



Miljø- og økonomigruppa

Miljø- og økonomigruppa initierte våren 2000 prosjektet "Project Packaging Protocol". Målet med prosjektet var å gje ei oversikt over korleis systemet med omsettelege "Packaging Recovery Notes" (PRN) i Storbritannia fungerer, og vurderer om føresetnadene for å etablera eit tilsvarande system i dei nordiske landa er til stades. Studien, som er et forprosjekt, vart avslutta i 2001, og vert følgt opp i 2002 gjennom eit prosjekt om etablering av ein marknadsplass for omsetjing av gjenvinningsbevis for batteri. Prosjektrapporten er utelukkande publisert i nettversjon.

Project Packaging Protocol

An investigation by



**The Environment Exchange
- part of OM**

on behalf of

The Nordic Council of Ministers

into the feasibility and the pros
and cons of introducing

A Nordic PRN system

EXECUTIVE SUMMARY

Introduction

The EC Directive on Packaging and Packaging Waste has been in operation since 1994. Individual nation states have chosen to introduce it in different ways. The United Kingdom (UK) introduced a system that creates competition between the packaging sectors and compliance organisations and a tradable economic instrument, the PRN. It has been suggested that the UK is viewed within Europe as achieving compliance to the Directive at the lowest cost to industry. The Environment Exchange – part of OM supplies the market place through which the PRNs can be traded on both spot and forward contracts.

Angus Macpherson, the Managing Director of The Environment Exchange, is one of the leading experts in the UK's implementation of the Packaging Waste Directive. He has been asked by the Nordic council of Ministers to investigate the feasibility and the pros and cons of introducing a PRN style system into the Nordic Region

Report

This report is divided into four parts. It:

1. Explains the system that currently operates within the United Kingdom.
2. Identifies its strengths and where improvements could be made to the current system (its weaknesses).
3. Outlines the current systems that are in operation within the Nordic countries.
4. Identifies the similarities between the systems and any opportunities to introduce a common system.

This analysis identifies answers to the following questions:

1. Do the necessary pre-conditions for establishing a PRN system in the Nordic countries prevail? Is it feasible?

If so:

2. How might the system operate?
3. Should the Nordic countries be regarded as one market or several?
4. What are the possibilities of establishing submarkets in the region (markets smaller than the Nordic market)? If so how should it be sub-divided by geographical markets or product group markets?

It then considers the pros and cons of moving to the proposed system in comparison to the current systems in place considering:

1. Cost efficiency for those businesses with an obligation.
2. Cost efficiency and administrative simplicity for those that would have to regulate the system.
3. Effectiveness of the system in meeting the objectives of the Directive

Conclusions

- It would be feasible to introduce a Nordic PRN system.

- The system would operate by establishing a tradable economic instrument between accredited reprocessors and exporters and the businesses with an obligation or their representatives (such as compliance schemes).
- The primary benefit would be the substantial cost reduction for businesses of implementing the European Directive but there are additionally regulatory, competitive and environmental benefits.
- The cost efficiencies for industry will only be available if Governments are prepared to review legislation or systems that are currently in place to encourage the minimisation and recycling of packaging.

In particular any system that only focuses on one form of packaging (viz: glass bottle recycling) may be achieving recycling success in that packaging type at the expense of the other materials or in comparison to countries where less specific segregation at source is demanded.

Equally Governments must be prepared to forfeit environmental economic instruments as a means of raising direct revenue.

- The risk is that as a result of introducing a tradable economic instrument the Nordic region fails to meet the revised recovery and recycling targets. This risk can be countered by introducing an appropriate structure at an early stage.
- To establish liquidity and competition between the reprocessors in the region it would be preferable to consider the Nordic region as one market. Nevertheless there might initially be restrictions due to the different development stages of national solutions to the European Packaging Waste Directive.
- As a stepping stone to this goal sub-markets could be established within or between those nations that have legislation or voluntary agreements in place.
- At all times packaging material types should be encouraged to compete between each other rather than be considered in isolation. This can be achieved by the introduction of a pooled recovery or general recycling option in excess of the de minimis material specific recycling levels.
- There would be no requirement for all Nordic nations to have the same recovery and recycling targets although there would be benefits if the targets were to exist in the same material (e.g. the no sub-division) types.

Recommendations

1. To develop standard accreditation and data gathering procedures.
2. To develop central registers both of packaging data and annual reprocessing and exporting activity.
3. To further develop at a regional level the concept of a competitive PRN style market throughout the Nordic region.
4. To identify a potential manager for that market.
5. To further investigate monopoly, early mover, banking and borrowing issues.

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ANTHOLOGY OF COMMONLY USED TERMS

Economic Instrument:

An economic instrument is a tool that uses financial incentives or penalties to encourage those on whom the instrument is being applied to behave in the fashion that is wished. Governments frequently use economic instruments in the form of taxes or grants to encourage sectors of society, such as industry, to conform to their wishes.

Tradable Economic Instrument:

A tradable economic instrument is a financial incentive that can be traded between relevant parties as a result the revenue raised is hypothecated to achieve the objective required rather than passing through the Government as a broker.

Producer Responsibility Obligations (Packaging Waste) Regulations 1997 Statutory Instrument 646/1997 (The Regulations):

Part of the UK's response to the EC Directive on Packaging and Packaging Waste (94/62/EC) which introduced a tradable economic instrument.

The Department of the Environment now part of the Department of the Environment, Food and Rural Affairs(DEFRA) are the lead Government for The Regulations. The Environment Agencies are responsible for enforcing them.

Packaging Recovery and Packaging Export Recovery Note (PRNs/PERNs):

PRNs and PERNS are a tradable economic instrument. They are the sole evidence of compliance with The Regulations that can be issued by reprocessors or exporters that have been accredited by the Agencies. They are notes on which are indicated in tonnes the quantity of packaging waste that has been accepted for reprocessing.

Evidence may be issued on receipt or export of the packaging waste but they must be supplemented with an auditable trail showing that the packaging has been reprocessed either at site or for exporters at an overseas location.

Reprocessor:

A reprocessor is a site that accepts packaging waste and puts it through a process which metamorphosises the secondary raw material and extracts value from it. This term includes both recovery processes (e.g. energy from waste plants) and recycling processes (e.g. paper and steel mills) but not re-use.

Secondary raw material:

Secondary raw materials are materials, such as old newspaper or scrap steel, which are extracted from the waste stream and can compete with primary materials, such as trees or bauxite, as a source of supply to manufacturers.

Re-use:

Re-use is a process when a waste product is cleaned and returned whole into the system. As such re-use is an element of waste minimisation since for each additional time that the product is re-used it reduces the requirement to dispose it as waste.

For example if a glass is collected, cleaned and used again then that it is re-use.

Recycle:

Recycling is a process when a waste product is collected, broken down and passed through a process to create a new product.

If, for example, the glass is broken during the cleaning process and the broken pieces are sent to a glass mill and returned as a new glass then it is recycled.

Recovery:

A process which includes recycling that extracts value from the secondary raw material. The most frequent example is energy from waste but the European definition includes a range of processes including composting.

Advisory Committee on Packaging:

A Committee established by the Secretary of State for The Environment to advise him on the implementation of The Regulations.

Consultations:

A process where the UK Government issues a paper on their proposals and the potential impacts of their proposals prior to implementing their proposals in order to canvas the opinion of interested parties.

Packaging Chain:

All those that handle packaging this ranges from packaging producers (those that create the cardboard), through converters (those that transform the cardboard into boxes), and packer/fillers (those that fill the boxes) to sellers (those that supply, this does not necessarily mean retail, the packaged products to the end user).

In the UK all members of the packaging chain so long as they handle in excess of 50 tonnes of packaging and have a turnover in excess of £2 million have a legal obligation under The Regulations. This obligation may either be discharged either independently or through a compliance scheme.

Compliance Scheme:

A compliance scheme takes on the legal obligations of an obligated business to meet its recovery and recycling obligations. It has a responsibility to increase the reprocessing and recycling infrastructure. It does not have an obligation to calculate the packaging data, that is the responsibility of the obligated companies (e.g. 'Producer Responsibility'). VALPAK is the largest compliance scheme.

There are currently 17 compliance schemes in operation in the UK.

Materials Organisations:

Materials Organisations were established by industry in each of the packaging materials to represent the views of that industry to Government both within and without the consultation process.

Market place:

The role of a market place is to provide a venue where the buyers and sellers meet. It provides a common code of conduct for all participants in that market place and if the Financial Services Authority regulates the market place, has to abide by their code of conduct as well. The key outputs from a market-place is price transparency and information.

The market place can also provide clearing and settlement facilities for both contracts traded through the market and off market.

1. The Current United Kingdom System

1.1 How does the United Kingdom system operate?

Producer Responsibility Obligations (Packaging Waste) Regulations 1997 Statutory Instrument number 646/1997 (The Regulations) are part of the UK's response to the EC Directive on Packaging and Packaging Waste (94/62/EC), which came into force on 31 December 1994. The Directive required member states, including the United Kingdom (UK), to bring legislation into force by 30 June 1996 to achieve the following targets for the recovery of packaging waste by 30 June 2001:

- Recover 50 - 65% by weight of packaging waste.
- Recycle 25 - 45% by weight of packaging materials in packaging waste, with a minimum of 15% by weight for each material.

The Directive is due to be reviewed in 2001 to consider whether the recovery and recycling targets should be adjusted.

The concept behind the UK Regulations is to minimise the quantity of packaging entering the waste stream by encouraging businesses:

- a. to reduce the quantity of packaging they use.
- b. to either re-use or recover packaging or get a third party to do it on their behalf.

and spread the responsibility of meeting these objectives through the packaging chain.

The UK Regulations stipulate those who have an obligation, what that obligation is in terms of a percentage of the packaging that business handles and introduces a method of monitoring compliance of the regulations.

The UK Regulations, which were laid before Parliament on 6 March 1997, set national targets for 2001 to:

- Recover 52% by weight of all packaging waste.
- Recycle a total of 26%, with a minimum material specific recycling level of 16% for each of the following packaging materials paper/fibreboard, glass, aluminium, steel and plastic.

In June 1998 the *Advisory Committee on Packaging* concluded that the majority of obligated parties considered it was necessary to have a compliance mechanism, such as Packaging Recovery Notes (PRNs), to deter fraud, to monitor compliance and provide a mechanism for directing funding at the development of additional collection and reprocessing infrastructure.

Proof is in the form of evidence such as a weighbridge ticket that packaging material has been delivered to and accepted by a reprocessor. If the reprocessor is accredited by the Environment Agencies it will issue PRNs.

In the event that the tonnage of a PRN has to be split the PRN needs to be returned to the original issuer for substitute PRNs to be issued. The original issuer may charge a fee for this service. Proof needs to be retained for four

years after the relevant year is complete (i.e. 2003 for proof issued in 1998) in case of inspection by the Agencies.

A consultation paper entitled *Review of The Producer Responsibility Obligations (Packaging Waste) Regulations 1997* was published in July 1998. Para 7.3 repeated the need for additional collection, sorting and reprocessing capacity to meet Directive targets for 2001, and that ‘A market mechanism would therefore have to evolve to ensure that resources were being directed appropriately’. The PRN, which had started to operate in January 1998, has evolved into that market mechanism.

In 1998 PRN supply considerably outstripped demand¹ causing an unexpected sharp decline in PRN prices. This combined with an assessment by DETR that the UK was moving more slowly than expected towards the targets for 2001 resulted in the interim recovery and recycling targets being raised in January 1999 to 43% and 11% for 1999 and 45% and 13% respectively for 2000.

In November 2000 the recycling and recovery targets for 2001 were increased by DETR to 18% and 56% respectively.

Table 1.1 UK National Producer Responsibility Obligations

Year	Overall Recovery Target	Material Specific Recycling Target	General Recycling Obligation
1998	38%	7%	N/A
1999	38 → 43%	9 → 11%	N/A
2000	43 → 45%	11 → 13%	N/A
2001	52 → 56%	16 → 18%	26 → 28%

1.2 Packaging.

The Regulations cover all packaging passed to producers and end users in the UK, including all imported packaging and packaging materials (including those imported and discarded by the importer). Excluded are all exports of packaging and packaging materials, production residues, packaging that becomes special waste and re-used packaging - the obligation being picked up on the first occasion that the packaging is used.

In 1994, the Producer Responsibility Group estimated that packaging consumption was 7,290,000 tonnes, and that it would rise to 8,050,000 by 2001. Subsequently packaging tonnages in 1998 for England and Wales and Scotland have been reported as 8,744,000 and 1,000,000 million tonnes respectively.

From January 2000, even with the financial threshold dropping to £2 million, it is estimated that the regulations exclude 96% of businesses, primarily small businesses, but include 88.9% of packaging.

To meet these targets, the UK chose the principle of ‘shared responsibility’, with different sectors in the packaging chain having different activity obligations

¹ See Table 2.2.

Table 1.2 Shared Responsibility Obligations in the UK

Packaging Activity	1997	2000
Raw material producer (82)	6%	6%
Convertor (528)	11%	9%
Packer/filler (2,922)	36%	37%
Seller/retailer (1,274)	47%	48%

Proposals to place an obligation of 47% on wholesalers with effect from January 2000 were dropped.

The figures in brackets for the packaging activity refer to the principal packaging activity of businesses registered by December 2000. In addition there are 64 for whom importing is the principle activity, who pick up the total 'rolled up' obligation of all packaging activities that have been carried out prior to import in addition to any packaging activities that they carry out within the UK.

Of these obligated companies 3,063 were registered with the largest compliance scheme, VALPAK, 811 registered individually, and the remaining 1,664 were with 15 other compliance schemes. The Environment Agencies estimate that a further 250 – 650 companies have not registered, despite over 50 successful prosecutions to date.

1.3 Tradable economic instruments.

An economic instrument is a tool that uses financial incentives or penalties to encourage those on whom the instrument is being applied to behave in the fashion that is wished. Governments frequently use economic instruments in the form of taxes or grants to encourage sectors of society, such as industry, to conform to their wishes. For a tax or a grant the Government has to estimate the correct levels to achieve its aims. This is not easy to do and on many occasions it is over-estimated at a considerable cost to the taxpayer. Also on many occasions the primary justification for a tax is to raise income rather than either achieve or deter any particular aim of society. A tradable economic instrument is a financial incentive that can be traded between relevant parties as a result the revenue raised is hypothecated to achieve the objective required rather than passing through the Government as a broker.

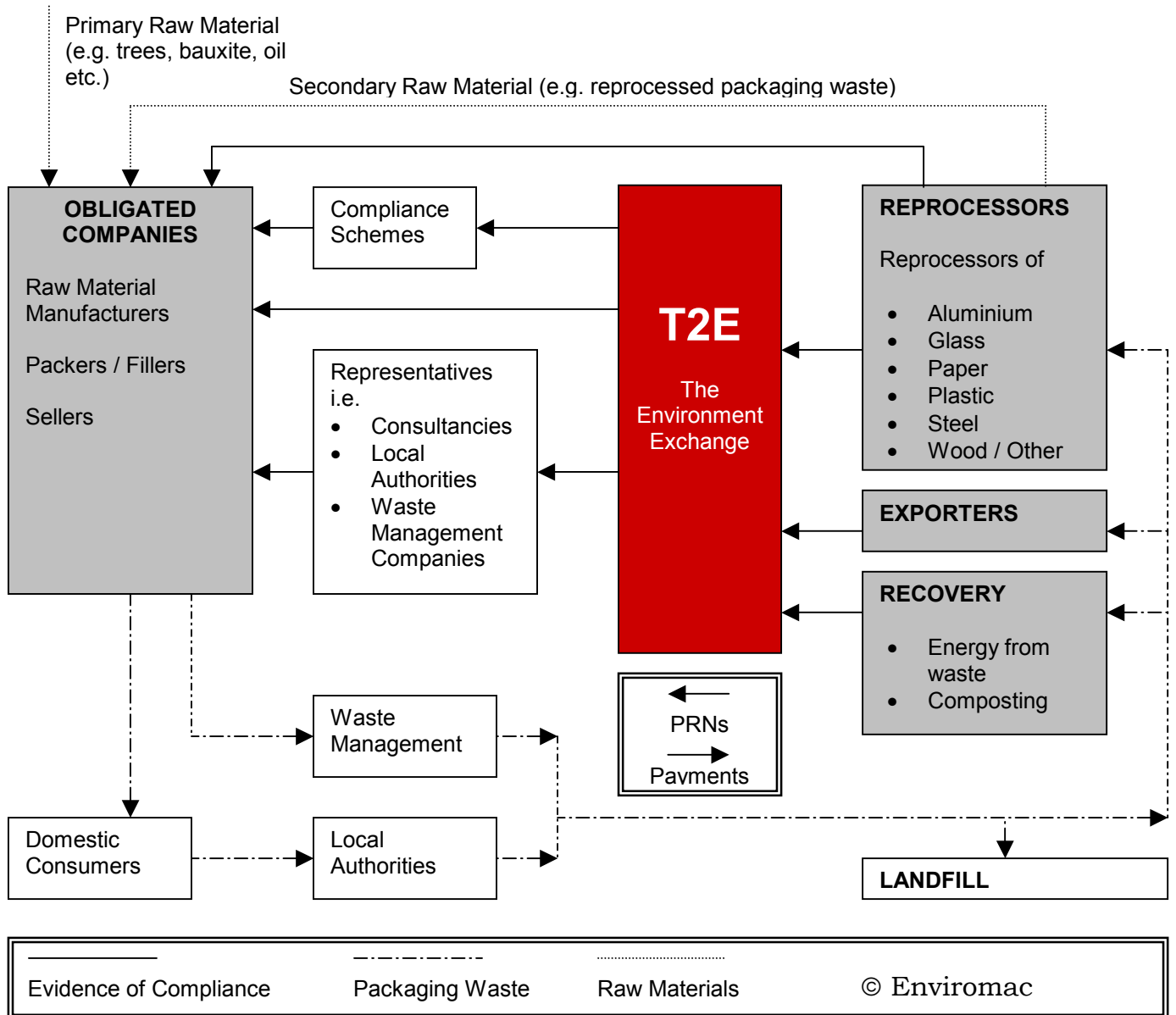
PRNs are tradable economic instruments because:

- they have come about as a result of Government Regulation, in response to the wishes of society. It is for those with an obligation or their representatives, the compliance schemes, the evidence of compliance with that Regulation.
- one party under the Regulations issues it, accredited reproprocessors and exporters, and another party requires it, the obligated companies or their representatives the compliance schemes, to prove legal compliance,
- it also has an economic value.

Competition between compliance options, individual registration or with a compliance scheme, ensures that service levels are maintained, brokerage fees are minimised, and efficiencies are maximised. Competition between

reprocessors ensures that these benefits are duplicated for the cost of compliance and the market establishes the optimum price. Hence the Government does not have to set the price solely regulate compliance with the legislation. Clearly in order to achieve this successfully definitions of the 'commodity' to be traded and enforcement of compliance need to be both regulatable and robust. As important the robustness of the regulation and the definition of the commodity maximise the potential environmental benefit.

Diagram 1.1 Diagram demonstrating the role of a tradable economic instrument using the PRN system as an example



In the PRN system the packaging chain, on the left of the diagram, has the legal obligation to comply and therefore they require PRNs. They can either opt to comply individually or join a compliance scheme that will achieve compliance on their behalf.

Obligated companies may access PRNs either directly from an accredited reprocessor by purchasing products made out of recycled packaging or by delivering packaging waste to the reprocessor either directly or indirectly through a local authority or waste management company or through a broker such as a compliance scheme. The deliverers of waste have first option on the PRN and therefore many waste management companies have established compliance schemes. These PRNs have a value.

Reprocessors and exporters, on the right of the diagram, require extra income to either enhance collection schemes or expand reprocessing capacity. In general the recycling market is highly volatile and as a result it is perceived as high risk and therefore undesirable to investors unless there are perceived to be high returns. From an investor's perspective - why invest in a bad business when there are plenty of good ones about?

To establish these higher returns additional income is required. The source of this additional revenue is PRN sales. Competition between PRN sources ensures that the cost of compliance is restricted to the level required to deliver compliance. Market immaturity, the unexpected and market interference by the Government or others (e.g. an unexpected increase in the targets) will result in increased market volatility.

For those that do not have direct access to a reprocessor or wish to balance imbalances in a portfolio they can access their PRNs through a centralised market. The accuracy of the price on the market depends on the liquidity (the total volume of transactions) through that market and the quality of information available to that market in both the quantity of PRNs potentially available and who is in a position to manipulate the market through excessive holdings.

1.4 What structure is required to implement a market led approach?

- a. The first and most important things to establish are the drivers that will make the market operate.
 - Who are the potential buyers? Why might they wish to buy?
 - Who are the potential sellers? Why might they wish to sell?

If these cannot be identified it is unlikely that a market led approach can be taken.

In the UK, for the PRN market, the drive to buy is provided by the desire of compliance schemes and the packaging chain (obligated companies) to comply with the legal obligation and avoid the penalties for non-compliance. The desire to sell comes from an opportunity for reproprocessors and exporters to make additional money while aiding compliance schemes and obligated companies to meet their legal obligations.

- b. The next most important thing to define is the commodity that is going to be traded. In the UK, this is the PRN. Legislation and the accreditation process of the Agencies define it.

The Agencies developed a voluntary accreditation system of reproprocessors with the aim of providing both proof of recovery or recycling (capacity and actual throughput) and consistency of evidence. It was first discussed in July 1996, and outlined in *Producer Responsibility Obligations July 1997*.

Such accreditation required reproprocessors to keep records and use a standard form, PRNs, to provide robust evidence of compliance. PRNs are the only documents that reproprocessors that have been accredited by the Agencies are permitted to issue as evidence of receipt by them of packaging waste which had originated in the UK. Sites rather than companies are accredited and reprocessing has to be taking place prior to accreditation. So far over 230 reproprocessors have been accredited.

PRNs must relate to the packaging waste provided to a reproprocessor, and not packaging waste processed (Regulation 22(2)). Accreditation may be suspended or revoked if such packaging waste once received is not reprocessed.

The intention was that by 31 January 1999, the first time that companies had to prove compliance with the Regulations, PRNs would be the means by which business could discharge their producer responsibility obligations for the previous year.

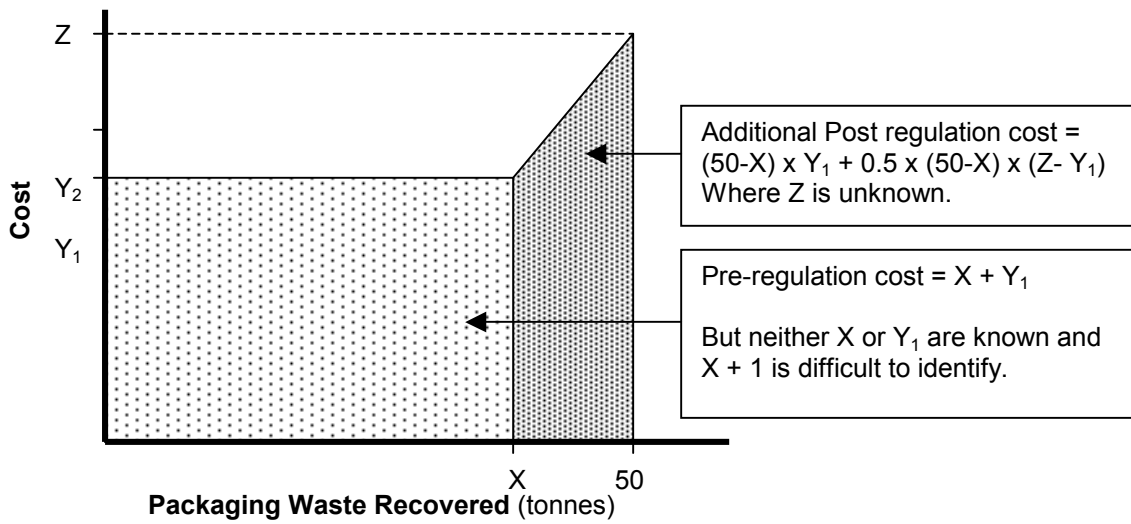
Those who present PRNs in support of their annual Certificate of Compliance are considered by the Agencies to have taken reasonable steps to comply with their producer responsibility obligations, although it is not necessary for businesses to obtain evidence exclusively from accredited reproprocessors.

Agency Accredited Exporter Status was subsequently developed as a system of voluntary accreditation of exporters in recognition that some packaging waste is exported for reprocessing. An exporter must establish an audit system to follow the export of packaging waste from its departure from the UK to its reprocessing overseas, and they issue as evidence the Packaging Export Recovery Note (PERN). So far there are over 40 Agency accredited exporters.

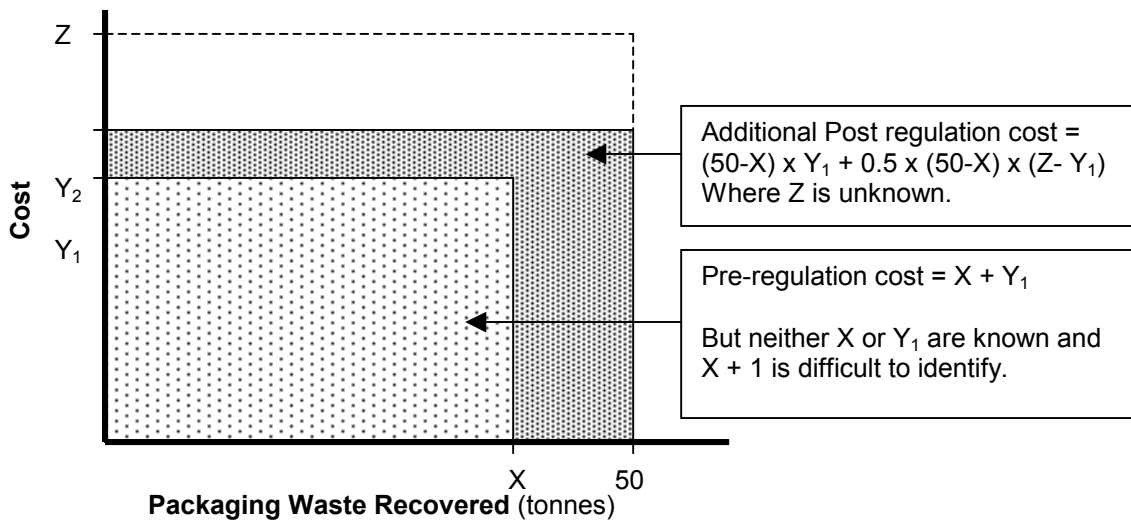
The concept of the PRN was initially developed from work undertaken by the consultancy firm Sequoia for VALPAK in late 1996 and then developed by Enviromac on behalf of SEPA in late 1997. To meet the higher recovery and recycling levels required by the Regulations significant extra finance would be needed. Thus PRNs were conceived as a way of enhancing market prices for packaging waste (secondary raw materials) and therefore provide market pull rather than simply rely on legislation to create supply push. It was anticipated that the price of a PRN would represent the marginal cost per tonne of recovering the total tonnage required. Importantly this total tonnage can be defined as a percentage obligation rather than an exact tonnage. The marginal cost represents the additional cost required to achieve the target averaged over every tonne reprocessed. This reduces the need to ever identify or monitor either the exact additional tonnage or the exact cost of each additional tonne.

Diagram 1.2 The economic theory behind the PRN

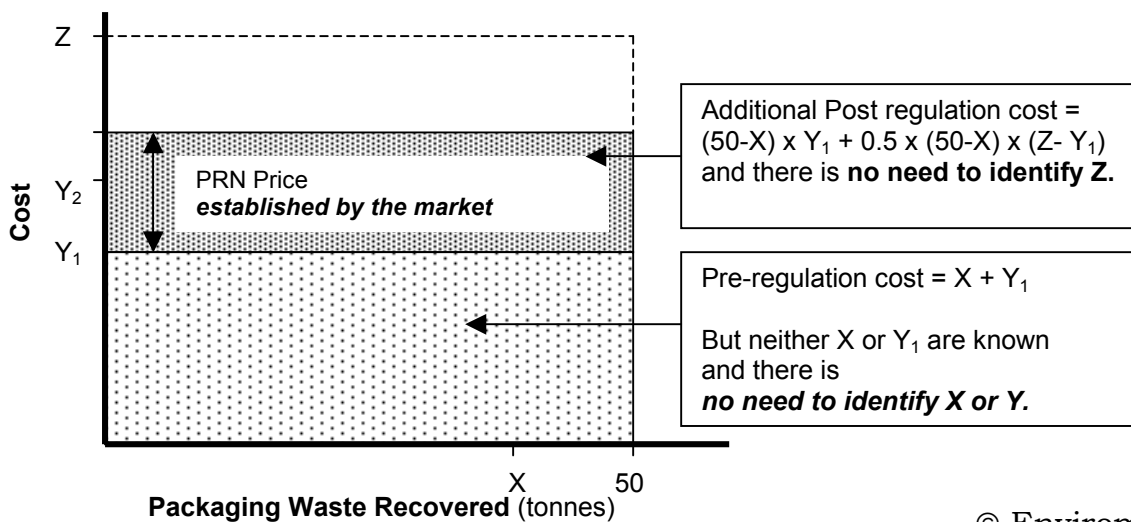
Additional Cost Approach



Average Cost Approach

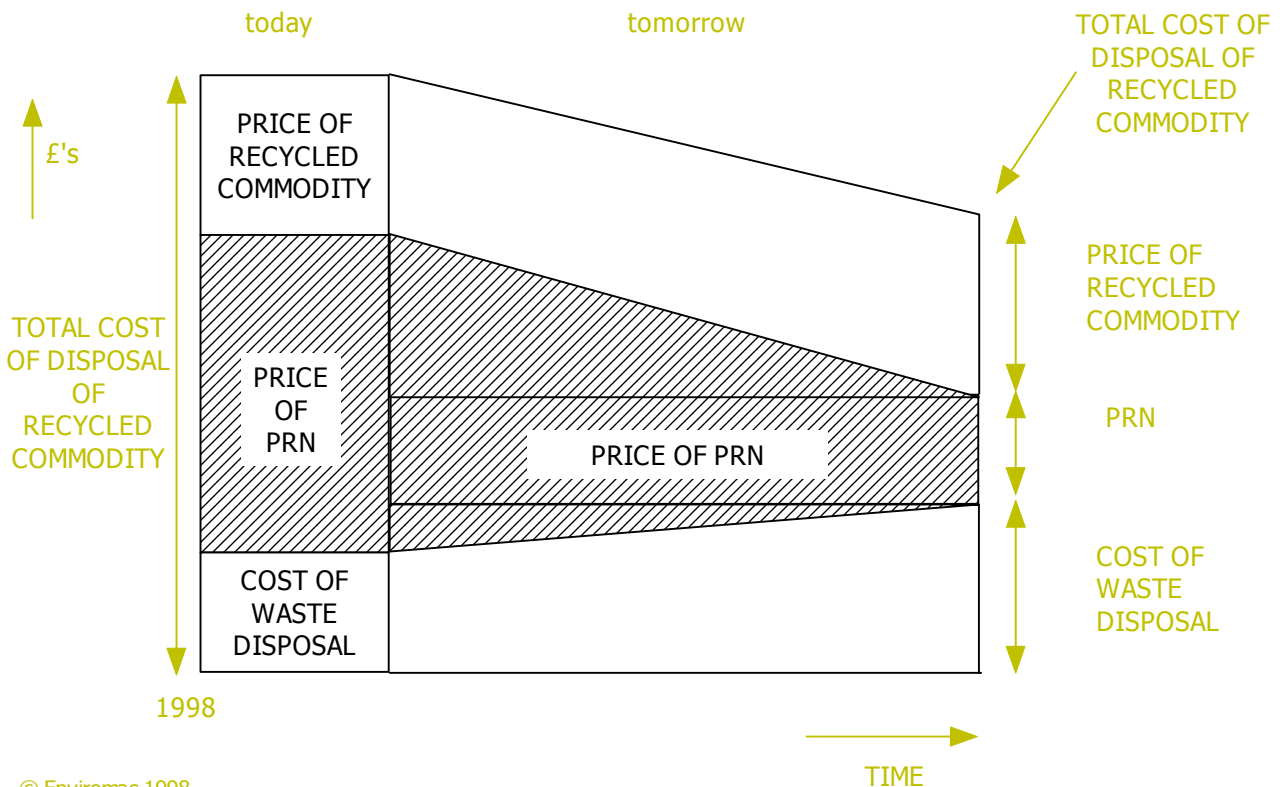


Marginal Cost Approach



An alternative scheme (Material Transfer Notes) involved tracking material from its point of origin to reprocessing, and was similar to the consignment note system for special waste. This scheme was trialled by several local authorities and reprocessors in late 1996, but PRNs were considered simpler, with no need for such tracking information. This assumption that it would not be necessary to track the transfer of PRNs has subsequently been proved to be incorrect. Although to date no action has been taken to make good this omission.

Diagram 1.3 The theory behind a PRN from the perspective of a disposer.



From the perspective of the waste disposer there is a cost of waste disposal. There is an additional cost to recycle that waste. That additional cost is partially offset by the price received from the reprocessor for the secondary raw material. But the implementation of targets means that an additional cost is imposed in order to achieve additional recycling levels above and beyond those found at market rate. This additional cost is met through the price of the PRN. The theory suggests that if the price of the secondary raw material increases then the price of the raw material decreases and vice versa in this way reprocessors can gain additional income to fund their additional investment in infrastructure.

Over time if all other things are constant, such as targets, then through economies of scale, the development of end markets and a movement down the learning curve the overall additional cost requirement reduces and the supplement reduces to ultimately an administrative charge. Hence not only is the optimum price found to achieve the environmental

aims but also that cost can decline over time once those environmental aims are achieved.

Cost effective for industry, simple for Governments to introduce and, once the environmental objectives are defined, easy for the Regulators to police.

There is a conflict between the Agency definition of the evidence of compliance and the requirements imposed on compliance schemes which require that they ensure that they grow the reprocessing infrastructure. This will be covered later.

- c. Having identified the drivers and the commodity the next most important aspect is to establish a manager for the market. This can be established concurrently with the process of defining the commodity.

It is not appropriate that the manager of the market should either be the Government, the legislator, or the Agencies, the Regulators. Nevertheless it is important that the market manager is respected by and in regular contact with all of these.

The manager should be responsible for interpreting the legislation and defining the commodity to be traded as well as operating a registry to be able to identify, without necessarily restricting, the ownership of the commodity or interfering with price issues. In the UK although the Minister for the Environment has an advisory committee, there is no clearly identified manager of the market.

Within this context there are clear roles for both the Regulator and the Government. The Government draws up the legislation and adjusts targets based on the best available advice. This will be a balanced opinion taking into account the views of the Regulators, industry, environmentalists and non-governmental organisations.

The Regulators enforce the Regulations. It is essential that the Regulators are effective in their role because without them there is a weaker demand driver to stimulate the market. Nevertheless to put a regulator in the role of an adviser potentially creates a conflict of interests both for the Regulator and the client. Equally for the Regulators to be effective in their role the Regulations must be simple to understand and regulate.

- d. Identify simple and appropriate steps to achieve the target.

- Establish realistic and achievable goals? Neither too easy to achieve, in which case legislation is unnecessary, nor too difficult, in which case the legislation becomes unsustainable.
- Ensure that early movers to comply with the aims of the legislators neither suffer a competitive disadvantage nor gain excessive profits.
- Decide whether the commodity can be stored (e.g. banked) or the obligation be stored (e.g. borrowed) and if so to what extent?

In the UK, the selection of interim targets has caused a considerable challenge, which has resulted in a number of target adjustments. These adjustments may not have been so necessary if banking or borrowing had been permitted.

- Consider how continuous supply will be blended with annual demand or depending on the legislation vice versa.

- Ensure that one buyer or seller does not dominate the market.
- Ensure that the monies generated achieve the desired aims.

1.5 Who is competing against whom and how?

Competition comes about within the PRN system through three aspects:

- a. There is a choice between registering independently or as part of a compliance scheme.
- b. There is a choice between joining one of 16 compliance schemes each of which compete both on price and additional services such as consultancy or waste collection.
- c. As all materials except plastic have exceeded their minimum material specific recycling obligations they all compete to sell into the recovery obligation. In this area they are not only competing between the identified material streams but also with non-specified packaging materials such as wood and energy from waste.

1.6 What is the role of a market place in a market led approach?

The idea of a dedicated electronic market place for PRNs was supported by the Agencies. The Environment Exchange (t2e) launched a market place in PRNs on 25 November 1998. t2e was subsequently taken over by the Swedish technology and trading company OM Group, which develops technology for, owns and runs market places, and became OM Environment Exchange (OMEE) on 1 April 1999. On 1 April 2001 it was rebranded The Environment Exchange – part of OM. Initially the market place started with spot contracts; forward contracts were introduced in 2000 and simple options contracts are being considered as a future development.

The role of a market place is to provide a venue where the buyers and sellers meet. It provides a common code of conduct for all participants in that market place and if the Financial Services Authority regulates the market place, has to abide by their code of conduct as well. The key output from a market-place is price transparency.

The market place matches a willing buyer with a willing seller of the commodity. The number of buyers and sellers that come to the market place and their frequency of transactions provide liquidity the essential ingredient to any market place. Because transactions are carried out through a centralised system at a visible price, a market place supplies an auditable trail and establishes a transparent market price for all. This transparent price provides a benchmark from which risk management/minimisation tools such as forward, future and options contracts can be run. The more liquid the market (e.g. the greater the volume of trades) the more efficient it becomes and the more accurate the price information.

The market place can also provide clearing and settlement facilities for both contracts traded through the market and off market. The Environment Exchange provides this integrated service.

At no stage is it necessary that all trading should go through the market place unless legislated otherwise some trading will take place ‘over the counter’ (OTC). Volumes tend to vary between 2% (Many commodities exchanges) and

56% (Many equity exchanges). Nevertheless it would be beneficial for purposes of price transparency that the price and volume of all transactions is reported to the market place.

2. Identify the strengths of the current UK system and where improvements could be made to the current system.

2.1 The benefits of the UK system and its current market led approach

The advantages of this system are that the market:

- establishes a competitive price at which the overall aims of Government can be achieved.
- removes the requirement for an assessment of costs in a dynamic situation and as a result delivers compliance at a lower cost.
- reduces overall administrative costs and increases transaction security.
- introduces new risk management tools such as forward, future and options contracts.

And:

- from a Government perspective:
 - there is no requirement to raise additional revenue to achieve its aims.
 - the system can be simply managed.
 - results are easily benchmarked.
- from an industry perspective:
 - compliance can be delivered at the minimum economic cost
 - there is the possibility of financial benefit for those that over perform in compliance with the regulation (e.g. incentives).
 - there is the possibility that when economies of scale and a movement down the learning curve are achieved the overall market price will decrease.
- from an environmental perspective it delivers:
 - absolute compliance with the defined environmental aims.
 - incentives to minimise packaging because of the cost of the PRN.
 - incentives to re-use through the removal of a packaging obligation on re-used packaging.
 - incentives to increase reprocessing/ exporting to overseas reprocessors through the income derived from the PRN.
 - ring-fenced funds for the designated purpose.

2.2 The inherent problems of using a market led approach

The disadvantages are that:

- the market will ruthlessly expose any flaws in its structure

In the UK there have been problems in defining packaging and hence the tradable commodity and obligations. Inconsistencies and variations relate to a range of factors:

- definitions of packaging and packaging wastes. This is primarily caused by the ambiguous definitions of packaging in the original European Directive.
- the range of companies generating packaging. Problems arise identifying between obligated companies that have registered, obligated companies which have not registered and companies without an obligation.
- company data reporting systems or at least the lack of them. This is attributable to the number of packaging items, the variation in their volumes, bulk density coefficients, and the resulting (over) estimates.
- imports and exports and whose responsibility they are. For instance the packaging brought into the UK by individuals that import wine, beer and cigarettes.
- dynamics of the packaging industry: lightweighting, material substitution, marketing (e.g. multi-packs).
- validation of data by Environment Agency and SEPA.
- the role and purpose of compliance schemes, PRNs and PERNs.

Estimates by consultants of packaging in the waste stream for 1996/97 were 8,700,000 tonnes. Data from obligated companies in 1997 suggested 12,000,000 tonnes, although subsequent analysis has indicated various inaccuracies (e.g. complex data collected for the first time, over-estimates rather than weights, weight conversion problems) with better data being returned in more recent years. Another figure, based on the total reported initially by obligated businesses in 2001², was 7,700,000. This figure was also quoted in an article and subsequent correspondence in the *Daily Telegraph* in February/March 2000.

The total tonnage reported in 1999 was 9,179,981, of which it is estimated about 1,000,000 was 'non-obligated'. There is considerable debate about this latter figure. In the *Consultation Paper on Recovery and Recycling Targets for Packaging Waste in 2001*, a total based on packaging coefficients and SIC codes produced a figure of 1,600,000. This is 23% of the total tonnage, compared to the original 8% estimate based on the £1 million turnover cut-off. The revised figure was rejected, and a figure of 1,021,684 tonnes (11.1%) was used. This appears to be based on a mid-estimate of the number of non-obligated companies (3,000) and typical annual tonnage (150) of packaging per business.

Table 2.1 illustrates the disparity between reported tonnages and the estimates of the material organisations between 1996 and 2000

² From the DEFRA consultation paper on recovery and recycling targets for packaging waste in 2002 published October 2001

Table 2.1 Overall Packaging Tonnages in the UK³

Material	1996 reported	1996 + de-minimis	1997 reported	1998 reported	2000 estimated
Paper	2,859,927	3,610,536	3,727,409	4,000,000	3,855,000
Glass	1,989,029	2,185,062	2,864,393	2,200,000	2,155,000
Aluminium	124,978	155,082	156,586	109,000	109,981
Steel	833,394	833,394	784,460	735,000	750,000
Plastics	1,416,666	1,611,624	1,611,624	1,700,000	1,600,000
Wood	2,151,413	2,372,374	2,372,374	1,500,000	670,000
Other	967,680	967,680	967,680		40,000
Total	10,343,087	11,735,752	12,484,526	10,244,000	9,179,981

Another problem has been the limited information available concerning the growth in obligated tonnages. Analysis of data by Biffa (*Wastes Management*, October 2000) suggest this could be as much as 10% in 1999/2000, and accounted for an additional 800,000 tonnes.

As a result there have been problems in defining both the total obligation and those that have an obligation. This is exacerbated by the challenge of identifying whom conducts which packaging activity on what piece of packaging. This makes the role of Regulator particularly difficult.

This in turn has exacerbated the 'free-rider' problem. While no doubt some avoidance is deliberate other 'free-ride' accidentally as a result of the complexities of the legislation. It is difficult to estimate the full extent of the problem and hence to what extent the current estimate for non-obligated tonnage is made up from free-riding.

As a consequence targets have been less demanding than expected with a consequent oversupply of PRNs. This has resulted in downward price pressure on PRN prices in 1998, 1999 and 2000 to lower than levels anticipated in 1997.

Table 2.2 shows that in 1998 there was a PRN over-supply of 20.6%. This is a substantial imbalance. In other markets a shift of 2% is sufficient to send a market into a price peak or trough.

³ Sources:

- 1996, 1997 from 'Review of The Producer Responsibility Obligations (Packaging Waste) Regulations, 1998'. All UK consultation papers are at <http://www.defra.gov.uk/environment/waste/index.htm>
- 1998 = DETR estimate from 'Increasing Recovery and Recycling of Packaging Waste in the United Kingdom - The Challenge Ahead. A Forward Look for Planning Purposes, 1999'.
- 2000 = Packaging flows estimated by the Material Organisations. With no annual growth, figures for 2001 would be the same except for aluminium at 0.9% = 110,971 and plastics at 2% = 1,632,000, giving overall total of 9,212,971, from 'Consultation Paper on Recovery and Recycling Targets for Packaging Waste in 2001, 2000'. Growth rates quoted in 'Increasing Recovery and Recycling of Packaging Waste in the United Kingdom. The Challenge Ahead. A Forward Look for Planning Purposes' 1999 were 0.9% for aluminium, 4% for plastics and 2.5% for paper.
- The figure for 2000 includes data for England, Wales, Scotland, Northern Ireland and non-obligated companies.

Table 2.2. Recovery and recycling of Packaging reported in the UK for 1998⁴

Material	Material specific obligation	Material received by reprocessors	1998 PRNs	1998 PRNs transferred to 1999	Surplus PRNs (not issued)
Paper	191,438	1,689,086	1,455,789	55,108	383,189
Glass	106,305	588,316	399,995	10,054	178,267
Aluminium	7,028	14,517	11,336	232	2,949
Steel	45,927	147,221	130,322	3,118	13,781
Plastics	90,178	115,169	87,258	7,052	20,859
Sub-Total	440,876	2,759,309	2,084,700	75,564	599,045
Energy from waste		448,354	371,536	16,656	60,162
Total		3,207,663	2,456,236	92,220	659,207

This combined with a limited carry forward, banking, ability (PRNs issued on material received into a reprocessor or exported in December may be sold into either the current or the subsequent year) has made available less rewards for reprocessors that took early action than they anticipated. As a result concerns have been expressed that insufficient investment has been made in the recycling infrastructure to achieve the 2001 targets.

Comments in the press have include:

Seen by merchants, incinerators and reprocessors as a bonus rather than focused on infrastructure development

Pressures from supermarket groups on merchants

Retention of PRNs by reprocessors in the hope of obtaining higher prices

Wide variations in PRN prices (and generally low values), both for packaging waste materials and over time

Dominated by VALPAK as the largest compliance scheme, and paper as the most important packaging waste material by weight

All are examples of an immature and poorly structured market trying to find its feet.

Concerns have also been expressed about the issuing point of PRNs (the Mayer Parry case). This debate has focused on who has the greatest incentive to increase the use of recycled material and why.

Reprocessors may be prepared to expand their use of secondary raw materials as an alternative to primary ones if one or more of the following applies:

- the quality of their products is not undermined by using them
- their machines are capable of changing to an alternative raw material
- the secondary raw material has increased qualities to the primary raw material

⁴ Source : *Increasing Recovery and Recycling of Packaging Waste in the United Kingdom – The Challenge Ahead. A Forward Look for Planning Purposes*, DETR June 1999. The penultimate column shows PRNs carried forward from 1998 to 1999.

- the secondary raw material is available at lower prices than the primary raw material
- they receive an additional income stream from doing so which more than compensates for any additional cost

However it has been argued that many of the traditional reprocessors are in packaging and/or declining industries. By requesting them to increase their use of secondary raw material at the same time as their end markets are declining, with an increased pressure on packaging producers to minimise, 'light weight', their products, is trying to push supply into an area with restricted demand. So the challenge has been to discover new markets into which secondary raw materials can be sold. Exporters have reacted swiftly to this requirement.

In this arena it is not the reprocessors that are taking the risks but the collectors that take the risks in developing new markets and therefore it is argued require the incentive of an additional cash flow to offset this risk.

- from a Government perspective they lose control of a potential source of revenue. Because funds are ring fenced the Government has no opportunity to raise additional revenue for other uses.

Nevertheless independent regulatory fees are raised in the legislation. Hence for this role there is no requirement for the Regulator to be funded directly from Government sources.

- from an industry perspective they may fail to comply and face potential penalties. In the UK the potential penalty is an unlimited fine. Judicial guidance has suggested that in this context unlimited could equate to up to 3% of a businesses annual turnover.

Industry can delegate, and the majority of them have done, their obligation on an annual basis to one of 16 compliance schemes. If a compliance scheme fails to meet its obligation it may not be accredited by the Agencies in subsequent years. To date no compliance scheme has failed to meet its obligation, although one voluntarily ceased to exist and another two merged.

Nevertheless industry has expressed concerns which include:

- What are reprocessors doing with PRN revenue? Are the 'ring fenced' funds being appropriately spent? Are the Agencies technically competent to audit the use of funds?

Obligated parties want to know that resources are being invested in reprocessing and collection infrastructure (this links to the issue of 'price and expenditure transparency' in both secondary raw materials and PRNs and with questions concerning actual pricing policies).

- Who should have the right to the PRN? Are they equally available to all obligated parties?

Obligated parties believed that PRNs should only be issued to other obligated parties or their representatives, and not discriminate against small players.

- Worries about non-obligated parties or others trading in PRNs for their own profit.

An issue here is whether PRNs could/should be issued to all deliverers of packaging waste, whether obligated or not but this raises the spectre of secondary trading.

- A need for suitable transitional arrangements for PRNs at year end to avoid market distortion.

There is also a conflict between the Agencies requirement from a PRN, as evidence that processing has taken place, and industry's, which requires evidence in the growth of reprocessing capacity.

Yet currently neither industry nor the compliance schemes have shown any wish to establish alternative universal independent auditing or accreditation procedures. Each compliance scheme prefers to establish its own individual auditing procedures. In fact auditing capability has been a competitive selling point between compliance schemes. This is partially the result of the legislation which requires compliance schemes to demonstrate the steps taken by a scheme to increase the use of packaging waste. In effect this has created a non-homogenous market with each compliance scheme striving to develop its own niche with the only nationally accepted form of compliance being the PRN.

- from an environmental perspective the wrong aim is selected or over or under ambitious targets are set. If the former has occurred the wrong outcome might result. If the later occurs if the targets are under ambitious the legislation is unnecessary. If it is over ambitious the costs might be prohibitively high which might either interfere with the wealth creating ability of industry or force industry into non-compliance or elsewhere to operate within a less demanding regulatory environment.
- It is new and it takes those regulated time to adapt to new ideas. In the interim there is considerable anxiety caused by the unknown.

2.3 Solutions to those problems

Some of these problems have been addressed and resolved. The Agencies and the Government have:

- Created more continuous demand to match continuous supply to stimulate a more liquid market.
- Created a framework to ensure that PRN funds are used for recycling infrastructure investment.
- Restricted access to market participants. This has not necessarily proved to be either beneficial or regulatable.

In March 1999, DETR proposed various changes involving PRNs:

The Reprocessors, as a condition of accreditation, must submit annual returns on expenditures from PRN revenue along Agency guidelines. This is to ensure greater transparency on expenditure to meet industry's requirements on the use of the additional funds.

Reprocessors will have to issue PRNs to 'obligated parties only or to those representing them'. This measure was designed to avoid a secondary, speculative, market in PRNs, which it was perceived might drive prices artificially high.

Paradoxically this also prevents Local Authorities, as well as those in the financial sector that might be prepared to share the risk, obtaining PRNs except on the request of an obligated company or compliance scheme. Supplying PRNs to non-obligated parties will be reconsidered in 2001.

In August 1999 a *Consultation Paper on Changes to the Percentage Activity Obligations and other Matters* included proposals for reporting compliance on a quarterly basis. There are several perceived advantages:

The proposals should help to ensure that PRN purchasing is not all left to the last quarter with little activity taking place earlier in the year

PRN purchasing throughout the year means fewer cash flow difficulties for reprocessors (especially small ones), who may also be experiencing the negative effects of international market prices on secondary raw materials. This aspired to put a halt to any further reduction in overall reprocessing capacity in the UK.

A planned approach to discharging obligations would allow the Government, the Regulators and businesses to assess what investment may be going into infrastructure development through PRNs and how much further investment needs to be injected

Reporting on a quarterly basis would be consistent with the requirement on accredited reprocessors to report quarterly to the Agencies. This would allow the Agencies to reconcile obligation discharged with tonnages reported as being recovered or recycled.

Proposed revisions to *Evidence of Compliance and Voluntary Accreditation of Reprocessors and Exporters* were also published in August 1999 as a Consultation Draft, and included:-

With effect from 1st January 2000 accredited reprocessors **must** inform the relevant Agency each year of the proportion of revenue from the sale of PRNs and PERNs which they have spent or will be spending on the development of markets for recycled materials, capacity for reprocessing and collection infrastructure

Accredited reprocessors agree to use the PRN as the only document they will issue as evidence of delivery to them of packaging waste which had originated in the UK

Accredited reprocessors must keep a continuous record, to be updated quarterly and submitted to the relevant Agency every calendar quarter

Agree to issue PRNs to obligated producers or schemes only, or to those representing them, and agree that obligated producers, schemes or those representing them who deliver their own packaging waste for reprocessing, will be given first option on the PRN when such waste is accepted for reprocessing.

It was announced in January 2000 that accredited issuers of PRNs and PERNs will be required to show what proportion of their PRN/PERN income has been spent under the following headings: increasing capacity, supporting recycling and developing markets for recycle.

2.4 How the current UK system might be further improved

Although the competitive benefits of a tradable economic instrument and the principles are now becoming better understood. Difficulties are still being encountered on a number of aspects of the legislation:

a. Shared Responsibility.

The principle of shared responsibility was widely applauded, particularly by the packer/filler sector, prior to the Regulations being introduced. It has undoubtedly given a wider appreciation amongst businesses of the quantity of packaging that they use. It has also embraced the retailers who it was feared would otherwise not make a significant contribution to implementing the Regulations. Nevertheless nobody had appreciated the difficulty that would arise as a result of the additional complexity of identifying who was conducting what packaging activity to which piece of packaging from both the perspective of calculating the obligation and from regulating the legislation.

It would have been simpler to focus the legislation at a single point, for example packer/fillers, and importers leaving the onus on both to prove whether any of their packaging had subsequently been exported. One of the unexpected discoveries of this legislation has been the number of different packaging activities a single business conducts. Hence this change would not necessarily have resulted in a substantial reduction in the number of companies embraced by the legislation, the de minimis turnover has had a greater impact. But it would undoubtedly have made the regulations less administratively burdensome and simpler to regulate. Both of which would have reduced the overall cost of compliance.

At this stage in the UK, both Government and industry, is unwilling to change an established system to such a radical extent.

b. Improved definitions of packaging.

To a great extent this is beyond the control of the UK Government. Nevertheless more consistent interpretation both internationally and nationally throughout the packaging chain would be beneficial. Not least it would aid comparison between the effectiveness of national compliance activities.

c. The issue point of PRNs.

Reprocessors on receipt of packaging waste material issue PRNs. The theory is that the revenue derived from PRNs is shared throughout the recycling chain between reprocessors and collectors. The existence of this theoretical money flow has not always been easy to establish. Collectors, and local authorities in particular, indicate that no financial benefit has been identifiable.

If those that delivered to reprocessors rather than the reprocessors themselves issued PRNs, it would provide parity between collectors and exporters. The onus of proof would be on the collectors to show that they had delivered the secondary raw material to a reprocessor but the implicit ownership of the PRN would be with the collector rather than the reprocessor.

Regardless of the issue point there is still a requirement to run a well structured and regulated market to ensure that neither the market nor the issue of the evidence are abused.

d. A central register for PRNs

Currently the Agencies delegate responsibility for the issuing of PRNs to the reproprocessors they accredit. Those reproprocessors have a responsibility to record to whom those PRNs are issued. If a PRN is split then it must be returned to the original reproprocessor to be split. However what happens to the PRN in the intervening period between issue and final submission with a certificate of compliance to the Agencies is nobody's responsibility. As a result the market can be manipulated by restricting supply or hoarding without anyone being either aware or in a position to take action.

In a managed market it is paramount that a central registry is establish in order that the manager can be supplied with the requisite information to manage that market.

e. A symbol to show compliance

To introduce a simple symbol, similar to the Green Dot, which would show that a PRN had been purchased to cover the cost of recycling or recovering that package. It could be unique to each nation. This would make it far simpler for the Regulators to monitor compliance by businesses as well as showing to consumers that the packaging chain were taking environmentally beneficial action.

f. Evenly balanced buyers and sellers

For a market not to be dysfunctional it is important that the players whether they be the buyers or the sellers are broadly of equal size. In the UK one compliance scheme makes up 55% of the market whereas its next largest competitors have about 6% of the market. On the selling side one reproprocessor dominates the sale of aluminium PRNs, with an excess of 90% of the market, in hindsight it was unnecessary for the UK to split the metal sector between aluminium and steel. Another reproprocessor claims to have between 20 and 25% of the total PRN market.

It is far better in a market situation to have a market divided between buyers and sellers of approximately equal strength than this split. An intensely competitive market could be developed between as few as four or five buyers of similar strength and the same number of sellers.

2.5 What is the total cost to UK industry?

Population (1997):	59,009,000
Annual cost to industry (1998):	£78,000,000
(1999):	£33,000,000 ⁵
Total packaging per annum (2000):	9,179,981 tonnes ⁶
Total growth in recovery 1998 - 1999:	268,755 tonnes ⁷
Annual cost per capita:	£0.56
Annual packaging per capita:	156 kg
Annual cost per tonne of packaging:	£3.59
Annual cost per tonne of increased recovery	£122.79

⁵ Estimates by DETR

⁶ From Materials Organisations estimates reported in DETR's consultation paper on Recovery and Recycling Targets for Packaging Waste in 2001.

⁷ From tonnages reported to the Agencies in 1998 and 1999 by the reprocessors that they have accredited. These tonnages exclude Northern Ireland where there was no reporting in 1998.

3. Outline the current systems that are in operation within the Nordic countries.

3.1 Denmark

In Denmark there is no independent legislation on packaging waste, it is included in Statutory Order No 619 of June 27 2000 on waste. This imposes an obligation on local municipalities to establish schemes for the household collection of glass and cardboard packaging waste where there are more than 2,000 and 1,000 households respectively. The rest of the household waste, such as metal and plastic packaging waste, is incinerated with energy recovery. From the incineration slag metal is collected magnetically and recycled. From 2001 businesses also have to maintain a register of their waste including packaging waste. The local council, regional council or Danish Environmental Protection Agency may request this information.

Additionally a voluntary agreement was introduced for the recycling and reuse of transport packaging on 16 August 1994. Responsibility for complying with the directive has been delegated to the municipalities who have to send plastic transport packaging, PVC and steel drums for recycling amongst general recycling obligations. In the Government's Waste Plan, Waste 21, the following targets are identified for the recycling of packaging waste in the year 2001:

- Cardboard/paper packaging 55%
- Plastic packaging 15%
- Metal packaging 15%
- Glass packaging 65%

Denmark deem that they comply with the legislation on the basis of these targets and the voluntary agreement with industry to recycle transport packaging and combined with their extensive energy from waste capacity.

Denmark has a packaging tax on beverages containers, service packaging, carrier bags and cutlery and other forms of packaging. The tax is a waste prevention/minimisation measure. This tax impacts on some 6% of Danish industry. These packaging taxes impact on approximately 15 – 17% of all retail packaging and some 7 - 8%⁸ of all packaging.

In 1999, from figures supplied by the Danish Ministry of Taxation, the beverage tax raised approximately Dkr 200 million, the service packaging and cutlery tax a further Dkr 50 million, the carrier bags DKr 176 million and the packaging tax a further DKr 376 million. These figures will change most probably upwards following the introduction of new rates on 1 April 2001. These new rates are based on life cycle analysis.

- How are packaging, recycling and recovery defined?

⁸ European Packaging Waste Law – Status Report on Denmark dated 22 May 2000 by Perchards.

In Statutory Order 619 Denmark uses the same definitions of recovery, recycling and packaging as the European Directive.

- What systems were already in operation prior to the implementation of the Directive?

There is a voluntary agreement with industry on the recycling of transport packaging; recycling systems run by the municipalities for glass, metal drums, paper and cardboard and LDPE. Furthermore there is a tax on service packaging and cutlery, beverage containers and packaging and a waste tax on landfill and incineration. Municipalities have a special obligation to collect glass and paper from households. Denmark has an established network of waste to energy plants for the incineration of municipal waste, which are in the process of being upgraded.

- How have they encouraged businesses to minimise their packaging?

No specific targets have been imposed on industry to minimise their packaging. It is assumed that the service packaging and cutlery, beverage containers and packaging taxes will provide a disincentive to excessive packaging use by businesses. There is an overall ambition to stabilise total waste amounts. Packaging appears to have reduced by 7.6% between 1997 and 1998 but this could be attributed to more accurate measurement rather than any actual reduction. The tax on carrier bags seems to have reduced the amounts of plastic and paper used by 20 and 65% respectively.

- What mechanisms are in place to encourage re-use?

There is a deposit refund scheme for beverage containers for beer and carbonised soft drinks. The Danish Environmental Protection Agency estimates that this system reduces the production of waste by 350,000 tonnes of glass a year. There is no waste tax on secondary raw materials that are re-cycled. The imposition of a waste tax in addition to a fee for the collection and treatment of waste discourage disposal by incineration or landfill.

- What mechanisms are in place to encourage recycling?

The voluntary agreement between industry and the Danish Government to recycle transport packaging and statutory obligations on the municipalities to recycle LDPE, paper and glass from households and metal drums. All of these involve taxes and treatment fees forgone rather than direct incentives, such as grants or other forms of additional revenue, to recycle.

- How have they chosen to interpret the consumer information obligation?

Municipalities have an obligation to inform households and businesses about their collection schemes and fee structures and have to incorporate their plans for packaging waste in their waste plans. These are made up every fourth year and are open to public scrutiny.

- How is the Directive regulated?

The Danish Environmental Protection Agency is responsible for regulating all waste policy and it is done through statutory orders on: waste, certain requirements for packaging, and statutory orders on packaging for beer and soft drinks among others.

- What results have been achieved?

There is a high rate of recovery and recycling of waste in Denmark. The most recent packaging statistics are for 1998, which show that a total rate for recovery of 89% including a recycling rate of 51% was achieved. Material specific recycling rates of 58% for paper and cardboard, 42% for metals, 75% for glass and 7% for plastics were achieved⁹.

- Have domestic recovery and recycling rates improved? If so by how much?

As can be seen in Table 3.1 there appears to have been a decrease in recovery between 1997 and 1998. As in the total packaging used this reduction may be attributed to more accurate measurement rather than any real change in overall recovery rates. Over the same period recycling in the material specific packaging streams increased by 15.2% with metal recycling increasing substantially¹⁰.

Table 3.1 Danish recovery and recycling rates of packaging between 1997 and 1998¹¹

Year	1997			1998			1997 - 8
	Total Packaging	Recovery rates	%	Total Packaging	Recovery rates	%	
Incineration	906,792	758,927	83.7%	837,927	742,688	88.5%	-2.1%
Glass	202,306	124,122	61.3%	175,985	132,039	75.0%	6.4%
Plastic	183,430	11,249	6.1%	172,196	11,455	6.7%	1.8%
Paper	463,021	218,886	47.3%	435,228	253,400	58.2%	15.8%
<u>Metal</u>	<u>58,035</u>	<u>9,170</u>	<u>15.8%</u>	<u>54,518</u>	<u>21,867</u>	<u>40.1%</u>	<u>+138.5%</u>
Total Recycling	906,792	363,425	40.1%	837,927	418,761	50.0%	15.2%

- How much has been exported? What impact have world markets had on those exports?

Table 3.2 A comparison between packaging waste recycled within Denmark and exported 1997 - 8¹²

Year	1997			1998			1997 - 8
	Domestic	Export	%	Domestic	Export	%	
Glass	96,368	27,754	22.4%	96,286	35,753	27.1%	+28.8%
Plastic	7,663	3,584	31.9%	8,879	2,576	22.5%	-28.1%
Paper	140,410	78,476	35.9%	158,845	94,555	37.3%	+20.5%
Metal	2,170	7,000	76.3%	3,500	18,367	84.0%	+162.4%
Total	246,611	116,814	32.1%	267,510	152,184	36.3%	+30.3%

⁹ From the statistics reported by Denmark to the European Commission in June 2000 and revised data from June 2001.

¹⁰ The rise in metals recycling is due to revised calculation methods. Because of uncertainty regarding calculation, the recycling of metal scrap subtracted after incineration was estimated very low in 1997. In 1998 it was assumed that 50% of steel packaging waste that goes through incineration was recycled.

¹¹ From statistics collected by the Danish Environment Protection Agency and submitted to the European Union in 1997 and 1998

¹² From the statistics reported by Denmark to the European Commission in June 2000.

Approximately 37% of Danish paper packaging waste and 85% of metal packaging is exported. The world markets appear to have had a considerable impact on the recycling of packaging waste with export growing at a considerably greater rate than domestic reprocessing.

The volatility of this market can be seen by the annual variation in the rates of growth in the individual materials and the proportion of the total quantity recycled that is exported with plastic and metal providing the most extreme examples.

- At what cost to business?

The cost to industry (and households as it is assumed that this tax is ultimately passed directly onto the consumer) of implementing the European Directive can be estimated to be the cost of the packaging taxes. Although the purpose of these taxes is both to encourage waste prevention, in which it may have been effective in reducing the quantity of packaging used, and raise revenue for the Danish Government. These taxes raised DKr 552,000,000. In addition the beverage tax raised DKr 200,000,000.

The total of these two taxes equates to 8% of the total cost of waste management in Denmark, which is estimated by Statistics Denmark to be DKr 9,496 million. In the UK packaging is estimated to represent 9% of the waste stream. Hence it could be argued that these taxes have been ring-fenced specifically by Government for the purpose of dealing with packaging, as a result potentially releasing taxes raised elsewhere for other purposes.

Population (1997):	5,275,000
Annual cost to industry (1999):	DKr 552,000,000 ¹³
Total packaging per annum (1998):	837,927 tonnes ¹⁴
Total growth in recovery 1997 - 1998:	-16,239 tonnes ¹⁵
Annual cost per capita:	DKr 104.64
Annual packaging per capita:	159 kg
Annual cost per tonne of packaging:	DKr 658.77
Annual cost per tonne of increased recovery	DKr -33,992.24

3.2 Finland

Finland introduced a packaging ordinance in 1997. By 30 June 2001 it aimed to reduce the total weight of packaging relative to the volume of packed products consumed in Finland by 6% from 1995 figures. At least 82% would be either recovered or reused, with a minimum of 61% recovered, 42% recycled and a material specific target of 15%. These targets are further subdivided by material as follows:

¹³ From the Danish Ministry of Taxation.

¹⁴ From Denmark's submission to the European Union.

¹⁵ The total increase in recycling and recovery from the figures submitted to the European Commission by the Danish Environmental Protection Agency

Table 3.3 Material recovery and recycling obligations for Finland

Material type	Recovery (%) (recycling & energy recovery)	Recycling (%)
Glass	48	48
Paper, cardboard	75	53
Metals	25	25
Plastics	45	15

The ordinance imposes an obligation on all packer/fillers and importers with a minimum annual turnover of 5 million FIM. All businesses above this turnover must submit packaging data to the Finnish Environmental Institute on an annual basis.

Businesses must either join a compliance scheme, PYR is the only one, or arrange their own take back and recovery operations. Businesses pay a fee based on material specific weight related recovery fees and an annual fee to PYR to administer the scheme. PYR contract with 6 material specific recycling companies to carry out the operations.

PYR and their contractors have initially concentrated on industrial packaging but some inroads have been made on domestic packaging.

Since 1976 there has been a tax on beverage containers. There is also a landfill tax in operation.

- How do they define packaging, recycling and recovery?

Finland has adopted the same definitions of packaging, recycling and recovery as the European Directive. They have created a very simple interpretation or user's guide. They have created an additional category of re-use.

- What systems were already in operation in each country prior to the Directive?

Since 1976 there has been a tax on beverage containers. There is also a landfill tax in operation. Palpa has been organising a collection scheme for cans since 1996. This is based on a deposit scheme.

A recycling initiative has been in place for paper and card since 1943.

- How have they encouraged businesses to minimise their packaging?

A packaging reduction target of 6% reduction on 1995 levels relative to the volume of packed products consumed in Finland by 30 June 2001 has been introduced. However the total quantity of packaging has increased by 1.4% between 1997 and 1998. Clearly this is outwith PYR's control.

- What mechanisms are in place to encourage re-use?

Re-use is encouraged through a tax on beverage containers, which includes a mandatory deposit scheme for refillable and recyclable packaging.

- What mechanisms are in place to encourage recycling?

Landfill tax encourages alternative disposal options.

- How have they chosen to interpret the consumer information obligation?

PYR have opted not to join the Green Dot scheme. They distribute a comprehensive range of information through newsletters, the internet and brochures.

- How is the Directive regulated?

The Finnish Environment Institute regulates the ordinance on behalf of the Ministry for the Environment. PYR effectively self-regulates its own operations.

- What results have been achieved?

By 1998 PYR has been very successful at establishing high recycling and recovery rates with a total of 66% re-use incorporating a 56% recovery rate and a 45% recycling rate. With material specific rates of 57% for paper and card, 48% for glass, 16% for metals and 10% for plastics.

- Have domestic recovery and recycling rates improved? If so by how much?

The statistics are difficult to interpret but it would appear that recycling capacity in all materials except for plastic is increasing. The most significant increases have been in metal cans, 92.3%, and glass, 39.0%. Paper reprocessing capacity appears to have increased by 2%. But recovery usage appears to have declined by 9.8%. Overall recycling and recovery capacity appears to have increased by 4.4%.

Table 3.4 Total recovery and recycling in Finland 1997 and 1998¹⁶

Material (tonnes)	1997		1998		Growth
	Recycling	Recovery	Recycling	Recovery	
Glass	24,900	0	34,600	0	39.0%
Of which exported			6,800		19.7%
Plastic	9,200	11,000	9,200	9,000	-9.9%
Of which exported			3,500		38.0%
Paper and fibreboard	137,600	40,000	140,400	37,000	-0.1%
Of which exported			10,000		7.1%
Imported tonnage			50,000		27.7%
Metals	2,600	0	5,000	0	92.3%
Of which exported			1,200		24.0%
Total	174,300	51,000	189,200	46,000	4.4%

- How much has been exported? What impact have world markets had on those exports?

All aluminium packaging waste is recycled outside Finland, 24% by tonnage of all metals packaging is exported, 20% of glass and 38% of plastic are exported for reprocessing.

¹⁶ From Finland's statistics reported to the European Commission as reported in PYR News 2/99 and 2/00.

As statistics are only available for one year it is difficult to judge the impact of world markets on these material flows nevertheless it can be identified that the export market is significant to Finland in meeting its targets.

- At what cost to business?

PYR estimate the annual cost of compliance at FIM 200,000,000. Though to be directly comparable to other nations the total raised in beverage container tax, FIM 60,000,000 annually, should be included as well.

They also

Population (1997):	5,140,000
Annual cost to industry (1998):	FIM 260,000,000
Total packaging per annum (1998):	424,100 tonnes
Total growth in recovery 1997 - 1998:	9,900 tonnes
Annual cost per capita:	FIM 50.58
Annual packaging per capita:	83 kg
Annual cost per tonne of packaging:	FIM 613.06
Annual cost per tonne of increased recovery:	FIM 26,263

3.3 Iceland

Iceland has not introduced any producer responsibility legislation so far. The intention is to introduce a bill in the spring of 2001. This will be a levy system based on packaging weights. It will be run by a combination of industry and the communities and regulated by their Environment and Food Agency. It is hoped that this will raise 500 million Ikr annually to increase recycling and recovery.

A beverage container tax/deposit scheme has been in place since 1989, which raises approximately 10 million Ikr. This tax, which consists of a returnable deposit and a service charge, is raised at point of import, as all beverage containers are imported. The system is operated by a limited company run jointly between industry and Government. It has raised recycling rates of beverage containers to 86%.

- How do they define packaging, recycling and recovery?

Iceland has used the same definitions of packaging, recycling and recovery as in the European Directive.

- What systems were already in operation in Iceland prior to the Directive?

A beverage container tax/deposit scheme has been in operation for 12 years.

- How have they encouraged businesses to minimise their packaging?

The beverage container tax/deposit scheme has encouraged a reduction in glass packaging from 4,600 tonnes to 2,400 tonnes between 1995 and 1998. In the same period metal packaging has increased from 3,800 tonnes to 7,100 tonnes so this may have been packaging material substitution rather than minimisation.

It is anticipated that the packaging levy will stimulate further reduction in packaging but emphasise that since a considerable proportion of their

packaging is imported (60% in 1995 rising to 65% in 1998) a great deal is beyond Iceland's direct control.

- What mechanisms are in place to encourage re-use?

The beverage container tax/deposit scheme encourages re-use because funds are refunded to consumers when the bottle is returned.

- What mechanisms are in place to encourage recycling?

There is no landfill tax in Iceland. There is an hazardous waste directive.

- How have they chosen to interpret the consumer information obligation?

Environmental meetings that are held approximately every 4 years to distribute consumer information. These are the responsibility of the Environment and Food Agency and their 10 regional offices.

- How is the Directive regulated?

As the Directive has not as yet been introduced it is not regulated. Nevertheless the draft bill will be regulated by the Environment and Food Agency.

- What results have been achieved? Have domestic recovery and recycling capacity improved? If so by how much?

Between 1991 and 1998 packaging has increased from 48,200 to 65,300 tonnes. The total quantity recycled has increased from 8,010 to 8,547 tonnes between 1995 and 1998. This reflects as an overall reduction in recycling percentage from 14% to 13% and recycling and recovery rate from 15% to 14%

Table 3.5 Packaging waste tonnages per material in Iceland between 1991 and 1998¹⁷

Material	1991		1995		1998	
	Total	Recovered	Total	Recovered	Total	Recovered
Paper ¹⁸	18,100	N/K	21,500	2,500	27,100	2,550
Plastic	11,400	N/K	15,500	1,600	18,000	1,800
Metal	2,800	N/K	3,800	1,200	7,100	1,200
Glass	5,600	N/K	4,600	1,700	2,400	1,700
Textiles	200	N/K	200	10	100	10
Timber	10,100	N/K	10,300	1,600	10,600	2,200
Totals	48,200	N/K	55,900	8,610	65,300	9,460

Recycling tonnages have increased by 537 tonnes with a significant improvement in the recycling of timber packaging of 500 tonnes in particular but it is difficult to be certain if this in exports or in domestic recycling as a substantial but unidentified element is exported. In addition some 3,600¹⁹ tonnes of glass are recycled onto landfill sites as aggregate.

¹⁷ From figures supplied by the Icelandic Ministry of the Environment

¹⁸ Including composite packaging

¹⁹ from figures supplied by the Icelandic beverage container scheme, Endurvinnslan.

Recovery tonnages have increased from 600 to 913 tonnes but one of the three Icelandic energy from waste plants has recently closed down.

- How much has been exported? What impact have world markets had on those exports?

Not known

- At what cost to business?

So far the only cost has been a beverage container tax/deposit scheme which has raised in the region of 10 million Ikr per year.

Population (2000):	272,000
Annual cost to industry (1998):	IKr 10,000,000
Total packaging per annum (1998):	65,300 tonnes
Total growth in recovery 1995 - 1998:	850 tonnes
Annual cost per capita:	IKr 36.76
Annual packaging per capita:	240 kg
Annual cost per tonne of packaging:	IKr 153.14
Annual cost per tonne of increased recovery	IKr 11,764.71

3.4 Norway

Although Norway is not part of the European Union they have as part of the EEA-agreement implemented the Packaging Directive. The directive has been implemented by a combination of measures, including regulations, agreements with industry as well as taxes. Establishment of agreements between industry and the Ministry of Environment has been found to be an efficient way of establishing Extended Producer Responsibility (EPR) with regard to recycling and waste reduction. The packaging industry has formed several Producer Responsibility Organisations (PRO) for different packaging materials in order to respond to the obligations in the agreements. The PROs have co-ordinated many of their activities in a joint company called Materialretur AS.

The following targets have been agreed with industry:

Table 3.6 Material recycling and recovery targets in Norway

Material	Recovery	Recycling
Corrugated Board	80%	65%
Cardboard	60%	50%
EPS	60%	50%
Other plastics	80%	30%
Metals		60%
Beverage carton		60%
Glass (other than beverage containers)		To be agreed ²⁰

²⁰ *A voluntary scheme has achieved approximately 80% recycling

Materialretur has been given the task of raising fees from industry to cover recycling operations. They are not responsible for organising transport or carrying out recycling on behalf of local authorities. Materialretur contracts with six material organisations to carry out the recycling operations on their behalf. Three of these are for the wood fibre industry, one for the glass industry, one for the metal industry and one for the plastic industry. The obligation has been focused on packer/fillers or importers and who pay a contribution per type and tonne of packaging material that they use.

The municipalities are offered the opportunity to deliver waste for recycling and receive payments for sorted fractions according to agreements with the relevant PROs. Concern is expressed by the municipalities that the payments received are too small compared to the funds raised.

- How do they define packaging, recycling and recovery?

Packaging is defined in the same way as for the European Directive. No agreements or other measures are established for wood, ceramic and other forms of packaging. Definitions of recycling include energy recovery.

- What systems were already in operation in each country prior to the Directive?

There is a tax on beverage containers, which reduces inversely to the increase in the percentage of recycling that is achieved in those containers. As an 85% rate is achieved this tax has been reduced from 4Nkr per container to 0.6Nkr per container. If rates reach 95% then there will be no tax.

The Norwegian Ministry of Finance estimates that the beverage taxes will cost Norwegian industry Nkr 479,000,000 in 2001. It raised Nkr 406,000,000 in 1999 and Nkr 511,000,000 in 2000.

- How have they encouraged businesses to minimise their packaging?

The packaging tax was designed to encourage business to minimise their beverage packaging. With regard to other packaging the agreements include provisions which require industry to work for reduction of packaging waste and to report annually on the measures taken and results achieved. The Packaging Industry has established an organisation called Styringsruppen For Avfallsreduksjon (SFA) which works on waste reduction and publishes best practice examples etc.

However Statistics Norway report that between 1990 and 1997 wood packaging increased by 26% and plastic by 4% while paper reduced by 14% and it would appear that since 1996 packaging, excluding glass, has risen by 4.3%, almost 16,000 tonnes.

- What mechanisms are in place to encourage re-use?

Reuse is encouraged by the tax on beverage containers.

- What mechanisms are in place to encourage recycling?

Recycling is encouraged by a tax on beverage containers and agreements between industry and authorities.

- How have they chosen to interpret the consumer information obligation?

Materialretur has opted to join the Green Dot system. All members of Materialretur may use the Green Dot on their packaging to indicate that they have paid for their packaging to be recycled.

- How is the Directive regulated?

The Ministry of the Environment monitors the agreement through statistics supplied by Materialretur to the State Pollution Control Authority.

- What results have been achieved?

Norway reports annually to the European Surveillance Authority (ESA) on the results achieved under the directive. Norway has reached the targets in the directive. Materialretur nevertheless express concern about the validity of the statistics because packaging totals reported to them quite often differ from the State Pollution Control Authority by as much as 20%. Regardless since Materialretur has been established recycling rates have increased by 34,680 tonnes to an estimated 71% of the total recorded packaging placed on the market.

- Have domestic recovery and recycling rates improved? If so by how much?

It is difficult to establish from the available statistics whether domestic recycling and recovery capacity has improved but Materialretur and the State Pollution Control Authority report the following:

Table 3.7 Recovered material in Norway from statistics supplied by Materialretur

Material (tonnes)	1997	1998	1999²¹	Growth
Corrugated Board	141,000	158,000	158,123	12.1%
Of which exported			5,500	3.5%
Plastic	42,000	52,000	55,752	32.7%
Of which exported			8,499	15.3%
Glass	41,500	46,500	38,196	-8.0%
Of which exported			33,350	87.3%
Beverage Cartons	6,500	7,800	7,187	10.6%
Of which exported			4,875	67.8%
Other cartons	10,000	11,700	12,707	27.1%
Of which exported			4,064	32.0%
Metal	0	700	3,715	430.7%
Of which exported			2,081	56.0%
Total	241,000	276,700	275,680	14.4%

Of the 1999 figures approximately 17.1% came from energy recovery.

- How much has been exported? What impact have world markets had on those exports?

²¹ From figures supplied by the Norwegian Pollution Control Authority

Norway is very reliant on export markets to comply with its legal obligation with some 21.2% of all its packaging waste exported and if the corrugated packaging is excluded that reliance increases to 45%. It is difficult to interpret from one's year's statistics what impact world price fluctuations would have on this market but one would anticipate substantial.

- At what cost to business?

In addition to direct material levies the beverage tax raises raised NKr 406,000,000 in 1999 and NKr 511,000,000 in 2000

Population (1999):	4,447,376
Annual cost to industry (1998):	NKr 137,000,000
(1999):	NKr 158,000,000 ²²
Total packaging per annum (1999):	381,899 tonnes ²³
(1996):	331,000 tonnes ²⁴
Total growth in recovery 1997 - 1999:	34,680 tonnes ²⁵
Annual cost per capita:	NKr 33.17
Annual packaging per capita:	89 kg
Annual cost per tonne of packaging:	NKr 413.72
Annual cost per tonne of increased recovery	NKr 6,749.03

²² Supplied by Materialretur

²³ From Norway's return to the European Commission supplied by the Norwegian Pollution Control Authority. This figure does not include beverage containers

²⁴ From Norway Statistics 2000. This figure does not include glass or wood packaging.

²⁵ From figures supplied by Materialretur and the Norwegian Pollution Control Authority.

3.5 Sweden

Sweden introduced a packaging ordinance in April 1997. It imposed an obligation on manufacturers, importers and sellers of packaging or packaged products. They have to establish collection systems for the separation by households and others of packaging from other forms of waste. They have been set the following targets:

Table 3.8 Material recovery, re-use and recycling targets for Sweden.

Type of packaging	By 2001		After 2001	
	Re-use	Recycling	Recovery	Recycling
Aluminium		50%		70%
Aluminium drinks containers		90%		90%
Steel		50%		70%
Glass beer and soft drinks containers	95%			
Glass wine and spirit containers	90%			
Other glass containers		70%		70%
PET bottles		90%		
Plastic packaging other than PET		30%	70%	30%
Cardboard, paper and paperboard		30%	70%	40%
Corrugated		65%		65%
Wooden			70%	15%
Other				30%

Industry opted to establish 5 materials organisations, two in paper, one in metal, one in plastic and one in glass, each responsible for setting up collection systems. These established a central company for drawing fees, REPA, and a second company for co-ordinating the collection of packaging materials.

REPA offers the option of a standard fee of SKr 2,000 to all businesses with a turnover of between SKr 0.5 million and SKr 3 million and a material levy to all other businesses. The exception is those that supply packaging used in shops for on the premises packing and for take away - like pizza cartons that do not wish to declare the quantity of packaging that they supply. REPA has a membership of some 10,500 businesses, which represents about 90% of the total packaging volume. REPA has an on-going concern about free riders and wishes state assistance to eliminate them.

- How do they define packaging, recycling and recovery?

Packaging, recovery and recycling are defined as in the European Directive. Although for many of the targets energy recovery is not an option.

- What systems were already in operation in each country prior to the Directive?

A deposit scheme has been in place on aluminium and PET beverage containers. In 1992 the can manufacturers, the Swedish Brewers Association and some supermarkets founded Svenska Returpak AB and Returpak PET to organise recovery systems. A glass collection scheme was also in place.

- How have they encouraged businesses to minimise their packaging?

The ordinance gives packaging minimisation as an aim but has no specific targets.

- What mechanisms are in place to encourage re-use?

Re-use is encouraged through the deposit scheme on beverage containers.

- What mechanisms are in place to encourage recycling?

Landfill tax of SKr 250 a tonne encourages alternative means of disposal. The packaging ordinance and the activities of REPA encourage recycling.

- How have they chosen to interpret the consumer information obligation?

REPA takes responsibility for consumer information.

- How is the Directive regulated?

The Swedish Environmental Protection Agency regulates the ordinance on behalf of the Ministry for the Environment. To date this has been a simple monitoring role as producer responsibility in Sweden is based to a certain degree on a voluntary approach. But REPA and its members are asking that they take a more aggressive approach to deterring 'free riders' in the future.

- What results have been achieved?:

By 1999 a 73% recycling and re-use rate is reported with all 2001 targets exceeded with the exception of steel and aluminium recycling targets, plastic and paper and board recovery targets. The total tonnage of packaging either recycled or re-used reported in 1999 by the Swedish Environmental Protection Agency appears to exceed the total amount of packaging that they reported to the European Commission had been put onto the market by some 400,000 tonnes.

Table 3.9 Growth in Swedish packaging recovery rates by material 1996 – 1999²⁶

Material	1996		1997		1999		Growth %
	Recycling	Recovery	Recycling	Recovery	Recycling	Recovery	
Glass	119,600		134,200		146,000		22.1
Plastic ²⁷	11,825		20,498	11,869	29,600	24,000	65.6 ²⁸
Paper	57,820		65,000	1,000	67,000 ²⁹		15.9
Corrugated	250,000	58,000	276,000	31,000	325,000	54,000	30.0
Steel ³⁰	31,900		25,900		27,700 ³¹		6.9 ³²
Aluminium ³³	14,000		15,607		16,100 ³⁴		15.0
Total	485,145	58,000	537,205	43,869	606,200	78,000	17.7 ³⁵

- Have domestic recovery and recycling rates improved? If so by how much?

Swedish recycling and recovery rates have increased since the introduction of Producer Responsibility by somewhere between 8.5 and 9.6%. Whether domestic recovery and recycling capacity has increased over the same period is difficult to judge

Table 3.10 Growth in Swedish packaging recovery rates from 1997 to 1999³⁶

Year	1997	1998	1999	Growth
Total Packaging	923,400	955,200	965,000	4.5%
Total recovered	601,000	649,000	657,000	9.3%
Total exported	66,800 ³⁷	300,600	140,000	
Total imported	136,300 ³⁸	381,000	288,000 ³⁹	

- How much has been exported? What impact have world markets had on those exports?

While it is known that some packaging waste materials are exported from Sweden for reprocessing elsewhere, exact figures are not available. What is clear from table 3.9 Sweden is very reliant on export markets to reach its recovery and recycling targets.

- At what cost to business?

Population (1997): 8,849,000

Annual cost to industry (1998): SKr 440,000,000⁴⁰

²⁶ From figures supplied by the Swedish Environmental Protection Agency which are used for the returns to the EC.

²⁷ Plastic recycling rates do not include PET bottles that are returned for re-use and subsequently recycled.

²⁸ Growth from 1997 to 1999 only as no recovery rates are reported for 1996.

²⁹ This figure may include an element of recovery (energy from waste)

³⁰ These figures include material received but not yet processed and packaging that is refurbished and reused as well as material that is reprocessed.

³¹ A further revision of measurement suggest that the figure for packaging alone is 19,200 tonnes.

³² Growth from 1997 to 1999 only. Due to changes in the definition of packaging, packaging reduced by 15,000 tonnes between 1996 and 1997

³³ These figures include aluminium can recycling, material received but not yet processed, packaging that is refurbished and reused as well as material that is reprocessed.

³⁴ A further revision of measurement suggest that the figure for packaging alone is 2,500 tonnes.

³⁵ Growth from 1997 to 1999 only.

³⁶ From figures supplied by the Swedish Environment Ministry that are submitted to the EC

³⁷ Only available for glass.

³⁸ Only available for glass.

³⁹ Only available for corrugated board and glass.

⁴⁰ Estimate by REPA.

Total packaging per annum (1999):	965,000 tonnes ⁴¹
Total growth in recovery 1997 - 1999:	103,126 tonnes ⁴²
Annual cost per capita:	SKr 49.7
Annual packaging per capita:	109 kg
Annual cost per tonne of packaging:	SKr 455.95
Annual cost per tonne of increased recovery :	SKr 4,266.62

⁴¹ From figures supplied by the Swedish Environment Protection Agency and reported by the Ministry of the Environment to the European Commission. They do not appear to include re-used packaging even on the first time of use.

⁴² From figures supplied by the Swedish Environment Protection Agency and reported by the Ministry of the Environment to the European Commission.

4. Identify the similarities and the key differences between the systems and the UK system and investigate the opportunities to introduce a common system.

This section will compare the systems in the different Nordic countries and identify what their similarities are and what the key differences are. It will then compare them with the UK system and identify if any of the key differences create a barrier to establishing a common system or a system similar to the UK system.

From this section it will be possible to identify whether a common system can be implemented and if so whether it could be a market led system and how that system might operate.

The report would then consider the pros and cons of moving to the new system in comparison to the current systems in place considering:

- The difficulty of implementing the change.
- Effectiveness of the system in meeting the objectives of the Directive.
- Cost efficiency for those businesses with an obligation.
- Cost efficiency and administrative simplicity for those that would have to regulate the system.

Concerns were expressed that a PRN system within the Nordic countries could be seen to violate the EC Treaty establishing the internal market, especially as Iceland and Norway are not members to the EU and be in conflict with the requirements of the GATT and TBT Agreements.

This concern appears to have based on a belief that a PRN would interfere with international trade and restrict imports. Yet as a trading instrument it is specifically designed and operated to provide a 'level playing field' for all packaging users. Through trading this 'level playing field' can be extended between nations as well as within nations. Furthermore the concept of harnessing market forces to deliver environmental benefit is accepted within the 6th Environmental Action Programme.

Equally it has been emphasised that currently Nordic region is not an homogeneous market area and it would be extremely burdensome to create an administrative framework for the management of the PRN system. The benefits of a tradable economic instrument are that it's flexibility allows it to function within a non-homogenous region and still create a level playing field so long as the level of enforcement is consistent. There will be an administrative burden initially on both regulators and industry but the burden of identifying packaging remains if any attempt is to be made to minimise this packaging and is soon offset by the financial and environmental benefits.

4.1 What are the similarities?

All systems have developed from voluntary systems that in some cases have been in operation for many years. In Norway a voluntary system continues, in Sweden and Finland an ordinance has been in place since 1997 and in Iceland one is about to start. In Denmark no specific industrial initiative has taken place but the municipalities have been funded through a waste handling fee

have taken on this responsibility. This approach splits the direct link between producers and the task of packaging recovery.

Table 4.1 Sector organisations in the Nordic region.

Sector	Finland	Norway	Sweden
Corrugated board	X	X	X
Paper and paperboard	Paperboard + Industrial Fibre Based	X	X
Drinking Cartons	Milk and Juice + Beer and Beverage	X	
Metal	X	X	X
Plastic	X	X	X
Glass	X	X	X

In all nations particular waste streams have been targeted predominantly beverage containers, where deposit schemes have been initiated in all Nordic nations, and also the major packaging materials or in Denmark specific sectors of packaging users. In Sweden there are 5 material sector organisations, in Norway there are 6, whereas in Finland these have been sub-divided into eight sector organisations.

These sector organisations may have evolved as a mechanism for the Governments to encourage producers to become involved in recycling on a sector by sector basis rather than on environmental or other grounds. This may have made it simpler for those Governments and industry to benchmark their achievements but overall this segregation of recycling obligations has proved costly to those industries. It may also result in the recycling of these waste streams at the expense of other less costly but equally resource productive waste streams.

All nations using producer responsibility systems expressed concern about 'free-riders', although it is difficult to identify their overall impact.

A desire to reduce the quantity of litter seems to have been the primary justification in the introduction of taxes and/or deposit refund schemes on beverage containers rather than any resource management issues. These deposit schemes, which do not exist in the UK, add a significant financial burden on those industries that bear it.

Within the UK although material organisations were originally established in paper, glass, steel, aluminium and plastic, they now take no active operational role instead reproprocessors and exporters are accredited directly by the Agencies. This ensures a consistent standard for accreditation but some businesses and compliance organisations express concern about the competence of the Agencies to accredit businesses.

An important consideration is that the greater the number of waste niches that are created that require to be both measured and individually handled, the greater the costs to industry and their representatives the compliance schemes to comply with the legislation. This is because of:

- the cost of the additional segregation, which from a reprocessors perspective may be unnecessary
- the monopoly position of these sector organisations in their fields which both results in little competition between them to achieve more cost effective recycling and gives little opportunity for anything other than high cost niche end markets to be developed.

The presence of these monopoly organisations imposes substantial challenges to the development of a competitive market.

4.2 Definitions of packaging, recycling and recovery

Where defined these seem to have followed the definitions of the European Directive. Neither Norway nor Finland has included wood or other packaging materials as yet. Nevertheless there appears to be no consistency throughout the region on either precise definitions or on the monitoring and supervision of those definitions. Responsibility for this has very much been left to the various compliance organisations with no guidelines or auditing to ensure regional consistency.

Importantly neither has consistency been applied in gathering the relevant data where first use of re-used packaging or beverage containers are sometimes excluded from the packaging handled or targets (Sweden, Norway and Finland) and on other occasions included in the totals of packaging recovered.

Consistency in definitions eases the ability to regulate the ordinances and achieve international parity of information. The simpler the regulation the more effective the demand drivers to deliver the environmental objectives.

Definitions of packaging and accreditation have been difficult areas in the UK. A producer responsibility organisation should meet to decide packaging definitions on a regular basis and what data is to be recorded. Accreditation is best organised by auditors that are independent from the regulators, unlike in the UK. This will provide both international consistency and the ability to utilise sector experts such as the various national sector organisations.

It is recommended that this area of definition and accreditation requires further investigation by the Nordic Council of Ministers.

4.3 Point of obligation

Where an obligation has been imposed the point of obligation always includes importers and packer/fillers. In Sweden it also includes manufacturers and sellers of packaging and packaged products.

The minimum number of activities an obligated business might be involved in increases the effectiveness of the Regulators and increases the demand drivers. The shared responsibility approach in the UK is immensely complex and could be improved by focusing the obligation on the minimum number of points in the packaging chain, such as packer/fillers and importers.

4.4 What are the targets and on which materials?

This wide range of targets seem to have been established partially based on historical success in increasing recycling rates and partially on life cycle

analysis or an identification of the most easily accessible waste streams. Regardless targets have been developed to best suit national circumstances. As identified in paragraph 4.1 this segregation of the waste stream into niche markets impacts on the overall cost to industry of these regulations and may provide barriers to entry for both particular packaging materials and packaging industries which could be viewed as anti-competitive. It also means that it is difficult to compare accurately the achievements of one nation with another.

Nevertheless the range of these targets can be accommodated very easily within an international trading scheme so long as all nations agree on definitions of recycling and recovery and each nation is both content with their targets and their implications and consistent in its enforcement of compliance.

Table 4.2 National recovery and recycling targets in the Nordic nations

Material	Denmark			Finland			Iceland			Norway			Sweden		
	Recycling	Recovery	Re-use	Recycling	Recovery	Re-use	Recycling	Recovery	Re-use	Recycling	Recovery	Re-use	Recycling	Recovery	Re-use
Aluminium	15			25						60			70		
Aluminium drinks containers										95			90		
Steel				25						60			70		
Glass beer and soft drinks containers	65			48								95			95
Glass wine and spirit containers				48								95			90
Other glass containers				48									70		
PET bottles	15			15	45					95					
Plastic packaging other than PET				15	45					30	80		30	70	
EPS				15	45					50	60				
Cardboard, paper and paperboard	55			53	75					50	60		40	70	
Corrugated				53	75					65	80		65		
Wooden													15	70	
Other													30		

4.5 How reliant is the Nordic region on export markets to meet its obligation?

A substantial quantity of the Nordic Regions obligation is met through export by the individual nations, whether this is to other nations in the Nordic region or elsewhere it has not been possible to establish. Regardless the ability of the Nordic region to comply with its obligations is vulnerable to the volatility of global markets. Therefore a flexible system such as a trading system would ease compliance.

4.6 What has been achieved?

The EC Directive requires for all packaging by 30 June 2001 a recovery rate of between 50 and 65%, a recycling rate of between 25 and 45 % and a material specific recycling rate of between 15 and 25 %.

Table 4.3 Recovery and recycling rates achieved by the UK and the Nordic countries compared to the minimum EC Directive targets

%	EC	UK	Denmark	Finland	Iceland	Norway	Sweden
Year	2001	1999	1998	1998	1998	1999	1999
Recovery rate	50 - 65	40	89	55	14	72	65
Index v EC	1.0	0.81	1.78	1.11	0.29	1.44	1.31
Recycling rate	25 - 45	33	50	45	13	60	57
Index v EC	1.0	1.31	2.00	1.78	0.52	2.39	2.29
Paper	15	48	58	57	8	73	58
Index v EC	1.0	3.22	3.87	3.80	0.53	4.85	3.87
Glass	15	28	75	62	71	80	84
Index v EC	1.0	1.85	5.00	4.14	4.72	5.36	5.59
Plastic	15	13	7	10	9	19	16
Index v EC	1.0	0.83	0.47	0.69	0.59	1.27	1.08
Metal	15	29	42	16	17	37	63
Index v EC	1.0	1.91	2.80	1.04	1.13	2.47	4.23

The UK and Iceland have yet to achieve the European Commission's overall recovery target. Iceland has not yet achieved the overall recycling target. Denmark, Finland, Norway and Sweden have achieved both the recovery and recycling targets. The UK, Denmark, Iceland and Finland have not achieved the material specific recycling target for plastic. Iceland has not achieved the material specific target for paper.

As important the following targets have been exceeded:

- The recovery target by Denmark and Norway
- The recycling target by Norway and Sweden
- The material specific target for glass has been exceeded by a factor in excess of 4 by all Nordic countries. This is linked to the taxes on beverage

containers in these countries which provide an incentive, through tax foregone, for the beverage industry to recycle glass. The glass is mainly collected from bottle banks in residential areas or from specific recycling sites and not through the deposit refund scheme.

While to surpass any target is to be applauded questions should be asked for whose benefit has this target been exceeded:

- society?
- environment?
- industry, and in which case which sector?

And whether the additional cost justifies that benefit.

For example were the taxes on beverage containers imposed:

- to raise recycling rates? or revenue for the Government? In which case has it been very effective?
- to reduce glass packaging? To increase re-use? In which case has it been successful? could a more cost effective system have been devised?
- to reduce litter? If it was the latter how effective have they been? could a and more effective system which is less costly to society be devised?

One of the benefits of a trading scheme is that it imposes an exact objective and once that target is exceeded then there is no economic value in the permit. In this way it is possible to manage much more precisely what is being achieved.

Table 4.4 Growth comparison between the UK and the Nordic countries

	UK	Denmark	Finland	Iceland	Norway	Sweden
Total packaging per annum – 1999	9,179,981 43	837,937 ⁴⁴	424,100 45	65,300 46	381,899	965,000
Total packaging recovered - 1998	3,207,663	742,688 ⁴⁷	235,200	9,460	276,700	649,000
Total growth in recovery 1997 – 1999	268,755⁴⁸	-16,239 ⁴⁹	9,900 ⁵⁰	850 ⁵¹	34,680	103,126
Total recovery rate achieved in 1998	40.28%	88.67%	55.46%	14.45%	72.19%	65.31%
Index relative to the UK	1.00	2.20	1.38	0.36	1.79	1.62
Annualised growth of recovery ⁵²	8.39%	-1.79%	4.39%	3.09%	6.27%	5.58%
Index relative to the UK	1.00	-0.21	0.52	0.37	0.75	0.67

- Denmark has achieved a recovery rate of over double the UK but has achieved an annualised reduction in recovery.
- Finland has a recovery rate 37% greater but is only achieving an annualised growth of 52% of the rate in the UK.
- Iceland has a recovery rate and annualised growth rate approximately 65% less than the UK.
- Norway has a recovery rate of 79% greater than the UK but an annualised growth 25% less than in the UK.
- Sweden has a recovery rate 62% greater than the UK but an annualised growth of 50% less than the UK.

These figures highlight the fact that the higher the current recovery rates the more difficult it is to access each supplementary tonne and that lower rates are achieved without regulation than with regulation.

But from a compliance perspective there is still some uncertainty as to whether the UK's growth rate will be sufficient to achieve the EC's recovery and plastic recycling targets for 2001. These uncertainties existed under all circumstances as the Directive imposed a considerable growth requirement on the UK from a

⁴³ 2000

⁴⁴ 1998

⁴⁵ 1998

⁴⁶ 1998

⁴⁷ 1998

⁴⁸ 1998 – 1999 only

⁴⁹ 1997 – 1998 only

⁵⁰ 1997 – 1998 only

⁵¹ 1995 - 1998

⁵² Annualised growth in recovery as a percentage of total recovered packaging

32% recovery rate in 1997 to a 50% one in 2001. The same concerns may well exist in Iceland.

Equally doubts exist as to whether Denmark or Finland can achieve their shortfalls in the material specific recycling obligations.

4.7 What is the size of the market?

Table 4.5 Total size of the Nordic market

Country	Denmark	Finland	Iceland	Norway	Sweden	Total
Total tonnage	837,927	424,100	65,300	381,899	965,000	2,674,226
Recovery rate	89%	55%	14%	72%	65%	72%
Total market	742,688	233,255	9,460	274,967	657,000	1,917,370
Packaging per capita	159 kg	83 kg	240 kg	89 kg	109 kg	136 kg
Population	5,275,000	5,140,000	272,000	4,447,376	8,849,000	23,983,376
Total revised tonnage 1⁵³	717,400	699,040	36,992	604,843	1,203,464	3,261,739
Recovery rate	104%	33%	26%	45%	55%	59%
Total revised tonnage 2⁵⁴	822,900	801,840	42,432	693,791	1,380,444	3,741,407
Recovery rate	90%	29%	22%	40%	48%	51%

Because of the differing interpretations of packaging with an obligation and patterns of enforcement, widely differing weights of packaging per capita are reported. As table 4.5 shows this has an impact on the total potential size of the market.

In trying to assess the potential for a market system the greater the number of participants, the greater the volume transacted and the greater the number of transactions the greater the liquidity and efficiency of the market. Also the lower the transaction cost per tonne. On this basis the ideal situation is to have the largest possible market (e.g. the entire Nordic region). Sub regional markets could be considered but at the risk of losing market efficiency and liquidity which also restricts the opportunities for maximising reduced transaction costs.

If a sub-market was to be considered it would appear that Sweden has the largest packaging total and therefore the greatest potential but it also has the greatest number of niche and material specific recycling targets as opposed to a general recycling and/or recovery target. This development of niche markets would restrict competition between packaging materials. On a material basis paper and cardboard as the largest would be the market with the greatest potential

⁵³ Assuming that every nation had the average packaging per capita. Recovery rate calculated by dividing the packaging known to have been recycled by the revised tonnage.

⁵⁴ Assuming that every nation had the same packaging per capita as the UK.. Recovery rate calculated as above.

4.8 What are the relative costs?

Table 4.6 Relative costs in Euros⁵⁵ between the UK and the Nordic countries

	UK	Denmark	Finland	Iceland	Norway	Sweden
Annual cost per capita	0.94	14.03	8.51	0.41	4.16	5.42
Index relative to UK	1.00	14.99	9.09	0.44	4.44	5.79
Annual cost per tonne of packaging	6.00	88.35	103.11	1.71	51.83	49.71
Index relative to UK	1.00	14.72	17.18	0.28	8.64	8.28
Annual cost per tonne of increased recovery	205.27	-4,559.05	4,417.11	131.01	845.43	460.15
Index relative to UK	1.00	-22.21	21.52	0.64	4.12	2.27

The annual cost per tonne of increased recovery in the UK is 21.52 times less than in Finland, 1.57 times greater than in Iceland, 4.12 times less than in Norway and 2.27 times less than in Sweden. Hence it would appear that the UK PRN system is significantly less costly for industry than the systems currently in place in the Nordic region.

Nevertheless a significant recycling stimulus and cost, although not included in this comparison, may be attributed to beverage container deposit schemes which have achieved high levels of recycling of glass throughout the Nordic region and in Sweden, Norway, and Finland cardboard beverage containers. There is no common deposit scheme in operation in the United Kingdom where glass recycling rates are significantly lower.

4.9 How might a PRN style system be introduced into the Nordic region?

There are sufficient similarities throughout the Nordic region that there need not be any barriers to establishing a PRN system in the Nordic region. As targets for 2001 have been broadly met it would be feasible to introduce such a system to achieve the 2006 targets. There would certainly appear to be cost benefits although uncertainties exist about the ability of the UK to achieve its statutory recovery obligation. To consider the individual factors:

- a. The first and most important things to establish are the drivers that will make the market operate.
 - Who are the potential buyers? Why might they wish to buy?

⁵⁵ Exchange rates as at 4 June 2001

The potential buyers are the compliance schemes operating in the Nordic Region or the companies that they represent. Currently there are three major ones but other organisations might form into compliance schemes with the creation of a market. In particular currently there is no compliance scheme in Denmark.

Equally individual companies might opt to go alone if the market provides them with that opportunity.

The driver to make them buy is the legal obligation. This exists in Finland and Sweden and is implicit in the voluntary arrangement in Norway but at this stage no equivalent driver exists in Denmark or Iceland. This could be achieved either through the creation of a tax rebate and a voluntary scheme or legislation.

Consideration would have to be given as to whether there would be some general recycling or recovery obligation to increase competitiveness between packaging materials and what role evidence of recycling from outside the nation but inside the Nordic region would play.

- Who are the potential sellers? Why might they wish to sell?

The potential sellers are the reprocessors and exporters of waste packaging or their representatives. These could be the established materials organisations but there would be a potential conflict of interest if they tried to take on dual roles of selling and accreditation.

In both buying and selling roles there would be concerns expressed if organisations tried to establish themselves as monopolies on price, although there is undoubtedly a role for organisations to establish common standards of accreditation.

- b. The next most important thing to define is the commodity that is going to be traded.

Currently there appears to be no accreditation system established within the Nordic region. This would need to be established. Although there would be no requirement for the accreditation authority to accredit all reprocessors and exporters it would still need to establish the standards that would be required in order that common standards would be applied throughout.

The criteria for accreditation would be technologies, auditability and planned and achieved growth in reprocessing capacity. Once accredited, reprocessors and exporters would be expected to use a central registry to record issues and transfers of certificates.

The combined population of the Nordic region equates to approximately half of that of the UK and therefore it would be fair to anticipate that half the quantity that currently exist in the UK, some 165 reprocessing sites and 20 exporters, exist in the region and would need to be accredited.

- c. Having identified the drivers and the commodity the next most important aspect is to establish a manager for the market. This requires further investigation and can be established concurrently with the process of defining the commodity.
- d. Identify simple and appropriate steps to achieve the target.

- Establish realistic and achievable goals? Neither too easy to achieve, in which case legislation is unnecessary, nor too difficult, in which case the legislation becomes unsustainable.

As substantial recovery and recycling targets have been achieved in the Nordic region, the more important short-term goals would be to get the structure in place to allow a market to operate rather than aiming at solely increasing the targets. This would include developing mutually acceptable data gathering and reprocessor and exporter accreditation processes and encouraging competition both between and to the established organisations.

- Ensure that early movers to comply with the aims of the legislators neither suffer a competitive disadvantage nor gain excessive profits.

Equal access to the market must be made available to both established and new participants. Banking and borrowing could counter balance this balance of advantages and disadvantages but this requires further investigation.

- Decide whether the commodity can be stored (e.g. banked) or the obligation be stored (e.g. borrowed) and if so to what extent?

As systems are established it may not be either necessary or beneficial to permit either banking or borrowing but both increase the liquidity in the market. Market liquidity, the volume of daily transactions, is an essential element to achieving price transparency the core ingredient to an efficient market.

Initially it is suggested that only one out of banking and borrowing should be introduced at any time and should only exist for a limited period of time. This would require further investigation.

- Consider how continuous supply will be blended with annual demand or depending on the legislation vice versa.

This requires further investigation but possible methods could be:

- imposing a more frequent obligation (e.g. PRNs purchased within 28 days of the packaging sold or on a quarterly basis).
- spreading compliance through the calendar year (e.g. businesses or their representatives must comply by their financial year ends rather than the calendar year end).

- Ensure that one buyer or seller does not dominate the market.

The market will tend to be dominated initially by the established compliance schemes. A simple way to create competition is by establishing a larger market or allowing outsiders in to compete for instance compliance schemes from elsewhere in Europe.

If neither of these can be achieved then the established schemes may need to be split.

- Ensure that the monies generated achieve the desired aims.

This would be part of the accreditation process.

5. Conclusion

In conclusion:

- It would be feasible to introduce a Nordic PRN system.
- The system would operate by establishing a tradable economic instrument between accredited reprocessors and exporters and the businesses with an obligation or their representatives (such as compliance schemes).
- The easiest benefit to identify would be the substantial cost reduction for businesses of implementing the European Directive but there are additionally regulatory, competitive and environmental benefits.
- The cost efficiencies for industry will only be available if Governments are prepared to review legislation or systems that are currently in place to encourage the minimisation and recycling of packaging.

In particular any system that only focuses on one form of packaging (viz: glass bottle recycling) may be achieving recycling success in that packaging type at the expense of the other materials or in comparison to countries where less specific segregation at source is demanded.

Equally Governments must be prepared to forfeit these economic instruments as a means of raising revenue.

- The risk is that as a result of introducing a tradable economic instrument the Nordic region fails to meet its revised recovery and recycling targets. This risk can be countered by introducing an appropriate structure at an early stage.
- To establish liquidity and competition between the reprocessors in the region it would be preferable to consider the Nordic region as one market. Nevertheless there might initially be restrictions due to the different development stages of national solutions to the European Packaging Waste Directive.
- As a stepping stone to this goal competitive sub-markets could be established within each nation.
- At all times packaging material types should be encouraged to compete between each other rather than be considered in isolation. This can be achieved by the introduction of pooled recovery and recycling options in excess of the de minimis material specific recycling levels.
- There would be no requirement for all Nordic nations to have the same recovery and recycling targets although there would be benefits if the targets were to exist in the same material types.

The recommendations are:

1. To develop standard accreditation and data gathering procedures.
2. To develop central registers both of packaging data and annual reprocessing and exporting activity.

3. To further develop at a regional level the concept of a competitive PRN style market throughout the Nordic region.
4. To identify a potential manager for that market.
5. To further investigate monopoly, early mover, banking and borrowing issues.