and recyclers and mapping of hidden flows. There is also a need for prevention of illegal export. We have identified marking as a problem that needs to be solved if the WEEE Directive is to work up-stream as well as down-stream. The report is, among other things, based on interviews with stakeholders in the Swedish system.

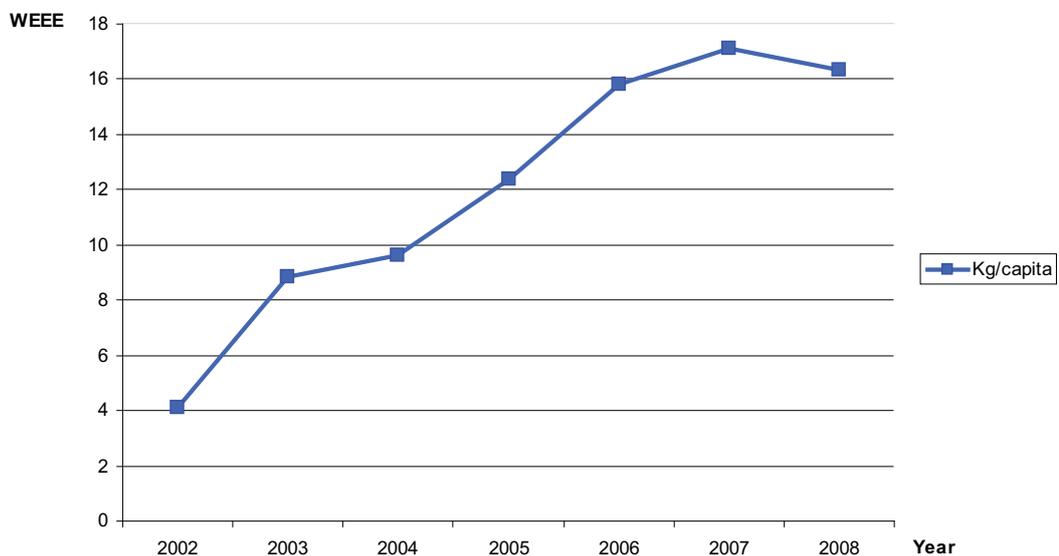


Figure 1. Collection of electric waste 2002-2008t. Source: El-kretsen AB, www.el-kretsen.se

The Swedish waste management system

The foundation of the Swedish waste management system is the municipal refuse collection obligation, established in Swedish law. It states that the local authorities of each of the 290 municipalities of Sweden are responsible for the management of household waste. They design their waste management work in accordance with the waste management policy adopted by the government and Parliament. The local authorities may put out all or parts of their operation to contract, but they are still responsible for administering the waste management in accordance with Swedish law. The Swedish waste management policy is founded on the waste hierarchy adopted by EU (figure 2).

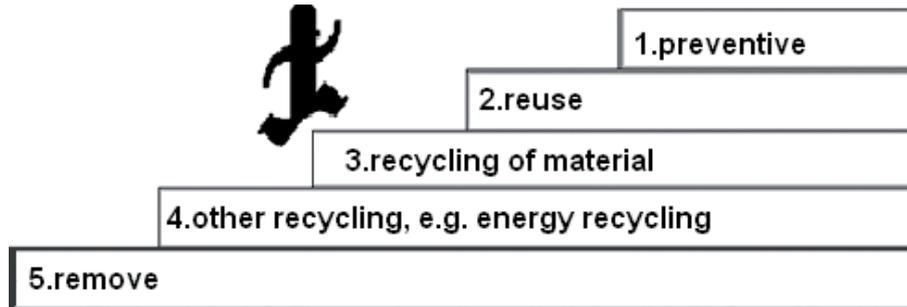


Figure 2. Graphic showing the European waste hierarchy.

The organization of the collection system

The Swedish collection system is originally based on an agreement between a producer organization, El-Kretsen, representing producers of electronic products, and the Swedish municipalities. The agreement was concluded in 2001, in connection with the implementation of the Swedish producer responsibility, establishing that the local authorities of the municipalities of Sweden will bear the costs of the collection of electric waste and El-Kretsen will bear all other costs. Thus assuring that the electric waste will be treated and recycled in accordance with the Ordinance. In 2008 the Swedish Association of Recycling Electronic Products (EÅF) was launched as a producer organization. EÅF uses its members' shops as collection points, but since those shops are not located in all municipalities, an agreement with El-Kretsen has been concluded. The agreement is a financial clearing agreement implying that EÅF will pay the same fee as other members of El-Kretsen for the part of their electric waste that is collected by El-Kretsen. A schematic representation of the collection system is shown in figure 3.

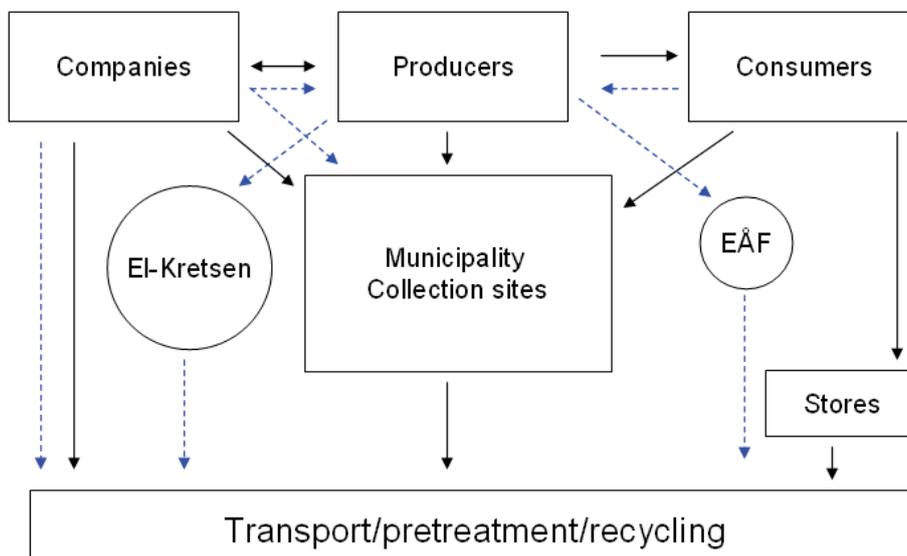


Figure 3. Flows of electric waste (solid arrows) and economic flow (dashed arrows) in the Swedish waste collection system.

Municipalities are allowed to make their own decisions regarding the organisation of the waste collection system. Consequently it may vary between different municipalities depending on the different conditions. Size of population, geographic size, types of housing, types of business and operation, are all factors that influence the design of the system. In some municipalities the local authorities choose to put out the waste collection to contract and in other municipalities the waste collection remains a part of the local organization. In some of the interviewed municipalities the reaction was that the control decreased when waste collection was put out to contract. Other and those municipalities where the local authorities had chosen to keep waste collection within its organization indicated the need for control a reason for this. In some municipalities the ambition level was discussed: "There are also differences in ambition between the municipalities, some municipalities have given priority to waste recycling and sorting more than others."

Registering and reporting

Companies manufacturing and selling or importing and selling any products included by the WEEE Directive must register with the Swedish EPA. Companies must also report quantities sold, quantities collected and treated for each calendar year, and report how the financial guarantee is arranged. The Swedish EPA handles the registration procedure concerning the WEEE Directive using the EE-register. This is an electronic reporting tool available on the website.

Producers that do not submit reports in time will be charged with an environmental sanction fee. The fee consists of 10,000 SEK for default or delay of reporting of quantities sold and 10,000 SEK for default of reporting of quantities collected and treated. Currently, some 1550 producers are registered in the EE-register. However, there are indications that there are some free-riders. At the moment there are not adequate resources available to find all free-riders.

MARKING

According to the Directive producers must mark (label) the products with the crossed-out wheeled bin symbol. The Swedish Ordinance states that the product also must be marked with a symbol indicating whether the product was placed on the market after 12 August 2005. Thirdly, details needed in order to identify the responsible producer must be applied on the product. Today there is no fully functioning marking system, neither in Sweden nor in Europe. Two out of four interviewed trade organizations were of the opinion that the marking condition is impossible to fulfill. However, the interviewed representatives of the material organizations do not agree with this. One of them believes that it is possible to fulfil the marking KRAVET, although complicated. The other believes that if the producers were forced to comply correct marking would be carried out. "If the Environmental Protection Agency made demands on them, then the market forces would solve the marking problem."

FINANCIAL GUARANTEES

In the autumn of 2007 the Swedish EPA drew up general guidelines on financial guarantees allowing four alternative insurance solutions. Here are some examples of how producers have chosen to solve the financial guarantee.

EÅF members use an insurance in order to assure the financial guarantee. In the insurance system the producer pays an annual insurance premium based on the number of products sold and the recycling costs of the products. The insurance premium, goes to a fund that finances the recycling costs for the electric waste of the producer. In case the producer goes into bankruptcy or leaves the market due to other reasons, the insurance company will continue to pay the recycling costs of the producer and thus assure that the producer will not become a free-rider.

El-Kretsen's financial guarantee has been subject to continuous transformation during the past years and consists of several different parts:

1. An operating capital ensuring their operation for one year ahead.
2. A blocked bank account consisting of a reserve fund to be pledged in favour of the Environmental Protection Agency. It assures the financing of the electric waste costs of the producer for the following calendar year.
3. A collective insurance agreement that guarantees that the producers' costs of electric waste management will be paid even in case the companies would go into bankruptcy.
4. A financial guarantee can also be solved collectively if:
 - a) the members of the system have an acceptable credit rating in relation to the total guarantee commitment of the members,
 - b) the system is not dependent on a minority of members,
 - c) the system has allocated sufficient funds in order to assure the financial guarantee.

Producers choosing to join El-Kretsen are also given the opportunity of being included by El-Kretsen's financial guarantee. They are allowed to choose other types of solution if they wish, as the white goods manufacturers have done.

VitvaruÅtervinning i Sverige AB, trade organisation of white goods manufacturers, represents almost 95 percent of all producers in product category 1. The members allocate money to a fund in the company. The financial guarantee consists of an insurance taken out using the members' fund as security.

Another financial guarantee solution is a blocked bank account. In this case the producer opens a bank account that is pledged in favour of the Swedish EPA. This solution is common for small companies that do not want to join any producer organization.

SUPERVISION

The Swedish EPA share the operational supervision responsibility for the producers' compliance with the municipalities. Supervision is carried out regarding registering, reporting, financial guarantee and marking. The local authorities of the municipality are furthermore responsible for the compliance of the local waste collection system with the requirements of accessibility and good service.

Hidden flows

No extensive mapping of hidden electric waste flows has been carried out in Sweden. There are proofs of the existence of these currents. An example of this is the case with a number of scrapped vehicles welded-up and filled with electric waste, caught by the German customs several years ago. Another similar case happened in the spring of 2008. At that time Swedish Customs stopped a vehicle which was full of electric waste, on its way to Ghana. Cases of this kind are not particularly common, but they do occur.

In interviews with local authorities, trade organizations, recyclers, administrative officials at the Swedish EPA and other experts, the following conclusions could be drawn:

- it is very probable that there is a leakage of electric waste from Sweden
- it is not possible to say anything about the proportions of the leakage
- it is very likely that the leakage between collection points and recycling companies is small
- it is very probable that electric waste disappears from municipal collection points
- it is not known where the leakage from the collection points goes
- it is not possible to say anything, with sufficient certainty, about possible leakages in other parts of the electric waste management system,
- it is possible that leakages could origin from companies public authorities and local authorities. In that case these flows could be relatively large.

Information

According to the Swedish Ordinance the local authorities are responsible for informing the households about the collection of electric waste in connection with other waste management information. A survey of Swedish local authority websites reveals that the local authorities have relatively little information on electric waste on their websites (figure 4).

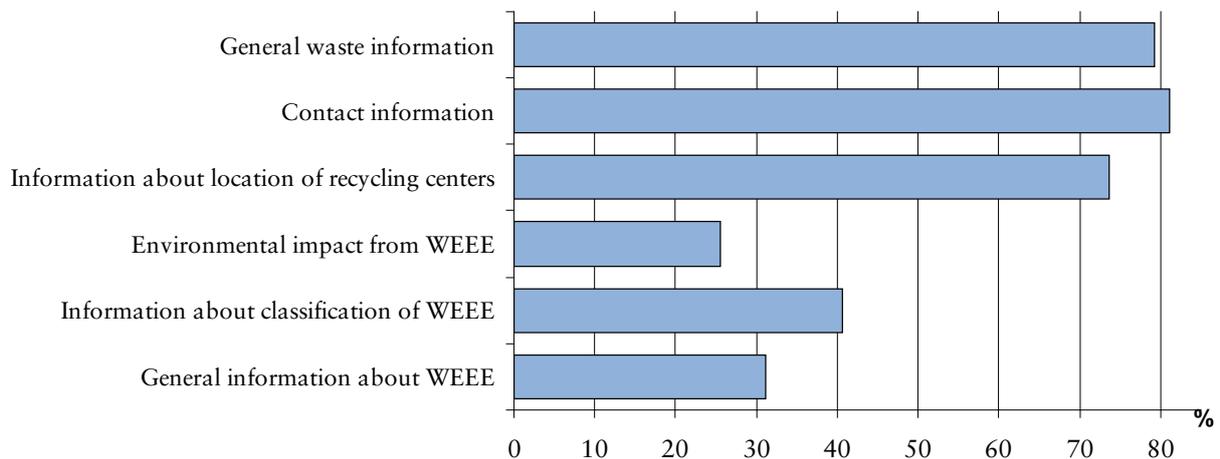


Figure 4. Information on electric waste on websites of some Swedish local authorities.

The majority of the interviewed experts describe the Swedes in general as very aware of the fact that electric waste should not be thrown into the refuse bin. Many of them explained this by saying that Swedes have a strong waste sorting culture that goes way back in time. Or as one of the interviewed expressed it: "On a Sunday there are more Swedes going to the recycling points than to the church." Furthermore nothing indicates that Swedish households, to any greater extent,

dump their electric waste. In one of the seven municipalities covered by our interviews, there is proof of dumping. According to the experts, the greatest problem is that waste from small appliances is left in the household waste. In 2008 a Swedish snap analysis showed that approximately 12,000 tons of electric waste, or 1.3 kg per inhabitant and year are wrongly sorted as household waste.

Why does the system work so well?

After the description of how the Swedish system works, an analysis of why the system has come to work as it does will follow. The processes which determine the outcome of a political effort, in this case the implementation of the WEEE Directive in Sweden, are often complicated networks of several concurrent factors.

A DETERMINED PATH

An important explanatory factor is that the process that preceded the WEEE Directive and the Swedish Ordinance had been going on during a relatively long period and with several active stakeholders. Both central and local administrative authorities and to a certain individual producers can be said to have participated in shaping the efforts. This way the establishment of the reform gained a legitimacy which facilitated the implementation and the acceptance. Furthermore the industry (the producers) was ready and the municipalities had a functioning collection system.

The introduction of producer responsibility for electric waste did not imply any change of direction but was in line with the prevailing view on waste and who was considered responsible. The Swedish legislation of 1998, that is to say the Environmental Code, in combination with the introduction of producer responsibility in 2001 had already determined the direction (figure 5). Nor was the matter of introducing producer responsibility a problem from a political point of view, since there was a common view on the matter.

When the producer responsibility was implemented in Sweden in 2001, the matter had been preceded by strong public opinion. The influence of the market on producers regarding management of hazardous or recyclable waste like refrigerators had a driving significance several years before the directive/Ordinance entered into force. Also, interest organizations had a positive influence on the outcome of how electric waste should be managed. Together, both these forces were a fruitful ground for the implementation of a set of rules and regulations by the public authorities. In Sweden Greenpeace and the Swedish Society for Nature Conservation were active.

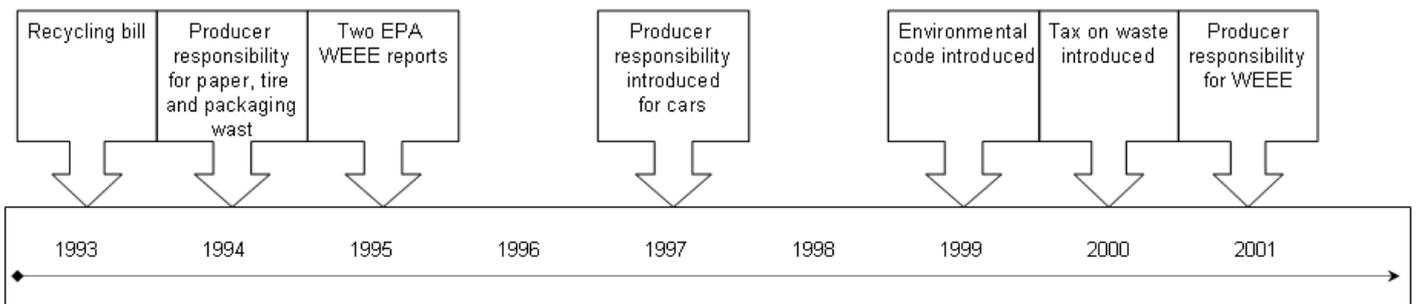


Figure 5. Timeline showing significant years of the historical background.

DEVELOPMENT BY DIALOGUE

Public authorities, agents, grass-roots bureaucrats and users were cooperating well, which probably explains the success of the Swedish system for electric waste. There was an understanding regarding the importance of the measure in all ranks, as well as ability, resources and desire to carry out the effort. An important risk worth considering is the fact that a dialogue in certain cases may result in that no work is being done on providing solutions, for instance regarding the issue of marking. The Swedish producers are generally well organized in different trade organizations and have the opportunity of engaging people who can work full-time with legal and strategic issues. The desire to work with the new set of rules and regulations is potentially high in trade organizations etc. They are able to use their knowledge and ability in order to pass on the information to their members, but if needed also in order to try to influence legislators.

The Directive allows the member states to make national adjustments. This means that indistinctness in directives in some cases may be intentional. The semantic indistinctness regarding the definition of producer provided some free scope for the Swedish interpretation. For Swedish authorities this provided an opportunity of gaining better control over the national market. If the directive had been more distinct, then the national interpretation would not have been possible. Whether this would be desirable or not is a question of interpretation.

Other parts which have caused discussions during the implementation step is the set of rules of marking and the financial guarantee. The realization of these aspects has varied. Certain technical complexity may be ascribed to the requirements for marking and financial guarantee, as well as to the EE-register. The solutions for the guarantee and the register have proven to be functioning well. In the case of product marking, the technical complexity could be an aggravating factor for the implementation. A functioning system had been built up by El-Kretsen and the municipalities. However, the WEEE Directive opened the way for new solutions and financing, changing the previous system. For the authorities it was probably difficult to foresee how the producers would choose to organize and find solutions. However, the public authorities have been working on adjusting, clarifying or anchoring everything in this direction.

There is a difference between the processes of implementation in local authorities and among producers. For the local authorities the implementation of the new set of rules and regulations did not imply any major changes, but for the producers it meant a major adjustment. Since electric and electronic products are subject to producer responsibility, this result was expected. A circumstance that became evident during the evaluation was the fact that the implications of the Ordinance was not something that could shock the Swedish producers. The awareness was already there.

CASE STUDY – MOBILE PHONES

Mobile phones in the drawer do not constitute any actual environmental problem, but when the metals in a mobile phone are recycled the demand for mining of virgin materials, associated with extensive environmental damages, will be reduced. The circulation of mobile phones in the system has been subject to examination in three different scenarios, varying in leakage and storage time. The scenarios are based upon sales returns for mobile phones during the period 2001 - 2007. In the business-as-usual-scenario the leakage amounts to 30 percent and the storage time to nine years.

Figure 6 shows the quantities of copper accumulated in Swedish households from mobile phones sales during the period 2001-2007. In the business-as-usual-scenario the accumulated quantity of copper amounts to a maximum of about 285 tons. A leakage reduction by 2/3 gives an accumulated quantity of copper of maximally about 310 tons.

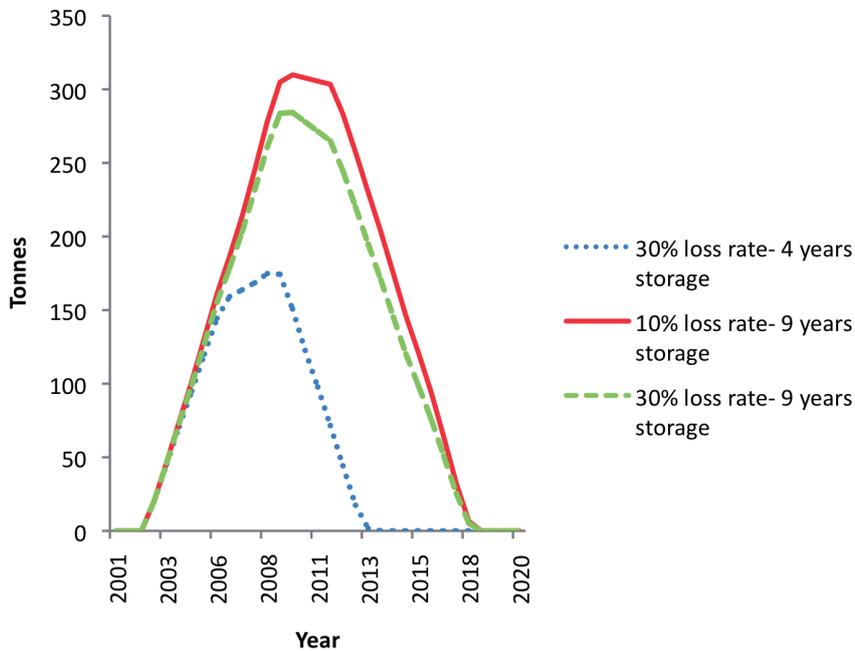


Figure 6. Accumulated quantity of copper from mobile phones stored in Swedish households.

ENVIRONMENTAL BENEFIT

The potential environmental benefit can be calculated from the accumulated quantity of copper. For one ton of copper recycled instead of mined out of virgin materials, the potential decrease of carbon dioxide emissions amounts to 20 (19,9) tons. Figure 7 displays the potential environmental benefit in reduced quantities of carbon dioxide emissions in the different scenarios.

CO2 reduction (ton)

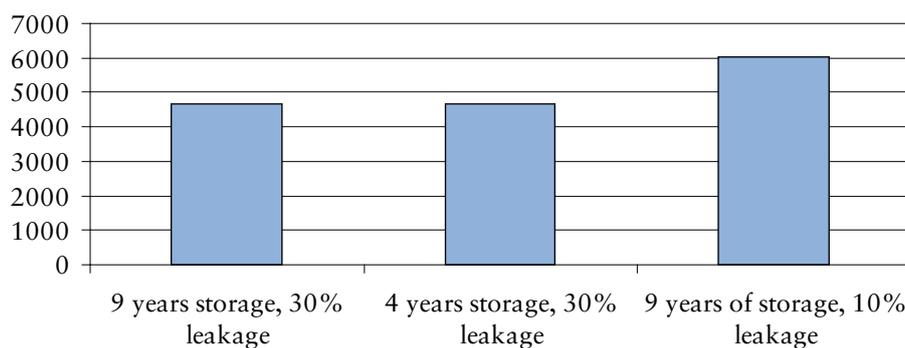


Figure 7. Environmental benefit from reduction of CO₂.

The estimation only takes into account potential environmental benefits in reduction of carbon dioxide from recycling of copper. Also recycling of other metal components from mobile phones would lead to substantial environmental benefits. Even though the quantities of these metals are smaller, their negative environmental impact per kg is much higher than the one for copper. The environmental benefit would also be much higher if the calculation took into account of a larger number of environmental factors associated with mining, for instance acidification, large quantities of waste, VOC-emission and changes in landscape.

The storage time has significance for the value of the potential environmental benefit. This is due to the fact that a benefit of today has a greater value than a benefit of tomorrow. With a discount rate of four years, the percentage environmental benefit coming from recycled mobile phone copper would be halved after 15-20 years (figure 8).

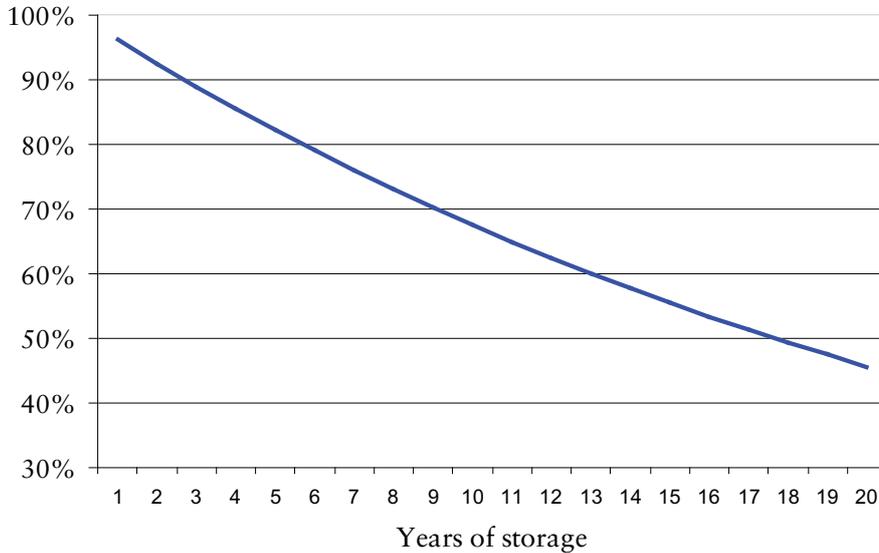


Figure 8. Percentage of Environmental benefit from recycled copper in relation to time of storage.

Figure 9 shows a sales forecast for mobile phones. In the forecast the number of mobiles sold is expected to increase until 2015. The forecast shows that a continuous sale of four million mobile phones per year leaves a constant storage of about 30 million mobile phones in Swedish households. This means that great quantities of metals impossible to recycle will constantly remain stored with the consumers.

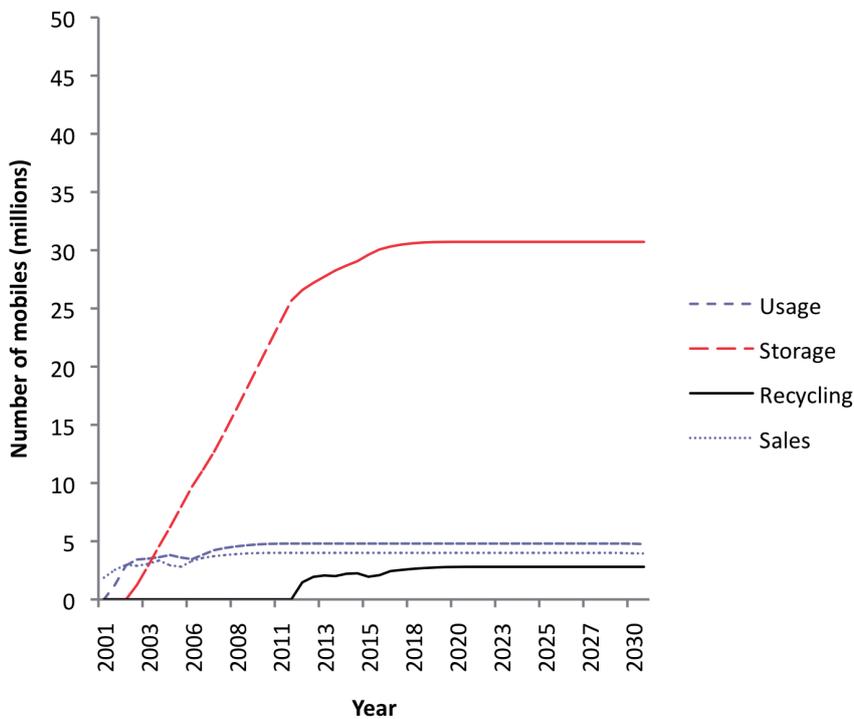


Figure 9. Scenario sales forecast of 4 million mobile phones per year by 2015.

References

- Naturvårdsverket (2009). WEEE-direktivet i Sverige – Utvärdering med framtidsstudie. The Swedish Environmental Protection Agency (2009). The WEEE-directive in Sweden – Evaluation with future study.
- SFS, Förordning (2005:209) om producentansvar för elektriska och elektroniska produkter. Ordinance on Producer Responsibility for electric and electronic products.
- United Nations University (UNU), 2008. Waste electrical and electronic equipment (WEEE). Final report. Contract no: 070104001/2006/442493/ETU/G4ENV.G.4/ETU/2006/0032
- Van Rossem, C. (2008). Individual Producer Responsibility in the WEEE Directive. From Theory to Practice? Doctoral thesis. The International Institute for Industrial Environmental Economics (Internationella miljöinstitutet). Lund University.
- Nordin, H. (2002). Miljöfördelar med återvunnet material som råvara. ÅI-RAPPORT 2002:1, Återvinningsindustrierna. Nordin, H (2002). Environmental benefits with recycled material as raw material. Report of The Swedish Recycling Industries' Association.

