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Miljørigtigt design af elektronisk udstyr

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Miljørigtigt design af elektronisk udstyr

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Indhold

Forord

Elektrisk og elektronisk udstyr (EEE-udstyr) fremstilles og markedsføres i stadig stigende mængder. Da levetiden for produkterne bliver stedse kortere, og prisniveauet for en stor del af produkterne er faldende, stiger mængderne af udtjent EEE-udstyr kraftigt – og dermed mængderne af elskrot (eller 'WEEE' - Waste Electrical and Electronic Equipment). Med det formål at forebygge og reducere mængden af WEEE, samt at fremme genbrug og genanvendelse for at mindske ressourceforbruget, blev WEEE-direktivet vedtaget i 2002. Direktivet er udformet efter producentansvarsmodellen, hvor producenter og importører skal tage ansvar for deres produkter også i bortskaffelsesfasen, og direktivet indeholder mål for tilbagetagning og nyttiggørelse af affaldet.

Med producentansvaret accepterer producenten sit ansvar overfor miljøet i design af produkterne, så der tilstræbes mindst mulige miljøpåvirkning i produktets livscyklus. Producenten accepterer samtidig sit reguleringsmæssige, fysiske og økonomiske ansvar for de miljøpåvirkninger, som produkterne medfører.

80 % af miljøpåvirkningerne fra elektriske og elektroniske produkter kan defineres og dermed modvirkes i designfasen, hvilket forklarer WEEE-direktivets særlige opmærksomhed på designfasen[1]. Imidlertid er forventningerne til forebyggelse via ændringer i design generelt ikke blevet indfriet med WEEE direktivet, hvorfor dette projekt har til sigte at vurdere mulighederne for at styrke denne del af de oprindelige ambitioner med direktivet.

Det overordnede formål med projektet er at fremme miljørigtig design af elektronisk udstyr. Projektets bidrag er at katalysere en politisk beslutning om styrkelse af det individuelle producentansvar i Danmark, for eksempel via ændret lovgivning eller ved fremme af målrettede initiativer.

Projektet er gennemført under ledelse af en styregruppe bestående af:
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Projektet er gennemført af PlanMiljø ApS ved Bjørn Bauer (projektleder), Ida Bode og Kia Egebæk, i samarbejde med Arne Remmen og Kasper Dirckinck-Holmfeld, Aalborg Universitet.

Læsevejledning
Rapporten er opbygget med følgende struktur:

- Kapitel 1 indeholder et idékatalog (på engelsk for at muliggøre international dialog om temaet) med ni initiativer, som kan styrke WEEE direktivets betydning for miljørigtigt design af elektronik. Idékataloget er udarbejdet på baggrund af litteratur, interviews og workshops.
- Kapitel 2 indeholder et forslag til praktisk gennemførelse og implementering af forslag 2 i idékataloget 'Miljødifferentieret allokering af WEEE-behandlingsomkostninger'.

[1] European Environmental Bureau; Analysis of the EuP, ROHS, WEEE directive - Designing greener electronic products.

I bilag findes:

- Beskrivelse af 19 mulige indsatser til at styrke WEEE direktivets betydning for miljørigtigt design af elektronik
- Kort redegørelse for de afholdte workshops
- Interviewrammen for forundersøgelsen.

1. Idea Catalogue – Potential regulatory initiatives

The purpose of the project has been to identify and develop regulatory initiatives with a potential to strengthen the ecodesign effect of the WEEE Directive.

The project has included the following activities:

- A review of literature (refer to the reference list)
- Interviews with key stakeholders in the European WEEE-context (refer to the reference list and Annex /Bilag 3)
- Three workshops with Danish and European WEEE-stakeholders (refer to Annex/Bilag 2)
- Preparation of a long list of potential regulatory initiatives (refer to Annex/Bilag 1).
- Selection of the nine most relevant regulatory options for detailed description (this section)
- Selection of the most promising regulatory option for analysis, in-depth description and discussion with stakeholders (section 2 of this report).

Selection of the most relevant regulatory options has been based on an initial assessment of three parameters:

a) The initiatives' potential environmental effect;
b) The initiatives' potential product design effect; and
c) The estimated administrative cost associated with the initiative.

The Steering Committee has selected the following potential regulatory initiatives for further investigation:

1. Differentiated fees in collective schemes
2. Environmentally based allocation of handling and recycling costs
3. Environmentally differentiated tax on EEE
4. Individual producer responsibility
5. Network for producers and recyclers
6. Green and innovative public procurement
7. Sharing information – RFID chip
8. Product Service System
9. Deposit and refund on small EEE.

Initiative 1 has been tested in real life in France and initiative 4 in Japan, whereas the remaining seven initiatives are fictional at this stage.

1.1 Differentiated fees in collective schemes

Firms are increasingly competing on the environmental quality of their products in response to consumers' willingness to pay a price premium for green, environmentally friendly goods. A differentiated fee on EEE products can strengthen the financial incentives for individual producers to improve the design of their products for reduced environmental impact at the end-of-life.

Manufacturing enterprises in general differentiate their products in quality to mitigate competition and increase profits, and a differentiated fee scheme will support this process in the direction of more environmentally friendly products. This has to be developed by all stakeholders in the life cycle of EEE, including individual producers, EEE trade associations, NGOs, treatment and recycling operators, and the national environmental authority in order to agree on an environmentally based differentiated fee structure.

In the new WEEE2-Directive (recital 23) there is a support for differentiated fees: "(...) Collective schemes could provide for differentiated fees based on how easily products and the valuable secondary raw materials that they contain could be recycled.(...)"

1.1.1 Previous experience

A Danish model for a differentiated fee scheme can find inspiration in the scheme in France with differentiated fees for the take-back and management of WEEE from private households implemented in 2010. The differentiation, which all collective schemes have agreed to, is based on product compliance with specific environmental criteria.

In order to reduce the amount and environmental harmfulness of WEEE, the French Ministry of the Environment in 2006 formalized a list of requirements for the approval of collective schemes.

Among the requirements was a differentiated compliance fee charged to producers (and passed on to consumers through mandatory visible fees) with the purpose of improving product design. The French collective schemes did not include the differentiated fee in their first operational period 2006-2009, but the Ministry of the Environment stressed that for the 2010-2014 permitting period collective schemes would be required to develop and initiate differentiated compliance fees as originally required in the approval agreement.

The group developing the differentiated fee system consisted of the French Producer Responsibility System (OCAD3E); the four collective schemes (ERP, Eco-logic, Eco-Systèmes and Récyclum); EEE trade associations; individual producers; charity reuse and repair organisations; NGOs; treatment and recycling operators; and the French Environment and Energy Management Agency (ADEME) – with observer status only.

A review of existing multi-criteria schemes for eco-labelling of EEE led to a simplified and pragmatic approach with a focus on EEE Categories 1-5 (Large Household Appliances, Small Household Appliances, IT and Telecommunications Equipment, Consumer Equipment, and Lighting Equipment), targeting one product type in each category and with only a single criterion for each (Van Rossem, 2010).

The criteria are focused on the 'end-of-life' of the products – for example repairability, reuse, and recyclability of household electrical and electronic equipment. The criteria and fee modulation amplitudes are shown in the following table, indicating especially an extra charge in case of unwanted substances:

Equipment	Modulation of criteria of the contribution	Amplitude modulation of the contribution
Cat 1: Equipment producing cold and refrigerant circuit	Presence of refrigerant fluid whose GWP > 15	+ 20 %
Cat. 2: Hoovers	Presence of plastic parts > 25 grams containing brominated flame retardant	+ 20 %
Cat. 3: Cell phones	Lack of universal charger (criterion applicable since publication of the international standard)	+ 100 %
Cat. 3: Laptop computers	Presence of lamps containing mercury **and** presence of plastic parts > 25 grams containing brominated flame retardant	+ 20 %
Cat. 4: Screens	Presence of lamps containing mercury **and** presence of plastic parts > 25 grams containing brominated flame retardant	+ 20 %
Cat. 5: Lamps	Exclusively LED source	- 20 %

French modulation criteria for five EEE categories and the corresponding differentiated fees.

ADEME plans to evaluate the initiative in 2012 and to expand the system to other product types (Fangeat, 2011).

1.1.2 A Danish model for differentiated fee

A Danish model for a differentiated fee scheme could learn from the French experience: keep it simple, involve stakeholders in system development, and begin slowly. Following an introductory period with single criteria for a few product groups, an evaluation will enable optimisation and expansion of the scheme.

The scheme can be initiated by the Danish EPA with reference to the WEEE Directive and the EU Road Map for Resource Efficiency. The scheme is developed as a voluntary agreement between the involved parties, and for this reason regulatory changes are not required.

By making visible the fee and the environmental performance of the affected products it is the ambition that conscious consumers will further extend the environmental impact of the system through deliberate selection of the most environmentally friendly products. Experience shows that the magnitude of this impact depends on price differences, awareness, information efforts, design issues, and several other conditions.

The existing collective collection and treatment of WEEE will continue without changes.

Environmental effect

With background in the WEEE Directive the requirements to the EEE's environmental performance should relate to reuse, recycling, and recovery of materials. The magnitude of the environmental effects depends on a number of factors, including the environmental criteria applied, the amplitude of the fee modulation and the actual fee amount, the information provided to the consumers, and the competition conditions. It should be noted that a focus on environmental characteristics already regulated through other initiatives (for example contents of mercury) could relatively reduce the effect of this initiative.

Effect on design
The French model has not yet been evaluated – but it has been deliberately constructed to support the ecodesign of EEE. The combination of visible rating of the products' environmental performance and (modestly) reduced costs for the environmentally superior products should lead to design improvements.

Administrative costs
The system requires manufacturers to assess their products against one criterion for each product group. Experience from France indicates that for some producers and importers this has caused some trouble, especially in relation to the products' contents of flame retardants. Based on the assessment, the required labelling is a relatively simple procedure. Administrative costs can be kept low by using the existing structures for payment of fees – for instance connected to the producers' reporting (and derived payment) to the collective scheme regarding amounts placed on the market. The existing collective collection and treatment of WEEE will continue without change.

Perspectives
The system appears to be relatively easy to design and implement, although some producers may face challenges in terms of achieving information from their suppliers on specific substances.

It has yet to be proven to which extent the initiative will lead to the desired outcome - more green design of EEE.

In the long term, increased differentiation in fee levels – for example reflecting the real costs of recycling of the specific product types (refer to section 2) – may lead to increased manufacturer interest for ecodesign. If additional environmental requirements are decided, the differentiated fee system could be combined with a RFID chip system providing ensuring an effective information flow and easy payment routines.

Broadening the scope of the initiative, the criteria for the differentiated fee could become part of the minimum performance requirements to the specific product groups in the Eco-design Directive. This will gradually allow authorities to sharpen the criteria for the differentiated fee so the incentives to cleaner product and improved end-of-life continuously maintained and expanded.

1.2 Environmentally based allocation of handling and recycling costs

This option is described in more detail (in Danish) in section 2 of this report.

Recycling of WEEE in Denmark is arranged with collective recycling schemes and division of costs according to market share – no matter the actual environmental characteristics of the specific product. But some products have a higher recycling value than other products; some contain hazardous parts or materials that are difficult or even dangerous to handle in the recycling system; and some products are just impractical or impossible to separate and therefore connected with considerable handling costs. The key in this initiative is to charge the costs of recycling of the individual products to the respective producers, hereby providing an incentive for green design.

Presently, the waste management and recycling costs for 'historical' WEEE delivered to the collective schemes are paid for according to each manufacturer's present market share – with no regard to the amount or environmental performance of previously marketed products or the costs of recycling of the products. By introducing easily controllable and simple environmental criteria for the different product groups, each manufacturer's/importer's share of the total recycling costs for the WEEE category could then be calculated based on a combination of amounts placed on the market and the products' environmental profile, expressed in a ranking.

1.2.1 Previous experience

There is no experience in Denmark or any other country with diversified allocation. The system may be inspired by the following reflections made by Kieren Mayers, an English researcher.

Illustrating this problem and approach, the following table showing the costs of recycling of specific types of WEEE in the UK in 2009-2011 demonstrates the variability in actual recycling costs depending on the products' environmental profile. The figure indicates the substantial difference between recycling costs for relatively similar products, for example laptops with mercury backlight or mercury-free backlight (marked with *italics*).

Recycling costs for selected EEE in the UK

Compliance category	**Product**	**UK**	
		Actual recycling costs per product type	**Actual PRO recycling compliance costs ***
Small appliances	Household appliances with batteries	£0/ton	£9.00/ton
	PCs & games consoles	£0/ton	
	Laptop (with mercury-free backlight)	*(£250)* /ton	
	Laptop (with mercury backlight)	*£180*/ton	
	Servers	(£150) /ton	
	Mobile phones	(£700) /ton	
Refrigerators	CFC refrigerant	£53/ton	£57.00/ton
	Propane refrigerant	(£100) /ton	
Displays	LCD with mercury backlight	£180/ton	£94.00/ton
	LCD with mercury-free backlight	£0/ton	
	CRT screen	£100/ton	
Large domestic appliances	e.g. microwave, dishwasher, washing machine	(£100) /ton	(£45.00)/ton

Source: Mayers 2011[2] – Recycling activities in the UK, excluding collection.

Figures in () are income.

* The price actually paid to the collective recycling system.

Note that these figures represent the cost of the present recycling system. If additional materials are to be extracted from the WEEE, the cost picture will be different.

Danish treatment facilities express interest in receiving more homogeneous e-waste fractions. Designed with the right blend of environmental criteria and financial diversification, the model can result in increased producer responsibility and motivation for green design.

The joint environmental organisation for IT enterprises in Denmark, 'IT Branchens Miljøråd', has expressed initial support to a model as described in this section (Bergrahm, 2011).

1.2.2 A Danish model for diversified allocation of WEEE handling and recycling costs

A Danish system with allocation of the total recycling costs between manufacturers according to the environmental profile of the marketed products will logistically continue as presently, but manufacturers placing environmentally harmful products on the market (e.g. causing high recycling costs) will pay a larger part of the total recycling costs than hitherto. In addition, green labelling of products will increase consumer interest in the best performing product.

[2] Mayers, Kieren: Implementing individual producer responsibility for Waste Electrical and Electronic Equipment (WEEE) in the EU through improved cost allocation; Presentation in Copenhagen, 12th November 2011 (PDF).

Environmental effect
The magnitude of the achievable environmental effects depends on a number of factors, including the environmental criteria applied, the amplitude of the allocation differentiation, the information provided to the consumers, and the competitive conditions.

Effect on design
The combination of visible rating of the products' environmental performance and (modestly) increased costs for environmentally poor products should lead to design improvements – but it is not possible to estimate the real impact of the initiative.

Administrative costs
The system requires manufacturers to label their product according to the set of criteria, but as simple and easily understandable criteria are used, labelling is a relative simple procedure that does not require thorough life cycle assessments. Administrative costs will be held low as the system fully works within the existing structures for payment of recycling costs. As the existing collective collection and treatment of WEEE will continue without changes, the environmentally based allocation does not imply practical burdens for the stakeholders.

Perspectives
The challenge of assessing the real handling and recycling costs is a serious one that implies considerable administrative problems as most actors in the value chain consider budgets and accounts as confidential material. Further, a precise assessment of the costs can only be carried out retrospectively, so the manufacturers may be required to deposit a guarantee that can cover the recycling costs when they occur. In the long term, increased differentiation in the allocation of recycling costs – for example reflecting the real costs of recycling of the specific product types[3] – will lead to increased interest in ecodesign by manufacturers.

If additional environmental requirements are decided, the system could be combined with a RFID chip system providing the necessary information throughout the complete value chain.

1.3 Environmentally differentiated tax on EEE

The use of environmental fiscal instruments has become quite common, in particular in OECD Member Countries. In recent years, several governmental tax commissions and research institutes all over Europe have proposed the implementation of further economic instruments.

Since 1980, total environmental tax revenues in the European Union (EU-15) have more than quadrupled in nominal terms and increased as a share of GDP. Energy taxes are by far the most significant, representing more than three-quarters of environmental taxes in 2001. Transport taxes account for 21% of total tax revenues (Eurostat, 2003a).

Most European countries have a goal of fiscal neutrality in the tax system as a whole and green taxes have been introduced without increasing the total tax burden. Introduction of green taxes is done in combination with reduction of other taxes, e.g. on personal income.

With an environmentally differentiated tax on EEE the state imposes a tax on environmentally harmful products. The system to a wide extent corresponds to the diversified VAT on luxury products existing in some Member States.

[3] Mayers, Kieren: Implementing individual producer responsibility for Waste Electrical and Electronic Equipment (WEEE) in the EU through improved cost allocation; Presentation in Copenhagen, 12th November 2011 (PDF).

1.3.1 Previous experience

In the Danish context, the scheme has similarities to the existing tax on portable batteries: producers and importers report the amount of batteries placed on the market (divided into five categories) to the Danish Tax and Customs Administration and are charged a fee per kilogram. All producers and importers are registered in the Danish Producer Responsibility System (DPA) and the reporting is controlled by the Danish Tax and Customs Administration, DPA-System, and the Danish EPA in cooperation.

In 1996 Denmark introduced a tax for the marketing of nickel-cadmium batteries, as an incentive to reduce the use of these batteries. This tax is one of the explanations for the significant reduction of the sale of nickel-cadmium batteries in Denmark, which has been seen in recent years.

1.3.2 Danish model for differentiated tax on EE

The system requires development of environmental criteria for each product group and assessment of each product against these criteria. As in the French system only one criterion for each product group could be pursued to simplify the system – refinements can be introduced at a later stage, if found necessary.

Depending on the magnitude of the tax difference - and all other things being equal - consumers will tend to buy the product imposed with the lowest tax, a trend that can be supported by information campaigns and labelling. If the effect on the market is measurable, producers will seek to design products complying with the environmental requirements.

All producers and importers are already registered in the Danish Producer Responsibility System (DPA) and the reporting on the new, environmentally differentiated categories can be established relatively easily. The enterprises will pay the tax directly to the Danish Tax and Customs Administration as other excise duties, and reports will be shared between DPA-System and the Danish Tax and Customs Administration (single registration).

Taxes have to be passed in the Danish Parliament, a more troublesome procedure than the administrative setting of differentiated fees in the producer responsibility system.

The existing collective collection and treatment of WEEE will continue without changes.

Environmental effect and effect on design
With background in the WEEE Directive the requirements to the EEE's environmental performance should relate to reuse, recycling, and recovery of materials.

Producers will be given an incentive to improve the design of their products in order to achieve competitive advantages: Reduced tax (for green products) and a green label (if labelling is also included in the system). The magnitude of the environmental effects depends on a number of factors, including the environmental criteria applied, the actual tax amount, the information provided to the consumers, and the competitive conditions.

Administrative costs
A key challenge for this option will be the always existing political opposition to new taxes. Lengthy discussions on the relevance and fairness (etc.) of the tax can be expected. On top of this, decisions on taxes have to be endorsed by the parliament and this may be a time consuming and resource demanding process for the EPA.

The system requires manufacturers to assess and label their product according to the set criteria, but as it is suggested to apply only one, easily understandable, criterion for each product group, labelling is a relatively simple procedure.

The business sector's administrative costs can be held low by using the existing structures for registration and tax payment. As the existing collective collection and treatment of WEEE will continue without changes, the tax implies limited practical burdens for the stakeholders.

Perspectives
The system with an environmentally differentiated tax on EEE appears to be relatively easy to design when it is decided. However, it should be considered if an environmental tax model provides enough flexibility for complex products such as electrical and electronic equipment - many products with a short time on the market and many products for which the environmental profile changes quickly.

1.4 Individual producer responsibility

The individual producer responsibility, IPR, in its complete version is a system in which products are returned from the consumer to the producers' own recycling facilities. The producers will pay for handling of their own products according to environmental requirements specified by national authorities. The Japanese 'Specified Home Appliances Recycling Law' (SHARL) comes close to such a model and can serve as inspiration for a Danish scheme.

1.4.1 Previous experience

The Japanese 'Specified Home Appliances Recycling Law' (SHARL) requires producers of certain EEE products – televisions, air-conditioning, refrigerators, and washing machines - to take back their own discarded products, dismantle them and meet reuse, recycling and recovery targets between 50-60 %. A major goal of law is the promotion of product design that facilitates waste reduction, recycling, and reuse. Retailers are required to deliver collected WEEE to regional aggregation facilities set up by producers and are permitted to charge consumers a collection fee to cover these costs.

SHARL was enacted in 1998 and fully enforced in 2001 as the second Extended Producer Responsibility (EPR) programme in the country that legally assigns part of the responsibility for the end-of-life management of products to manufacturers. The main driving forces behind the law were the scarcity of final disposal sites, a significant increase of WEEE in the waste stream, and the inadequacy of existing treatment plants for handling of WEEE.

In order to develop the physical infrastructure effectively, dominant manufacturers grouped themselves in two clusters and cooperated on the establishment of take-back sites, take-back networks, and recovery and treatment facilities. Each manufacturer possesses at least one treatment plant enabling them to compile and communicate information from the downstream to the upstream, accumulate knowledge, test and develop recycling technology, and collect knowledge on the actual cost of recovery and environmentally sound treatment. Exchange of information between different manufacturers' recycling plants and product design departments has taken place by way of periodical meetings among the personnel involved, seminars, via intranet, and through designers' visits to recovery plants. The costs of take-back, recovery, and treatment are reported to have been of an equal size for the prominent manufacturers.

SHARL is currently under review by the Japanese authorities; it appears that two additional product groups will be added to the scope in the revised law, namely tumble dryers and TV sets with LCD or plasma display.

SHARL creates a strong link between the downstream management of waste products and the manufacturers' design departments. Feedback reports from the recyclers encourage proposals for design improvements on issues such as material composition, ease of disassembly, and labelling and there are several examples of improved design initiated by the system:

- Several Japanese EEE manufacturers have made material substitutions to increase the recyclability of their products. NEC, Hitachi, Fujitsu, Matsushita and Sony have replaced plastic housings with magnesium alloy for TV cabinets and personal computers (due to low plastic recycling results).
- Matsushita, Sharp, Mitsubishi, Ricoh, and Hitachi have improved the recyclability of products through material unification and standardisation of types and grades of plastics used in products.
- Hitachi and Mitsubishi have designed products that are easy to repair and maintain, and Ricoh, Fujitsu and NEC have adopted modular designs to facilitate component reuse.
- Many Japanese manufacturers have implemented lead-free solders in advance of European law (Van Rossem 2006).

1.4.2 Danish model for individual producer responsibility

Discussions with stakeholders have made it clear that a Danish IPR system cannot establish separate logistical systems for different brands – it must rely on the existing collective collection system that can be expanded with new regional sorting/transfer stations to execute the brand separation.

In order to separate the different brands (especially for smaller goods), a brand recognition system like labels, RFID chip (see section 7), or bar codes, has to be implemented.

From the transfer station the products are brought to the producers' recycling facilities and the producers are responsible for the correct treatment of their products – and the costs associated with the treatment and recycling.

It is recommended to begin with a pilot system comprising one or a few consumer products that are easy to collect and distinguish (brand) - like washing machines and televisions.

The system will enable manufacturers to compile and communicate information from the downstream to the upstream, test and develop recycling technologies, and collect knowledge on the actual cost of recovery and environmentally sound treatment. Exchange of information between manufacturers' recycling plants and product design departments will pave the way for more eco-friendly products reducing the environmental impact of WEEE.

Environmental effect
By returning the brands to specific recycling stations the recycling processes and technology can be refined and a much more effective recycling system can be expected, valuable resources regained and pollution from residual WEEE scrap reduced.

Effect on design
The system gives producers a clear incitement to improve the design of their products in order to ease their recycling process and make it more cost effective.

Administrative costs
This proposal entails considerable administrative costs on the manufacturers as it requires several additions to the existing recycling system, including:

- Sorting processes and transfer stations must be established to separate the brands.
- Individual recycling plants (or recycling contracts with existing plants) must be established.
- Logistical systems must be arranged between transfer stations and recycling plants.

- Information systems between recycling plants and brand offices will be established to enable information sharing and improved design.

Perspectives
This option has limited perspectives in Denmark as the turnover in Denmark of even the largest producers does not make the establishment of efficient individual systems possible.

1.5 Network for producers and recyclers

A central argument in the above-mentioned initiatives is to establish closer linkages between recyclers and designers, providing recyclers with information on the contents and disassembly of products, and providing designers information on constraints for optimal recycling. This evident need for information exchange between treatment enterprises and EEE designers is supported with this initiative, focusing on the 10 % of manufacturers/importers that distribute 90 % of the total amount of EEE products.

1.5.1 Previous experience

The Danish Product Panel for Electronics was established in 1998 at the initiative of the Danish Environmental Protection Agency with the aim of initiating and carrying out activities that would reduce the environmental burden from the production, use, and disposal of electronic products. The Panel consisted of a range of stakeholders within the EEE and WEEE sectors.

The Panel initiated significant projects within the electronics sector. The Action Plan 2003 – 2006 had focus on consumer attitudes to environmental effects from electronics products with the aim of inflicting changes in consumer behavior and developing tools that allow consumers and professional purchasers to make environmentally sound purchasing.

Other Panel activities have resulted in new knowledge and tools related to the technical aspects of the electronic products - to be used by designers and the recycling industry. Further, the Panel has carried out a study on how the market, mainly private consumers, perceives the environmental aspects of electronic products, with the aim of formulating effective and targeted activities to stimulate market demand for environmentally friendly electronic products (Thestrup 2002). After 2006 the Panel was not granted further funds and was discontinued.

1.5.2 Danish model for a network or partnership

Utilising the experience from the Electronics Panel, a network can be established embracing the largest producers and the WEEE treatment enterprises under contract with the specific collective scheme. The coordinator establishes the network meetings or workshops concerning current environmental issues 2-4 times a year. The meetings could be dedicated to specific product types/treatment technologies for selected stakeholders.

Environmental effect and effect on design
The environmental impacts and the effect on design will be indirect and difficult to measure - but the knowledge exchange and personal contacts between producers and waste treatment facilities will without doubt be valuable with the potential of leading to closer cooperation, projects or innovative solutions linking design of products and resource recovery at treatment facilities.

Administrative costs
The administrative costs for the producers will be small. DPA-System or the collective schemes can function as coordinating bodies, and the largest producers and waste treatment enterprises can be obliged to join the network and contribute to the exchange of knowledge.

There is no need for supervision or control for the Danish EPA. The collective scheme could be responsible for annual reporting to the Danish EPA regarding activities within the network.

Bilateral cooperation
Another model will be to make it obligatory for all major manufacturers and importers to enter into direct dialogue with one or more waste treatment enterprises. This dialogue could become accurate and potentially have a higher outcome. Collective scheme will not be involved.

A partnership would require more interaction and administrative costs for the producers and the treatment enterprises. Potentially, the positive benefits from partnership will compensate the added administrative cost.

Perspectives
Based on the previous experience in Denmark and realising the obvious potential synergies, it appears promising that the actors could establish and maintain an informal network ensuring improved recycling of WEEE.

1.6 Green and Innovative Public Procurement

Public procurement constitutes around 16 % of all procurement in Denmark, and computers (and related services) is one of the largest product groups in Danish public procurement with a total of more than EUR 1,200,000,000 in 2008[4]. As documented in several reports prepared for the Nordic Council of Ministers there are evident possibilities for public procurement to support the ecodesign of EEE through green and innovative procurement[5].

1.6.1 Previous experience

The public sector is gradually realising its potential for directing manufacturing of important product groups towards more sustainable practices. The EU guidelines for green procurement of Office IT[6] and mobile phones [7] both entail significant support to ecodesign and improved recycling.

Also contributing to more sustainable public procurement and supporting ecodesign of EEE products are the two dominating ecolabels in Denmark, the Nordic Swan and the European Flower. The labels – among others – for EEE entail requirements for contents of flame retardants and other substances[8].

1.6.2 Danish system for IGPP of EEE

On top of these instruments that support the procurement staff's selection of 'the greenest product on the shelf', Innovative Green Public Procurement, IGPP, can add an additional aspect to the ecodesign impact of public procurement.

IGPP as a term covers public procurement activities that seek to stimulate eco-innovation through demands and interaction with suppliers and other stakeholders with the purpose of improving the environmental performance of products and services.

A Nordic study from 2008[4] identified computers and related products as one of the most promising sectors for IGGP in the Nordic countries – with a huge total volume of procurement and significant potentials for environmental improvements.

[4] PlanMiljø for Nordic Council of Ministers: Innovative Green Public Procurement of Construction, IT and Transport Services in the Nordic Countries. TemaNord 2010:529..
[5] PlanMiljø for Nordic Council of Ministers: Technology Procurement. TemaNord 2008/567..
[6] European Commission: First set of criteria
[7] European Commission: Second set of criteria
[8] www.forbrugerkemi.dk

Successful IGGP of computers and other EEE requires systematic identification of needs and timely and effective engagement with the market.

- A central precondition for enabling IGPP is extended communication with the complete value chain combined with thorough assessment of needs and technical/organizational opportunities.
- New models for tendering are needed. “Two step tendering” has provided valuable results in terms of integrating new technological and organisational solutions with environmental requirements:
  - Interaction and dialogue between the procurement organisation and the potential tenderers concerning needs, options/solutions, and possible ways forward.
  - The actual tendering process.
- In public tenders it is common to use technical criteria based on specific technical standards. To enable more eco-innovative solutions, performance based criteria constitute a useful alternative instrument, providing an “innovative room” for the supplier. An example of performance based criteria could be “lowest possible content of mercury in low-energy bulbs”.
- As for the other instruments described in this report there is a need for more knowledge on the most important environmental aspects of EEE, not least the EEE characteristics determining the options for and costs of recycling. Information from the recycling industry and EEE designers should be compiled and concurrently updated to secure that all stakeholders in the value chain, including public procurement staff, have sufficient information to demand the greenest possible product.

Environmental effect

The volume of public procurement of EEE and the environmental differences between traditional and green products clearly indicate a huge potential environmental impact of GPP and IGPP related to the handling of WEEE, including:

- avoidance of specific substances and chemicals
- reduction of the number of substances and materials in each product
- use of more recyclable materials.

Effect on design

IGPP's potential support to ecodesign of EEE depends on the volume of GPP and the relative importance of GPP within the different sectors. A joint requirement from the Danish public sector that only specific products are accepted could have significant ecodesign impact, for example:

- Cell phones with universal charger
- Laptop computers without mercury in lamps
- Lamps exclusively with LED sources.

Going beyond the performance and characteristics of existing products, IGGP implies an additional potential for influencing the design process through future oriented demands to products, for example:

- products without flame retardants
- products with easily recyclable screens
- products with a minimum of easy identifiable rare metals that can be recycled.

Administrative costs

The private sector's administrative burden connected with GPP and IGGP concerns compliance with the environmental requirements of the different schemes – and it is important to note that compliance with GPP and ecolabel requirements is completely voluntary for enterprises.

Related to basic GPP demanding products with the Swan or the Flower labels, enterprises already complying with these ecolabel criteria will face no additional challenges. By contrast, they will experience increased dividend for their environmental efforts.

Enterprises' challenge of entering into innovative procurement cannot be neglected - it requires innovative, administrative, and financial capacity and competence. However, still being a voluntary scheme, only enterprises with sufficient impetus will face this challenge.

Perspectives
Green public procurement is by many stakeholders considered one of the most promising tools for influencing the market and promoting environmentally friendly products, including EEE. A series of Danish GPP initiatives have been established and there are good options of expanding the sale of EEE causing less environmental impact.

1.7 Sharing information – RFID chip

RFID chip is short for Radio Frequency Identification, which is a contactless identification chip that can hold sufficient information for specific identification of products and product types. With RFID chips applied to electronic and electrical equipment, all actors in the value chain can in principle receive accurate and specific product information and thereby have the opportunity to handle and recycle the products effectively. The technology is available for several purposes and development projects are on-going in order gain experience in the field of recycling.

In view of the growing WEEE amounts, many experts are pinning their hopes on RFID as a means to reduce the number of computers, mobile phones, and other electronic products that are not recycled satisfactorily. The electronics industry can relatively easily utilise RFID for environmental purposes, as some valuable electronic items today are RFID tagged due to their value.

The RFID chip can in different ways improve the environmental handling of EEE in an end-of-life perspective. For instance, RFID can be used to sort objects automatically into desired fractions, allowing recyclers to apply specific recycling technologies and methods to each product group or sub-group – and charge the costs of recycling to the specific manufacturers. The chip can further be used to track radioactive waste or other specific WEEE fractions, to count product types or equipment from specific brands, or to ensure that the recycling of hazardous and non-hazardous components is managed correctly.

1.7.1 Previous experience

The RFID chip is already utilised for waste management purposes in Europe.

The chip is used in several cities' weight based waste management systems to report on individual households' waste amounts – hereby encouraging citizens to reduce the weight of waste[9].

In a multinational effort called the RecycleBank, the chip is used for rewarding consumers for actual recycling. The RecycleBank tracks how many pounds a household recycles and offers incentives such as coupons and discounts. RFID tags are applied to trashcans and the automatic reader on the truck registers the unique identification number of the trashcan and the weight of the recycled goods. The initiative established in 2005 and is claimed to have helped divert more than 36 million tonnes of recyclables from landfills[10].

[9] Discoverfid: Can RFID technology help the environment?
[10] Recycle bank: Home Recycling

1.7.2 Danish RFID system

With a shared information scheme in Denmark, the recycling of EEE products could be facilitated with the help of an international implementation of identification chips on larger / important parts of the products. If the parts are tagged according to their recycling value, waste management companies could sort waste materials more easily, increasing the overall rate of recycling. Thereby the different kinds of recyclables would "sort themselves" into separate bins via RFID instead of needing manual sorting.

An overall RFID system for all WEEE cannot be established in Denmark alone, as it requires all major producers of the products included in the system to tag their products with an RFID chip. A general Danish system can only be established as part of an international effort. If and when this becomes a reality, the RFID chip can support the different regulatory initiatives described. The Danish EPA could initiate together with other stakeholders an experiment with a specific product group in order to gain experience.

Environmental effect
With an RFID chip attached to EEE the treatment facility can get product specific information and increased options for sorting, resource recovery, and correct treatment.

Effect on design
Attaching an RFID chip to EEE will provide increased options for information flow between recyclers and manufacturers.

Administrative costs
A complete system with RFID chips on all EEE will require a major effort that does not necessarily match the environmental benefits. However, other benefits can be associated with this effort, such as tracking the product in case of theft. It appears sensible to begin with selected product groups and base an expansion of the system on thorough assessments of costs and benefits. The actual cost of the chip is constantly reduced, the present price of 0.02 – 0.25 DKK each is not prohibitive, but the costs and administrative burdens of the surrounding system is still a barrier.

Perspectives
In the short term it appears reasonable to believe that a RFID chip system can be introduced for more costly EEE products, serving several purposes. However, as the potential impact on the design process is limited, this option is not of paramount relevance for the present project.

1.8 Product Service System

Product Service System (PSS) means that focus is moved from the sale of products to the services that they provide, hereby opening for business models for decoupling of sales from the physical *goods*. The producers keep the ownership of the products (for example through leasing systems) and can at the end-of-life take the product back for enhanced reuse, recycling or resource recovery. Designing future products for PSS can make repairing, reusing and/or recycling an advantage for the manufacturer (White et al. 1999).

With the shift of focus from sale of products to sale of services, it becomes an competitive advantage to market reliable and long-lasting equipment – the longer service, the fewer items produced – and the better economic results for the manufacturer. In-use factors can be minimized with maintenance, whereas efficiency improvements and manufacturing burdens can be improved with product take-back and remanufacturing (Mont 2004). With leasing systems keeping the maintenance with the manufacturer/vendor is environmentally advantageous because the lessor retains special knowledge of its products and is in the position to make repairs and upgrade components, which

provides an opportunity for improved technologies to be installed on existing machines (Pongpech 2006; Desai; Purohit 1998).

The promotion of PSS is thus a possibility for reducing the amount of WEEE (longer lifespan) and facilitating closed loops of EEE equipment along with the direct individual producer responsibility.

1.8.1 Previous experience

In the business to business market, several types of equipment are often rented, leased, or sold with embedded services, maintenance and repair. XEROX pioneered the professional printer and photocopy market by applying such a concept for sale of office equipment, leading in the nineties to an extended take-back programme of their obsolete products. The XEROX system has been extended with services on document management (not only prints on paper), and XEROX offers optimisation of the interior office design in respect to placing of printers etc. (www.xerox.com).

Concepts such as ESCO, and chemical leasing / chemical management services, are gaining momentum as business models that alter the traditional focus by selling the functionality and thereby optimising the use of the product – often including the end-of-life phase.

In the business to consumer market, profitability is often related to the volume of items sold. For bigger investments and more expensive consumer goods such as cars and kitchen appliances, different pay options have been applied. From the consumer perspective it may appear as a leasing option, with a monthly payment, but as it does not change the ownership or the responsibilities of producers, it does not provide incentives for design changes.

The financial crisis has, however, caused an increased focus on leasing options, e.g. in the automobile sector. With leasing, the vendor keeps the ownership of the item and therefore in principle has incentives to optimise the product lifespan. But some evaluations have shown that leasing schemes often result in actual shorter product lifespan because consumers tend to expect relatively new equipment, causing the average product age to decrease over time (White et al. 1999).

Electrolux, a Swedish appliance manufacturer, estimates that 80% of a product's total energy consumption occurs during the use stage, and as the energy consumption during use is for most EEE a central environmental parameter, increased product turnover actually to a certain extent can be environmentally rational as newer products are often more energy efficient (Intlekofer et al. 2010). The gains, however, are reduced in the future as the improved energy efficiency decreases in absolute terms.

In 2004, the Austrian Government and UNIDO launched the Global Chemical Leasing Project. Chemical leasing forms part of UNIDO's strategy to assist enterprises globally in a variety of aspects related to Green Industry. Over the past few years, this innovative approach has been implemented in a number of different sectors, processes and countries. The first demonstration projects were successfully implemented in close cooperation with the National Cleaner Production Centres in several countries. Chemical Leasing is feasible for a broad spectrum of industry sectors, including, e.g., cleaning and purification; greasing or degreasing of parts; powder coating, etc. Chemical Leasing is a proven innovative instrument to promote resource efficiency and sustainable management of chemicals. It closes the material cycles between suppliers and users of chemicals and contributes to waste avoidance and minimisation.

1.8.2 A Danish model for product service system

The experience from product service systems is rather limited in Denmark, and therefore it is important to increase knowledge of the practical implications of PSS – especially when it comes to durability, maintenance, reuse, and recycling. Mapping the successful use of product service systems, environmental benefits and other benefits in different types of enterprises and describing

their cases are key elements of this initiative. A recent study for the Nordic Council of Ministers has outlined some of the experience within areas such as functional sale, Energy Service Companies (ESCO); Chemical Management System; Design, Build, Finance and Operate (DBFO), and product sharing (e.g. cars) – today also called collaborative consumption.

A survey of the benefits and limitations of product service systems will give producers a platform for considering the pros and cons of applying product service systems in their specific business sector. Most likely, it is more advantageous to lease large products (such as washing machines, refrigerators, etc.) than smaller products – even though some of the business models for mobile phones get rather close to a 'payment for the service' system. Options for tax exemptions or other motivating instruments to promote leasing and take-back systems could be considered.

Environmental effect
A private owner of a product can have difficulties in deciding whether or not it is profitable to repair a broken product or just buy a new one. In several cases, the price of repair equals the price of a new product, which of course is a way to increase sales, but also with the risk of losing customer loyalty. Product service systems can be a way to create incentives for maintenance, repair, take-back, durability, longer warranty, improved reuse, material recovery, etc. The potentials for eco-design of PSS and leasing are huge. If the manufacturers take back their own products, they will also get more feedback on design and therefore be more aware of the problems and of ways to improve the environmental performance of products.

Administrative costs
There is no administrative cost for producers involved and the design effects and environmental effects depend on the extent to which product service systems are diffused within different trades.

Perspectives
A strengthened trend towards product service systems will increase the amount of reliable, long-lasting, easily repairable and environmental superior equipment on the market. With the right incentives (for example from green public procurement) product service systems may very well gain terrain and contribute to reduced environmental impact of EEE.

1.9 Deposit and refund on small EEE

Extended Producer Responsibility (EPR) systems in Europe suffer from a very low collection rate of small appliances, for example mobile phones. This is not surprising as obviously it is easier to discard a mobile phone in the bin than a washing machine. Increased collection rates may be achieved by establishment of a deposit and refund system for selected small EEE products. An additional benefit will be the collection of more uniform fractions that can be recycled more effectively.

1.9.1 Previous experience

In Norway, the Minister for the Environment has commissioned a consultancy report in order to consider a deposit and refund system for small electronics to increase the collection rate of mobile phones and other small EEE[11]. The report concludes that a possible introduction of a deposit and refund system for small electronics in Norway should await testing of a number of other instruments to increase the collection rate within the current system.

[11] Baastad, Dag-Friis: "Utredning av obligatorisk panteordning for småelektronikk" 2012.

Deposit and refund on small EEE was already discussed in Denmark in 1995 and it was concluded that the instrument might work well on new products marketed in a considerable number and constituting considerable environmental risks[12].

1.9.2 A Danish deposit and refund system for mobile phones

A deposit and refund system for small EEE in Denmark should be based on the experience from the existing well-functioning deposit and refund system for beverage containers. A simple version solely covering mobile phones will – among others – face the following key challenges:

- A professional organisation with excellent logistics is necessary to ensure smooth operation of the system.
- Mobile phones for which a deposit has been paid should be labelled to ensure refund of the correct amount – and to avoid irregularities.
- The number of return points should be sufficient to enable consumers' easy return of the used products. Some resistance from retailers may be expected.
- The deposit should be of a magnitude providing sufficient incentive for consumers to return the product and cash in the refund.
- Optimal recycling of the collected phones must be established to secure consumer motivation.
- Long lasting and repeated information campaigns are necessary to make consumers understand and participate in the system[13].

Environmental effect

Presuming that a considerably increased return rate is achieved, a deposit and return system will provide increased recycling rates and enable more specialised and effective recycling of the mobile phones due to the large quantity of relatively similar products.

Effect on design

A basic deposit and refund system will have no impact on the design of mobile phones unless expanded with other instruments described in this report, for example a differentiated deposit according to environmental performance of the product.

Administrative costs

Establishment of an individual and independent deposit and return system for mobile phones is administratively complicated and will entail considerable administrative costs. It should be investigated whether a system can be arranged under the umbrella of the existing Danish Recycling System already managing the deposit and return system for beverage containers.

Perspectives

The lack of existing technological solutions to the collection task and the expected practical, administrative and financial challenges do not make a deposit system realistic in the short term, but it may be introduced if collection figures are not improved in the medium term.

[12] Miljøstyrelsens Arbejdsrapport 53/1995: Elektriske og elektroniske produkter.
[13] As mentioned in Miljøstyrelsens Redegørelse 4/1987: Pant.

2. Miljødifferentieret allokering - et middel til miljøoptimeret design

Elektrisk og elektronisk udstyr (EEE-udstyr) fremstilles og markedsføres i stadig stigende mængder. Da levetiden for produkterne bliver stedse kortere, og prisniveauet for en stor del af produkterne er faldende, stiger mængderne af udtjent EEE-udstyr kraftigt – og dermed mængderne af elskrot (eller WEEE - Waste Electrical and Electronic Equipment). Samtidig indeholder EEE-udstyr en lang række værdifulde materialer, der ud fra et ressourcemæssigt synspunkt bør genanvendes i forbindelse med fremstilling af nyt udstyr.

Med det formål at forebygge og reducere mængden af WEEE, samt at fremme genbrug og genanvendelse for at mindske ressourceforbruget, blev WEEE-direktivet vedtaget i 2002. Direktivet er udformet efter producentansvarsmodellen, hvor producenter og importører skal tage ansvar for deres produkter også i bortskaffelsesfasen, og direktivet indeholder mål for tilbagetagning og nyttiggørelse af affaldet. Direktivet sigter dermed på væsentligt at reducere mængderne af WEEE, som forbrændes eller bortskaffes ved deponering.

80 % af miljøpåvirkningerne fra elektriske og elektroniske produkter kan defineres (og dermed modvirkes) i designfasen. [14] Direktivet har derfor sigte på, at producenter og importører – via systemerne til tilbagetagning og nyttiggørelse af affaldet – motiveres til at miljøoptimere design og produktion af EE-udstyr. Producenten accepterer samtidig sit reguleringsmæssige, fysiske og økonomiske ansvar for de miljøpåvirkninger, som produkterne medfører.

Imidlertid er forventningerne til omfanget af WEEE-direktivets forebyggelseseffekt via ændringer i design generelt ikke – og heller ikke i Danmark – blevet indfriet. For at øge genanvendelsen af ressourcerne i WEEE og styrke producenter af miljøvenlige EEE produkter, er der behov for at udvikle supplerende instrumenter til styring af materialestrømmen. I det følgende præsenteres det virkemiddel, som Miljøstyrelsen har besluttet at beskrive mere detaljeret, fordi det er fundet perspektivrigt i den konkrete sammenhæng – nemlig initiativ 2 i Idékataloget ”Miljødifferentieret allokering af indsamlings- og behandlingsomkostningerne for WEEE”. [15]

[14] European Environmental Bureau: Analysis of the EuP, ROHS, WEEE directive - Designing greener electronic products.
[15] Se afsnit 3 med beskrivelse af ni forskellige muligheder for indsats. Særligt mulighederne 1 og 2 er fundet løfterige, men rapporten indeholder ikke en detaljeret beskrivelse af forslag 1 i idékataloget – ”Differentierede takster i kollektive ordninger”-idet en fransk evaluering af denne ordning er under udførelse.

2.1 Det nuværende danske system for genanvendelse af WEEE

De danske regler om producentansvar for elektrisk og elektronisk udstyr administreres af DPA-System (Dansk Producentansvars-system) for så vidt angår registerdelen. Producentansvaret har hjemmel i Lov om Miljøbeskyttelse udmøntet i den såkaldte Elektronikaffaldsbekendtgørelse. Lovgivningen gælder for alle producenter og importører, som markedsfører elektrisk udstyr i Danmark, med mindre, at udstyret er omfattet af et undtagelseskriterium.

Den danske ordning for indsamling og genanvendelse af WEEE er organiseret omkring kollektive producentordninger, som er tre non-profit organisationer etableret og styret af EEE branchen samt en kommerciel virksomhed:

- Elretur
- ERP Danmark ApS
- LWF – Lyskildebranchens WEEE forening
- RENE

Kollektivordningerne er en enkel administrativ løsning for de enkelte producenter og importører af EEE og fungerer samtidig som en fælles økonomisk model for finansiering af de omkostninger, der er knyttet til indsamling og behandling af WEEE.[16] Kollektivordningerne tilbyder en løsning til elektronikbranchen, som sikrer behandling af WEEE i henhold til lovgivningen, idet virksomheder, der ikke er medlem, selv sørger for at aflevere WEEE hos godkendte oparbejdere og afregner direkte med dem.

Medlemmerne betaler til ordningen ud fra vægten af deres salg af forskellige produktkategorier, i det store og hele uden hensynstagen til produkternes miljømæssige præstation eller prisen for genanvendelse af det pågældende produkt. Ordningen giver dermed *ikke* den enkelte producent incitament til udvikling af design eller komponentvalg, som kan øge genanvendelsen af det specifikke produkt.

2.2 WEEE-system med incitament til miljørigtigt design

Dette forslag til en tilføjelse til den danske ordning for WEEE har sigte på at bibringe producenter og importører incitament til øget miljørigtigt design.

Forslaget bygger på, at der i det bestående system, baseret på kollektivordningerne, sker en graduering af betalingen for indsamling og behandling af WEEE, sådan at de miljømæssigt uønskede produkter tildeles en større del af den samlede omkostning. Forslaget gennemføres principielt set således (se nærmere forklaring efterfølgende):

1. De samlede årlige omkostninger for indsamling og håndtering af hver kategori WEEE skønnes/beregnes. Der er her tale om den faktuelle omkostning for indsamling og behandling, idet det forudsættes, at denne lever op til regelgrundlaget herfor. Der indgår således ikke en vurdering af, hvad behandlingen vil koste hvis den skal være miljømæssigt optimal.
2. Kriterier for miljødifferentiering fastsættes og markedets udvikling i det kommende år vurderes.
3. Størrelsesordenen for den differentierede allokering bestemmes, altså hvor meget ekstra der skal betales for det 'mindre miljøvenlige' produkt inden for hver produktkategori.

[16] De enkelte kollektivordninger har forskellige tilgange til bestemmelse af producenternes betaling. Elretur anvender en 'pay as you sell'-model, hvor prisen for en produktgruppe fastsættes ud fra en a priori vurdering af markedets udvikling i det kommende år, hvilke affaldstyper der vil komme, hvor meget affald Elretur vil modtage, og hvor meget oparbejdningen vil koste. Elretur giver en fast pris for den foranliggende periode. RENE arbejder med en 'pay as you scrap'-model, hvor producenterne betaler i relation til den faktiske omkostning – men dermed ikke præcist kan overvælte omkostningen til forbrugeren ved salg. Dette afsnit tager udgangspunkt i Elreturs model.

4. Producenter og importører selvangiver til central enhed de markedsførte produkter som værende 'miljøvenlige' eller 'mindre miljøvenlige'.
5. Producenter og importører afregnes svarende til markedsføringen af henholdsvis 'miljøvenlige' og 'mindre miljøvenlige produkter'.

Der er tale om en frivillig aftale, som under ledelse af Miljøstyrelsen og styring af DPA skal implementeres af kollektivordningerne.

Da der for nuværende (januar 2012), gr. høje verdensmarkedspriser på råstoffer, for de fleste WEEE-kategorier og produkttyper samlet set er tale om en positiv indtjening ved behandling af WEEE og salg af materialer, skal der udvikles et system, der løbende giver mulighed for at beregne de samlede netto-omkostninger ved indsamling og behandling af WEEE (altså ekskl. salgsindtægter). Den miljødifferentierede allokering kan dermed knyttes isoleret til omkostningerne, hvorved der skabes den ønskede incitamentsvirkning. Der foreligger ikke pt. nogen opgørelse af de omkostninger og indtægter, som indsamling og behandling af WEEE giver anledning til. Såfremt disse tal ikke umiddelbart kan indhentes fra aktørerne, kan tallene skønnes.

Ordningen er inspireret af den franske ordning, hvor der er indført kriterier og differentierede omkostningsfordeling for udvalgte produkttyper i kategorierne 1-5 i WEEE-direktivets Bilag 1 A.

Produkttype	Moduleringskriterier	Moduleringens størrelse *
Kategori 1: Apparater til køling af fødevarer	Indhold af kølemiddel med GWP > 15	+ 20 %
Kategori 2: Støvsugere	Indhold af plastikdele > 25 gram indeholdende bromerede flammehæmmer	+ 20 %
Kategori 3: Mobiltelefoner	Ingen universal-lader	+ 100 %
Kategori 3: Bærbare computer	Indhold af kviksølvholdige lamper og indhold af plastikdele > 25 gram indeholdende bromerede flammehæmmere	+ 20 %
Kategori 4: Skærme	Indhold af kviksølvholdige lamper og indhold af plastikdele > 25 grams indeholdende bromerede flammehæmmere	+ 20 %
Kategori 5: Lamper	Udelukkende LED lamper	- 20 %

* Ekstrabetaling for de 'mindre miljøvenlige' produkter i forhold til de 'miljøvenlige' produkter.

2.2.1 Mål for tiltaget

Det overordnede mål er at øge miljøhensynet i design af EEE og dermed dels øge genanvendelsen af WEEE og dels gradvist udfase produkter med en dårlig miljøpræstation over tid.

Indsatsens konkrete mål er, at producenter og importører ved hjælp af en miljødifferentieret omkostningsallokering motiveres til at øge produktion og markedsføring af miljøvenlige EEE produkter.

2.2.2 Tiltagets væsentlige udfordringer

Tilrettelægning og gennemførelse af miljødifferentieret omkostningsallokering vil bl.a. skulle håndtere følgende væsentlige udfordringer:

- Der skal opbygges en organisation, som transparent og pålideligt gør det muligt at arbejde med miljødifferentierede omkostninger - en organisation som sikrer, at opgaven kan løses i et konstruktivt samarbejde blandt de vigtigste interessenter.
- Der skal udvikles et system, der løbende giver mulighed for at beregne de samlede *netto-omkostninger* ved indsamling og behandling af WEEE (altså ekskl. salgsindtægter). Som det er i dag betaler producenterne ikke for, at WEEE-materialerne samles af kommunerne, men først fra de overtager materialerne fra genbrugsstationerne.
- Hvis regnskabstal ikke kan indsamles fra aktørerne, må omkostningerne skønnes.
- Der skal besluttes miljømæssige kriterier, som enkelt, transparent og rationelt giver mulighed for at miljødifferentiere omkostningerne. Der kan evt. arbejdes med en stramning af kriterierne når mindst 80 % af produkterne opfylder kravet.

2.3 Aktiviteter

2.3.1 Organisering af indsatsen

A. *Lederskab*. Indsatsen vil være baseret på aktørernes frivillige medvirken i et system, hvor indsamlings- og behandlingsomkostningerne fordeles på producenterne efter et miljødifferentieret takstblad. En del af motivationen for at deltage i det differentierede system vil være, at der alternativt til systemet tænkeligt vil blive indført en regulering, som fx i form af afgifter tilstræber samme virkning. For at denne motivation skal være tydelig, vil Miljøstyrelsen skulle påtage sig det overordnede lederskab for det differentierede system. De praktiske opgaver uddelegeres til aktørerne, og Miljøstyrelsen indgår i styregruppen med repræsentanter for aktørerne.

   Allerede nu er kollektivordninger lovreguleret, og det vurderes, at det er muligt i et frivilligt system at pålægge aktørerne krav til performance som en betingelse for at agere i systemet. Det har ikke været muligt at finde relevante eksempler på sådanne EU sager, men de generelle EU-regler, og særligt Traktaten om den Europæiske Unions Funktionsmåde[17] udtrykker, at tiltag ikke må være mere restriktive for erhvervslivet end nødvendigt for at opnå det miljømæssige formål. I denne konkrete sammenhæng vurderes dette ikke at være tilfældet [18].

   Man kan se to situationer:

   - Den enkelte kollektivordning accepterer kravene, og den enkelte virksomhed kan vælge at være medlem af kollektivordningen eller selv stå for WEEE-håndteringen.

   - Såfremt kravene formuleres i lov, fx i form af en licensordning, vil det kun være muligt for kollektive ordninger, som overholder disse krav, at få licens – og dermed operere i Danmark.

B. *Struktur*. Med henblik på at sikre ensartede kriterier hos alle kollektivordninger, og tillige med sigte på at følge gennemførelsen og overholdelsen af systemet, etableres en enkel struktur med DPA som den neutralt styrende institution.

   Kollektivordninger og genanvendelsesvirksomheder vil fortsat være de praktiske aktører i ordningen. Med sigte på at sikre den bedst mulige opbakning til ordningen gennemføres ordningen i et tæt parløb med aktørerne, ligesom der udarbejdes materiale til producenter og importører med forklaring på ordningens baggrund og konstruktion.

   Til udvikling af kriterierne inviteres interesseorganisationer, Forbrugerrådet og NGOer til at deltage.

[17] EU: Konsolideret udgave af Traktaten om den Europæiske Unions Funktionsmåde; Den Europæiske Unions Tidende, C83/47 30.2.2010.
[18] Dalhammar, Carl, jurist med speciale i WEEE regulering, IIIEE, marts 2012.

C. *Systemer*

DPA, Miljøstyrelsen og aktørerne vil i fællesskab udvikle et system, som gør det muligt at opgøre nettoomkostningerne forbundet med indsamling og behandling af WEEE (ekskl. salgsindtægter). Disse nettoomkostninger vil danne rammen for den miljødifferentierede allokering.

DPA vil – i tæt samarbejde med Miljøstyrelsen og kollektivordningerne – fastsætte enkle miljøkriterier for de udvalgte produktgrupper og ligeledes fastsætte den omkostningsfordeling, der skal gælde i ordningen, naturligvis med en højere andel af omkostninger tildelt de mindst miljøvenlige produkter. Det skal aftales, hvor ofte kriterierne skal opdateres, ligesom der med fordel kan aftales en implementeringstrappe, som transparent viser hvordan krav og omkostningsdifferentiering er bestemt til at udvikle sig over en årrække.

Der etableres et system, som gør det muligt for producenter og importører at registrere markedsførte produkter i forhold til de opstillede kriterier. Registreringen kontrolleres af kollektivordningerne som repræsentanter for producenter og importører. Som udgangspunkt kan systemet tilrettelægges sådan, at virksomheder betaler de høje omkostninger, med mindre de konkret ansøger om at betale den lave omkostning – med passende dokumentation.

I ordningen bør kraftigt overvejes, om der bør indgå en mærkning af produkterne. Dette møder dog betydelig tøven hos kollektivordningerne, der forudser en væsentlig administrativ byrde herved. Dette bør undersøges og drøftes – se afsnit 2.3.3.

Det skal ligeledes overvejes, om der via differentierede krav om garantistillelse afhængig af produkternes egnethed til genanvendelse kan opnås yderligere gevinster.

Der skal tillige etableres et kontrolsystem – baseret på indberetninger fra producenter, importer og kollektivordningerne – der giver DPA mulighed for at følge udviklingen og sikre, at differentieringen rent faktisk implementeres som planlagt. Man kan lægge et krav om revision ind i systemet, fx baseret på produktblade og omsætningstal. Forhold omkring håndhævelser og sanktioner skal ligeledes aftales.

Efter to års drift gennemføres en evaluering, der belyser aktørernes holdning til den differentierede allokering, de økonomiske virkninger af ordningen, de administrative omkostninger, ordningens effekt på produktudbuddet og på producenternes og importørernes indstilling til miljørigtigt design.

2.3.2 Miljøkriterier for forskellige EEE produktgrupper

A. Vurdering af produkters miljøperformance.

Der foretages et studie af forskelligheder i miljøperformance inden for de udvalgte produktgrupper under WEEE bekendtgørelsen – hvoraf det vil være mest relevant at arbejde med produkter med et vist volumen og genkendelighed (det franske system arbejder med produktgrupperne 1-5 som det ses af tabellen i afsnit 1). Formålet med evalueringen er at kunne fastsætte konkrete og enkle miljøkriterier for de udvalgte produktgrupper. I overvejelserne indgår en nærmere undersøgelse af det franske system.

I vurderingen skal indgå performance i forhold til effekter på ydre miljøforhold (emissioner, deponering, øko tox, ressourcespild, energi- og øvrigt ressourceforbrug til håndtering) og arbejdsmiljø (AM ved håndtering, hum tox) samt evt. bonusfaktorer på adskillelsesgrad og graden af ecodesign.

B. *Miljøkriterier for produkters performance i relation til WEEE behandling.*
Der udarbejdes en liste over mulige miljøkriterier til de respektive EEE produktkategorier, som udtrykker den konkrete miljøperformance for EEE produkter. Listen vil danne udgangspunkt for drøftelser omkring udvælgelse af enkle og lettilgængelige kriterier, der samtidig håndterer den enkelte produktgruppes væsentligste miljøpåvirkninger.

Et alternativ til denne ordning vil være at tage udgangspunkt i de anerkendte miljømærker EU-Blomsten og den nordiske Svane. Eftersom miljøvurderingen allerede er foretaget, mærkerne uddelt, og kontrolinstanser etableret, vil dette system udgøre den enklest mulige basis for den differentierede allokering. Blomsten og Svanen omfatter i dag følgende EE-udstyr: Computere (bærbare og stationære), computerskærme, elpærer, fjernsyn og digital-boxe, kopimaskiner, printere, opvaskemaskiner, vaskemaskiner og varmepumper.

C. *Differentieret allokering.*
I et samarbejde mellem aktørerne besluttes, hvordan den differentierede allokering konkret konstrueres, hvordan omkostninger beregnes og fordeles iht. Miljøperformance.

D. *Høring.*
For at sikre bedst mulige transparens og opbakning, sendes kriterielisten samt forslag til den differentierede allokering i høring hos relevante parter, herunder elektronikbrancheforeningen og nøgleproducenter.

2.3.3 Mærkning af WEEE

Mærkning af produkterne i henhold til deres placering i miljøhierarkiet vil sende en klar besked til forbrugerne og have en særlig incitamentsvirkning overfor producenter og importører – til understøttelse af effekten af den differentierede allokering.

I den franske ordning har man – trods miljømyndighedernes ønske – ikke iværksat en mærkningsordning i sammenhæng med den differentierede betaling. Dette skyldes modstand fra producenter og importører grundet de administrative vanskeligheder og besvær, som en sådan ordning vil medføre. De danske kollektivordninger betragter på linje hermed en mærkningsordning som en betydelig administrativ byrde. Ikke mindst mindre (udenlandske) producenter og mindre importører vil have vanskeligheder ved at gennemføre mærkning af deres produkter.

Det vil i overvejelserne omkring mærkning være væsentligt at forholde sig til, om kravet om mærkning tilfører tilstrækkeligt additionalitet til at begrunde det øgede administrative besvær for aktørerne.

Hvis man som ovenfor nævnt vælger at tage udgangspunkt i de etablerede miljømærker – Blomsten og Svanen – vil dette problem være håndteret for de produktgrupper, for hvilke der er udarbejdet miljømærkekriterier.

I sammenhæng med mærkning – og evt. som et blødere alternativ – kan det drøftes, om der med midler fra kollektivordningerne kan iværksættes en informationsindsats (vedvarende), som gør det muligt for forbrugerne at vælge det miljøvenlige produkt.

Konklusion og sammenfatning

80 % af miljøpåvirkningerne fra elektriske og elektroniske produkter kan defineres (og dermed modvirkes) i designfasen. WEEE-direktivet har derfor sigte på, at producenter og importører – via systemer til tilbagetagelse og nyttiggørelse af affaldet – motiveres til at miljøoptimere design og produktion af EE-udstyr.

Det foreliggende projekt sætter fokus på, hvordan Danmark kan styrke producenters og importørers motivation til at arbejde med miljørigtigt design af EEE-udstyr.

I projektet er der gennemført drøftelser med en lang række aktører involveret i WEEE-varekæden i Danmark og internationalt. Drøftelserne har ført til opstilling af en lang liste med mulige initiativer, som er blevet kogt ind til et *Idékatalog* med ni initiativer, der kan styrke miljørigtigt design af elektronik. De ni initiativer er:

1. Differentieret afgift i de kollektive systemer
2. Miljøbaseret allokering af genanvendelsesomkostningerne
3. Miljøskat på EEE
4. Individuelt producentansvar
5. Netværk for produkter og affaldsbehandlingsvirksomheder
6. Innovativt offentligt indkøb
7. Informationsdeling via RFID chips
8. Produkt-service systemer – leasing
9. Pant på småt elskrot

Væsentlige konklusioner fra projektet:

- kun få lande i EU har tilrettelagt implementeringen af WEEE-direktivet sådan, at det har ført til særlige incitamenter for miljørigtigt design af EEE-udstyr;
- det franske forsøg med miljødifferentierede afgifter på EEE-udstyr er det mest spændende initiativ i Europa;
- der kan peges på en lang række muligheder for styrket miljøhensyn i WEEE-varekæden, mens der kan identificeres relativt få indsatsmuligheder med en tydelig indvirkning på EEE-producenternes motivation for miljørigtigt design
- initiativer, som økonomisk direkte påvirker producenterne, fremstår som de mest lovende.

Overordnet kan det konkluderes, at det er muligt via forskellige styringsmidler at øge producenters og importørers opmærksomhed på mulighederne for via miljørigtigt design at mindske den miljømæssige påvirkning fra WEEE.

Der er i sammenhæng hermed opstillet et mere detaljeret forslag til praktisk gennemførelse og implementering af initiativ 2 i Idékataloget ”M*iljødifferentieret allokering af WEEE-behandlingsomkostninger”*. Det foreslåede system vil betyde, at producenter, som markedsfører produkter med dårlig miljøperformance, kommer til at betale en større del af omkostningerne til WEEE-indsamling og –behandling, end de producenter, som markedsfører mere miljøvenlige produkter.

Der foreslås en organisering med DPA System som udførende institution og med Miljøstyrelsen som deltager i en styregruppe med repræsentanter for alle led i WEEE-varekæden.

Kollektivordningerne skal acceptere kravene i systemet for at få ret til at indsamle WEEE i Danmark, ligesom behandlingsanlæg skal fremsende nødvendig information til systemet.
Der skal udvikles systemer til bl.a. fastlæggelse af miljøkriterier og den differentierede allokering, samt til registrering, opfølgning og kontrol. Som alternativ hertil kan der tages udgangspunkt i de anerkendte miljømærkningsordninger Svanen og Blomsten, inden for hvilke der foreligger miljøkriterier for flere end ti væsentlige produkttyper.

Det foreslåede system drager i øvrigt i videst mulige omfang nytte af allerede eksisterende strukturer, systemer og økonomi inden for WEEE-håndteringen i Danmark og der vurderes at være en god basis for de videre drøftelser. Implementering af forslaget forudsætter yderligere undersøgelser og systembeskrivelser i samarbejde med aktørerne.

Summary and Conclusions

80% of environmental impacts from electrical and electronic equipment (EEE) can be defined (and thus mitigated) in the design phase. Therefore, the WEEE Directive aims to give incentives to producers and importers - through systems of take-back and recovery of the end-of-life equipment - to eco-optimize design and production of EEE.

This project focuses on ways in which Denmark can enhance incentives for producers and importers in working with eco-design of EEE.

In the project, discussions have been held with a large number of players in the WEEE product chain in Denmark and internationally. The discussions have led to a long list of possible initiatives that have been boiled down to an Idea Catalogue containing nine initiatives that may enhance the design of green electronics. These nine initiatives are as follows:

1. Differentiated fees in collective schemes
2. Environmentally based allocation of handling and recycling costs
3. Environmentally differentiated tax on EEE
4. Individual producer responsibility
5. Network for producers and recyclers
6. Green and innovative public procurement
7. Sharing information – RFID chip
8. Product Service System
9. Deposit and refund on small EEE.

The most essential conclusions from the project are:

- Only few EU Member States have designed their implementation of the WEEE Directive in a way that it has led to specific incentives for eco-design of EEE;
- The French initiative of environmentally differentiated taxes on EEE is the most promising initiative in Europe;
- Many options for enhanced environmental considerations in the WEEE product chain exist, but only relatively few areas for effort with a tangible impact on EEE producers' motivation for eco-design can be identified.
- Initiatives having a direct economic impact on the producers seem to be the most promising.

In general, it is concluded that through different instruments it is possible to increase the attention among producers and importers regarding the possibilities for using eco-design to reduce environmental impacts from WEEE.

In this context a more detailed proposal for the practical implementation of initiative 2 in the Idea Catalogue, "*Differentiated allocation of WEEE handling and recycling costs*", has been prepared. The proposed system will mean that producers placing products with a poor environmental performance on the market will pay a larger share of costs for WEEE collection and treatment compared to producers placing more environmentally benign products on the market.

An organization is proposed where Danish Producer Responsibility System is the executive institution and the Danish Environmental Protection Agency participates in a steering committee with representatives from all levels of the WEEE product chain.

The collective schemes must accept the requirements of the system before they are allowed to collect WEEE in Denmark, and treatment facilities must submit the necessary information to the system.

Systems should be developed, for example, for setting up of environmental criteria and the differentiated allocation, as well as for registration, follow-up, and control. Alternatively, offset can be taken in the recognized ecolabelling schemes - The Swan and The Flower - within which environmental criteria are available for more than ten important product types.

The proposed system also utilizes as far as possible already existing structures, systems, and economies within WEEE management in Denmark, and it is believed that the basis for further discussions is positive. The implementation of the proposal calls for further studies and system descriptions in cooperation with affected players.

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Bilag 1: Liste over mulige initiativer til støtte for individuelt producentansvar –

I dette bilag præsenteres en sammenfatning af projektets forundersøgelse, som har bestået af en gennemgang af væsentlig litteratur og en række interviews om producentansvar og miljørigtigt design.

Der er i interviews og litteraturgennemgang fokuseret på følgende emner:

- Udviklingstanker og forslag til initiativer, som kan motivere til miljørigtigt design af EEE
- Fordele og ulemper ved initiativerne
- Erfaringer med miljørigtig design
- Identifikation af aktører i succesfulde udviklings- og implementeringsprocesser i denne sammenhæng

De følgende forhold er væsentlige for forståelsen og vurderingen af de enkelte initiativer:

- En af de helt store udfordringer ved fysisk producentansvar er sortering i mærker, idet en manuel sortering er meget krævende logistisk og økonomisk. RFID-tags giver mulighed for at formidle en stor mængde information på en lille chip, som kan påføres elektriske og elektroniske apparater og derved kunne fungere som identifikationselement.
- En egentlig adskillelse af de udtjente WEEE-produkter i komponenter er ikke interessant for behandlere, som har fokus på ressourcernes "råstof" og deres værdi på markedet. Behandlerne neddeler derfor produkterne i en shredder, sådan at råstofferne kan udvindes mest effektivt.
- Nogle producenter mangler viden om, hvordan de mange miljøparametre skal prioriteres - fx energiforbrug, ressourcer, stoffers farlighed eller den efterfølgende affaldshåndtering - hvad er mest miljørigtigt?
- Da udbud af WEEE-behandling ofte sker hvert eller hver andet år, er det vanskeligt for genvindingsindustrien at investere langsigtet i nye teknologier.
- Større koordinering på nordisk og europæisk plan kan blive nyttigt set i lyset af, at Danmark er et meget begrænset marked.
- 90 % af markedet i Danmark er båret af 10 % af producenterne.

Muligt initiativ	Kilde	Indhold	Effekt på design	Fordele	Ulemper
Individuelt producent-ansvar for udvalgte husholdningsprodukter - Japan	"IPR, A review of practical approaches to implementation of the WEEE Directive" (Dempsey et al, INSEAD, 2010)	Producenter og importører af TV, AC, frysere og vaskemaskiner skal tilbagetage deres eget udstyr til gen-brug/genanvendelse af komponenter og materialer.	Van Rossem (2006) angiver, at denne tilgang har givet effekt på design af produktet ift. materialeforbrug, levetid, adskillelsesgrad, genanven-delsesgrad og farlige stoffer	Skaber incitament for at kommu-nikere ml. down-stream og up-stream for at effektivisere om-kostningerne. Producenter driver selv genind-vindingsanlæggene, hvilket gør det muligt at modtage feedback til produktdesign.	Stor omskiftning i forhold til det eksisterende danske system.
Miljømærkeordning	Interview og DAKOFA seminar	En miljømærkeordning kunne indføres i stil med Energimærkeordningen med en synlig angivelse af produktets placering på en miljøskala.	Forbrugersynliggørelse kan muligvis – via forbrugernes valg eller producen-ternes forventning herom - påvirke produktdesign.	Det skaber synliggørelse hos forbrugerne.	Kan være omfattende at administrere og kontrolle-re og kræver en grundig massestrømanalyse for kravspecifikation.
Differentieret synligt gebyr – Frankrig	Interview DAKOFA seminar	I Frankrig har man indført differentierede takster i det kollektive system ved at udarbejde et sæt kritierier for specifikke produktgrupper. Processen har indbefat-tet alle væsentlige aktører og man har set på forskellige mulige tilgange til differentieringen herunder anvendelse af miljømærker som kriterier, hvilket blev droppet.	Tiltaget er gennemført som et forsøg på at skabe incitamenter for miljørig-tig design i et kollektivt WEEE sy-stem. Kilde nævnte, at det ikke på nuværende tidspunkt var muligt at sige om det har en effekt på pro-duktdesign, men forbrugeren har nu et synligt valg.	Giver forbrugeren et synligt valg fordi gebyrerne er forskellige på de samme typer produkter. Giver en god reguleringsmulighed ift. fx afskaffelse af bestemte typer af produkter.	Kræver antageligt mere omfattende administrati-on end i dag.

Muligt initiativ	Kilde	Indhold	Effekt på design	Fordele	Ulemper
Individuelt producent-ansvar for computere, med genanvendelse - Japan	"IPR, A review of practical approaches to implementation of the WEEE Directive" (Dempsey et al, INSEAD, 2010) og Van Rossem, 2006	Computere returneres af forbrugeren til producentens eget genanvendelsesanlæg. Der er ingen afgift på produktet, som er forsynet med et "PC-Recycling"-mærke. Producenten driver selv genanvendelses-anlægget og betaler kun for produkter med eget brand. Japan Post sørger for logistikken.	Van Rossem angiver, at denne tilgang har givet effekt på design af produk-tet ift. materialeforbrug, levetid, adskillelsesgrad, genanvendelsesgrad og farlige stoffer (Van Rossem, 2006).	Skaber incitament for at kommu-nikere ml. down-stream og up-stream for at effektivisere om-kostningerne. Producenter driver selv genind-vindingsanlæggene, hvilket gør det muligt at modtage feedback til produktdesign.	Kræver et udbygget logi-stik system.
Individuelt producent-ansvar for udvalgte husholdningsprodukter: ICT, printere og telekommunikations-udstyr – Holland (ICT Milieu)	"IPR, A review of practical approaches to implementation of the WEEE Directive" (Dempsey et al, INSEAD, 2010) Interview	I nogle år frem til 2003 modtog individuel-le producenter en månedlig afregning direkte fra genvindingsvirksomheden baseret på vægten af de genanvendte produkter. Hvert produkt blev vejet og de forskellige mærker visuelt identificeret.	I følge administrativ kilde har anven-delsen af IPR i Holland antageligt ikke givet incitamenter for bedre design, men der findes ikke en evaluering af det.	Producenterne betaler den præci-se omkostning for genanvendelse af egne produkter. Muligheden for at opdage free-riders er stor.	Ifølge Hollandsk kilde var der ingen virkning på design og systemet var administrativt tungt
Individuelt producent-ansvar for udvalgte husholdningsprodukter – Maine	"IPR, A review of practical approaches to implementation of the WEEE Directive" (Dempsey et al, INSEAD, 2010)	Systemet indebærer en optælling og vejning af hvert indsamlet, mærket pro-dukt, med muligheden for at sortere de individuelle mærker til separat genindvin-ding. Kommunerne indsamler WEEE og giver det videre til et modtageanlæg. Producenter kan indsamle en repræsenta-tiv mængde af WEEE fra modtageanlæg-get med pligt til genanvendelse eller betale modtageanlægget for at overtage genindvindingen og en andel af det "for-ældreløse". Alle producenter udfylder	Producenten modtager egne produk-ter retur (eller betaler for genvinding) hvilket giver tydeligt incitament til miljørigtigt design.	Producenterne betaler den præci-se omkostning for genanvendelse af egne produkter.	Administrativt og logistisk udfordrende system.

Muligt initiativ	Kilde	Indhold	Effekt på design	Fordele	Ulemper
		affaldsplan.			
Synliggørelse af indtjening ved genanvendelse	DAKOFA seminar	Virksomheden modtager godtgørelse, hvis de afleverer WEEE med et revenue (pt fraktion 1 - LDA). Dokumentation for indvejet WEEE er en afgørende forudsætning for administration.	Ingen påviselig effekt.	Fakturering indgår i enhver virksomheds bogholderi, hvilket betyder at der kan komme større fokus på at øge størrelsen på denne "indkomst". Derved kan virksomhedens incitament blive større for at indsamle og genanvende WEEE.	Forudsætter et større administrativt lag ift. dokumentation for fakturering samt udbetaling
Miljøvurderet afgiftsmekanisme	DAKOFA Seminar	Der pålægges afgift på et produkt ved, at man gennem en miljøvurdering af produktet fastlægger en miljøafgift (som overgår til en fond, hvor midlerne går til genindvindingsindustri og universiteter som i samspil skulle udvikle bedre genanvendelsesmetoder)	Effekt afhængig af afgiftens størrelse og kriterierne – tydeligt potentiale.	Kan stimulere en bedre produktudvikling hos EEE producenter og teknologiforbedring hos genindvindingsindustrien	Kræver konsensus om en transparent metode for miljøvurdering af produkt ift. afgiftsfastsættelse
Netværk for producenter og aktører i affaldskæden	Interview	Et netværk mellem aktørerne i hele værdikæden kan give bedre vidensdeling om miljø, praktiske forhold ved genanvendelse mv.	Der kan tænkes en effekt på design i det omfang, der fra affaldsaktørerne vil flyde anvendelig information om fx adskillelsesprocesser til producenterne	Øget informationsstrøm i værdikæden kan bidrage til innovationer	Netværket vil være uforbindende og alene baseret på aktørernes interesse for at forbedre systemerne og miljøforbedre designet

Muligt initiativ	Kilde	Indhold	Effekt på design	Fordele	Ulemper
Finansiel garanti/ sikkerhedsstillelse for tilbagetagning og genanvendelse - Sverige (ordning for biler)	Interview	Producenten stiller garanti for en fremtidig genanvendelse af de solgte produkter. Der fastsættes en differentieret præmie for efterbehandlingen alt efter graden af produktets miljøvenlighed i forhold til genanvendelsesgraden.	Med direkte økonomisk incitament for producenten til at sikre enkel/billig genanvendelse er der tydeligt incitament til miljørigtigt design.	Garantierne kan afspejle de reelle omkostninger ved behandling og genanvendelse.	De mange typer af WEEE kan gøre systemet uoverskueligt og administrativt tungt.
Pant på småt elektronik	Interview og Simonsen, 11.03. 2011.	I Norge overvejes muligheden for indførelse af pant på mobiltelefoner og evt. mp3-afspillere	Begrænset effekt på miljørigtigt design da producenten ikke er involveret i genanvendelsen.	Giver en ny logistisk mulighed for at indsamle denne fraktion til en evt. mere specifik eller producentstyret genanvendelse.	Incitamentet i Norge er i høj grad baseret på at øge indsamlingsprocenten. Har ikke effekt på øget genanvendelse som sådan
Differentierede miljøbidrag	Interview, EU Parlamentet og DAKOFA seminar	Kollektive ordninger skal indføre differentierede producenttakster baseret på, hvor let et produkt og dets strategiske råmaterialer kan genanvendes (ændring 48) i Artikel 12 - stk.2 – afs. 1. I den endelige WEEE2- direktivtekst er dette implementeret som en "kanbestemmelse" i præambel 23.	Tydeligt incitament for miljørigtigt design.	Omkostningerne i affaldsbehandlingen skal afspejles i WEEE omkostninger	Forudsætter et større administrativt lag ift. tilvejebringelse og vedligeholdelse af viden om transparente miljødifferentierede omkostninger.
Øget samarbejde mellem producenter og	Interview	En mulighed er etablering af et forum mellem værdikædens aktører for diskussion af løsninger. Flere kilder angiver, at de	Indirekte indvirkning på design – i det omfang, kommercielt attraktive innovation kan skabes.	Kan skabe god vidensudveksling til udvikling af nye behandlingsmetoder og design af produkter	Det er ikke et forpligtende tiltag

Muligt initiativ	Kilde	Indhold	Effekt på design	Fordele	Ulemper
modtageanlæg		arbejder med dialog på tværs af aktørgrupperne.			
Individuelt producentansvar - Return Share by Brand Sampling – Washington State	"IPR, A review of practical approaches to implementation of the WEEE Directive" Dempsey et al, INSEAD, 2010	Producenter skal lade sig registrere ved Department of Ecology, som bestemmer størrelsen på den andel, hver producent (økonomisk) skal håndtere, ud fra et 'Brand Data Management System' udviklet af The National Centre for Electronics Recycling (NCER). De kommende års returneringsandel vil for hver producent blive fastlagt ved hjælp af stikprøver. Vejledende stikprøvestørrelse og procedure er udviklet af NCER. Producenter kan starte en selvstændig plan for på egen hånd eller sammen med andre at sikre genanvendelse.	Incitamenterne for miljørigtigt design findes i forhold til at reducere vægten på produktet eller øge levetiden for at nedsætte omkostningen.	Oparbejdningsomkostningen for hver enkelt producent er baseret på en vurdering af producentents andel af den afleverede WEEE-mængde.	Incitamenterne for miljørigtigt design adskiller sig ikke væsentlig fra i dag.
Standard for kvalitet og opbevaring ved indsamling	Interview	Kvaliteten i indsamlingen bør kommunerne generelt forbedre, f.eks. vanskeliggøres genanvendelse hvis WEEE ikke er under tag og derfor fyldt med regn, sne og is.	Tiltaget har en muligvis kun en lille indvirkning på design af produkterne.	Der er potentiale for forbedret genanvendelse af produkterne ved rigtig håndtering under indsamling og transport. Dette	Tiltaget har en muligvis kun en lille indvirkning på design af produkterne.

Muligt initiativ	Kilde	Indhold	Effekt på design	Fordele	Ulemper
		Der foreslås en standard for opbevaring og indsamling.		kan føre til forbedret proces ift. design af produkterne.	
Krav til forbehandling	Interview	Skrothåndteringen er i dag ikke gearet til at trække kritiske metaller ud. En mulighed er at sætte krav til effektiviteten af genanvendelsen ift. skrothåndteringen. Shredder-behandling ødelægger de små og værdifulde mængder. Der kan stilles krav til bedre forbehandling og sortering. Der kan stilles krav til en række processer som skal være udført før WEEE neddeles, fx udtagning af farlige stoffer, identifikation af sjældne metaller, afmontering af plast med bromerede flammehæmmere etc.	Ingen direkte effekt, men muligvis en indirekte, hvis behandlingsanlæggene adresserer kravene hos producenterne.	Forbedret genanvendelse af ressourcerne.	Økonomiske og praktiske udfordringer for genanvendelsesvirksomhederne
Krav til produkters adskillelsesgrad	Interview	Et lovkrav om produkters adskillelsesgrad ville forbedre WEEE produkterne på	Har direkte effekt på produkt design.	Et tiltag der har direkte betydning for produktdesignet.	Behov for retningslinjer for vurderingen af adskil-

Muligt initiativ	Kilde	Indhold	Effekt på design	Fordele	Ulemper
		samme måde som kravet om separering af batterier fra udstyret har gjort. Lige så snart kravet til adskillelse er der, bliver processen ændret.		Det ville potentielt lette og øge kvaliteten af genanvendelse.	lelsesgraden for de forskellige produkttyper.
Kampagner og styrkelsen af bevidsthed hos designere	Interview Dalhammer, 2010	Der findes mange gode rapporter, standarder (EPEAT, IEC etc.) og guidelines til designere til at gøre produkter mere miljøvenlige	Ved en større bevidsthed blandt designere om produkternes miljøbelastning i livscyklen, inkl. efter endt brug, og mulighed for anvendelse af værktøjer til at forbedre designet kan det potentielt føre til mere miljøvenlige produkter	Relativ enkel indsats, primært baseret på information.	Dette er ikke et forpligtende tiltag.
Klare prioriteringsværktøjer til producenter	Interview	Producenter er ofte i tvivl om hvilke stoffer og materialer der skal foretrækkes ud fra et miljøperspektiv. Der er behov for prioriteringsværktøjer, som gør det muligt at miljøafveje stoffer og materialer med hinanden.	Ved en større bevidsthed blandt designere om hvilke miljøparametre der nationalt har bevågenhed vil der potentielt designes efter disse prioriteter.	Enkelt og ubureaukratisk tilgang	Dette er ikke et forpligtende tiltag.

Bilag 2: Workshops

I projektets opstartsfase blev der afholdt fire workshops med danske og europæiske WEEE aktører samt repræsentanter fra Miljøstyrelsen og PlanMiljø. Programmet var:

Program for

Idéworkshop

Om mulige fremtidsscenarier for producentansvaret og miljørigtigt design af elektronisk udstyr

Tirsdag d. 13. september hos Miljøstyrelsen, Strandgade 29, 1401 København

80 % af miljøpåvirkningerne fra produkter defineres og kan modvirkes i designfasen. Imidlertid er forventningerne til forebyggelse af miljøpåvirkning fra elektriske og elektroniske produkter via ændringer i design ikke blevet indfriet med WEEE direktivet.

I denne workshop udvikles på tværs af interesseområder idéer til, hvordan vi i Danmark kan fremme miljørigtig design af elektriske og elektroniske produkter.

Program:

10.00 - 1010	***Formiddagskaffe***
10.10 – 10.15	***Velkomst*** *v. Søren Freil, Miljøstyrelsen*
10.15 – 10.30	***Forberedelse på dagen*** *v. Bjørn Bauer, PlanMiljø ApS*
10.30 – 10.50	***Vinkler og cases om miljørigtigt design og producentansvar*** *v. Arne Remmen, Aalborg Universitet*
10.50 – 12.00	***Idé generering i grupper*** *v. Bjørn Bauer, PlanMiljø ApS*
12.00 – 12.15	***Idéer præsenteres i plenum*** *Grupper*
12.15 – 13.15	***Frokost***
13.15 – 13.40	***Initiativer og parametre præsenteres*** *v. Bjørn Bauer, PlanMiljø ApS*
13.40 – 14.20	***Prioritering af initiativer og idéer i grupper*** *Gruppearbejde*
14.20 – 14.30	***Pause, kaffe***
14.30 – 15.00	***Fremlæggelse af prioriteringer af initiativer*** *Grupper*
15.00	***Tak for i dag*** *V. Søren Freil, Miljøstyrelsen*

Workshopsene forløb planmæssigt, dog med enkelte forskydninger i tiden, hvilket skyldtes en særdeles udpræget diskussionslyst i grupperne.

Efter en kort velkomst fra Miljøstyrelsen/konsulenterne var alle deltagere bekendt med dagens indhold, hvorefter konsulenten gennemførte en forventningsafstemning for dagen, sådan at alle var indforstået med dagens formål og klædt på til udfordringerne.

Herefter fulgte et oplæg om vinkler på miljørigtigt design og de mulige miljøeffekter heraf. En række cases blev gennemgået, og muligheder og udfordringer ved producentansvar blev drøftet for at bevidstgøre deltagerne om de forskellige elementer og parametre, som kan have betydning for de initiativer, som projektet sigter på at udvikle.

I workshopsenes kreative fase blev indledt med et oplæg om innovation, hvorpå deltagerne fik mulighed for at generere ideer til styrket miljøhensyn i EEE-design afledt af WEEE-direktivet. Deltagerne blev inddelt i grupper, og efter idégenereringsøvelsen blev alle idéer til initiativer præsenteret i plenum – typisk flere end 20 ved hver workshop. Efter frokost diskuterede grupperne sig frem til prioriterede ideer i den danske kontekst og udarbejdede initiale handlingsplaner for implementeringen. De tre bedste ideer fra alle grupper blev præsenteret i plenum inklusiv begrundelse for valget. De bedste ideer er inkluderet i projektets videre arbejde og gengivet i bilag B.

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Bilag 3: Interviewramme

- Interessentens forhold til WEEE direktivet i almindelighed og i særdeleshed ift. det individuelle producentansvar – herunder hvordan det fungerer for interessenterne i Danmark og hvordan det påvirker dem i andre lande.
- Erfaringer med miljørigtigt design - hvilke faktorer kan fremme miljørigtigt design blandt produktudviklere; Hvordan får miljørigtigt design prioritet i virksomheden?
- Visioner og langsigtede planer for miljørigtigt design af elektronikprodukter.
- Visioner og planer for producentansvar.
- Erfaringer og udviklingstanker om systemer og virkemidler, som kan støtte miljørigtigt design og producentansvar, herunder hvordan en prismekanisme til støtte for miljørigtigt design kan anvendes i større omfang end for nuværende.
- Erfaringer vedr. den institutionelle og organisatoriske opbygning af systemer og instrumenter til støtte for producentansvar.
- Forslag til initiativer der kan fremme miljørigtig design
- Fordele og ulemper ved initiativerne (økonomisk, kommercielt, miljømæssig, lovgivning og teknisk)
- Identifikation af aktører i succesfulde udviklings- og implementeringsprocesser i denne sammenhæng.

Miljørigtigt design af elektronisk udstyr.

Rapporten indeholder et idékatalog med ni initiativer, der kan styrke miljørigtigt design af elektronisk udstyr. Rapporten konkluderer, at det er muligt at øge producenternes fokus på miljørigtigt design af elektronisk udstyr og herved øge genanvendelsen og mindske miljøpåvirkningen fra elektronikaffaldet.

Et af initiativerne er mere udførligt beskrevet i rapporten. Hvis initiativet gennemføres, vil producenter, som markedsfører produkter med ringe miljøperformance skulle betale en større del af omkostningerne til indsamling og behandling end producenter, som markedsfører miljøvenlige produkter.

Eco-design of electronic equipment

The report provides a catalogue of ideas with nine initiatives to strengthen the eco-design of electronic equipment. The report concludes that it is possible to increase producers attention to eco-design of electronic equipment and in this way enhance recycling and reduce environmental impact from electronic waste.

One of the initiatives is more fully described in the report. Implementation of the initiative will have as a result that producers marketing products with low environmental performance pay a larger share of the costs related to collection and treatment than producers who market environmental friendly products.

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