Options and Feasibility of a European Refund System for Metal Beverage Cans

Final Report

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16th November 2011

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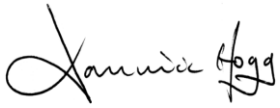

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Acknowledgements

Our thanks to all those who participated in the workshops and consultation, and those who provided additional data and commentary for the study. We are grateful also to Diana Oancea of the European Commission for comments on previous versions of this report.

EXECUTIVE SUMMARY

E.1.0 Introduction

A number of claims have been made to the effect that in some cases, the lack of full harmonisation of collection and recovery systems for packaging could result in internal market disruptions. In particular, cross-border trade, and especially parallel and private imports in border regions, may be affected by the lack of compatibility of refund systems used to stimulate the return of used packaging. To the extent that this occurs, there may be environmental consequences, as well as impacts upon authorities, businesses and consumers. The Project Specifications pointed out that, in past years, there have been calls to harmonise the refund system for metal beverage cans at EU level in order to ensure a high environmental protection and a smooth functioning of the internal market.

In 2009, the European Parliament voted in favour of undertaking a pilot project on a European refund system for metal beverage cans, to be implemented by the Commission in 2010. This project follows from that request. It aims to collect and evaluate options/elements for a refund system for metal beverage cans operating across either part of, or the whole of, Europe in such a way that any problematic cross-border issues and constraints on trade are minimised.

The Project Specifications outlined a number of key tasks that were to be performed. These tasks formed the basis of the research methodology employed in the study to ensure the main objectives were met. The key elements of this study were as follows:

- Literature review of collection systems for metal beverage cans in all EU-27 Member States;
- Comparative analysis of collection systems for metal beverage cans;
- Stakeholder workshops to assess the nature and scale of any problems;
- Development of interoperability options;
- Web-based consultation;
- Cost benefit analysis of interoperability options; and
- Final stakeholder workshop.

E.2.0 Interoperability Impacts and Solutions

The underlying rationale for this study was to investigate whether the lack of harmonisation of national collection systems for packaging across the EU creates barriers to environmentally sound resource management. During the literature review best estimates for the current level of recycling of metal beverage cans were developed. This provided evidence to understand the magnitude of the impacts associated with the incompatibility of national collection

systems. An analysis of the cross-border trade in beverage cans was then carried out.

One can see from Figure E-1 that the key cross-border movements through private 'border-trade' are around Northern Europe, where differences in the price of beverages are most pronounced. Some modelling work was carried out based upon the known 'flows' of privately exported/imported cans and the price differentials between the EU-27 Member States, to estimated a total figure for the movement of metal cans across borders. This, in turn, would then help determine the location and magnitude of any problems resulting from the lack of harmonisation of national collection systems for packaging.

Figure E-1: Map of Major Cross Border Alcohol Purchases

Table E-1: Estimated EU-27 Private Imports of All Canned Drinks

	Total Private Imports, millions	% Cans Placed on Market
High	2,500	7%
Central	1,800	5%
Low	1,200	3%

Note: total cans placed on EU-27 market ~36 billion

The estimates (see Table E-1) show that the private border trade accounts for a relatively small flow of canned beverages when compared to the total number of canned beverages placed on the market (around 5% of the total in our central estimate). Moreover, the majority of the cross-border flows are concentrated at a small number of borders, mostly in northern Europe. However, detailed data for all flows is not publically available so there is some uncertainty in these figures.

At some borders where private imports are significant (e.g. imports into UK from France), the movement of cans gives rise to no major issues in terms of the handling of the cans. They are treated in exactly the same way as domestically purchased cans. Problems arise mostly in cases where cans are privately imported from, or into, a country with a deposit refund scheme, and where the cans entering the country either bear no deposit, or where any deposit that has been paid cannot be refunded. The vast majority of the problem in this respect stems from imports into Denmark, Sweden and Finland. We estimate that imports into these countries account for around 56% of all private imports, and a much greater proportion of those that give rise to interoperability issues.

Information from the comparative analysis of collection systems, and estimations of the quantity of privately imported cans, were used to undertake an analysis of the compatibility of national systems with cross-border flows of products. A summary of the results from this analysis is given in Table E-2 below.

Table E-2: Significance of Problems Identified

Problem Identified	Scale	Importance
Lower recycling of privately imported cans	Significant at Member State level, in EU context not widespread.	Important, as clear environmental, economic and social benefits from recycling.
Littering of privately imported cans	Significant at Member State level, in EU context not widespread.	Difficult to assess, public opinion appears to suggest this is an important issue.
Loss of consumer deposits	Only around countries with DRS.	Important to consumers who lose out, but they do not outweigh financial savings from border-shopping. There are real losses that result from single-trip travellers (e.g. business and tourism), but the magnitude of this problem is not known, and may relate more to plastic bottles than cans.
Financing of the management of privately imported cans	EU wide issue as there are no existing cross-border financing arrangements for privately imported cans.	Depends on the material value and marginal cost of collection, as well as (politically) where the burden falls in the receiving country.

From this understanding of the impacts associated with incompatibility of national collection systems, a number of interoperability options were identified as potential solutions to these problems. Included in this list was an EU-wide deposit refund system (DRS), as required in the Project Specifications. The list of Options (Op.) is as follows:

- Op. 1: National requirement for the German deposit to be applied to all metal cans sold in Germany;
- Op. 2: Bi-lateral agreement between Germany and Denmark to compensate for cost of managing cross-border cans;
- Op. 3: Bi-lateral agreement between Germany and Denmark to ensure the national systems are interoperable. Four variants to this option were considered:
    - Op. 3a - German Deposit is applied in Border Shops, Danish Deposit is paid back to Danish Consumers in Denmark;
    - Op. 3b - German Deposit is applied in Border Shops, German Deposit is paid back to Danish Consumers in Denmark;
    - Op. 3c - Cans from Dansk Retursystem are sold in Border Shops, Danish Deposit is paid back to Danish Consumers in Denmark; and
    - Op. 3d: - Border Deposit is applied in Border Shops – Border Deposit is paid back to Danish Consumers in Denmark;
- Op. 4: Requirement for all existing and future Deposit Refund Systems (DRSs) for

metal cans to be interoperable;

- Op. 5: Requirement for all existing and future Deposit Refund Systems (DRSs) for metal cans to form a single system;
- Op. 6: A single European Union Deposit Refund System (DRS) for metal cans to cover all Member States.

The options were then evaluated qualitatively, and a cost benefit analysis was carried out in proportion to the improvement expected and the scale of the problems identified.

E.3.0 Assessment of Interoperability Options

The key results from the cost benefit analysis are summarised in Table E-3. The Table shows the financial costs likely to be incurred, and the external costs (including the monetised effects from changes in recycling, the monetised impacts of changes in transport emissions, and the effect on disamenity of changes in the level of litter) associated with each Option. The figures shown are for our Central case only.

Table E-3: Financial and External Costs of Options (million € per annum)

	Op. 1	Op. 2	Op. 3a	Op. 3b	Op. 3c	Op. 3d	Op. 4	Op. 5	Op. 6
Financial Costs	13.1	0.1	32.2	21.0	17.2	15.4	25.5	30.8	490.0
External Costs	-14.2	-2.9	-14.2	-15.8	-14.2	-13.2	-16.6	-21.2	-340.0

Note: a positive figure denotes a cost or a detrimental environmental impact, a negative figure denotes a saving or environmental improvement.

Key observations are:

1. The scale of the financial and external costs for Option 6, the EU wide DRS, are disproportionately high when compared with other Options;
2. For Option 6, the financial costs far exceed the environmental benefits;
3. In respect of Options 1 to 5:
    a. The worst performing Option is Option 3a, in which consumers lose considerable sums of money as a consequence of paying a much higher deposit on cans purchased in German border shops than they obtain as a refund when returning the cans in Denmark. The financial costs exceed the additional external benefits by a reasonable margin;
    b. Options 1 and 2 are both systems for which the additional financial costs are exceeded by the external benefits;

c. Options 3b, 3c and 3d are all systems for which the additional costs are slightly greater than the external benefits, though the outcome is sensitive to some key parameters (and hence, the costs and benefits seem likely to be in close balance);

d. Options 4 and 5 offer somewhat more comprehensive solutions, but the margin by which the costs exceed the financial benefits is greater than under Options 3b, 3c and 3d.

Some of the key parameters driving the analysis are subject to some debate and uncertainty. They include:

- the level of disamenity associated with litter, and the extent to which proposed Option contributes to reducing this;
- the effect of implementing deposits on the behaviour of border shoppers. To what extent, for example, would the implementation of a deposit in the border shops be expected to change the behaviour of those purchasing in the border shops?

Additional factors were then considered alongside the analysis of costs and benefits. This approach was used to highlight the most promising options for further consideration. The analysis is summarised in Table E-4.

- The Options which emerge as potential solutions to the interoperability problem were Option 2, Option 3b, Option 3c and possibly, Option 4.
- Option 2 is a low cost measured aimed at addressing the problem, though it does not achieve the same level of environmental benefit as other front-running Options.
- Options 3b and 3c are somewhat similar in that they seek to ensure that cans purchased bearing deposits in the border shopping areas of Germany can be easily returned in Denmark with the full deposit being refunded. 3b is a system where the German deposit is applied, whilst 3c is a system where the Danish deposit is applied.
- Option 4 is a system which generates significant benefits, it addresses the interoperability issue more comprehensively, but its major drawback is that the costs seem more likely to exceed the benefits by some margin (with the costs and benefits being distributed unevenly across countries and key stakeholder groups).
- Option 1, for which external benefits exceed financial costs, was ruled out as a possible solution on the basis that key stakeholders in ongoing bilateral discussions between Germany and Denmark do not support this Option. The same was the case with Option 3d, and indeed both Options found little support in the technical consultation.
- Option 6 – the EU wide DRS scheme – was ruled out on a variety of grounds. It was viewed particularly unfavourably in the consultation with technical stakeholders. The key reasons given by the stakeholders for rejecting the Option as a means to address the problem under consideration were that:
  1. An EU-wide scheme is too difficult/not currently feasible/unreasonable burden;
  2. Producer responsibility/other waste collection schemes are sufficient/better;
  3. A single DRS would infringe the principles of subsidiarity, proportionality, and

discrimination; and

4. The approach would be too costly.

Table E-4: Summary Assessment of Options

Option	Benefits Outweigh Costs	Proportional to Scale of the Problem	Degree to Which Impacts Reduce	Risk of Side Effects	Feasibility	Support from Consultation	Potential Solution
Op. 1 - DE Dpst Redm DE in DE	Closely balanced	Yes	Medium / High	Medium	Low	Low	No
Op. 2 - DK non-deposit Schemes	Yes	Yes	Medium	Low	Medium	Medium	Yes
Op. 3a - DE Dpst Redm DK in DK	No	Yes	Medium / High	Medium	Low	Low	No
Op. 3b - DE Dpst Redm DE in DK	Closely balanced	Yes	Medium / High	Low	Medium	High	Yes
Op. 3c - DK Dpst Redm DK in DK	Closely balanced	Yes	Medium / High	Low	Medium	High	Yes
Op. 3d - BD Dpst Redm BD in DK	Closely balanced	Yes	Medium / High	Medium	Low	Low	No
Op. 4 – All Interoperable	No	Medium	High	Medium	Medium	Medium	Potentially
Op. 5 – Existing form One System	No	No	High	Medium	Low	Low	No
Op. 6 – Single EU Refund System	n/a	No	High	Medium	Low	None	No

Note: DE Dpst Redm DK in DK means the German deposit is charged on border cans, and the Danish deposit is redeemed in Denmark (for example).

E.4.0 Conclusions and Recommendations

Overall, our analysis suggests that the magnitude of the problem caused by a lack of interoperability of systems is small in relation to the total quantity of material being handled as waste metal beverage packaging across the EU. Moreover, the vast majority of the issues arise in a small number of countries. Therefore, implementing any EU-wide measure in response to what is essentially a localised problem seems inappropriate to its scale (see also Section 5.3 below). Besides, as indicated in Table E-3, Option 6, the EU-wide DRS, is one where, in the central case, the costs are likely to exceed benefits by some margin.

There are ongoing bilateral discussions between Germany and Denmark, with both parties seeking to resolve the interoperability issues. This seems the appropriate level at which to address the principle source of the problems which arise. Given the intent of the countries to implement a system to return deposits close to the residence of the border shoppers in Denmark, Op. 2 does not seem likely to be favoured. In addition, the likelihood that requiring all DRSs to be interoperable would result in financial costs which exceed the environmental benefits by some margin would suggest that Op. 4 might not be a front-running Option.

Based upon all the evidence presented in this study, the principle policy recommendation would be that:

- ***The Danish Government should continue to seek a solution to the bi-lateral problems identified with co-operation from the German Government.***

It is to be hoped that this analysis sheds some light upon the possible pros and cons of the different Options which could be considered.

It is important to clarify that our analysis has not incorporated an estimate of the benefits from avoided alcohol consumption. We make clear, in the Main Report (see Section 3.2.1.1) that a key driver of cross-border movements of privately purchased beverage containers, and hence, of interoperability problems, is the differential in the excise duties which Member States apply to alcohol. Some countries clearly see the use of excise duties as one means of curbing alcohol consumption, and hence, reducing social problems associated with excessive drinking. In many of our policy scenarios, where there is a significant drop in demand for alcohol, this is deemed to increase the overall costs of the option to society. Such results might reasonably be set in a broader context which acknowledges the potential benefits which might flow from a reduction in alcohol consumption. At the same time, reduced consumption would also lead to a decline in consumer surplus, which would work counter to the increase in social benefits from reduced alcohol consumption.

E.4.1 Additional Observations

The analysis in the report has highlighted many other matters arising which are worthy of mention. They include the following:

1) There appears to be a lack of clear understanding, and associated uncertainty, with regards to the appropriate handling of VAT payments on deposits within and between Member States. Further clarification would be valuable in this regard, including assessing the possibility for, and legality of, a zero rate;

2) Better data and reporting on the costs and performance of packaging waste collection systems appears necessary. The level of knowledge regarding this matter is poor in most Member States. Better information would enable a sensible comparison of the efficiency of national packaging waste collection systems (not just for metal cans) to take place across the EU. Such an analysis should differentiate between the systems for collection of packaging from different sources (e.g. households, commerce, industrial producers), recognising that the systems used, the packaging materials collected, and the associated costs are likely to considerably across the sources of packaging;

3) An assessment could be made as to how cross-border flows of products influence the actual recycling rates achieved in Member States (i.e. understand to what extent private imports increase or decrease national recycling rates across the EU);

4) Member States could consider whether it is appropriate to implement cross-border financing of collection systems when the flow of privately imported containers is known;

5) Research into the disamenity associated with littering could be undertaken to increase confidence in the potential social benefits associated with measures that reduce littering; and

6) Research into the impact of the presence of a deposit on the consumption patterns of consumers could be recommended to understand better the impact of an introduction of a deposit, or a change in its level. This could include surveys or consumer focus groups.

Contents

1.0 Introduction

Eunomia Research & Consulting Ltd, along with Scuola Agaria del Parco di Monza, TBU, ekokonsultacijos, LDK Consultants, ENT - environment & management and Satsuma Media, are pleased to present this Final Report to DG-Environment of the European Commission as part of the study '*Options and feasibility of a European refund system for metal beverage cans*'.

The Project Specification noted that there have been claims made to the effect that in some cases the lack of full harmonisation of collection and recovery systems for packaging could result in internal market disruptions. It also noted that, in particular, cross-border trade, and especially parallel and private imports in border regions, can be affected by the lack of compatibility of refund systems used to stimulate the return of used packaging. The resulting disruptions have allegedly caused environmental damages and revenue losses for authorities, businesses and consumers. The Specification went on to point out that, in past years, there have been calls to harmonise the refund system for metal beverage cans at EU level in order to ensure a high environmental protection and a smooth functioning of the internal market.

In 2009, the European Parliament voted in favour of undertaking a pilot project on a European refund system for metal beverage cans, to be implemented by the Commission in 2010. This project follows from that request. It aims to collect and evaluate options/elements for a refund system for metal beverage cans operating across either part of, or the whole of, Europe in such a way that any problematic cross-border issues and constraints on trade are minimised.

We note that many of the issues considered by the European Parliament are currently being investigated by relevant national governments, and that this study has been carried out in parallel to ongoing negotiations. The aim has not been to replicate this work, but to add value to it as far as possible. Moreover, where specific regional issues are identified, we have sought to frame them in an objective manner and ensure that assessment at the regional level is used as a basis to inform wider EU policy making. In addition, it is important to note that the study has been conducted under the premise that key EU policy making principles are upheld. Hence the EU policy context is discussed at the start of this report.

This study is focused on metal beverage cans. Mainly because, the cross border issues referred to above are usually linked to the private trade in exports of beer which is typically supplied in metal cans, but also metals (especially aluminium, from which metal beverage containers are often made) have a relatively high value and the environmental benefits from recycling them are acknowledged to be at the higher end of values typically derived from the recycling of materials. However, the policy principles investigated in this study will most likely apply equally to beverage containers made of any material, although the costs (due to the material value and the environmental impacts of manufacture) are expected to vary.

1.1 Study Objectives

The main objective of the study, as detailed in the Project Specification, was:

> *'To collect and evaluate options/elements for a European refund system for metal beverage cans. These evaluations should include environmental, economic, social and administrative burden-related issues and take into account the smooth functioning of the internal market.'*

However, the Specification also made clear that *interoperability* between national packaging collection systems was the key focus of the study, and highlighted the principles of subsidiarity and proportionality. The more detailed objectives were described as follows:

1. *Description of the systems implemented by the EU Member States to fulfil the requirements of Directive 94/62/EC with respect to metal beverage cans. Each system should be briefly described with a focus on its compatibility with cross-border flows of products. The systems should be clustered into groups of implementation systems of similar characteristics, as appropriate.*

2. *Comprehensive assessment of the potential problems related to the lack of harmonisation of the different collection and recycling schemes for metal beverage cans, with a special focus on the border regions and the related environmental, economic and social impacts.*

3. *In case problems resulting from the lack of harmonisation are identified (see point 2 above), identification of interoperability options to link the different (groups of) systems, in order to remove cross-border barriers and allow for cross-border refunds. Interoperability options can respect the different nature of the systems by acting as an interface, or can imply the full or partial harmonisation of (groups of) systems. Interoperability options shall be identified that can link all of the systems, or some of the systems. The advantages and disadvantages of each interoperability option shall be described.*

4. *Evaluation of interoperability options (costs and benefits). The study shall propose solutions likely to deliver the most benefits and least cost to society as a whole and assess at which level of governance such solutions could be adopted in view of the principles of subsidiarity and proportionality. The assessment shall include scenarios for the implementation of identified solutions and a cost benefit analysis of each option.*

Approach to Meeting Objectives

The Project Specification outlined a number of key tasks that were to be performed. These tasks formed the basis of the research methodology employed in the study to ensure the main objectives were met. Thus the resulting key elements of this study were as follows:

- Literature review of collection systems for metal beverage cans in all EU-27 Member States;
- Comparative analysis of collection systems for metal beverage cans;
- Stakeholder workshops to assess the nature and scale of any problems;
- Development of interoperability options;
- Web-based consultation;
- Cost benefit analysis of interoperability options; and
- Final stakeholder workshop.

1.2 Report Structure

Based upon the approach to meeting the objectives of the study, this report is structured in the following manner, and follows the order of tasks carried out in the research:

- Section 2 – Comparative Analysis of Collection Systems for Metal Beverage Cans;
- Section 3 – Impacts Associated with Incompatibility;
- Section 4 – Development of Interoperability Options;
- Section 5 – Evaluation of Interoperability Options; and
- Section 6 – Conclusions and Recommendations.

There are a number of accompanying Appendices to the report, which are signposted in this main report as appropriate. These are as follows:

- Appendix 1 – Member State Reports;
- Appendix 2 – Comparative Analysis of Collection Systems for Metal Beverage Cans;

- Appendix 3 – Impacts Associated with Incompatibility;
- Appendix 4 – Options Development;
- Appendix 5 – Stakeholder Workshops and Consultation; and
- Appendix 6 – Cost Benefit Analysis.

2.0 Comparative Analysis of Collection Systems

2.1 Introduction

The Project Specification required the contractor to carry out a comprehensive literature review of the organisation and performance of collection and recycling systems for metal beverage cans in all 27 Member States and of the impacts of the lack of harmonisation of these systems. This would form the evidence base from which to:

- *'provide an overview of the collection and recovery schemes for metal beverage cans across the EU presenting the different existing schemes, their functioning including finance flows, their performance in terms of recycling rates';*
- *'provide a comparative analysis of the systems for collection and recovery of metal beverage cans in terms of performance and efficiency'; and*
- *'identify the obstacles that fragment the market in terms of metal beverage cans return, with particular attention on border regions'.*

In addition, the following objectives of the study relate to this section of the report and the analysis which was carried out. In relation to collection systems for metal beverage cans:

1) *Each system should be briefly described with a focus on its compatibility with cross-border flows of products.*
2) *The systems should be clustered into groups of implementation systems of similar characteristics, as appropriate.*

Eunomia carried out a comprehensive literature review of the packaging collection systems in each of the 27 Member States. This work included input from a number of sub-contractors based across the EU.

The result of the literature review was a compilation of Member State reports, which can be found in 'Appendix 1 – Member State Reports'. The structure of each report is as follows:

- Description of Primary Collection System for Metal Cans;
- Additional Recovery Routes for Metal Cans;
- Fees Paid by Obligated Parties;
- Proportion of Total Recovery Costs Covered by Fees;

- Recycling Rate for Metal Cans.

It should be noted that some aspects – for example, information in respect of costs – are covered with varying degrees of detail. It is important to understand that the fees paid to producer responsibility organisations (PRO), in respect of delivering compliance with a producer's obligation, are not the same as the costs of achieving a specified level of recycling for the simple reason that the PROs do not always bear 100% of the costs of collection and recycling / recovery or the costs of managing that fraction which remains in residual waste.

From this evidence base a comparative analysis of the costs (insofar as this proved possible) and performance of packaging collection systems for metal beverage cans was undertaken. In addition, compatibility of the collection systems with cross-border flows of metal beverage cans was considered. This comparative analysis can be found in 'Appendix 2 – Comparative Analysis of Collection Systems for Metal Beverage Cans'. Firstly, a summary of a review on the policy background is given to provide some context to the research.

2.2 Summary of Policy Background

To provide some context to the approach taken in this study, and to the development of interoperability options later on, it is important to discuss the policy background within which the assessment takes place. This study is primarily related to waste policy. However, to understand the reasons why products, which later become wastes, move between Member States some of the key financial drivers of cross-border movements of products are also discussed.

From the overview of EU policy given in 'Appendix 2 – Comparative Analysis of Collection Systems for Metal Beverage Cans', it is clear that EU Directives have been designed to give Member States the freedom to design their own measures to meet the targets specified in Directives, taking national circumstances into account. The principles of subsidiarity and proportionality underpin the development of this policy, and are likely to continue to be used as a guide to policy development unless the evidence strongly suggests that EU harmonisation is required.

In terms of waste policy, Member States need to implement collection systems for packaging waste, including the management of metal beverages cans waste. Member States have freedom to choose the nature of the collection system they put in place, as long as a minimum of 50% by weight of metal packaging (of which metal cans are a part, but certainly not the only part) is collected for recycling. The year by which the target has to be met varies between Member States, depending upon whether a derogation was permitted or not. However, the harmonising effect of the Directive has also been called into question, and some specific concerns around deposit refund systems have been raised, especially around the smooth functioning of the internal market.

As mentioned in the introduction, policy makers have repeatedly called to harmonise the refund systems for metal beverage cans at EU level in order to ensure a high

environmental protection and a smooth functioning of the internal market. This also provides some policy context to the study.

The comparative analysis of collection systems for metal beverage cans follows in the next Section.

2.3 Summary of Comparative Analysis

The comparative analysis found in 'Appendix 2 – Comparative Analysis of Collection Systems for Metal Beverage Cans', is structured as follows:

- Collection and Recovery Schemes for Metal Beverage Cans;
- Recycling Performance;
- Financial Flows;
- Commentary on Cost Effectiveness of Producer Responsibility Systems;
- Obstacles that Fragment the Market in terms of Beverage Can Return; and
- Compatibility of Systems with Cross-border Flows of Products.

The key data and findings are summarised under the headings below.

Recycling Performance

The most relevant data from the appendices, which includes the most recent European Aluminium Association data for aluminium can recycling, is compiled in Table 2-1 to give our best estimates for beverage can recycling across Europe. The data proposed here (which includes both aluminium and steel beverage cans) compares all available data sources and proposes the most likely recycling rate, where we are able to do so, as well as to attribute a level of confidence to the accuracy of the data.

Table 2-1: Best Estimates of Steel and Aluminium Can Recycling Rates

Country	Code	Best Estimate of Beverage Can Recycling Rate (%)	Year for which data relates to	Level of confid-ence in data accuracy	Source of data and comments on the recycling results
Austria	AT	45% (68% inc. RWS*)	2007	High (medium for RWS figure)	Includes recycling from residual waste of 80% remaining steel cans and 25% aluminium cans. Calculated from detailed data (presented in appendices) from the Austrian Chamber of Commerce and the Austrian MoE.
Belgium	BE	93%	2009	Medium	EAA data (Green dot scheme - average for all beverage containers), supported by World Steel Association data, although no

Country	Code	Best Estimate of Beverage Can Recycling Rate (%)	Year for which data relates to	Level of confid-ence in data accuracy	Source of data and comments on the recycling results
					primary data assessed.
Bulgaria	BG	34%	2009	Low	EAA extrapolation for Bulgaria and Romania combined. Includes informal (waste picker) collection.
Cyprus	CY	Unknown (metal packaging = 70%)	2009	n/a	Data only available for whole metal packaging from green dot scheme.
Czech Republic	CZ	20%	2009	n/a	EKO-KOM claim 64% metal packaging recycling in 2010, though PRO Europe suggests the figure from Eurostat is a best estimate - 56%. However, aluminium only recycling figure of 20% is used as more likely to reflect can recycling than for steel or all metal packaging.
Denmark	DK	85% 86%	2009 2010	High	All beverage containers.
Estonia	EE	85%	2009	Medium	Deposit scheme data for cans returned = 59%, low figure due to many cans exported. Accounting for cans going to Finland leads to a figure of 85% recycling, though the true figure may be higher still as cans may be exported to other countries besides (especially other Scandinavian [DRS] countries).
Finland	FI	94%	2010	High	Figures from Palpa with imports and exports of cans accounted for.
France	FR	Unknown (metal packaging = 50%)	2009	n/a	Data only available for whole metal packaging. Majority collected through bring sites / drop off centres (i.e. suggesting lower captures than kerbside approaches).
Germany	DE	95%	Un-known	Medium	Estimates made by Ball Packaging.
Greece	EL	34%	2009	Medium	EEA data from green dot scheme combined with industry collected data.
Hungary	HU	42%	2009	Low	EEA data from green dot scheme and scrap dealer reports. Data in appendices not sufficient to confirm.
Ireland	IE	41-47%	2009	Medium	41% = Alupro calculated data. 47% = EEA data (extrapolation for cans).
Italy	IT	Unknown (metal packaging = 68%)	2011	n/a	Data only available for whole metal packaging.
Latvia	LV	30%	2009	Medium	EEA data “Green dot scheme + industry report for cans only”. Source and accuracy of data not determined.
Lithuania	LT	38%	2009	Medium	EEA data “Green dot scheme + industry report for cans only”. Source and accuracy of data not determined.

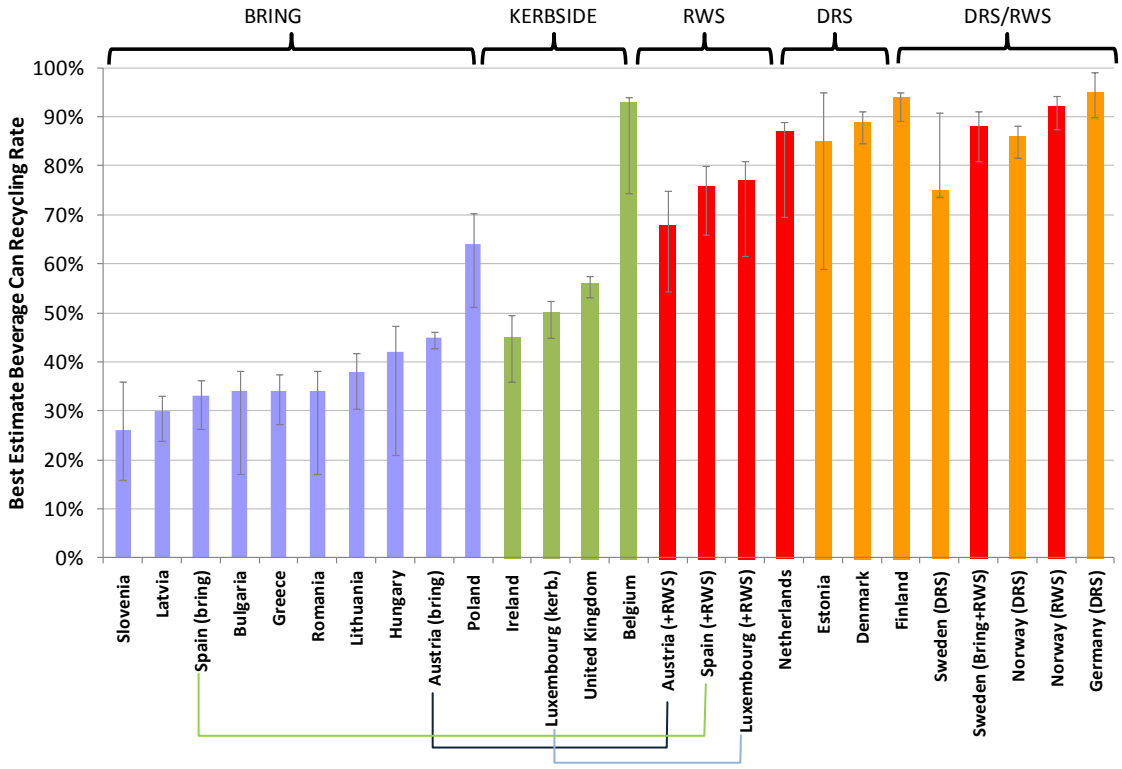
Country	Code	Best Estimate of Beverage Can Recycling Rate (%)	Year for which data relates to	Level of confid-ence in data accuracy	Source of data and comments on the recycling results
Luxembourg	LU	Unknown (metal packaging = 50%, 77% inc. RWS*)	2009	n/a	Data only available for whole metal packaging.
Malta	MT	Unknown	n/a	n/a	No data reported to Eurostat
Netherlands	NL	87%	2009	Medium	Linked to metal packaging recycling rate as almost entirely recovered via incinerators. (High proportion of steel cans.)
Poland	PL	64%	2009	Medium	Rekopol Recovery Organisation data for aluminium cans from 'combined industry reports'. Poland's high recovery rates are discussed in Appendix 2.
Portugal	PT	Unknown (metal packaging = 40% inc. RWS*)	2009	n/a	Data unclear. This figure is EAA data for whole metal packaging.
Romania	RO	34%	2009	Low	EAA extrapolation for Bulgaria and Romania combined. Includes significant informal (scavenger) collection.
Slovakia	SK	Unknown (metal packaging = 56%)	2008	n/a	Data unclear. This figure is Eurostat data for whole metal packaging.
Slovenia	SI	26%	2009	Low	All metal packaging from PRO Scheme SLOPAK.
Spain	ES	33% (76% inc. RWS*)	2009	Medium	Calculated from the Association of Beverage Cans [of Spain and Portugal] 2011 report (refer to member state report appendices).
Sweden	SE	75% (88% inc. RWS*)	2009	High	Calculated from data provided by Returpack. In this calculation cans from private imports are not included in the recycling figure, as they do not appear in the denominator (i.e. the quantity of cans placed on the market). Otherwise, the recycling rates would appear artificially higher.
United Kingdom	UK	56%	2009	High	EAA data from PRN trading corroborated by analysis in appendix.
Norway (not EU)	NO	88% (92% inc. RWS*)	2009	High	EAA data from deposit scheme and calculations from Norsk Resirk data.

**RWS =Residual Waste Sorting system (recycling from MBT or thermal processes)*

The recycling performance of countries from Table 2-1 (where data is available for cans) is grouped by the type of system used and shown in Figure 2-1. In cases where

both the source separation and final residual waste sorting (RWS) recycling rates are known (Austria, Spain, Luxembourg, Norway and Germany) then the data for such countries is shown in two bars within the chart. Error bars are shown in proportion to the level confidence in the data as identified in Table 2-1.

Figure 2-1: Best Available Data on Metal Beverage Can Recycling



Note: DRS = Deposit Refund System / RWS = Residual Waste Sorting i.e. mechanical separation of metal cans from residual waste, or extraction from incinerator bottom ash.

As shown by Figure 2-1, the system which most commonly delivers high recycling rates is the DRS. One country (Belgium) using a kerbside system has a similarly high rate of recycling, whilst another which uses a RWS has a high rate also (the Netherlands). The highest rate achieved overall (Germany) involves a DRS, but with additional metals recovery also possible via kerbside and residual waste sorting systems.

In all cases, the reasons why individual countries perform as they do are distinct and complex. The DRS and other PRO type systems are considered independently in the following sections where we attempt to draw lessons from individual countries.

The following issues are noted in relation to the data available on the recycling performance of collection systems for metal beverage cans:

1) Where metal beverage cans are concerned, it has not always been possible to gain information regarding the extent to which metal beverage cans are recycled. The main reason for this relates to the fact that Member States tend to report – in

line with what they are required to report for the purposes of the Packaging Directive – the recycling rate for all 'metal packaging';

2) For a number of reasons, deriving a recycling rate for metal beverage containers, from that which is given for all metal packaging, is not generally possible, and would require a considerable body of information for each country which is not obviously available;

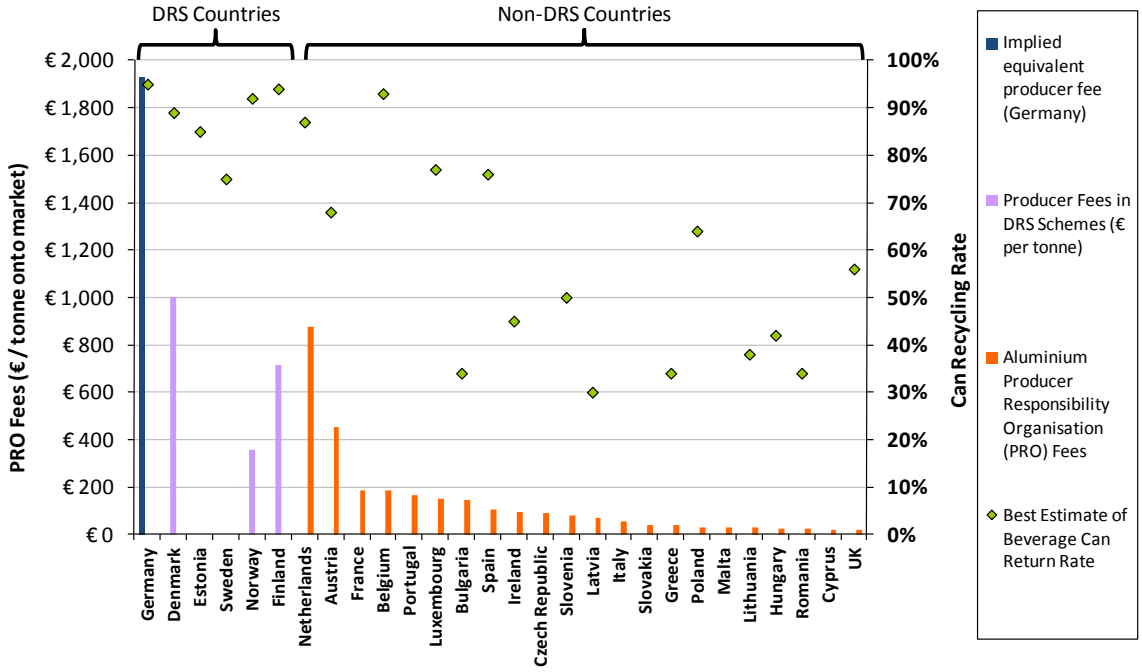
3) It seems likely, for example, that different countries may be reporting different things, and moreover, that the basis for deriving the figures being reported varies in the extent to which it could be considered robust. The basis for the estimation of both the numerator (what is recycled) and the denominator (what is the total amount of targeted material in the waste stream) varies across countries, and is likely to be affected by imports and exports, not just of packaged products, but also of waste itself.

Fees Paid by Obligated Parties

There are no publicly available figures which give a clearly identifiable cost for the management of aluminium cans in each of the systems being used. The closest one comes to truly valid measures of this are those cases where the principle upon which the scheme is founded are such that 100% of all the costs of the selective collection are funded by the relevant scheme. These include the deposit schemes (though the unreturned deposits are used to reduce these costs) and the producer responsibility schemes in selected countries, including Belgium, Germany, Luxembourg and Austria, where 100% of relevant costs are funded by producers.

The only measures for which information exists in all countries are not strictly comparable. These are the fees paid by the relevant parties either to a DRS or a relevant producer responsibility organisation (PRO) which arranges for compliance with the terms of the company's obligation. These fees, summarised from Appendix 2 (but without including the effective contribution from unclaimed deposits) are shown in Figure 2-2. We include here only the aluminium PRO fee since the market share of beverage cans in deposit countries tends to be more strongly weighted towards aluminium. We strongly caveat the presentation of this data, as the PRO fees are not strictly comparable (for some reasons alluded to above, and further described below). However, there is no other cross-country data that is available.

Figure 2-2: Fees Paid by Relevant Parties for Aluminium and Steel Packaging Recycling



Note: for DRSs return rates do not include privately imported cans in the numerator, or privately exported cans in the denominator.

As can be seen from Figure 2-2, the implied German fees are by far the highest. It is also notable that the fees for Denmark, Finland and Norway are also high, and that these are all countries with DRSs (for convenience, these are shown grouped to the left of the Figure). On the other hand, Estonia and Sweden both charge nothing to the relevant parties for aluminium. In these countries, the revenues from unreturned deposits are deemed sufficient to cover the costs of operation for aluminium. It is noted that because the return rate is lower in these countries there is more funding from unredeemed deposits and thus no additional funding from producers is required.

Countries with traditional producer responsibility systems, in the main, levy lower fees than in DRS countries. In many cases, however, the full costs of operating waste management systems are not charged to the producers. Instead, residents (or the general tax payer) effectively support service costs. This may also be said of DRSs – consumers contribute by way of unclaimed deposits and so producers themselves are, again, not funding full system costs. Nevertheless, the general conclusion is that systems that are more heavily funded by producers tend to achieve better results.

It may also be noted that across all the systems studied, the true concept of Producer Responsibility is not wholly realised. To claim such a title, producers would have to take possession of all costs associated with the recycling of their packaging, ***as well as*** the costs associated with collection and disposal of their unrecycled packaging (this happens in Belgium). Although this would give the strongest incentive to design

and operate systems which lead to high rates of recycling, such an approach has not been witnessed here. Evidently, the closer countries come to achieving a 100% recycling rate, the closer the scheme comes to being 100% funded by producers.

Again, the following points summarise the key observations from the analysis:

1) A problem with comparing fees under the conventional PRO-based model, is that different countries require the systems to cover varying proportions of the overall cost. It is not always clear, even where these costs are underpinned by calculations (and in some countries, the accuracy of these is disputed), what is the *actual* percentage of the overall cost which the PRO is required to cover;

2) Consequently, lower fees do not necessarily imply more efficient systems. Indeed, this might simply reflect low performance, or a reduced requirement to raise revenue; and

3) Nevertheless, a fairly broad observation appears to be that the countries levying lower producer fees have generally lower recycling rates. Equally, it should be noted that among countries where all costs are covered by the PRO scheme, there is an wide range of fees with no obvious link between the recycling rate achieved and the fees being paid. This suggests that there may be considerable savings to be made through improved efficiency of operation of these schemes.

Compatibility of Systems with Cross-border Flows of Products

In the literature review the range of collection systems for metal beverage cans in each Member State was described (see 'Appendix 1 – Member State Reports'). It is worth noting that for some Member States there are multiple systems for metal cans to be collected and recycled. The collection systems were grouped into the following broad categories:

- Bring – bring banks, igloos etc
- Kerbside – collection from the kerbside / doorstep of properties
- Hybrid – mixture of the above
- DRS – Deposit Refund System
- RWS – residual waste sorting, by mechanical processes

The following table shows the system for capturing the material for recycling, along with a summary of its compatibility with the capture and recycling of non-national cans from the border-trade.

Table 2-2: Compatibility of Collection Systems with Recycling of Non-national Cans

System Type	Compatibility with Recycling of Non-national Cans	
Bring	✔	Bring systems seek to distinguish between material types, but not by product types. Thus there are no constraints to accepting non-national cans and are therefore compatible.
Kerbside	✔	Kerbside systems seek to distinguish between material types, either through manual sorting at the kerbside or through some form of mechanical sorting post co-mingled collection, but not by product types. Thus there are no constraints to accepting non-national cans and are therefore compatible.
Hybrid	✔	As per Bring and Kerbside.
DRS	Mostly	All deposit refund systems operate by distinguishing between product types. Thus take-back mechanisms will check every returned container to assess whether a deposit needs to be paid out or not. Primarily this is to ensure the consumer has the correct deposit value paid back, but this is also to stop fraud i.e. paying back deposits to consumers who did not pay a deposit upon purchase. Most deposit refund systems do accept non-national cans at take-back locations – but do not pay out any deposit. In some retail outlets in Denmark proprietors do not accept non-national cans, although the Danish Government note that "only very few of more than 2,000 retailers with RVMs have asked Dansk Retursystem to set their RVM to reject foreign cans". Thus DRSs can be said to be compatible with non-national cans, as long as they are accepted by the retail trade at take-back locations. The more important issue is that the deposit itself acts as a motivation for the return of the can, so as long as the deposit is not refunded on foreign cans, the system – which relies on the incentive of the refunded deposit – is unlikely to be as effective for cans which bear a deposit from another country.
RWS	✔	Most wastes can be placed in refuse bins for collection – including any empty cans purchased nationally or abroad. These processes do not distinguish by product type and are therefore compatible with non-national cans.

However, the volume of material collected for recycling is not the only issue of concern. Each system type will, by its nature, collect material of varying quality. This is discussed above. Table 2-3 represents the key factors for each system type.

Table 2-3: Key Features of the Different Recycling Systems

System Type	Rejects	Material Value	Quality
Deposit Refund Systems	Low	High	High
Bring / Kerbside	Low to Medium	Medium/High	Medium / High
RWS	Low to High	Low	Low

Note: For the degree of metals extracted from incinerator bottom ash the views of industry stakeholders varies considerably. Reported extraction rates range from 20% to 85%.

Some secondary collection systems may deliver lower performance or lower quality material from privately imported cans, as opposed to domestic cans. For all collection systems other than DRSs there appears to be no difference in the management of non-national cans from the border-trade to cans placed on the market nationally. In other words, there is no reason to suggest a difference in collection efficiency or quality for border cans. However, for deposit refund systems the presence of the DRS has a strong influence on the design and performance of the national system, so that non-national cans are unlikely to be expected to be captured at the same rate as national cans with deposits (the evidence from the comparative analysis of efficiency supports this view).

In addition to material quantities and quality, DRSs make use of a financial incentive which seeks to ensure high levels of empty containers are returned for recycling. The final comment to make on compatibility, therefore, is how differing collection systems deal with deposit payments, and thus whether or not the consumer is affected. At this time there are no systems which are setup to refund a deposit which is paid in one country, but where the can is returned in another. Thus any DRS collection system type could be said to be incompatible with cross-border cans in relation to the return incentive (the deposit).

Finally, there appears to be some incompatibility with the funding of beverage can collection. In no cases is the collection of privately *imported* cans funded by the producers in the country in which they become a waste. Equally, there appears to be no situation in which a transfer of revenue takes place from the country where the cans are purchased to the country where they become waste. If PRO fees, or deposits, are paid in one country and the can is moved to another, there is no mechanism for funding to support the collection and recycling of privately imported containers.

The main incompatibility issues, with privately imported metal beverage cans and national packaging waste collection systems, are as follows:

1) Beverage cans which are privately imported into countries with DRSs are not recycled to as high a level as national cans;;

2) Beverage cans privately imported into countries with DRSs are not recycled to as high a quality as national cans;

3) Deposits on beverage cans are not paid back to consumers outside the country in which they are paid; and

4) The management of waste packaging from privately imported cans is not funded by the producers who placed the packaging on the market (in the country of purchase). This is true irrespective of whether or not the country into which the cans are imported operates a DRS.

3.0 Impacts Associated with Incompatibility

3.1 Introduction

The underlying rationale for this study is to investigate whether the lack of harmonisation of national collection systems for packaging across the EU, causes barriers to environmentally sound resource management. The Project Specification required the contractor to:

- *'identify and assess environmental impacts due to lack of compatibility of national schemes including assessing of the contribution of metal beverage cans to littering, the impacts on metal cans recycling rates and generally on metal recycling rates, the impact on raw material use.*
- *identify and assess the economic and internal market impacts due to lack of compatibility of national schemes including potential trade barriers, cross border competition issues, the impact on economic operators and local authorities, impact on budgetary revenues.*
- *identify and assess the social impacts due to lack of compatibility of national schemes including impacts on consumers and labour markets'*

The impacts are all assessed in relation to the main incompatibility issues determined in Appendix 2 and summarised in the Section above under the heading ***Compatibility of Systems with Cross-border Flows of Products***:

1) Beverage cans which are privately imported into countries with DRSs are not recycled to as high a level as national cans. Not only do more arise as residual waste, but evidence suggests that a higher proportion arise as litter;

2) Beverage cans privately imported into countries with DRSs are not recycled to as high a quality as national cans;

3) Deposits on beverage cans are not paid back to consumers outside the country in which they are paid; and

4) The management of waste packaging from privately imported cans is not funded by the producers who placed the packaging on the market (in the country of purchase). This is true irrespective of whether or not the country into which the cans are imported operates a DRS.

In-line with single market principles, private cross-border trade in products is not the problem per se, but its magnitude does influence the scale of any problems resulting from the management of the discarded packaging in some specific circumstances.

Thus it is important to understand the scale of the border trade to assess the significance of the issues noted above and any problems that stem from them.

To understand the nature and scale of any impacts that may arise, a literature review was carried out, and two workshops were conducted in border regions where issues had previously been identified. Namely between:

- Denmark and Germany; and
- Finland and Estonia.

Summary reports from these workshops are included in 'Appendix 4 – Stakeholder Workshops and Consultation'. Data from these reports and the literature review are used to assess the significance of any impacts identified in the following sections of this report. In addition, a stakeholder consultation was carried out to gather views from industry experts.

The full analysis on determining the impacts from a lack of compatibility of national collection systems for metal beverage cans can be found in Section 1 of 'Appendix 3 –Impacts Associated with Interoperability'.

3.2 Summary of Key Findings from Incompatibility Impacts

In this section the magnitude of the cross-border flows are discussed. Then the economic, environmental and social impacts that occur are highlighted and discussed.

3.2.1 Cross-border Flows

3.2.1.1 Underlying Causes

Consumers cross borders to other Member States to purchase beverages, amongst other goods (the 'border-shopping' trade),Where cans are purchased in a country that does not have a Deposit Refund System (DRS) but consumed in one that does, the empty cans may not be compatible with national collection systems for deposit bearing cans. Where the country in which the cans are purchased has a DRS in place, and where the country of consumption also has a DRS in place, then the incentive for returns is weakened if a refund cannot be obtained in the country of consumption.

One of the most important influences on consumer behaviour is the price of goods and services. If there are price differentials in valued consumer goods between different locations, consumers may find it cost-effective to travel further than necessary to buy them. Some of the causes of price differentials in canned beverages include:

- Alcohol excise duty;
- Value Added Tax;

- Other taxes (e.g. sugar tax);
- Product price (including production costs, transport, distribution and retailing);
- The existence (and magnitude of) deposits;
- Demand and supply for the products (market influences); and
- Exchange rates.

Clearly some of these price factors are decided at the national level, by Government, and some are a consequence of the free market. The intention of this discussion is not to weigh up the rationale for these fiscal measures, but to ascertain the magnitude of the price differentials between Member States. Some of the above mentioned factors will affect the price differentials of some types of beverages more than others. Alcohol excise duty and VAT are two of the largest contributors.

Alcohol excise duties are in place in all EU member states. In fact, minimum rates on alcohol excise duty are set by the European Commission. In 2010 London Economics conducted a study on possible changes in the minimum rates and structures of excise duties on alcoholic beverages to address concerns raised by Member States.[1] The report states:

> *'There is a very wide dispersion of before-duty (pre-tax) prices of the alcohol beverages consumed within the EU and the current duties accentuate such differences further. In particular, for all beverages there is a wide disparity between the high rates charged by four member states (FI, SE, IE, UK) and the rates charged by the rest of EU member states. At present, because of their low level relative to the high rates charged by the four, the minimum duty rates contribute little to reducing such disparities.'*

Interestingly the authors also go on to discuss the issue of whether the differences between pre- and post-tax prices of products are likely to change the relative prices of alcoholic beverages (and hence potentially influence consumer behaviour). The outcome of the analysis did illustrate that:

> *'taxation changes the relationship between products, so that consumers see significant differences when comparing the relative prices of pre- and post-tax products.'*

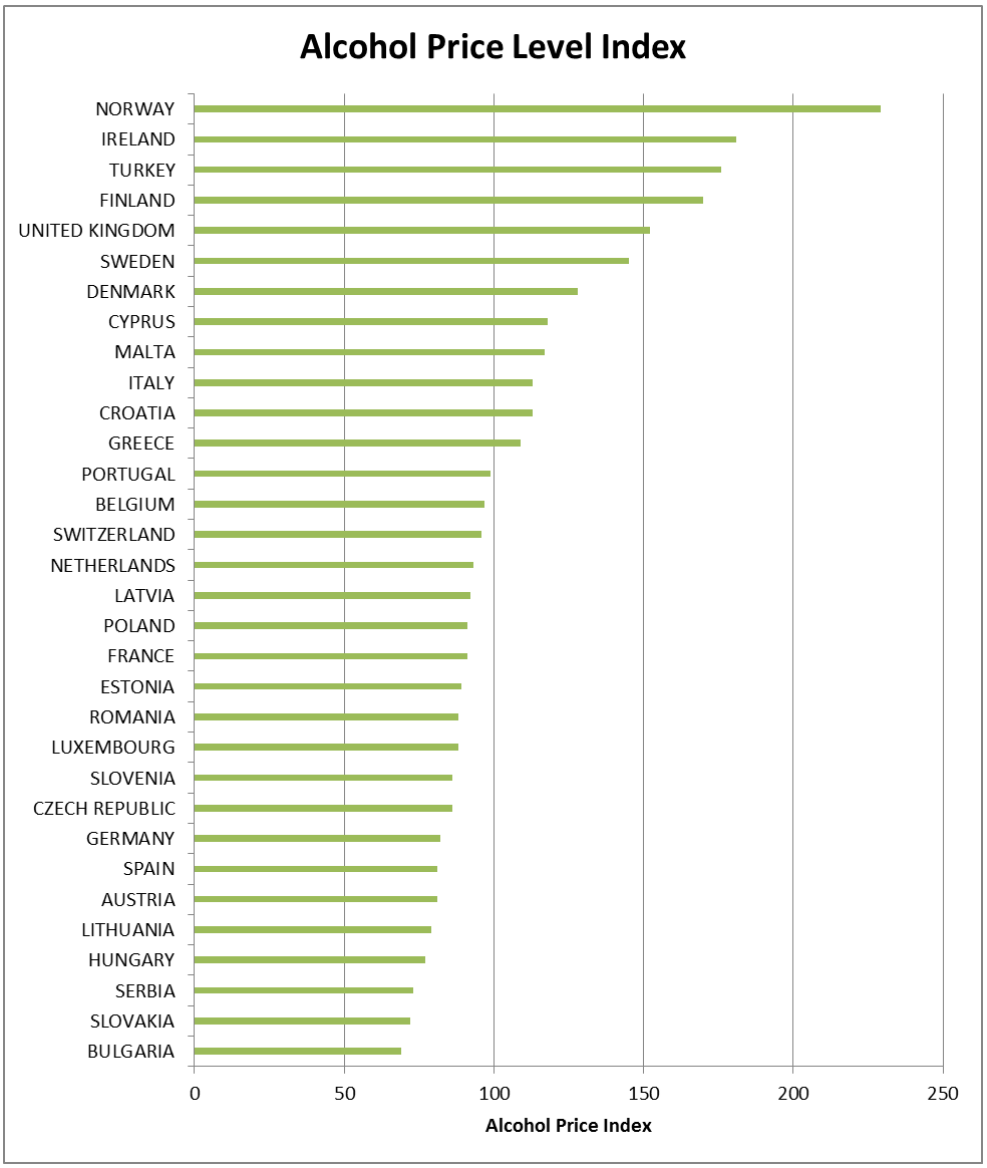
The relative pricing between member states resulting from differences in alcohol excise duty is thus considered first, and followed by a discussion around VAT, ex-

[1] London Economics (2010) *Study Analysing Possible Changes in the Minimum Rates and Structures of Excise Duties on Alcoholic Beverages*, Executive Summary to EC DG Taxation and Customs Union, May 2010.

factory, and deposit prices. Note that the alcohol price index includes all taxes, but not deposits. Figure 3-1 shows the range of prices across the EU.

Figure 3-2 shows that there is a strong correlation between alcohol excise duty and the price level index (which includes excise duty and all other elements of the price) for alcoholic beverages. This appears to validate the London Economics findings that the alcohol excise duty contributes significantly to the price differentials of alcoholic beverages. Countries with higher duties, such as Norway, Finland, Sweden and others, have high prices for alcohol. Where alcohol excise duties are lower, then for perhaps obvious reasons, the influence of other factors becomes more important in determining the alcohol price.

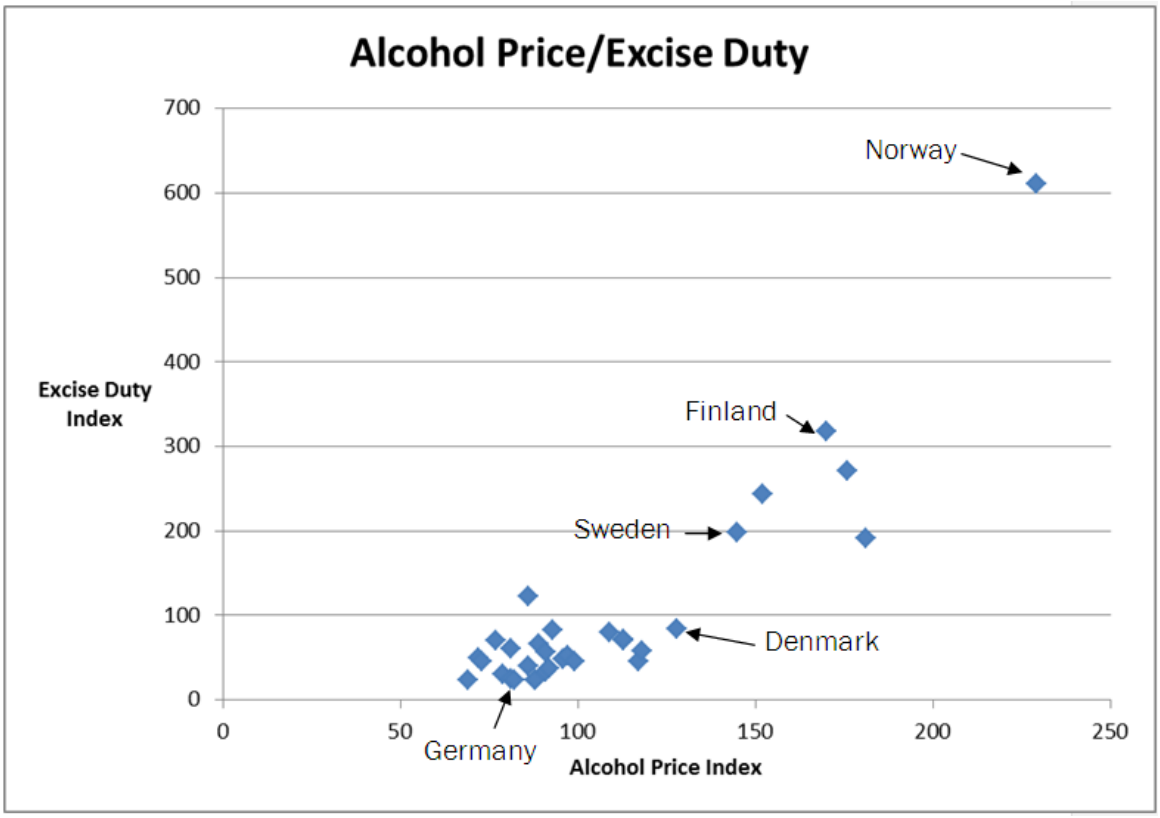
Figure 3-1: Alcohol Price Level Index for EU member states (2010) EU27 = 100



Sources: Borchert, E. and Reinecke, S. (2007) Eating, drinking, smoking - comparative price levels in 37 European countries for 2006, Report for Eurostat, 12 July 2007,

http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-07-090/EN/KS-SF-07-090-EN.PDF ; Karlson T. and Osterberg E. (2009) ibid.; Brewers of Europe (2011) ibid.

Figure 3-2: Alcohol Price Index vs Alcohol Excise Duty Index across the EU



Sources: Borchert, E. and Reinecke, S. (2007) Eating, drinking, smoking - comparative price levels in 37 European countries for 2006, Report for Eurostat, 12 July 2007, http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-07-090/EN/KS-SF-07-090-EN.PDF; Karlson T. and Osterberg E. (2009) ibid.; Brewers of Europe (2011) ibid.

Table 3-1 shows the costs of a case of 24, 330ml cans of beer in Denmark and in the border shops. The taxes in Denmark alone are greater than the pre-tax prices in the border shops. Taking taxes into account, the retail prices are such that the price in Denmark is almost double the price in Germany. The largest explanatory factors are the differences in excise duty, and the difference in pre-tax prices. However, as discussed above, the pre-tax price differentials are partly a function of the nature of the shopping experience, itself motivated by price differentials.

Price differentials on soft drinks are smaller, but in Denmark, for example, the higher than average prices are a consequence of the tax on carbonated soft drinks that

contain sugar. Currently the tax is around 108 øre per litre (around €0.14).[2] This creates a price differential that results in a flow of carbonated soft drinks from Germany to Denmark.

Table 3-1: Example of Danish/German Price Differential in Beer (Euro per case – 24 x 330ml)

	Denmark	Germany
Retail sales price	13,42	7,16
VAT	2,68	1,14
excise duty	2,49	0,65
packaging tax	0,32	-
before-tax price	7,92	5,36

Source: Personal communication with the Danish Ministry of Taxation – Skatteministeriet, October 2011

Of course the price differentials on alcoholic beverages are not the only driver of border shopping. Differentials for other non-alcoholic beverages and other products, such as cigarettes, also drive consumers across borders. Indeed this may be the more significant driver for some, with alcohol simply being purchased on the same trip.

3.2.1.2 Estimation of Cross-border Flows

Using known information on cross-border flows and beverage price indices, a model was developed to estimate a relationship between price and 'flow'. In addition, local / cultural influences were taken into consideration. This was used to estimate cross-border flows around Europe and to aggregate to EU-27 level.

The key cross-border flows of privately purchased metal beverage cans are depicted in Figure 3-3. It is clear that the larger flows are concentrated in the Northern parts of Europe where the price of canned beverages is much higher.

[2] SKAT (2009) *Danish Taxes and Customs*, http://www.skat.dk/SKAT.aspx?oId=1812920&vId=0&search=sukker%A4sodavand

Figure 3-3: Map of Major Cross Border Alcohol Purchases (direction of arrows shows movement of material from the country of purchase to the country of consumption)

Source: Karlson, T. and Osterberg, E. (2009) Alcohol Affordability and Cross Border Trade, Report for Swedish National Institute of Public Health, 1 June 2009, http://www.fhi.se/PageFiles/7308/Alcohol-affordability-and-cross-border-trade.pdf

3.2.1.3 Summary

Whilst this type of analysis will obviously have relatively high margins for error, at a European level it provides a start to understanding the relative magnitude of the border-trade and the quantity of beverage packaging, placed on the market in one Member State and becomes waste in another. Using the methodology discussed in 'Appendix 3 – Incompatibility Impacts', we estimated the total figures for private cross-border trade within the EU-27 to be as in Table 3-2.

Table 3-2: Estimated EU-27 Private Imports of Canned Beer[3]

	Total Imports, millions	% Beer Cans Placed on Market
High	1,500	8%
Central	1,100	6%
Low	800	4%

Note: total beer cans placed on market ~18 billion

A similar methodology was applied to soft-drinks, however, there is much less evidence regarding the flow of these beverages, so the figures (below) must be treated as indicative only. The two flows together are summarised in Table 3-4.

Table 3-3: Estimated EU-27 Private Imports of Canned Soft-Drinks[4]

	Total Imports, millions	% Soft Drink Cans Placed on Market
High	1,000	5%
Central	700	4%
Low	400	2%

Note: total soft drink cans placed on market ~18 billion

Table 3-4: Estimated EU-27 Private Imports of All Canned Drinks

	Total Imports, millions	% Cans Placed on Market
High	2,500	7%
Central	1,800	5%
Low	1,200	3%

Note: total cans placed on market ~36 billion

[3] Note, these estimates were revised following the submission of the consultation document.

[4] Note, these estimates were revised following the submission of the consultation document.

In summary, this analysis has presented the available data on the scale of border-shopping, and made some estimates on the scale of the cross-border flow of canned beer and soft drinks within the EU-27. The estimates show that there is a relatively small flow of canned beverages between Member States compared to the total number of canned beverages placed on the market (around 5% of the total in our central estimate). Moreover, the majority of the cross-border flows are concentrated at a small number of borders, mostly in northern Europe. Flows to Denmark, Sweden and Finland account for over 1,000 million cans under the central scenario. Historically the flow from France to the UK has been very significant, but the fall in the value of Sterling relative to the Euro in recent years has reduced the extent of this trade significantly.[5]

We caveat these figures by noting that alternative sources of data, from the beverage and retail industry, were not available to us during the course of the study. Thus we recognise that other estimates are likely to exist, but would also note that the magnitude of the flow of beverage cans is unlikely to impact significantly on the resulting relative costs and benefits modelled in the cost benefit analysis (CBA). The German border shopping association Interessengemeinschaft der Grenzhändler do suggest that, for the major FMCG category products, a modest estimate for cross-border flow would be around 10%.[6] However, it is unclear whether this relates specifically to cans or not. If it does, this would be slightly above our higher end estimate.

3.2.2 Environmental Impacts

The following provides a brief summary of the environmental impacts which have been identified:

1) The initial analysis of environmental consequences shows that at the EU-27 level there are only likely to be marginal reductions in recycling resulting from the incompatibility of privately imported cans with national collection systems. In addition, we note that this outcome is sensitive to a small number of cross border flows and the assumptions made regarding the efficiency of non-deposit collection systems for metal cans in countries with DRSs;

2) On a Member State specific level, the difference in collection efficiency between systems for private imports and domestic cans does appear significant in some cases;

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[5] Wearden, G. (2009) *Majestic Wine: Weak pound takes the shine off booze cruises*, The Guardian Newspaper, Accessed 16th October 2011, http://www.guardian.co.uk/business/2009/jun/15/majestic-wine-booze-cruises-profits-down

[6] FMCG – Fast Moving Consumer Goods

3) If all privately imported cans in the EU-27 were recycled to the same extent as domestic cans in the country where they become waste, recycling of metal beverage cans could increase by just over 4,000 tonnes per annum. In other words, in more cases than others the recycling of privately imported metal beverage cans occurs to a lower extent than cans purchased domestically. To put this into the European context, the recycling rate for cans would increase marginally from 65.8% to 66.4%;

4) In countries with DRSs, the material quality from privately imported cans collected for recycling is lower than that for domestic cans where the material is not collected through the DRS, but some other 'back-up' collection system, such as bring or kerbside systems which include co-mingled material streams or where sorting of metals from incinerator bottom ash occurs; and

5) Reports in some countries (Austria, Ireland, the UK, Estonia, Luxembourg, Spain and Denmark, for example) suggest that littering of beverage cans, especially those outside deposit systems, is an issue across the EU. Moreover, evidence from litter picking activities in Denmark strongly suggests that privately imported beverage cans are littered to a significantly higher extent than domestic cans, where they are included in a DRS. The exact contribution of metal beverage cans to the problem of litter is, however, uncertain and varies depending on the methodology employed. Moreover, valuing the social cost of litter is not an easy task, and few studies have attempted to do this. Consequently, the impacts of littering due to metal beverage cans are hard to quantify.

3.2.3 Economic Impacts

In this section, the economic impacts resulting from the lack of compatibility of national collection systems for metal beverage cans have been considered. The following points summarise the main issues:

1) Out the estimated 550 € million value of metal beverage cans placed on the market, around 3.4 € million revenue from the sale of recyclate is being lost per annum, due to the lower recycling rates for privately imported cans as opposed to domestic cans;

2) Out of the total estimated 600 € million paid by consumers every year for deposits on cans, at least 9 € million is being lost per annum as a result of consumers not being able to redeem the deposit in the country of consumption. However, the border shoppers are still making savings on beverage sales despite this cost, and the cost of transport;

3) No evidence was found of any barriers to trade or cross-border competition issues over and above those already highlighted by the Commission in communications with Member States;[7]

4) The financing of the collection of privately imported cans could be considered an issue, depending on whether the marginal cost of collection exceeds the additional revenue generated from the sale of the material, or not;

5) Given the free movement of products within the single market and the diversity of packaging collection systems across the EU, there does indeed appear to be a good argument for co-operation between Member States to deal with impacts related to the management of privately imported beverage cans. This is not necessarily a problem confined to countries with DRSs in place. In principle, where large cross-border flows occur (for example, between France and the UK), there could be issues arising for producers funding collection systems in the UK, as they would be paying to fund the collection of empty beverage containers placed on the market in France. Arguably, the only reason why this is not regarded as an issue in the UK is the fact that producers themselves are not responsible for a significant proportion of the costs of dealing with consumer beverage packaging in the UK (this being largely the responsibility of the local authorities).

3.2.4 Social Impacts

In this section, the social impacts resulting from the lack of compatibility of national collection systems for metal beverage cans have been considered. The following points summarise the main issues:

1) No impacts related to labour markets could be found;

2) Research regarding householder's willingness to pay for improved recycling services was carried out through a literature review (see 'Appendix 3 – Impacts Associated with Incompatibility'), From this research, and subsequent analysis, there appears to be a social cost of around 9 € million, reflecting the householder's willingness to pay for improved recycling services. This is a result of the reduction in recycling seen as a consequence of the incompatibility of national collection systems.

3.2.5 Significance of Impacts

A number of these impacts are a consequence of whether lower levels of recycling of privately imported cans, as opposed to domestic cans, is likely. This matter needs to

[7] Communication from the Commission — Beverage packaging, deposit systems and free movement of goods (2009/C 107/01), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2009:107:0001:0009:en:PDF

be placed in some context. The levels of recycling of metal cans in different EU Member States vary significantly. To this end, the loss of environmental benefit has to be considered as small relative to the environmental improvement which would be generated by a more generalised improvement in recycling performance across the EU.

The focus of this study is that of the (in)compatibility of national collection systems, mainly DRSs, and interoperability, not the level of recycling of metal cans which may be aspired to across the EU. In this light, the following issues identified could be considered as problematic:

- Lower recycling of privately imported cans than would be the case with domestically purchased cans;
- Greater littering of privately imported cans than would be the case with domestically purchased cans;
- Consumers sacrificing deposits because the country of purchase differs from the country of consumption (though the majority of the cross-border movements are related to imports of goods where no deposit is paid in the first place); and
- Absence of mechanisms for the financing of the management of privately imported cans, be it between producer responsibility systems, DRSs, or public sector waste management organisations.

The significance of each of these problems is considered in Table 3-5.

Table 3-5: Significance of Problems Identified

Problem Identified	Scale	Importance
Lower recycling of privately imported cans	Significant at Member State level, in EU context not widespread.	Important, as clear environmental, economic and social benefits from recycling.
Littering of privately imported cans	Significant at Member State level, in EU context not widespread.	Difficult to assess, public opinion appears to suggest this is an important issue.
Loss of consumer deposits	Only around countries with DRS.	Important to consumers who lose out, but they do not outweigh financial savings from border-shopping. There are real losses that result from single-trip travellers (e.g. business and tourism), but the magnitude of this problem is not known, and may relate more to plastic bottles than cans.
Financing of the management of privately imported cans	EU wide issue as there are no existing cross-border financing arrangements for privately imported cans.	Depends on the material value and marginal cost of collection, as well as (politically) where the burden falls in the receiving country.

The next stage of the study was to consider policy options which would address the problems identified. The development of interoperability options to address these problems is discussed in 'Appendix 4 – Options Development', and the key conclusions are presented in the next Section.

4.0 Development of Interoperability Options

4.1 Introduction

The Project Specification states the following as a key task:

> *'The contractor shall identify elements for possible solutions to address the potential problems arising from the lack of compatibility of national schemes for collection and recycling of metal beverage cans. In doing so, the contractor shall indicate what are in his view the appropriate levels of governance where such solutions should be adopted in line with the principles of subsidiarity and proportionality'.*

It is clear from the above statement that proposed solutions should be proportional to the nature of the problem they seek to address.

The key problems identified relate to:

1) Privately imported beverages in metal cans are not recycled to as high an extent, or as high a quality, as national cans when reach the end of their use;
2) Privately imported beverages in metal cans are more commonly littered in the environment when they reach the end of their use as compared to deposit cans;
3) Consumers who have paid deposits on beverage cans in one Member State cannot claim them back in another;
4) The management of waste packaging from privately imported cans is not funded by the producers who placed the packaging on the market (in the country of purchase).

The identification of possible solutions was also to be guided by elements of the key objectives of the study. There was a need to identify:

> *'I<u>nteroperability</u> options to link the different (groups of) systems, in order to remove cross-border barriers and allow for cross-border refunds'.*

This objective links most closely to problem 3) identified above. The consequences of allowing cross-border refunds, however, are also likely to include an increase in recycling and a reduction in littering - i.e. 1) and 2) above. In addition it was also noted that:

'Interoperability options can respect the different nature of the systems by acting as an interface, or can imply the full or partial harmonisation of (groups of) systems'.

This suggests different possible levels of governance for proposed solutions. The objective is to seek to identify options which could link all, or only some, of the systems. By systems this statement refers to national deposit refund systems for metal beverage cans:

Interoperability options shall be identified that can link all of the systems, or some of the systems.

Finally:

The advantages and disadvantages of each interoperability option shall be described'.

We also note that the Project Specification set out a number of possible solutions which the contractor was requested to consider, namely:

- The introduction of one European refund system for metal beverage cans;
- The harmonisation of all the existing refund systems for metal beverage cans;
- The introduction of a number of harmonised cross-border refund schemes for metal beverage cans.

The following indicates the process that was adopted to arrive at the final set of interoperability options which were to be assessed through performing a cost benefit analysis:

1) Considering the objectives and requirements of the study set out above, a full list of potential interoperability options, which could address the key problems identified, was developed;
2) Each interoperability option was briefly described, and the advantages and disadvantages from an environmental, economic, social and administrative burden point of view, were considered;
3) Each interoperability option was assessed in terms of proportionality, subsidiarity and feasibility;
4) The approach to evaluation, including the level of detail of any cost benefit

It is also noted that the location of the problems identified above is mainly around countries with DRSs. This is because there are clearly differences between the management of empty containers from the purchase of domestic beverages and those purchased in other countries and privately imported. Thus the development of any interoperability options, which would mitigate the problems identified, was

strongly influenced by this factor. Hence, there was a focus on countries with DRSs, and where existing issues had already been clearly identified (for example between Germany and Denmark).

More detail around the development of the interoperability options, which were to be evaluated, can be found in 'Appendix 4 –Options Development'.

4.2 Interoperability Options to be Assessed and Approach to Evaluation

The following list shows the interoperability options that were chosen to be evaluated in the latter stages of the study, based upon the process describe above:

- National requirement for the German deposit to be applied to all metal cans sold in Germany;
- Bi-lateral agreement between Germany and Denmark to compensate for cost of managing cross-border cans;
- Bi-lateral agreement between Germany and Denmark to ensure the national systems are interoperable;
- Requirement for all existing and future Deposit Refund Systems (DRSs) for metal cans to be interoperable;
- Requirement for all existing and future Deposit Refund Systems (DRSs) for metal cans to form a single system;
- A single European Union Deposit Refund System (DRS) for metal cans to cover all Member States.

The aim of including a number of options, which may be deemed more or less feasible by various stakeholders, was to ensure additional evidence on the feasibility of the options was gathered through the stakeholder consultation. All the options were subject to a detailed feasibility assessment during the evaluation stage of the study (see Section 5.5).

In addition, we note the following points in relation to the development of interoperability options:

1) There were a range of conflicting stakeholder views regarding the nature, scale and responsibility for any problems relating to the cross-border movement of metal beverage cans, thus some potential options are likely to be contested;

2) One of the key barriers or concerns regarding the interoperability of national deposit refund systems is uncertainty around the cost and who will pay for it. Thus any analysis which estimates the potential cost of interoperability, and its distribution, may reduce this uncertainty.

The approach to evaluation of these interoperability options was to include a stakeholder consultation, a cost benefit analysis (CBA) and a qualitative assessment of the options. The CBA is described in 'Appendix 6 – Cost Benefit Analysis', and the stakeholder consultation in 'Appendix 5 – Workshops and Stakeholder Consultation'.

4.3 Description of Interoperability Options

The options identified in the Section above are described in more detail in the sections below. The Options are assigned a number, which follows through to the presentation of the results and evaluation later on in the report. Note also, that a number of variants of Option 3 (Bi-lateral agreement between Germany and Denmark to ensure the national systems are interoperable) were developed and assessed to fully investigate the different principles which could be applied to any future policy intervention whether it is bilateral or multilateral. These are identified by the post-script a,b,c or d. The focus on the German-Danish situation arises directly from the fact that this is where the most significant issues were reported (see above for the analysis of flows).

4.3.1 1: National requirement for the German deposit to be applied to all metal cans sold in Germany

The German deposit could be applied to all cans sold in Germany, including border-cans. The deposit would be redeemable only in Germany. There is currently a court ruling in Schleswig-Holstein which has concluded that the border cans should be considered as 'exported' and thus should not be covered by the packaging ordinance. It is worthy of note that VAT and alcohol excise duty is still paid in Germany, not the country of consumption, which would be rather unusual for 'exported' goods. Thus, although some decisions have been reached in the regional courts, the sort of change in policy being envisaged here does not seem to be completely out of the question.

It is recognised that this would not be a preferred option by some parties, but it was included to determine whether there were any significantly different costs, or indeed benefits, that may not arise from other options.

The cans could be redeemable at German border shops, or perhaps, other centralised locations close to the border with Denmark. It would be outside of the scope of this study to dictate the exact nature of the return arrangements, and this has not been attempted, but it has been assumed that a possible solution could be for additional reverse vending machines (RVMs) to be purchased and located at German border shops, specifically for the return of cans purchased by border shoppers.

4.3.2 2: Bi-lateral agreement between Germany and Denmark to compensate for cost of managing cross-border cans

This option assumes no specific adaptation of the respective DRSs. It acknowledges, however, that if cans that bear no deposit are to be managed better in Denmark, there are likely to be additional costs incurred by the Danish DRS and / or the wider

system of packaging recycling in Denmark. In this option, we take the view that the principle of producer responsibility would best be reflected in a payment by the producers in lieu of managing waste packaging related to their products.[8]

This option could be achieved in various ways, and could be based around varying levels of action taken on the part of the Danish packaging recycling system. For example, funds might be used to support an increased density of can banks, or a more dense system of 'on-the-go'/ 'on-street' recycling bins (intended to reduce littering).

One way of achieving the financial transfer would be a straightforward agreement between the two countries for a formula-based re-imbursement in the form of a lump sum. Another mechanism for re-imbursement, used to generate funds to support the management of cans in Denmark, could be developed on a unit basis. In other words, in relation to the number of cans sold in Germany, and destined for the Danish market. The extent to which this could be achieved voluntarily, and without changes in legislation, depends upon the choice of mechanism. However, it is likely that this option would require some intervention from Government.

The basis for the level of transfer could relate to, for example:

1. The additional costs of managing German cans in Denmark through Dansk Retursystem (potentially by using the value of the collection and / or retailer handling fees per can);

2. The additional cost of the 'back-up' collection services for cans (bring banks / recycling centres etc);

3. The costs of clean-up of border cans found as litter in Denmark; or

4. An alternative base would be the costs which are avoided by the German DRS not having to deal with cans sold in Germany.

An exact, and defined, mechanism is not so important for this study. What this approach is effectively based upon is a mechanism which re-establishes the link between the producers of border shop cans and their financial responsibility for end-of-life management. If these cans were sold under what might be considered normal conditions, whether in Germany or Denmark, this responsibility would clearly apply, in-line with the principle of producer responsibility.

[8] An alternative view would be that since Danish (and Swedish and other) consumers are major beneficiaries of the cheaper beverages in Germany, then they, not the packaging companies, should make this transfer. In principle, placing the responsibility with producers enables them to pass the cost through, subject to the shape of the demand curve, to the customer. This would make the two approaches broadly equivalent,

This option was modelled through assuming a payment is made to the Danish Environmental Protection Agency to compensate for the cost of managing the cans in Denmark. The funds would be paid by the producers / fillers placing beverages on the market in Germany. In this regard, it is worth noting that many of the relevant producers are themselves Danish companies, and will, most likely, have existing arrangements relating to beverage packaging placed on the market in Denmark. The Danish EPA could choose to use the charge, for example to incentivise Danish retailers to accept the cans, or to fund litter clean-up operations or to increase the performance of the back-up collection systems (i.e. the recycling collection system which exists independently of the DRS). It is the latter (an improvement in the back-up system) that is modelled in this study.

4.3.3 3a: Bi-lateral agreement between Germany and Denmark: German Deposit is applied in Border Shops – Danish Deposit is paid back to Danish Consumers in Denmark

The *German* deposit is applied to all beverage cans in German border shops, so that Danish consumers pay it when they purchase the beverages. Danish consumers can then take the empty containers back to Dansk Retursystem and redeem the *Danish deposit*.

It has been assumed that the cans would be labelled for the Danish market, include Danish EAN codes but include a label indicating that the German deposit was paid (as per the requirements of the German Packaging Ordinance).

4.3.4 3b: Bi-lateral agreement between Germany and Denmark: German Deposit is applied in Border Shops – German Deposit is paid back to Danish Consumers in Denmark

Cans will be entered into the German system as for other cans exported from Denmark for the German domestic (i.e. not the border shop) market. Appropriate fees would be paid and the cans would have to be labelled in accordance with the requirements of the German Packaging Ordinance (i.e. include the security mark). The deposit would then be levied at the point of sale. These cans would then be allowed to enter Danish RVMs and the deposit redeemed to consumers.

In this case, the border shop retailers in Germany pay the deposits directly to the producers (mainly Danish exporters) upon sale of the beverages, who would then pay them to Dansk Retursystem, to be used to fund the redemption of deposits in Denmark and supply some additional revenue to the system. The German border shops would be compensated when they 'sell' the deposit to the consumers. Danish RVMs would be required to recognise the DPG logo and German security mark. This would require some upgrades to the infrastructure in Denmark.

4.3.5 3c: Bi-lateral agreement between Germany and Denmark: Cans from Dansk Retursystem are sold in Border Shops – Danish Deposit is paid back to Danish Consumers in Denmark

Under this Scenario, cans destined for the border trade would be entered into Dansk Retursystem. Collection fees would be paid to Dansk Retursystem and the cans labelled with the appropriate markings. They would then be put onto the market in the German border shops and the Danish deposit would be levied at the point of sale. The cans would then be allowed to enter Danish RVMs and the deposit redeemed by consumers.

This option would require the deposits collected from border shop sales to be paid by the retailers in Germany directly to Dansk Retursystem, who would then pay out the redeemed deposits to consumers in Denmark, and maintain the balance for funding the system.

4.3.6 3d: Bi-lateral agreement between Germany and Denmark: Border Deposit is applied in Border Shops – Border Deposit is paid back to Danish Consumers in Denmark

Under this option a separate 'border deposit' would be included on the border cans. This system would operate mostly in isolation to the DRSs in Germany and Denmark, but the collection infrastructure (RVMs) in Denmark could be utilised for the return of the cans. The level of the deposit could be any amount agreed by both parties, but for this option a lower level of deposit than the existing national systems has been modelled to exemplify the option only. Cans could be returned to the Danish RVMs, and the border deposit paid back to consumers. A separate, transparent organisation may be set up to manage the deposit clearing process, or it could be a joint venture between Dansk Retursystem and DPG.

4.3.7 4: Requirement for all Existing and Future Deposit Refund Systems (DRSs) for Metal Cans to be Interoperable

Under this option all Member States who already have, and any ones which do in future, a deposit refund systems must operate systems capable of refunding a deposit to consumers who purchased beverages in deposit-bearing containers, , irrespective of the Member State where the beverage was purchased. The map below shows the existing DRSs for beverage cans in the EU-27.

The existing systems would stay mostly the same in terms of their operation, for example, with regard to branding, deposit levels and materials management.

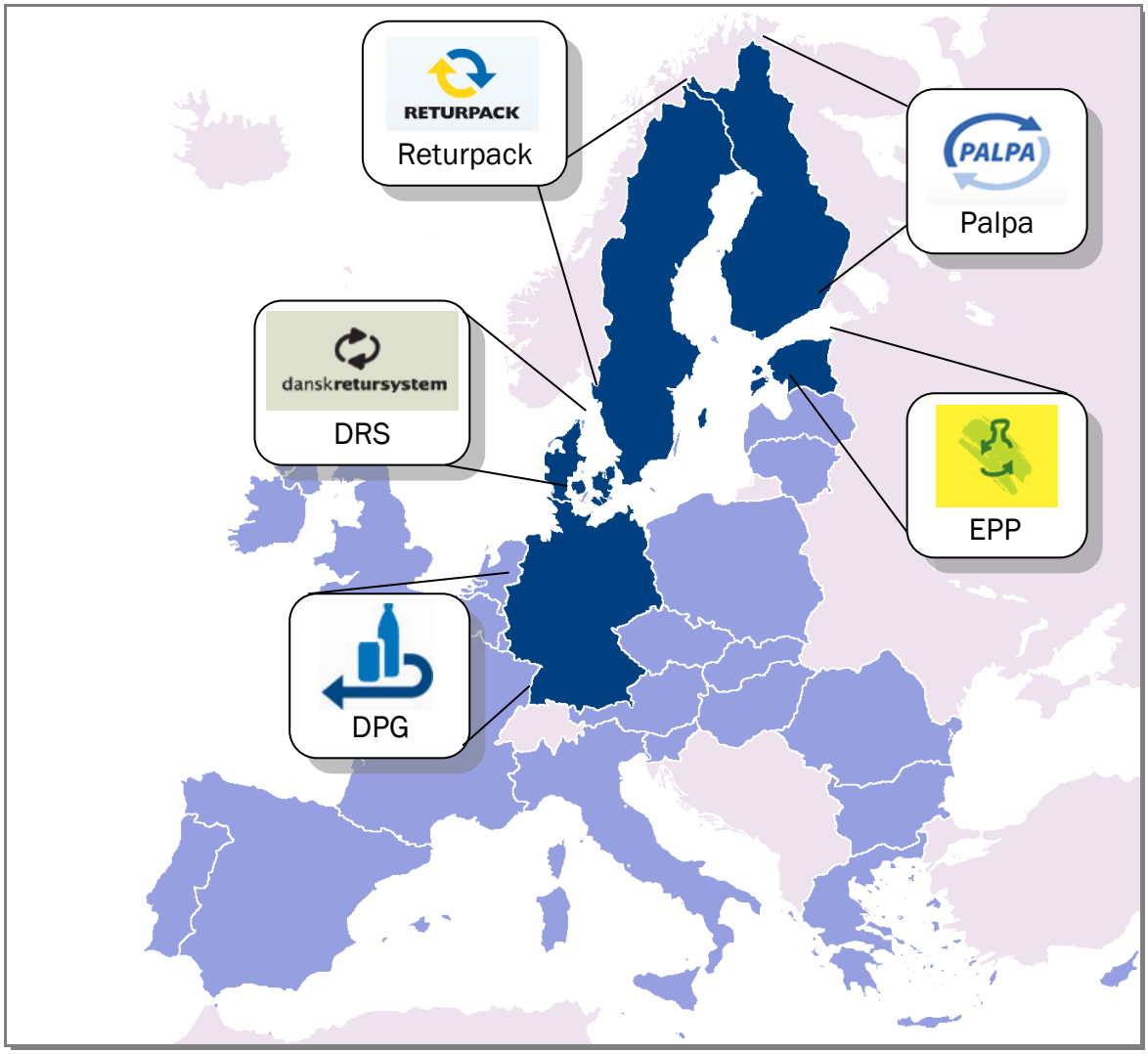
The change in operation of the DRSs would relate to the management of non-national cans only, rather than those placed on the market in the country of operation. Thus the container databases and RVMs would need to be populated with the relevant data to recognise all the containers from all the other Member States with DRSs. Producers of beverages that are put on the market in any DRS country would pay the deposit and fees for 'border cans' in the same way and at the same rate as for other

cans. An additional fee could be charged to cover the administrative cost of the inter-DRS funds transfer. The flow of funds from the origin country DRS to the destination country DRS could be controlled in a number of ways.

- Separate labelling for cans destined for each DRS country. This would clearly provide an audit trail for the deposit payments, and make transfer of relevant funds between countries simpler, though segregation of products in border shops would be required;

- An estimate of sales of border cans to each DRS country, could be made and used as a basis for distributing funds;

Figure 4-1: Existing Deposit Refund Systems in the EU for Metal Cans



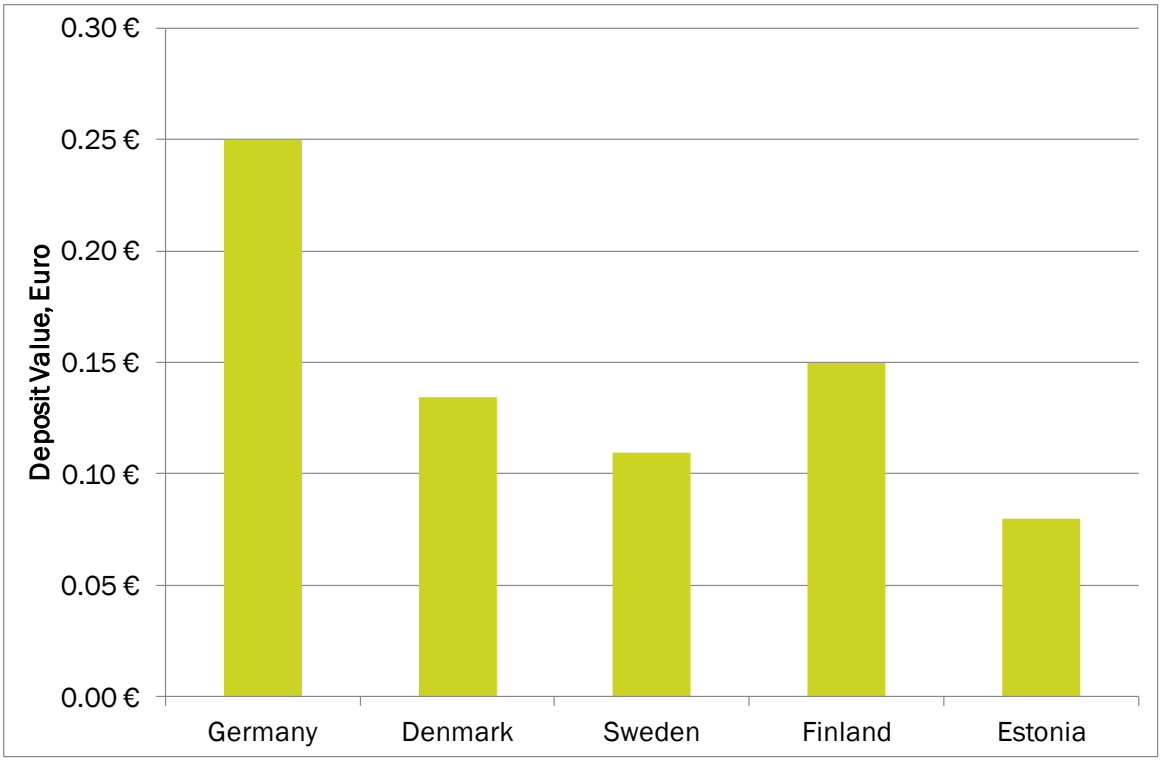
Source: Eunomia

For the purposes of modelling, we have assumed that an estimate of sales would be agreed between countries and funds are moved to the destination DRS to cover the sales volume. This means that unredeemed deposits, from those beverages sold in the border trade, are transferred to the destination country to help to meet the costs of operating the DRS. The approach taken for this option is to assume that the deposit paid in the country of purchase is paid back to the consumer upon take-back in the country of consumption.

4.3.8 5: Requirement for all Existing and Future Deposit Refund Systems (DRSs) for Metal Cans to form a Single System

Under this policy option the deposit itself would be harmonised, though the systems themselves might not need to be harmonised. The level of the deposits would need to be set at a uniform rate, and this might not be so straightforward to agree upon. Different deposit systems were set up with different policy objectives in mind. Thus the levels of deposit are different also. This is exemplified in the chart below.

Figure 4-2: Deposit Values for Metal Beverage Cans in Key Countries, €



Source: Deposit Systems

The deposit values are more or less equivalent in the Nordic countries, lower in Estonia and significantly higher in Germany. Again, the policy aims in Germany are different to those in other countries, so it is quite unclear what an agreed value for a common deposit could be. On the one hand increased deposit levels may be a burden for the consumer at the point of sale, and might be deemed politically unacceptable in some systems, but on the other hand, they may incentivise a greater level of take-

back (although the extent of the effect could be relatively marginal over and above levels of €0.15), and also provide greater revenue to support the operation of the systems. The political considerations are, somewhat, put to one-side and the following range of possible deposit values was used to assess the costs and benefits of the option. The feasibility of a common deposit is again discussed at the end of this Appendix.

High: 0.20 € to Low: 0.10 €

The label would also be common so that consumers across the EU would recognise it. One issue would be associated with security markings on the container, which appear in addition to the label and barcode, as currently, Member States operate different, bespoke systems. In addition, certain operational elements of each national DRS would be combined and run by one *Central Organisation*. The single system approach would not necessarily require uniform collection points or the harmonisation of collection infrastructure. Given that the existing systems already have a significant amount of national experience, it would not be prudent to require significant changes to existing infrastructure.

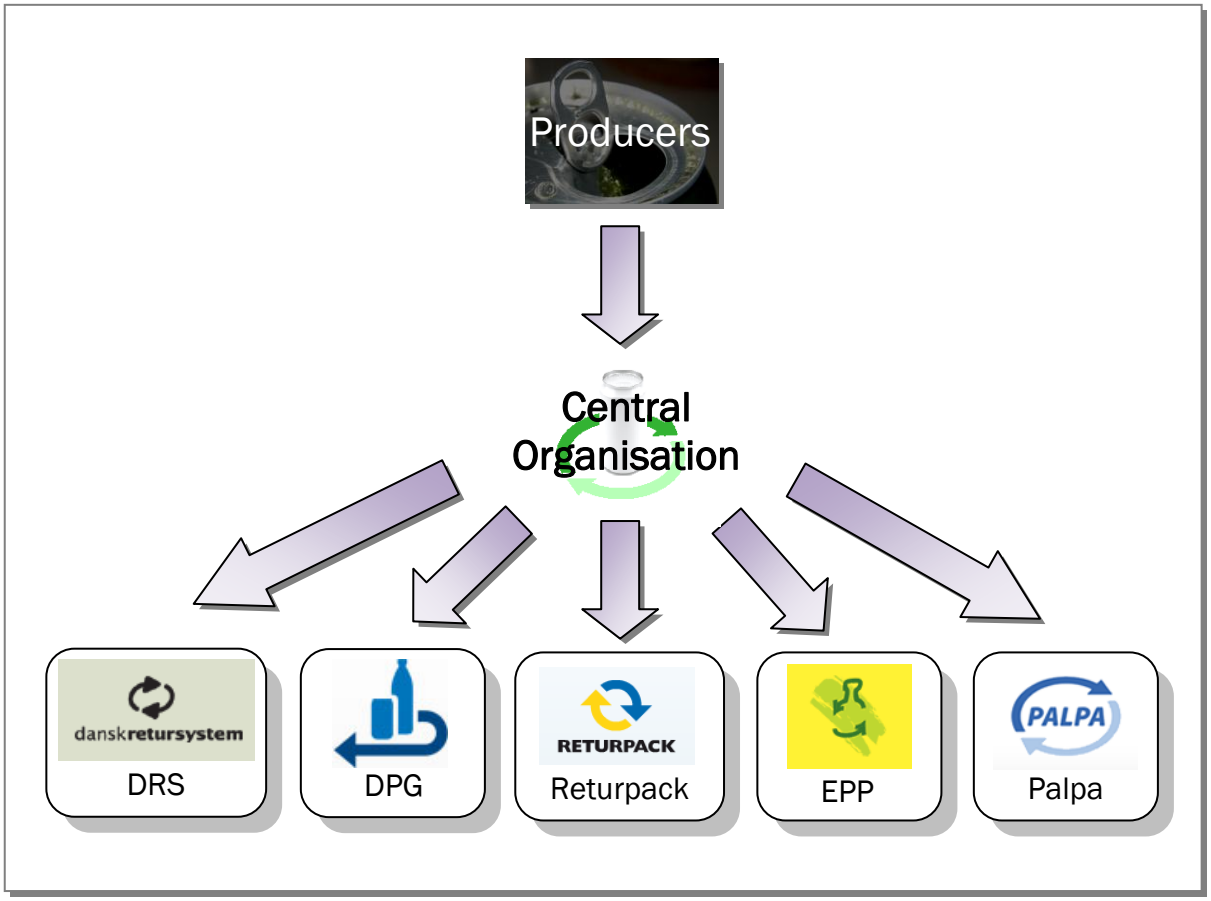
The extent to which elements of each existing national DRS is managed by the *Central Organisation* would most likely be contentious. Currently, the structure of each existing DRS is quite different. For example, there is a significant variation in the number of processes that are outsourced. Consequently, there would need to be some negotiation between Member States as to which processes are centralised and which are not. The Processing Facilities are included in the scope of control, but the only aspect of this control is the management of data relating to the clearing of deposits and the recycled material. The number, location, organisation and operational management of the Processing Facilities would be left under control of the national systems in each Member State.

The *Central Organisation* would consist of a board of members from each deposit system, as well as an independent Chair (and potentially, other independent Board members). The *Central Organisation* would be the central point of contact for all the systems. In its role it would interact with beverage producers placing any containers on the market in any Member State with a DRS, and handle the appropriate producer fees. Producers would have one fee to pay, rather than many. The *Central Organisation* would also manage any deposit transactions, the sale of recyclate collected by the systems and the updating of RVMs with the EU container universe. An appropriate IT system, to link all the national shops (with RVMs or those which manually take-back containers) and sorting facilities, would be required.

In addition, the Central Organisation / authoritative body, would need to set out minimum return rates and / or minimum requirements for take-back infrastructure in the Member States. This is so the system would appear harmonised to the consumer, but the practical operation of the system could be maintained at a national level. If there were no minimum requirements then one would expect the provision of infrastructure to vary significantly between countries.

Under this policy option, the consumers would pay the centrally determined deposit. The amount redeemed to consumers would always match the deposit paid. Overall, the amount of deposits paid to consumers would increase in line with the increase in returns of border trade cans. Under this policy option the producers only pay one fee across the EU to a central system. These fees, as well as the revenue generated from the sale of recyclate and the unredeemed deposits, would act as the funds used by the central system to pay the national systems for the expenditure associated with collection, logistics, administration and retailer handling fees.

Figure 4-3: Financial Payments from Producers under Single System



Source: Eunomia

4.3.9 6: A Single European Union Deposit Refund System (DRS) for Metal Cans to Cover all Member States

One of the options identified as a possible means to deal with the issue of interoperability of deposit schemes is a single EU deposit-refund system for metal beverage cans. This scheme would have the following characteristics:

1. **All metal beverage cans sold in the EU would be sold bearing a deposit**;

2. **In order to ensure inter-operability issues are resolved, the deposit paid in one country would need to be matched by the refund received in any other country.** In principle, this would require some (at least periodic) revision in deposits offered in those countries not currently within the euro zone (so as to ensure that the refunded deposit matched that being paid);

3. **A uniform system (in terms of the nature of the infrastructure made available for returning the deposits) would be in place across the EU.** Note that this 'uniformity' might not necessarily translate into equal densities of return points across Member States (either in terms of return points per head of population, or per unit of area). The uniformity might be organised in terms of which types of outlet are required to offer an opportunity for take back. However, the system would, ideally, be designed to achieve similarly high return rates across all countries;

4. **The labelling of cans would need to reflect the level at which the system was organised:**

    a. If the system was organised at the Member State level, with a clearing system for deposits paid in one country but refunded in another, then the labelling of cans would need to allow for identification of the country of origin (where the deposit was first paid).

    b. If the system was designed and organised at the EU level, in which case, it could have a uniform deposit level, then in principle, labelling could be uniform across the EU, other than to the extent that labels were required to be different by other (i.e. not related to deposits) legislation;

This principle objective of this system would be that it would allow for a deposit, paid on purchase of a can in any part of the EU, to be refunded in another part of the EU. There are effectively two possibilities in respect of deposit levels:

1. The deposit is not uniform across the Member States, so that labelling is required to ensure that the refunded deposit is the same as what was initially paid by the consumer ('cross-national' approach). Under this approach each DRS would set the required deposit to ensure the minimum return rate was met. DRSs would then communicate the value of deposit payments that needed to be transferred as a consequence of consumers claiming back the paid deposit in another country;

2. The deposit is made uniform across the Member States, so that labelling could be more uniform, and all EU citizens obtain the same level of refund wherever the can is eventually returned (converted at the relevant exchange rate for countries outside the Euro-zone) ('EU' approach) This could either work as described above, with systems communicating with each other, or deposit clearing could be achieved at the EU level via a single transnational solution. However, given that the implementation of EU waste policy is in the hands of

the Member States the former would appear more feasible, with only a common deposit level to be agreed upon.

Evidently, if Member States could not agree a common deposit level, then only the 'cross-national' approach would be possible. Clearly, for both the EU and cross-national cases, a pre-requisite would be agreement by the Member States to progress a system of DRSs across the EU.

In principle, the choice which is made in this respect primarily affects the costs in terms of labelling, the configuration of RVMs / counting centres, and the costs of administration of the funds (see Section 4.3 above). Other than in these respects, the two systems would be expected to operate in a similar manner.

5.0 Evaluation of Interoperability Options

After the interoperability options were developed, they were critically evaluated through a number of means. The outcomes from this evaluation are presented in this Section. Firstly, the results of the cost benefit analysis (CBA) of the options is given, followed by an assessment of the implications of introducing an EU-wide refund system for metal beverage cans, and finally a qualitative discussion is provided regarding the evaluation of all of the options. Whilst under taking the evaluation of these options objective principles were used to ensure the outcomes of the study were as fair as possible. It is this evaluation stage of the study that is primarily used to inform the conclusions and recommendations that follow from the research (see Section 6.0).

5.1 Cost Benefit Analysis

5.1.1 Introduction

The Project Specifications describe the tasks to be carried out in order to complete a *'Cost-benefit analysis of the identified solutions in relation to the size of the problem'*:

> *The contractor shall perform a cost benefit analysis of each option identified in Task 3 in relation to the size of the problem and the status quo scenario. Costs and benefits should be expressed in quantified and monetary terms to the highest degree possible.*
>
> *For different options of implementation tools special attention needs to be given to assessing:*
>
> > *a) proportionality with regard to the magnitude of the problem and the improvement expected;*
> >
> > *b) administrative effort to be expected for implementation and enforcement by public administrations and economic actors;*
> >
> > *c) new opportunities and benefits generated by the measures;*
> >
> > *d) degree to which impacts identified in Task 2 would be reduced;*
> >
> > *e) risks of possible unintended environmental, social and economic side-effects.*
>
> *In addition, the contractor shall assess any elements that might influence the feasibility of the identified options, such as legal, technical and operational constraints, risks of possible unintended environmental, social and economic side-effects etc.*

> *On the basis of the cost benefit analysis, the contractor shall make policy recommendation(s) and develop implementation scenarios for the best identified option(s).*

The Specification notes that cost benefit analysis (CBA) should be carried out in relation to the *magnitude of the problem and the improvement expected*. As the final interoperability option relating to a single EU-wide system was not deemed proportionate to the scale of the problem, it was not considered appropriate to subject it to a detailed CBA, but focus on options which focused on interoperability (this is discussed above in Section 4.2). However, the single EU system is considered in Section 5.3, and this does include very high level estimates of some key costs and benefits for context.

5.1.2 Approach to Cost Benefit Analysis

The Project Specification states that:

> *Costs and benefits should be expressed in quantified and monetary terms to the highest degree possible.*

Financial costs and savings are already expressed in monetary terms. However, environmental and social impacts are not, generally, internalised in market prices and so, methodologies for placing values on these costs and benefits have been utilised as far as possible.

Financial impacts are tangible and can be assessed by the costs associated with the development and operation of any market based process – these may include, labour costs, energy costs, capital expenditure, consumer product costs or deposit payments in the deposit refund systems. The approach in this study has been to consider the financial costs as they are experienced in the market – which is to say, including all taxes and subsidies (transfers) in the estimation of financial costs and savings. Typically, CBAs consider costs from a societal perspective, and exclude the impact of taxes and transfers. The fact that the different stakeholders would be seeking to understand the changes in the costs and savings they might experience was deemed reason enough to justify this approach.

One consequence of this is that because some taxes and transfers might be designed as means to internalise some externalities, or non-market values, into market prices, then strictly speaking, the addition of non-market values (such as environmental benefits) to these financial costs could imply some double counting of some externalities. We suspect that in the analysis undertaken, the extent to which this leads to problems is limited. The financial costs include taxes on landfill and incineration, for example, but the impact of landfilling or incinerating metal beverage cans does not reflect the level of taxes applied. Generally, however, the consequence is that financial and non-market costs might not be directly comparable, and as such, care needs to be taken when adding the two together.

Non-market costs arise from environmental or social impacts which are not reflected in market prices. These costs, for obvious reasons, carry with them greater uncertainty.

The general approach to the CBA was as follows:

1) Describe the interoperability options in more detail;

2) Consider the consequences of the options;

3) Identify the resulting financial and environmental impacts, and upon which actor they fell;

4) Develop systems models to assess the material and financial flows;

5) Calculate the impacts which fall on each actor; and

6) Aggregate and compare the overall impacts.

The following impacts were considered in the analysis to contribute to the overall costs and benefits of the interoperability Options.

- Operational costs of the deposit refund systems. This included the following elements:
  - Revenue from the sale of material for recycling;
  - Revenue from the unredeemed deposits;
  - Revenue from the 'producer fees' paid by beverage companies;
  - Expenditure from retailer handling fees, logistics, collection and administration costs.
- Interoperability costs included the following elements;
  - RVM upgrade costs;
  - Clearing costs;
  - Labelling costs;
- The avoided costs of existing non-DRS waste management activities, such as:
  - Back-up bring systems;
  - Incineration;
  - Landfilling; and

- Residual waste collection;

- The deposits which consumers 'lose';
- Greenhouse gas (GHG) and air quality (AQ) benefits from additional recycling;
- GHG and AQ impacts from changes in transport usage;
- Consumers' willingness to pay for recycling services – the value people place on the presence of recycling services;
- Litter disamenity – the value people place on a litter free environment;

There are, however, some potentially important omissions in our work. For example, we have not estimated any benefit (avoided costs to society) from reducing alcohol consumption. This benefit could be significant in cases where it is assumed that consumers respond to the change in policy by reducing purchases of alcohol.

The key results are now presented in the following Sections.

5.2 Results from Cost Benefit Analysis

This section provides the results of the cost benefit analysis for all the interoperability options that were assessed. The following results are given:

- Change in Demand for Beverages;
- Change in Recycling;
- Market Based Financial Costs and Benefits;
- Non-market Costs and Benefits; and
- All Costs and Benefits.

Where charts show positive figures this indicates a cost to society, and where the figures are negative, this indicates a saving or a benefit. Again note that the financial costs are given according to the private cost metric (i.e. they include transfer payments such as taxes and subsidies, and the cost capital is evaluated assuming a typical private discount rate). These costs will be more familiar to the reader than those based upon a social cost metric, but as noted above, care needs to be exercised when considering adding the one to the other. In the analysis, we consider them separately (we do not add them together), but this does not mean that some general conclusions cannot be drawn around the relative costs and benefits of different options.

High and low response scenarios were also modelled to show potential ranges in the costs and benefits. These are either labelled clearly, or are represented by error bars in the graphs.

5.2.1 Change in Demand for Beverages

The change in demand for beverages under the different Options is shown in Table 5-1. The Table shows the change in demand for cans in Denmark and Germany, as well as the change in total demand. There are some uncertainties about the likely nature of the price response on the part of consumers. A deposit, wherever there is some prospect of a refund being obtained, is unlikely to act in the same way as a pure price increase. The responsiveness to some of the policy Options being considered, therefore, is likely to depend upon how straightforward it will be for consumers to have their deposit refunded. Other things being equal, the more straightforward this becomes, the less likely consumers are to respond to the implementation of a deposit as though it constitutes an increase in 'price'. This is an area in which some surveys have been undertaken, and where some empirical observations can be made (for example, where deposits change in value), but it remains an area of some contention (see 'Appendix 6 – Cost Benefit Analysis' for a discussion) and for this reason, we have modelled variants around a central value to reflect the level of uncertainty.

For simplicity no change in demand for beverages was modelled for Options 4 and 5. This reflects the central scenario for the bi-lateral options given in the table above (i.e. little long term change as the deposit can be redeemed close to the consumer's residence).

Table 5-1: Change in Demand for Beverages in Germany and Denmark

	Op. 1 - DE Dpst Redm DE in DE	Op. 2 - DK non-deposit Schemes	Op. 3a - DE Dpst Redm DK in DK	Op. 3b - DE Dpst Redm DE in DK	Op. 3c - DK Dpst Redm DK in DK	Op. 3d - BD Dpst Redm BD in DK
Decreased Beverage Sales in Germany (million units)						
High Response Scenario	-107	0	-107	-107	-65	-27
Central Scenario	-22	0	-20	0	0	0
Low Response Scenario	0	0	0	0	0	0
Increased Beverage Sales in Denmark (million units)						
High Response Scenario	76	0	76	76	42	16
Central Scenario	15	0	14	0	0	0
Low Response Scenario	0	0	0	0	0	0
Net Change in Beverage Sales Overall (million units)						
High Response Scenario	-31	0	-31	-31	-23	-10
Central Scenario	-6	0	-6	0	0	0
Low Response Scenario	0	0	0	0	0	0

Again, we note that that actual response of consumers is very uncertain. Our high response estimates indicate that the reduction in demand maybe somewhere over 100 million units. However, we note that other estimates of a reduction in demand of over 200 million units per annum from the border shops have been made.[9] This shows the difficulties faced when seeking to assess the behaviour of consumers.

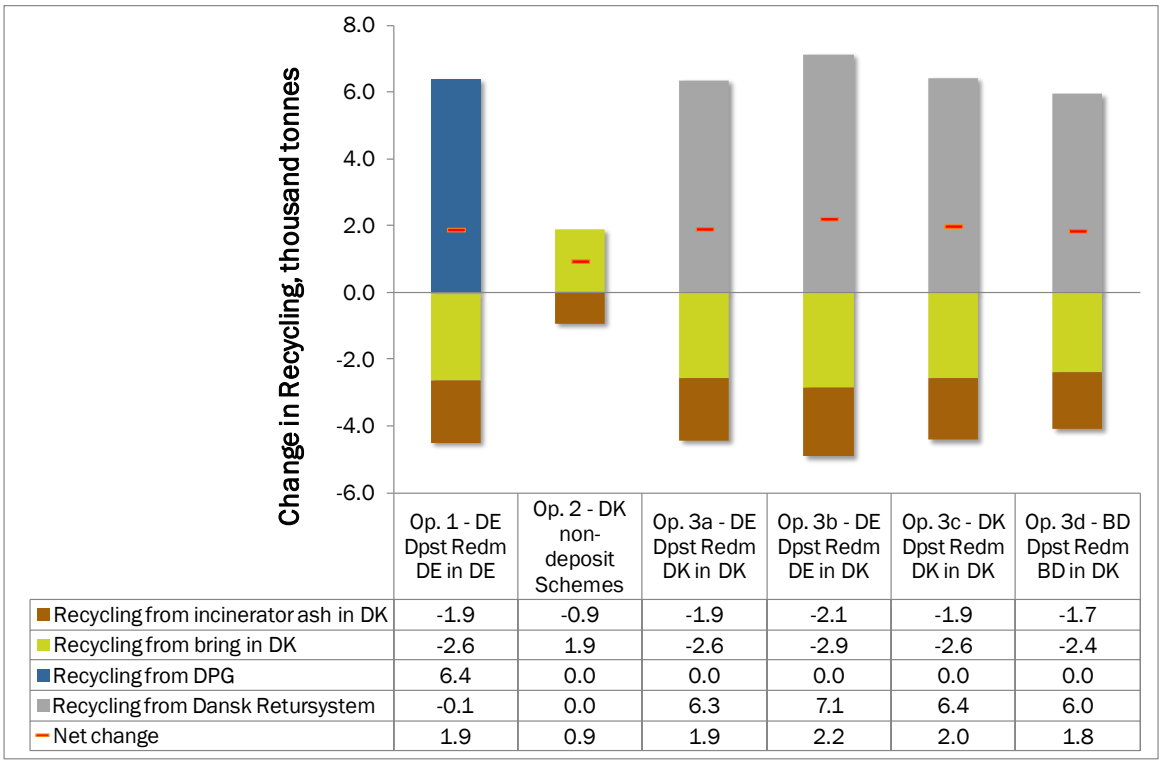
[9] Personal communication with the German border shopping association Interessengemeinschaft der Grenzhändler.

5.2.2 Change in Recycling

The impact of the different Options on the anticipated level of recycling is demonstrated in Figure 5-1 (bilateral Options) and Figure 5-2 (multilateral Options).

In the bilateral Options, one can see increases in recycling under all options. Apart from Option 2 (which implies a simple increase in performance of the back-up collection systems), the additional levels of recycling achieved are comparable across all the bilateral Options. On average, an additional 2 thousand tonnes of recycling could be achieved by these bilateral agreements.

Figure 5-1: Change in Recycling under Bi-lateral Interoperability Options (1 to 3), thousand tonnes

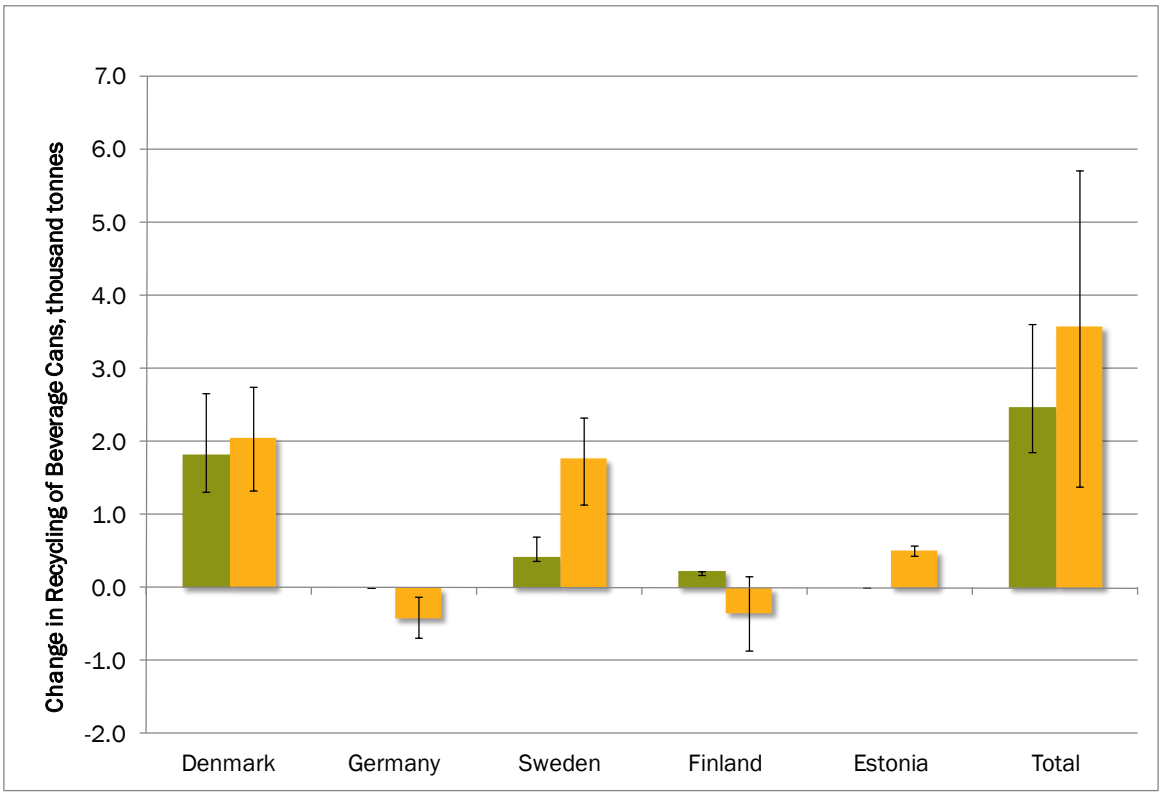


	Op. 1 - DE Dpst Redm DE in DE	Op. 2 - DK non-deposit Schemes	Op. 3a - DE Dpst Redm DK in DK	Op. 3b - DE Dpst Redm DE in DK	Op. 3c - DK Dpst Redm DK in DK	Op. 3d - BD Dpst Redm BD in DK
Recycling from incinerator ash in DK	-1.9	-0.9	-1.9	-2.1	-1.9	-1.7
Recycling from bring in DK	-2.6	1.9	-2.6	-2.9	-2.6	-2.4
Recycling from DPG	6.4	0.0	0.0	0.0	0.0	0.0
Recycling from Dansk Retursystem	-0.1	0.0	6.3	7.1	6.4	6.0
Net change	1.9	0.9	1.9	2.2	2.0	1.8

Under the multilateral Options, we also expect to see an increase in recycling. Given that the experience for the consumer is similar for both options, the range of possible return rates is likely to be similar for both multi-lateral Options (4 and 5). However, due to the uncertain nature of the harmonised 'single' system, including the level of harmonised deposit that would be set, and how this system may influence the behaviour of consumers (i.e. what the return rate would be), the range of possible outcomes for Option 5 is much higher than for Option 4.

As there are no significant flows of containers for which deposits have been paid *into* Germany and Estonia, then no increase in recycling has been modelled for these countries (although it is accepted that there will be some from tourists / business travel, the quantity is very difficult to estimate and no data was found that would enable such an estimation to be made).

Figure 5-2: Net Change in Recycling under Multi-lateral Interoperability Options (4 and 5), thousand tonnes



The total increase in recycling for Option 4 is likely to be somewhere between 2 and 3.5 thousand tonnes per annum, and anywhere between 1.5 and 5.5 for Option 5.

5.2.3 Financial Costs and Benefits

The following charts show the financial costs and savings that result from the Options, and the nature / actor impacted of those costs. A brief synopsis of the key messages from the results is also given for each option.

5.2.3.1 Bilateral Options

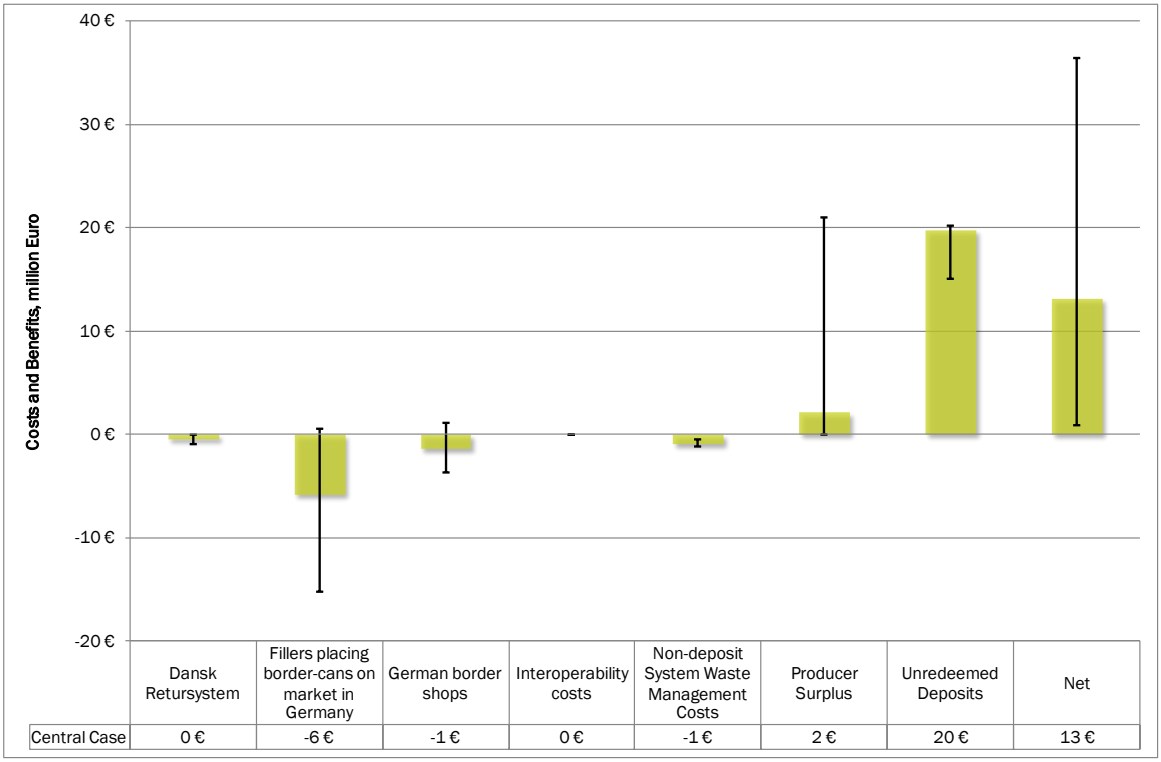
For Option 1, in which the German deposit is levied in Germany, and is refundable when containers are returned to Germany, the situation is as in Figure 5-3. Key observations are as follows:

- There may be small cost savings for Dansk Retursystem as the few % of unfinanced cans that are currently returned through the system are returned to Germany, thus there is a financial saving;
- Under this Option the lost deposits are kept with the fillers / producers placing cans on the market in Germany. This revenue may exceed the additional cost

of labelling, logistics and clearing that occurs (and does so in the Central case);

- The additional revenue from the sale of collected material may exceed the costs of collecting the cans returned to the border shops. This reflects the current situation in Germany where retailers now benefit from material sales, following upfront RVM installation costs;
- There are no interoperability costs associated with this Option (i.e. there are no costs associated with one system making additional adaptations to accommodate another);
- There are small cost savings from not collecting the cans that currently go through the bring systems and the residual waste collection system in Denmark;
- There is likely to be a loss in producer surplus as the net sales of beverage cans from Denmark and Germany fall, due to the introduction of a deposit on the border cans. The extent of the reduction is uncertain and as such the error bars span a significant range;
- Some consumers who do not return the cans to Germany for redemption lose the deposit, and as such incur an additional cost;
- The net financial costs to society appear positive in all cases.

Figure 5-3: Option 1 - DE Dpst Redm DE in DE: Financial Costs and Benefits (€ millions)



	Dansk Retursystem	Fillers placing border-cans on market in Germany	German border shops	Interoperability costs	Non-deposit System Waste Management Costs	Producer Surplus	Unredeemed Deposits	Net
Central Case	0 €	-6 €	-1 €	0 €	-1 €	2 €	20 €	13 €

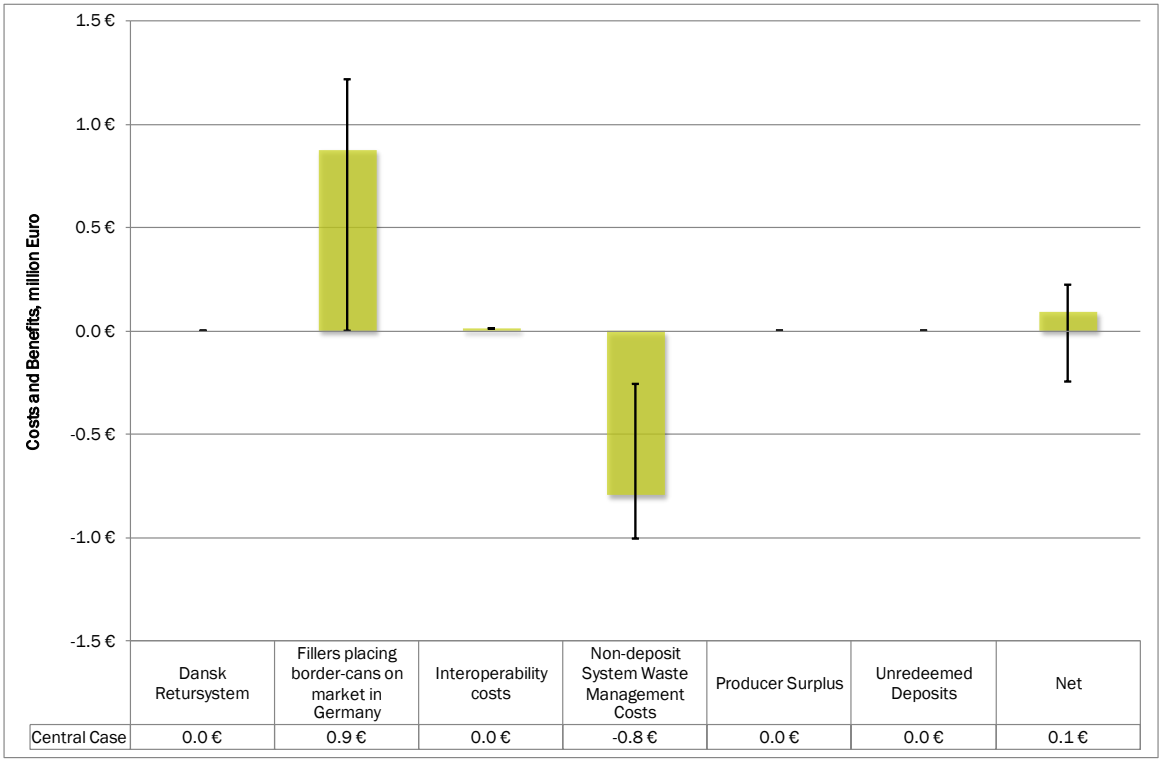
Note: +ve = cost / -ve = benefit

For Option 2, in which fees are paid in Germany to support the development of a back-up system for can recycling in Denmark, the situation is as in Figure 5-4. Key observations are as follows

- There are no change in costs to Dansk Retursystem;
- Under this Option producers placing cans on the market in Germany which are destined for export, and consumption in Demark, now pay a fee to fund the collection of the waste packaging through the 'back-up' bring systems;
- There is a minimal cost for the financial transaction required to make the payment to those responsible for alternative collection;
- There is now a reduction in the costs of non-DRS waste management as there is funding from the producers;
- There may be a small net increase in costs overall, or a small saving depending on the marginal cost of collection of cans through the bring systems.

Note that the scale of this graphic is quite different to that used in the other Options as the magnitude of costs and savings is much lower.

Figure 5-4: Option 2 - DK non-deposit Schemes: Financial Costs and Benefits (€ millions)



	Dansk Retursystem	Fillers placing border-cans on market in Germany	Interoperability costs	Non-deposit System Waste Management Costs	Producer Surplus	Unredeemed Deposits	Net
Central Case	0.0 €	0.9 €	0.0 €	-0.8 €	0.0 €	0.0 €	0.1 €

Note: +ve = cost / -ve = benefit

For Option 3a, in which the German deposit is paid by consumers, who then receive the Danish level of deposit back when they return to the Danish scheme, the situation is as in Figure 5-5. Key observations are as follows:

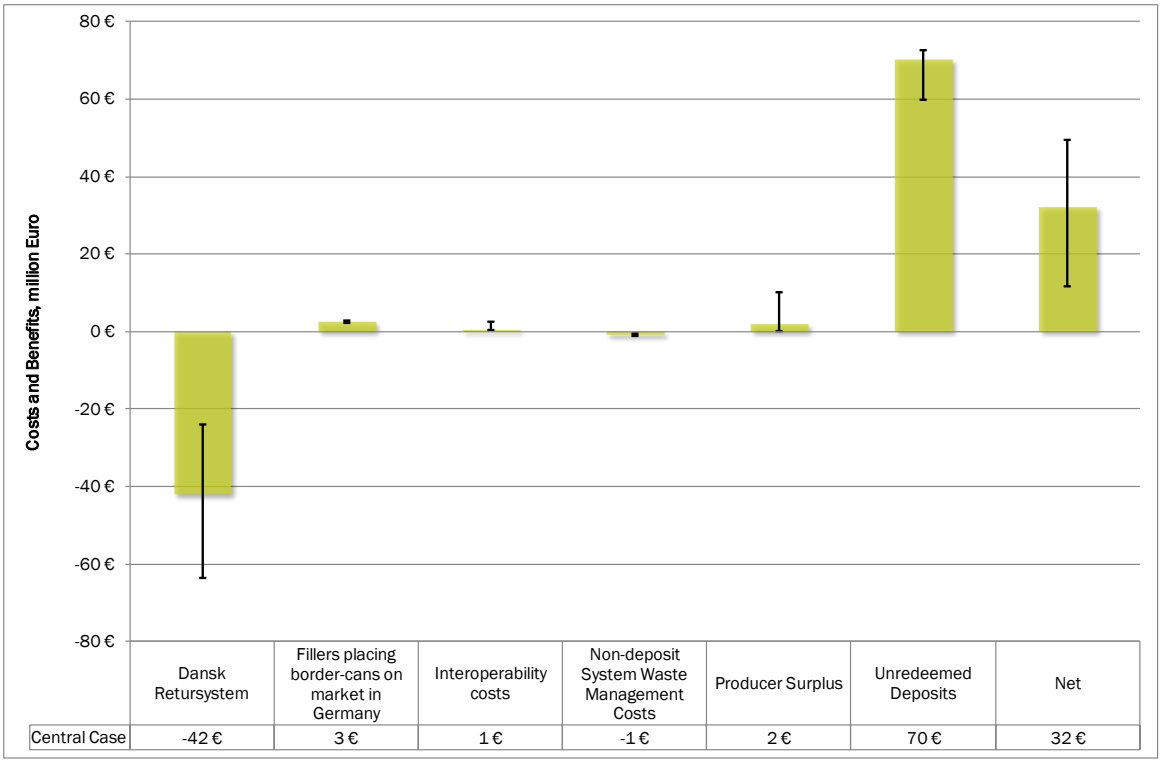
- Under this Option, arrangements are put in place to transfer the unredeemed deposits to Dansk Retursystem, in order to help finance the cost of collection. As there is a difference in the deposit values paid and redeemed by consumers, a significant revenue stream is generated. This revenue stream outweighs the additional cost of collecting the border cans;
- As the cans are part of DPG when they are placed on the market there are additional labelling costs to the producers;
- There are some interoperability costs associated with the transfer of deposits and producer fees, and upgrades to RVMs and the container database;
- There are small cost savings from not collecting the cans that currently go through the bring systems and residual collections in Denmark;
- There is likely to be a reduction in producer surplus as the net sales of beverage cans from Denmark and Germany fall due to the introduction of a deposit on the border cans. Note that demand very clearly drops in this case

since the deposit is not matched by the level of the refund (so that a genuine 'price wedge' (increase in price) is brought into play);

- Some consumers who do not return the cans to Denmark for redemption lose the deposit, and as such incur an additional cost. However, all consumers lose the difference between the German and Danish deposit values, so there is a significant additional cost to society;

- The net financial costs to society appear positive in all cases, with the loss to consumers being greatest.

Figure 5-5: Option 3a - DE Dpst Redm DK in DK: Financial Costs and Benefits (€ millions)



	Dansk Retursystem	Fillers placing border-cans on market in Germany	Interoperability costs	Non-deposit System Waste Management Costs	Producer Surplus	Unredeemed Deposits	Net
Central Case	-42 €	3 €	1 €	-1 €	2 €	70 €	32 €

Note: +ve = cost / -ve = benefit

For Option 3b, in which the German deposit is paid by consumers, who then receive the German level of deposit back when they return containers to the Danish scheme, the situation is as in Figure 5-6. Key observations are as follows:

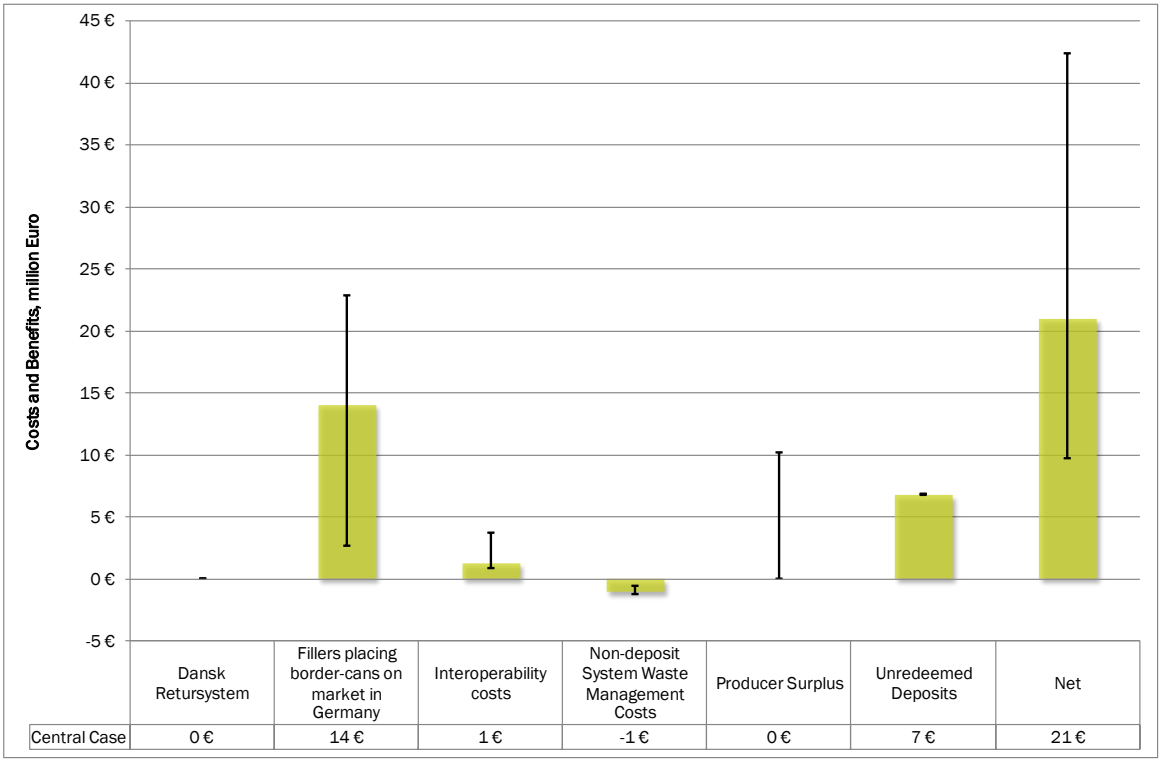
- Under this option, arrangements are put in place to transfer the unredeemed deposits to Dansk Retursystem, in order to help finance the cost of collection. Any additional costs are compensated for by an increase in the 'collection fees' producers pay to Dansk Retursystem, thus the overall system cost is zero;

- The fillers / producers pay additional costs relating to: the collection fees payable to Dansk Retursystem; and additional labelling costs to produce the

DPG logo. The most significant proportion of this cost is the collection fees paid to Dansk Retursystem. The potential range in the amount of fees payable relates to the uncertainty in the actual costs of managing the additional border cans. There are multiple solutions which could be implemented, and the requirement for new infrastructure varies between them. Moreover, the existing negotiations between Germany and Denmark are not publically available, so it is not possible to model the latest solution. Hence there are large error margins associated with the level of additional fees the producers would have to pay;

- There are some interoperability costs associated with the transfer of deposits and producer fees, and upgrades to RVMs and the container database;
- There are small cost savings from not collecting the cans that currently go through the bring systems and residual collections in Denmark;
- There may be a small loss in producer surplus if the net sales of beverage cans from Denmark and Germany fall due to the introduction of a deposit on the border cans. In this case, we would expect such an effect to be limited since the cans being purchased in the border shops could have their deposits redeemed relatively straightforwardly (as though the cans had been purchased in Denmark);
- Some consumers who do not return the cans to Denmark for redemption lose the deposit, and as such incur an additional cost; and
- The net financial costs to society appear positive in all cases.

Figure 5-6: Option 3b - DE Dpst Redm DE in DK: Financial Costs and Benefits (€ millions)



	Dansk Retursystem	Fillers placing border-cans on market in Germany	Interoperability costs	Non-deposit System Waste Management Costs	Producer Surplus	Unredeemed Deposits	Net
Central Case	0 €	14 €	1 €	-1 €	0 €	7 €	21 €

Note: +ve = cost / -ve = benefit

For Option 3c, in which the Danish deposit is paid by consumers in the German border shops, who can then receive this deposit back when they return containers to the Danish scheme, the situation is as in Figure 5-7. Key observations are as follows:

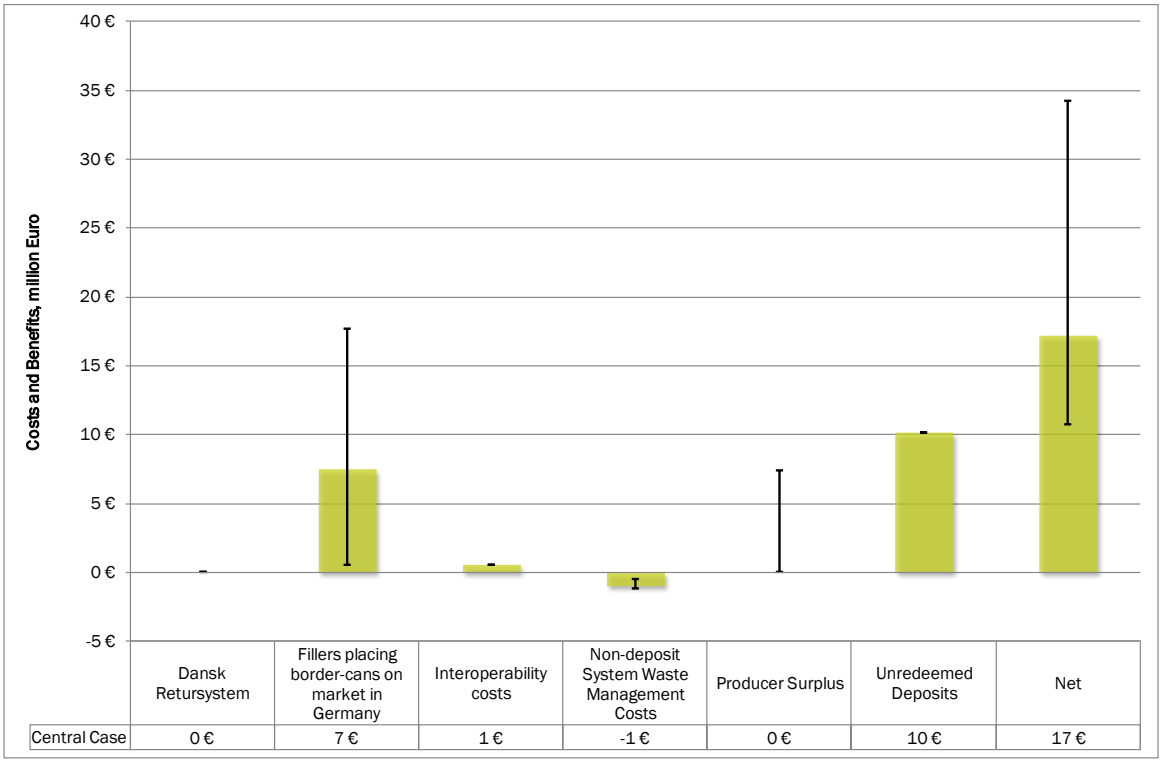
- Under this option deposits are paid directly to Dansk Retursystem, so the unredeemed deposits can be used in order to help finance the cost of collection without any transfer. Any additional costs are compensated for by an increase in the 'collection fees' producers pay to Dansk Retursystem, thus the overall system cost is zero;

- The fillers / producers pay additional costs relating to the collection fees payable to Dansk Retursystem; and additional labelling costs to produce the Dansk Retursystem logo for the border cans which currently have not deposit labelling – however, the latter cost will be minimal. As described above, the type of collection system which would required to manage the border cans could vary. Hence there are large error margins associated with the level of additional fees the producers would have to pay as the different solutions would vary in cost;

- There may be some interoperability costs associated with upgrades to RVMs and the container database;

- There are small cost savings from not collecting the cans that currently go through the bring systems and residual collections in Denmark;
- There may be a small loss in producer surplus if the net sales of beverage cans from Denmark and Germany fall due to the introduction of a deposit on the border cans. In this case, we would expect such an effect to be limited since the cans being purchased in the border shops could have their deposits redeemed relatively straightforwardly (as though the cans had been purchased in Denmark);
- Some consumers who do not return the cans to Denmark for redemption lose the deposit, and as such incur an additional cost;
- The net financial costs to society appear positive in all cases.

Figure 5-7: Option 3c - DK Dpst Redm DK in DK: Financial Costs and Benefits (€ millions)



	Dansk Retursystem	Fillers placing border-cans on market in Germany	Interoperability costs	Non-deposit System Waste Management Costs	Producer Surplus	Unredeemed Deposits	Net
Central Case	0 €	7 €	1 €	-1 €	0 €	10 €	17 €

Note: +ve = cost / -ve = benefit

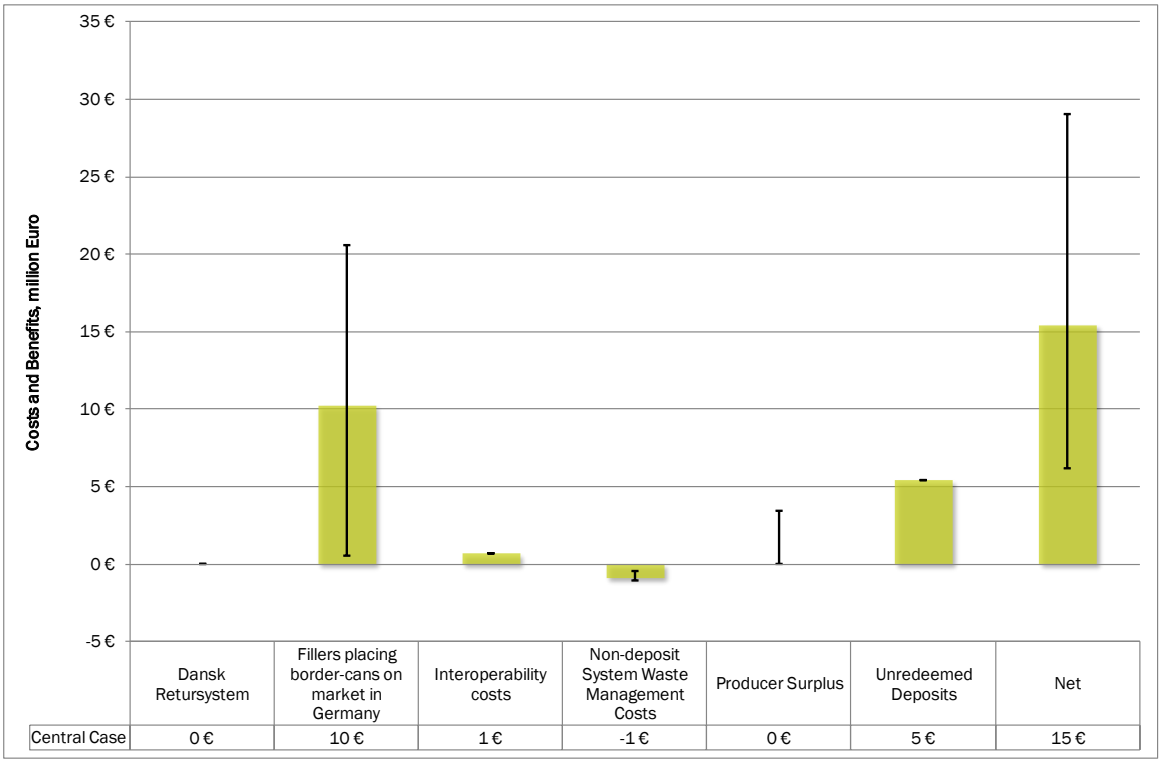
For Option 3d, in which a specified 'border shop deposit' is paid by consumers in the German border shops, who can then receive this deposit back when they return containers to the Danish scheme, the situation is as in Figure 5-8. Key observations are as follows:

- Under this option arrangements are put in place to transfer the unredeemed deposits to Dansk Retursystem, in order to help finance the cost of collection.

Any additional costs are compensated for by an increase in the collection fees producers pay, thus the overall system cost is zero;

- The fillers / producers pay additional costs relating to: the collection fees payable to Dansk Retursystem; and any labelling requirements needed to indicate the presence and sale of the separate 'border deposit';

Figure 5-8: Option 3d - BD Dpst Redm BD in BD: Financial Costs and Benefits (€ millions)



Note: +ve = cost / -ve = benefit

- There are some interoperability costs associated with the transfer of deposits and producer fees, and upgrades to RVMs and the container database;

- There are small cost savings from not collecting the cans that currently go through the bring systems and residual collections in Denmark;

- There may be a fall in producer surplus as the net sales of beverage cans from Denmark and Germany fall due to the introduction of a deposit on the border cans. As with Scenario 3c, we would expect such an effect to be limited since the cans being purchased in the border shops could have their deposits redeemed relatively straightforwardly (as though the cans had been purchased in Denmark);

- Some consumers who do not return the cans to Denmark for redemption lose the deposit, and as such incur an additional cost;

- The net financial costs to society appear positive in all cases.

For the bilateral systems, these results are summarised in Figure 5-9. Some key points are as follows:

- All Options appear to suggest that there are likely to be additional financial costs from any interoperability option.

- The costs are lowest for Option 2, which leads to relatively little change to the way the market currently operates, and makes no provision for a deposit to be levied on border cans. There is no additional loss to consumers from unredeemed deposits. However, there is a smaller increase in overall recycling (see Section 5.2.4 below);

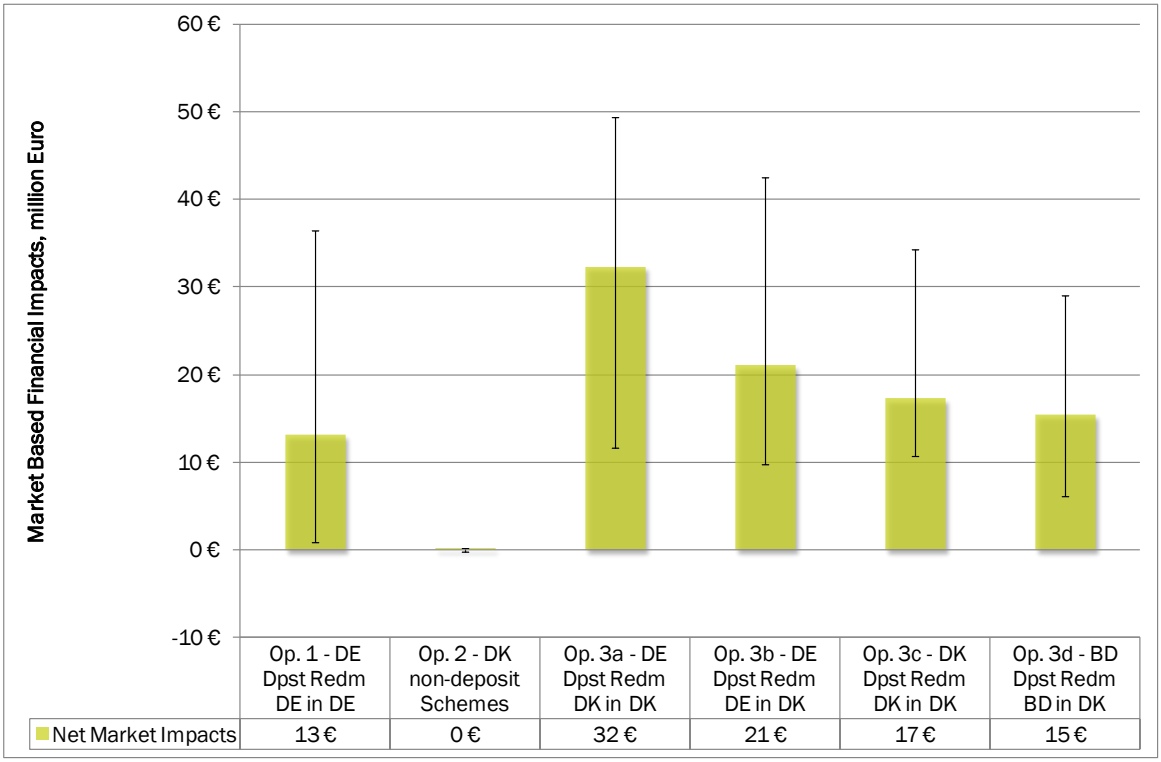
- The costs are highest for the case where the losses to consumers are greatest. This is deemed likely to be highest where consumers pay a higher level of deposit than they can gain on are not able to have refunded to them the same level of deposit which they pay on purchase. This effectively acts as a tax on consumption;

- Where a lower 'border deposit' is introduced and redeemed in Denmark, the overall costs to society fall as the value of the unredeemed deposits for consumers also reduces;

- Out of the two Options which utilise existing deposit levels, the option where cans from Dansk Retursystem are sold in German border shops appears to generate lower additional costs than where there are included in DPG and the German deposit is returned to Danish consumers; and

- Due to the uncertainty of the marginal cost of collecting additional border cans through the Danish deposit system, the error margins are high. The uncertainty in the behaviour of consumers relating to how they would respond to the introduction of a deposit in Germany which they could only redeem in Germany, leads to the highest error margins. However, if consumer demand does not fall significantly, the overall costs may be lower due to the efficient collection of empty containers returned to the border shops in Germany.

Figure 5-9: Comparison of Market Based Financial Costs and Benefits (Options 1 to 3) (€ millions)



	Op. 1 - DE Dpst Redm DE in DE	Op. 2 - DK non-deposit Schemes	Op. 3a - DE Dpst Redm DK in DK	Op. 3b - DE Dpst Redm DE in DK	Op. 3c - DK Dpst Redm DK in DK	Op. 3d - BD Dpst Redm BD in DK
Net Market Impacts	13 €	0 €	32 €	21 €	17 €	15 €

Note: +ve = cost / -ve = benefit

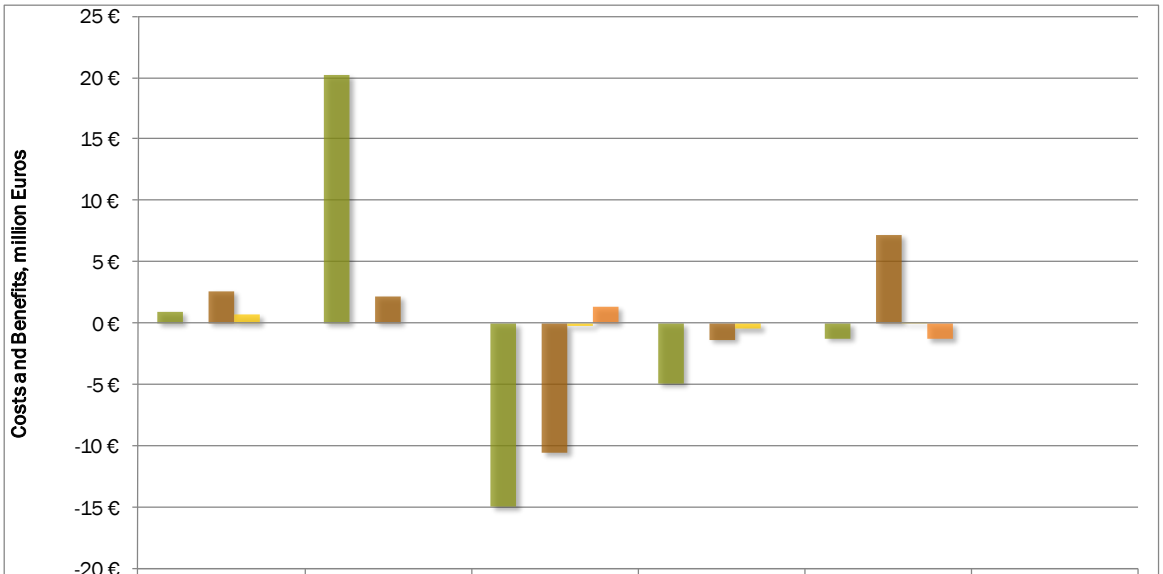
5.2.3.2 Multilateral Options

The following charts show the financial costs for the options which include all existing DRSs in the EU-27. To explain the results, firstly the estimated operating costs of the deposit systems are given (see Figure 5-10), then the additional financial costs which fall on other actors (see Figure 5-11). Key points to note from the comparison of DRS operational costs are:

- Increased handling fees are seen in countries where privately imported cans are now returned through the DRSs;
- Other operating costs are likely to be most significant in Denmark where there would be a > 100% increase in the volume of cans managed. In other countries, where the flow is only around 25% or less of domestic consumption the marginal costs of collection will be lower, and may be close to zero;
- In countries which are now receiving cans from the border trade, the balance of unredeemed deposits initially paid by consumers goes to fund the operation of the system. The exception would be Estonia, which would relinquish the benefit from unredeemed deposits paid by Finnish consumers. Note that the revenue generated from unredeemed deposits relates to a) the value of the

deposit, b) the number of cans on the market and c) the return rate. If any one of these factors were to change, the available revenue would change also;

Figure 5-10: Option 4 – All Existing and Future Systems are Interoperable: Deposit System Operational Costs (€ millions)



	Handling Fees	Other Operating Costs	Unredeemed Deposits	Material Revenue	Producer / Filler Fees	Net Deposit System Operational Costs
Denmark	1 €	20 €	-15 €	-5 €	-1 €	0 €
Germany	0 €	0 €	0 €	0 €	0 €	0 €
Sweden	3 €	2 €	-11 €	-1 €	7 €	0 €
Finland	1 €	0 €	0 €	0 €	0 €	0 €
Estonia	0 €	0 €	1 €	0 €	-1 €	0 €

Note: +ve = cost / -ve = benefit

- There would be some additional revenue from increased sales revenue associated with additional material collected;
- In the case of Denmark and Estonia additional funds would be required by producer fees to ensure the costs of the DRS operation remain in balance. In the former case, the main reason for this is the assumed higher marginal cost of collection, and in the latter case, the main reason relates to the fact that revenue from unredeemed deposits paid by Finnish consumers is now ultimately paid back to consumers in Finland. In the case of Sweden, the additional revenue from lost deposits, and the potentially low marginal cost of collection may result in an excess of funds. This would result in a reduction in the additional funds required by producers (either for metal cans or other materials covered by the system). However, if the return rate was to increase (in this instance from 75% to 96% - the Swedish and German domestic return rates) then the funds available from unredeemed deposits would reduce significantly and additional producer fees would be required;
- The DRS costs and revenues are assumed to be in balance.

From Figure 5-11, key points worthy of note from the comparison of financial costs and benefits are:

- Any additional costs to the operation of the national deposit systems (after unredeemed deposits and material revenue are taken into account) are funded by the producers. There will be some additional cost to producers for some countries, but not others. The requirement for additional funding could be somewhere between 0 and 20 € million per annum. This funding gap is most strongly influenced by the marginal cost of collection and the assumed return rate for the border cans. In relation to the latter, the lower the return rate the greater the level of unredeemed deposits that can be used to fund the system and the lower the additional producer fees that are required;

- RVM upgrade costs may be between 10 € and 20 € million. The higher costs relate to any requirement to upgrade all RVMs outside of Germany with the security label reader. These costs, however, are likely to be 'one-off' and would not be required on an annual basis, thus in subsequent years the financial burden would be reduced. Alternatively, the payment could be amortised over a number of years, reducing the annual financial costs to the DRSs;

- The total cost of operating a cross-border clearing system is relatively small, but would be required on an ongoing basis;

- Additional labelling costs may be incurred if the overall security of all systems were to be increased to German standards;

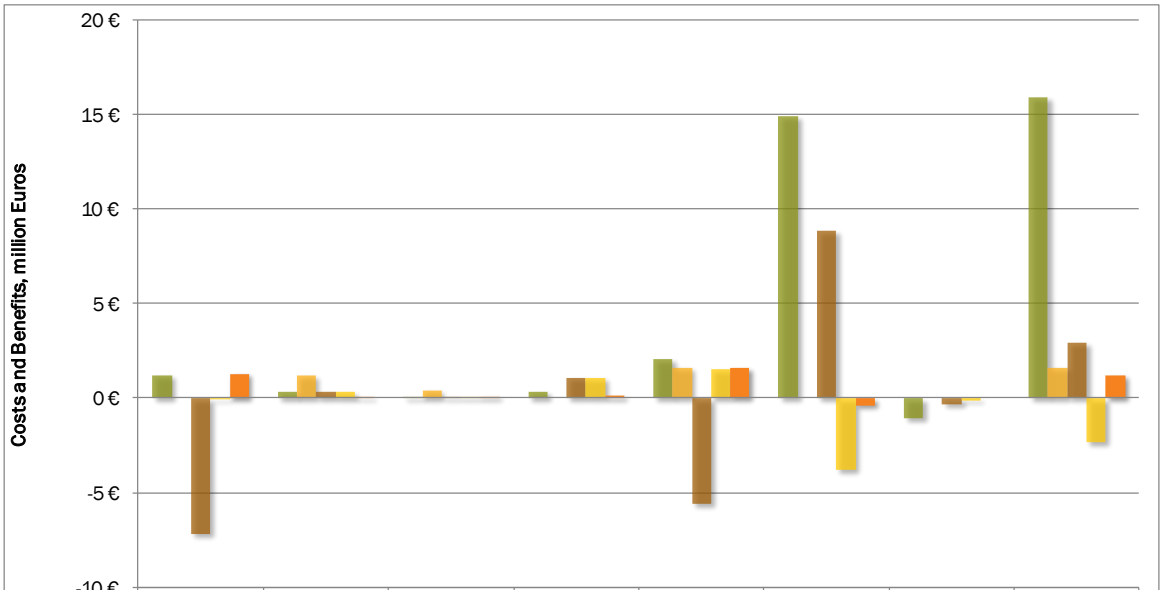
- In most cases the overall costs of operating deposit systems is positive, but if the additional revenue from unclaimed deposits is significant, these may outweigh the additional costs of interoperability;

- Danish and Swedish consumers purchasing cans in German border shops would now all be charged a deposit. For those that do not take containers back to collection points to redeem the deposit, there will be an additional financial loss. For Finnish consumers, who are currently losing deposits, there will be a benefit when they now have the opportunity to redeem them. Despite the benefit some consumers now receive from being able to redeem deposits where they currently cannot, the inclusion of the border cans in Germany into a deposit system, and the resulting additional loss in deposits by consumers not returning the containers, results in an overall net cost;

- There will be some saving that arise from a reduction in border cans being managed through the non-DRS collection and management systems;

- The overall net financial costs appear positive for most countries.

Figure 5-11: Option 4 – All Existing and Future Systems are Interoperable: Financial Costs and Benefits (€ millions)



	Producer / Filler Fees to DRS	RVM Upgrade Costs	Clearing Costs	Labelling Costs	Overall Deposit System Costs	Unredeemed Deposits (Consumers)	Non-deposit System Costs	Net Financial
Denmark	1 €	0 €	0 €	0 €	2 €	15 €	-1 €	16 €
Germany	0 €	1 €	0 €	0 €	2 €	0 €	0 €	2 €
Sweden	-7 €	0 €	0 €	1 €	-6 €	9 €	0 €	3 €
Finland	0 €	0 €	0 €	1 €	2 €	-4 €	0 €	-2 €
Estonia	1 €	0 €	0 €	0 €	2 €	0 €	0 €	1 €

Note: +ve = cost / -ve = benefit

5.2.4 Non-market Costs and Benefits

The approach to valuing non-market benefits is described in 'Appendix 6 – Cost Benefit Analysis'. The results of the analysis are shown in Figure 5-12 for the bilateral Scenarios (Scenarios 1 to 3). Key points to note from the comparison of the non-market costs and benefits are:

1) All Options appear to suggest that there are likely to be environmental benefits from additional recycling of beverage cans. The benefit could be somewhere around 0.5 to 2 € million per annum;

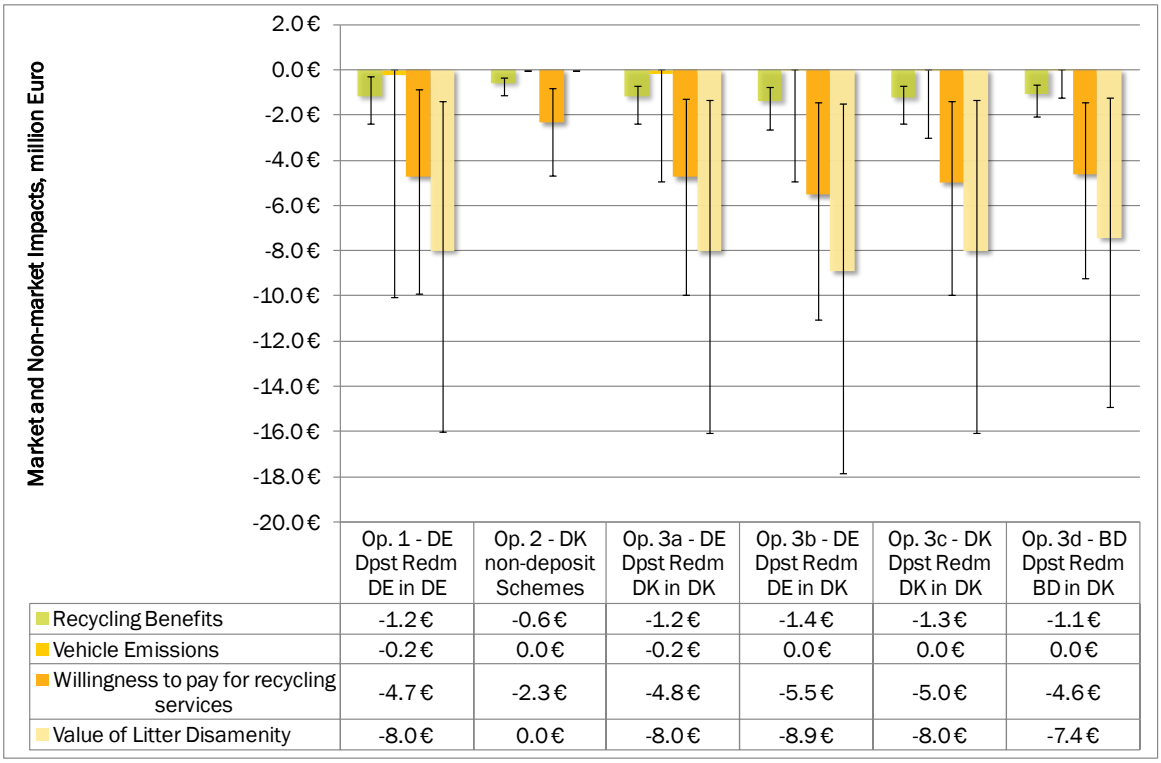
2) Under the high response scenario, consumers reduce their demand for beverage containers in German border shops, and consequently they stop travelling to Germany. As such there are benefits from a reduction in vehicle emissions. Assuming the average vehicle stock is Euro 5 compliant the benefits could be relatively significant – around 10 € million per annum. Under the central case, where there is limited or no change in demand, the reduction in emissions does not occur to the same extent;

3) There could be social benefits from citizens' willingness to pay for recycling services, which is an expression of how they value recycling services. The value of

this social benefit is in the order of 1 to 10 € million per annum. The large range reflects uncertainty in the value, due to the fact the literature does not specifically relate to willingness to pay for additional levels of recycling from systems which are already performing at high levels;

4) There could be additional benefits from a reduction in the disamenity associated with litter in the order of 2 to 18 € million per annum. Again the range is large, reflecting the uncertainty around the contribution of beverage cans to litter and how people value the disamenity associated with litter. It is important to note that in the central case, this is the largest of the environmental benefits.

Figure 5-12: Comparison of Non-market Costs and Benefits (Options 1 to 3) (€ millions)



	Op. 1 - DE Dpst Redm DE in DE	Op. 2 - DK non-deposit Schemes	Op. 3a - DE Dpst Redm DK in DK	Op. 3b - DE Dpst Redm DE in DK	Op. 3c - DK Dpst Redm DK in DK	Op. 3d - BD Dpst Redm BD in DK
Recycling Benefits	-1.2 €	-0.6 €	-1.2 €	-1.4 €	-1.3 €	-1.1 €
Vehicle Emissions	-0.2 €	0.0 €	-0.2 €	0.0 €	0.0 €	0.0 €
Willingness to pay for recycling services	-4.7 €	-2.3 €	-4.8 €	-5.5 €	-5.0 €	-4.6 €
Value of Litter Disamenity	-8.0 €	0.0 €	-8.0 €	-8.9 €	-8.0 €	-7.4 €

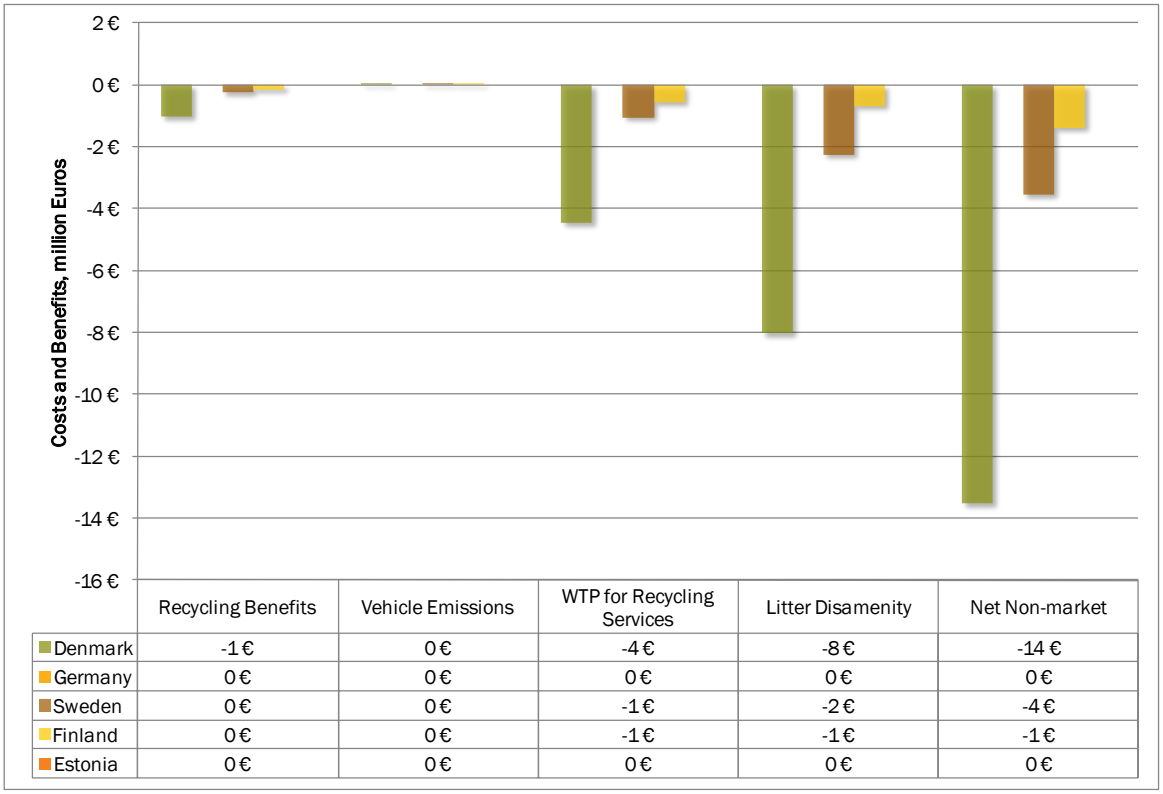
Note: +ve = cost / -ve = benefit

For the multilateral Options, the results of the analysis are shown in Figure 5-13. Key points to note from the comparison are:

1) The relative impacts between recycling, emissions, WTP and litter disamenity are similar to those seen for the bi-lateral Options (1 to 3). The level of impacts (in Denmark) reflects the level of the deposit assumed to operate;

2) Between countries the most significant benefits occur in Denmark, with less in Sweden and again less in Finland. This distribution of benefits relates to the magnitude of privately imported cans and the change in management from current practices. No change is expected in those countries from which cans move to other Member States (i.e. Germany and Estonia).

Figure 5-13: Non-market Costs and Benefits (Option 4 – all DRSs are interoperable) (€ millions)



	Recycling Benefits	Vehicle Emissions	WTP for Recycling Services	Litter Disamenity	Net Non-market
Denmark	-1 €	0 €	-4 €	-8 €	-14 €
Germany	0 €	0 €	0 €	0 €	0 €
Sweden	0 €	0 €	-1 €	-2 €	-4 €
Finland	0 €	0 €	-1 €	-1 €	-1 €
Estonia	0 €	0 €	0 €	0 €	0 €

Note: +ve = cost / -ve = benefit

5.2.5 Net Costs and Benefits

For all of the Options, Figure 5-14 summarises the key impacts. The Figure identifies the benefits from recycling as a separate item, though this is also included in the figure for 'net non-market impacts'. Key points to note from the presentation of all costs and benefits are as follows:

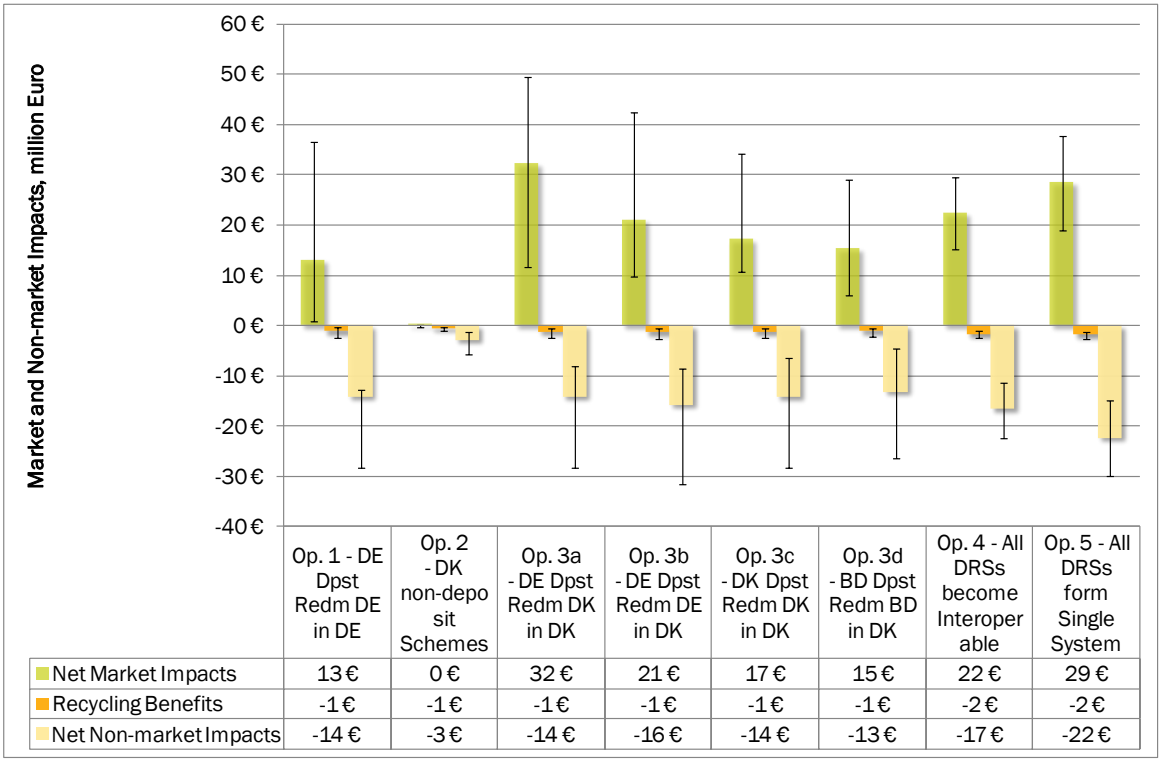
- The private costs of any interoperability arrangements would appear positive or zero in all cases. That is to say, there is a cost to implementing all the Options. The distribution of these costs clearly varies across the different Options (see Section 5.7);
- The potential benefits from recycling do not appear significant in relation to the financial costs. As indicated in Section 5.2.4, the largest environmental benefit is associated with reduced disamenity related to a reduction in litter, which forms the largest part of the benefit from 'net non-market impacts';
- For Option 2, the benefits exceed the costs. This is the only Option for which this is the case, though costs and benefits are in balance for Option 1. For Options 3b-3d, the costs exceed the benefits, but the costs and benefits are close to being in balance.

- For Option 4, in which all DRSs are made interoperable, net financial costs appear to be positive within the full range of the parameters tested in the modelling. In other words, no combination of input parameters results in a net financial saving.

- Costs appear to outweigh the benefits under Option 5, but there is a high degree of uncertainty, due to a lack of clarity about what deposit value might be used and what the resulting influence of consumer behaviour would be;

- There appear to be benefits from non-market impacts in all cases also.

Figure 5-14: Comparison of All Costs and Benefits (Options 1 to 5) (€ millions)



	Op. 1 - DE Dpst Redm DE in DE	Op. 2 - DK non-deposit Schemes	Op. 3a - DE Dpst Redm DK in DK	Op. 3b - DE Dpst Redm DE in DK	Op. 3c - DK Dpst Redm DK in DK	Op. 3d - BD Dpst Redm BD in DK	Op. 4 - All DRSs become Interoperable	Op. 5 - All DRSs form Single System
Net Market Impacts	13 €	0 €	32 €	21 €	17 €	15 €	22 €	29 €
Recycling Benefits	-1 €	-1 €	-1 €	-1 €	-1 €	-1 €	-2 €	-2 €
Net Non-market Impacts	-14 €	-3 €	-14 €	-16 €	-14 €	-13 €	-17 €	-22 €

Note: +ve = cost / -ve = benefit

5.3 Evaluation of Single EU-27 Refund System

5.3.1 Potential Impacts of the Approach

This is an option for which, as far as we are aware, there are no obvious precedents. The implication of the approach would be as follows:

1. Member States with DRSs in place would need to adapt their schemes so that the deposits and rules regarding density of collection points were aligned with what was proposed for the system. The national deposit level for cans might have to be adjusted, depending upon whether the system was the cross-

national or EU one, and in the national system, RVMs would need to be equipped to read a range of labels from all other Member States;

2. Member States with no DRS in place would be required to set up a new system for cans only. This would need to include provision for introducing the deposit on all cans sold in the country, and the development of services which facilitated the convenient return of all cans. The infrastructure put in place would need to have the requisite density to facilitate convenient return (or else, there would be little point in the system). This would mean that new infrastructure for beverage cans would need to be implemented with the capacity (in the cross-national system) to read labels from all other Member States. The impact on the existing systems is described below in Section 5.3.1.3.

Perhaps the most obvious question which this option raises is whether, given the scale of the problem, the response could be considered proportionate to the size of the problem it seeks to address. It also appears to fall between two stools in terms of the solution it might offer: on the one hand, it addresses the issue of interoperability, which is problematic only in a small number of countries, and to varying degrees; on the other, the nature of the response would beg the question '*why only for cans?*' given that, especially for countries with no DRS currently in place, the changes which would be required might logically be extended to cover other beverage containers.

Closer inspection, however, reveals that many of the DRSs in place handle relatively little glass, partly because the DRS in some countries are dealing mainly with one way packaging (and refillable glass containers are dealt with separately). For example, the DPG system deals with one-way packaging and some of the Scandinavian systems appear to deal mainly with PET bottles and cans. By number of units, other than in Germany (where historic factors associated with scheme design affected the market share of cans in the system), the share of cans tends to be quite high (between 50%-78% according to data from the systems themselves). In Germany, PET is the dominant material in the DPG system, by number of units.

5.3.1.1 Costs of Implementing the System

There is a view that it ought to be relatively cheap for DRSs to deal with cans because the value of the material – especially aluminium – is thought to enable a DRS to be operated in such a way that material revenues cover all costs. The extent to which any deposit scheme is 'self-funding', however, has to be considered in the light of a full appreciation of how it is that the unredeemed deposits are being dealt with, as well as the return rate achieved. Any DRS can be 'self funding' if it benefits from unclaimed deposits, and if the mechanism for redeeming deposits is sufficiently *in*convenient that a low return rate is achieved.

In this work, we have consistently treated the unclaimed deposits as a cost to consumers. Adopting this view, then the magnitude of the unclaimed deposits is treated both as a cost, but also, as a means of reducing the costs (to be visited on other actors in the economy) of operating a DRS. As long as the unclaimed deposits

are not in excess of the costs of running the DRS, then the magnitude of the unclaimed deposits do not really affect the overall analysis – they simply affect the distribution of the cost of operating the DRS (the more consumers pay in the form of unclaimed deposits, the less other stakeholders have to contribute to close the gap between 'receipts' and 'expenditure' incurred in the operation of the system).

In effect, a DRS would need to be developed for the metal beverage cans, and would need – if it aimed to achieve high recycling rates and low rates of littering of cans – to offer a similar level of convenience, in respect of returns, to existing high-capture systems. Where machines were used for the returns (RVMs / counting centres), the machines might not have to be so costly as those which are designed to accept a wider range of materials (although as noted above, glass does not appear to be a major material in the DRSs operated, this often being collected in a 'separate route').

The above considerations suggest that were a given Member State to introduce a system for cans only, the costs might not be so dissimilar as for the fees paid by producers, as reported in the comparative assessment in Section 2.0 by some Scandinavian countries (and summary figures for these systems are shown in Table 5-2). This might be especially true in the case of the 'cross-national' system, where any reduction in costs of the machinery (to deal with a smaller range of materials) might be offset by an increase in cost, reflecting the need to have the capability to read a range of labels, and issue multiple refunds. In the EU system, the costs ought to be somewhat lower.

Table 5-2: DRS Operational Costs per Can Placed on Market, eurocents

DRS Operational Costs per Can Placed on Market	Denmark	Sweden	Finland	Estonia
Income				
Total Producer Fees	1.3	0.0	1.0	0.0
Total Revenue from Unclaimed Deposits	1.3	2.0	0.7	2.3
Total Revenue from Material Sales	1.2	1.0	1.2	0.8
Expenditure				
Total Retailer Handling Fees	0.2	1.2	1.4	1.6
Total Other System Operating Costs	3.6	1.9	1.5	1.5

Note: 'Total Other System Operating Costs' include administrative costs of running the system; these are likely to be a small proportion, with the majority for funding the collection (potentially RVMs), logistics for collection of empty containers, counting centre costs and other clearing costs.

High level estimates of the costs are given, based upon these estimates, in Table 5-3. Under the central case, if the total expenditure that may be required is 3.0 eurocents

per can, and the income from unclaimed deposits and material sales is 2.2 eurocents, then the shortfall is 0.8 eurocents per can. This gives the estimated producer fees or additional cost of implementing the DRS. Of course the revenue from the unredeemed deposits is ultimately an additional cost to consumers, so that the total cost for implementing the system would be 1.8 eurocents per can. The costs would be 1.3 and 3.3 eurocents per can under the low and high estimates, respectively. Evidently these figures might vary depending upon a nation's geography, as well as on the market share of cans in the system. They are intended only to be indicative of costs which may be expected.

Table 5-3: Estimated Average Costs for Operating New DRSs, eurocents per can

	Low	Central	High
Expenditure			
Total Retailer Handling Fees	1.0	1.0	1.0
Total Other System Operating Costs	1.5	2.0	3.5
Net Expenditure	2.5	3.0	4.5
Income			
Total Revenue from Material Sales	1.2	1.2	1.2
Total Revenue from Unclaimed Deposits	1.0 [1]	1.0 [1]	1.0 [1]
Total Producer Fees	0.3	0.8	2.3

1. *Note: Assumes deposit value = 10 € cents, return rate = 90%, so revenue from unclaimed = 1.0 € cents per can in system. Varying the return rate would increase the revenue from unclaimed deposits, reducing the level of producer fees required to fund the system (and vice versa).*

There are 22 Member States which do not currently have DRSs for metal beverage cans. The total quantity of cans placed on the market in these countries is estimated at around 33 billion. Thus the estimated cost for implementing an EU-wide refund system for metal cans only could be in the order of 600 € million.

There will be some upfront administrative costs for designing and implementing the system, and potentially for changing national legislation. The cost of the latter is not easy to estimate without modelling a fully designed system, and in the case where the specific changes in legislation required are unknown. Using data from the design of the German system, one study in the UK found the upfront costs for developing a DRS

may be in the order of 90 € million.[10] This cost was related to labour and capital costs, from system design, IT, requirements, publicity and advertising, legal fees and retailer costs from optimising floor space and storage to accommodate RVMs. Some of these costs would generally be higher in the UK than the EU average. Assuming that scale effects exist, and input factor costs are lower, on average, in the new DRS countries, upfront costs might be expected to be of the order 200 € millions.

There will be some savings from the avoided collection of metals cans through existing recycling and residual waste collection and disposal / treatment systems. In using the data gathered in the comparative analysis of collection systems for metal beverage cans (Appendix 2) it is estimated that around 20 billion metal cans are currently collected for recycling in the 22 Member States without DRSs. Taking average figures for the non-deposit costs described in 'Appendix 6 – Cost Benefit Analysis' it is estimated that there would be savings of 80 and 30 € million for the reduction in the use of existing recycling and residual waste collection systems respectively, giving a total of 110 € million. Depending on the level of costs avoided, then figures may range from 70 € million to 150 € million in low and high cost scenarios, respectively.

5.3.1.2 Effects on Market for Beverage Containers

It should be noted that the market share of cans, and the split in the market between aluminium and steel, would not necessarily remain static in the wake of application of a DRS. There are two effects which seem likely to occur in the case of implementing an EU wide system for cans only:

a) There may be a shift in the use of packaging materials as a result of the implementation of a DRS for cans, but not for other beverage packaging; and

b) There may be a shift in the use of metal beverage packaging from one material to another, depending upon how the fees for the DRS are charged to producers. Experience with DRSs seems to suggest that where the costs of operation are recovered on a material-by-material basis, the costs for aluminium are lower than for steel and this tends to shift usage away from steel and towards aluminium.

There are environmental consequences of such shifts. In the case of the first type of switch, this might keep more material out of the DRS, and might be expected, other things being equal, to reduce the improvement in environmental performance that might otherwise be achieved in terms of material recycling. On the other hand, the material use aspect would need to be considered from a life-cycle perspective. Where the second type of switch is concerned, the issue relates to the life-cycle implications

[10] Eunomia Research & Consulting (2010) *Have We Got the Bottle? Implementing a Deposit Refund System in the UK,* Report for the Campaign to Protect Rural England, September 2010.

of the decision to change the use of materials, assuming that the materials are equally likely to be recycled.

These impacts cannot easily be estimated, especially those in respect of the first type of switch, partly because of the lack of experience with this type of approach.

5.3.1.3 Effects on Different Schemes

We highlighted in our review of systems that the existing recycling systems vary in the extent to which they capture cans (see Section 2.3). We mentioned, in our analysis, that the figures are not always easy to come by, and there may be reasons to question their reliability.

In general, it would be expected that collecting cans through a DRS will alter the costs of the existing recycling and residual waste collection systems in different Member States. The impacts will, of course, vary depending upon the nature of the scheme, and the extent to which it is already successful in capturing metal beverage containers for collection.

If we consider the effect on the country schemes insofar as we characterised them, we might say the following:

Bring Schemes
For these schemes, the main effect of the introduction of a single DRS would be to remove the metal cans from recycling and residual waste bring containers, reduce the amount of cans found in litter (see Section 5.3.1.5 below), and move the materials into the DRS.

For these schemes, the costs of collection are relatively low, and the reduction in containers collected via this means would be expected to reduce the costs of the existing recycling services (the infrastructure might remain similar, aiming to capture food cans, and where this already happens, other light packaging in the designated bring containers) and to reduce the costs of collection and disposal / treatment of the residual waste.

It is uncertain whether the loss in revenue from the removal of metal cans from bring systems would be balanced by a reduction in the costs of operating the bring collection system. Much depends upon the efficiency with which these are operated, as well as the density of the bring banks, and the performance of the system (determining how much is collected through the system for recycling, and how much is collected in the residual waste system). The performance of bring schemes is likely to be influenced by the density of bring banks (as well as other factors such as the quality of the communications with residents). Given these factors, in the absence of a detailed 'bottom up' assessment, the question cannot be answered unequivocally.

Kerbside Schemes
For countries with kerbside schemes in place, similar considerations might apply, although in some schemes, depending upon the ratio of aluminium to steel in the mix of cans, there may be an increase in costs of the service as for some systems, the

incremental costs of including materials such as aluminium may be negative (so a reduction in their presence in the kerbside system might reduce revenues from material sales more than it might reduce the costs of operating the service). In practice, much depends upon the design of the service, and the efficiency of the existing operations.

A model of the UK's kerbside collection system suggests that cost savings would be made if metal, plastic and glass beverage containers are removed from the system, but the effect if just metals are removed is not known. A similar range of factors is likely to be at play as in the case of bring banks described above. The balance of revenue losses and cost savings is likely to be affected by the quality of the service (how good is the citizen's experience?) and its performance, as well as the communications effort and the effect of any incentives in place.

For most countries, there is still a considerable quantity of cans to be found in residual waste. DRSs, to the extent that they increase captures above existing levels (and they seem likely to in most of the Member States), will reduce the costs of dealing with cans in residual waste (if not significantly in respect of collection, then almost certainly in terms of the costs of disposal / treatment as long as the appropriate recovery infrastructure is in place).

RWSs

Countries where the approach focuses on the extraction of metals from residual waste would find that the costs of collecting and treating cans in residual waste should fall. Note that incinerators might see a drop in revenue from sales of metals, but it seems unlikely that this would trigger some permanent change in gate fees at such facilities unless there is some explicit payment mechanism in place which reflects the level of revenue achieved through material sales.

Countries with Existing DRSs

The countries with DRSs already in place would need to ensure their systems were aligned with the EU-wide system.

In the 'cross-national' approach, they would need to ensure that their systems were capable of receiving cans from other countries and refund the deposits as necessary. They could do this with relatively little change to their own systems.

In the EU approach, the principle change would be in terms of the domestic design, which would need to be harmonised at a common EU deposit level, and with common labelling principles. This would require changes in the design of the instrument, but might require less by way of re-tooling of equipment (since only one refund level would ever need to be repaid).

5.3.1.4 Effects on Recycling Rate

It seems reasonable to state that the overall EU recycling rate for cans would increase. Under a static analysis, we estimate that the recycling rate for cans could move from 62% to somewhere between 75% and 95% depending on how the system is setup and taking the performance of existing DRSs into account, leading to an

increase in recycling of between 30,000 and 70,000 tonnes of steel and 55,000 and 135,000 tonnes of aluminium. The external benefits associated with this increase are estimated to lie between 15 € million and 115 € million per annum, with a central estimate of around 40 € million per annum.

This static analysis assumes no change in the mix of materials from which beverage cans are made are steel, and no switch into other materials and away from metals as a result of the DRS.

5.3.1.5 Effects on Litter

It seems reasonable to state that the amount of cans arising as litter would decline. This would be expected to contribute to a reduction in the costs of collection of cans as litter, and to a reduction in the disamenity associated with litter. The proportion of cans placed on the market that end up as litter is very uncertain. This makes estimating the change in litter from the introduction of a new waste management system difficult. However, the proportion is not likely to be significant, perhaps 1 to 2% of the total.

Under a static analysis, we estimate that the proportion of cans arising as litter in countries without DRSs could fall by 1%, leading to a reduction in litter of 330 million units. The external benefits associated with this increase are estimated to lie between 50 € million and 600 € million per annum, with a central estimate of 300 € million per annum. Of course these results are strongly influenced by the actual number of items remaining in the environment each year, thus introducing further uncertainty into the analysis.

As with the recycling analysis above, this static analysis assumes no change in the mix of materials from which beverage cans are made are steel, and no switch into other materials and away from metals as a result of the DRS.

5.3.1.6 Quality of Material Collected

In recent years, the issue of 'quality' has come to the fore in recycling markets. This always was an issue, but came into sharper focus during the collapse in prices in the second half of 2008. It is increasingly recognised that at times when markets are becoming more selective (when, for example, supply of material outstrips demand), quality is a watchword for ensuring that collected materials do not fall foul of the higher levels of discretion which periods of over-supply inevitably allow buyers to exercise. It is expected that the materials collected may be of higher quality, with lower contamination levels than existing schemes.

Summary of Costs and Benefits, EU-wide DRS Table 5-4 shows a summary of the costs and benefits from the very high-level analysis undertaken here. It must be stressed that these are indicative figures only. The analysis suggests a considerable amount of uncertainty in the likely costs and benefits. The wide range obtained for the net costs and benefits reflects what may happen in the cases where:

1. all assumptions are favourable to the system (low costs / high benefits) – the Low cost scenario; and

2. all assumptions are unfavourable to the system (high costs / low benefits) – the High cost scenario.

The Central case, however, indicates a significant net cost, this being driven by the financial costs of implementing the DRS. It should also be considered that, as noted above, one-off upfront costs of the order 200 € million may also be incurred in the 22 countries which do not already have DRSs. These one off costs are not shown in this Table, which reflects the estimated annual flow of costs and benefits once the system was up and running.

Table 5-4: Summary of Indicative Costs and Benefits for an EU-wide Deposit Refund System for Metal Beverage Cans, € million per annum

	High	Central	Low
Financial			
Operation of DRS	760 € M	600 € M	430 € M
Savings from existing systems	-70 € M	-110 € M	-150 € M
Environmental			
Recycling benefits	-15 € M	-40 € M	-115 € M
Litter disamenity	-50 € M	-300 € M	-600 € M
Net Costs and Benefits	625 € M	150 € M	-435 € M

Note: +ve = cost / -ve = benefit

5.3.2 Feasibility of an EU-wide DRS

We discussed above the fact that the approach suggested here might not necessarily be proportionate to the nature of the problem under examination, which is to say, the impacts related to the lack of compatibility of the different systems.

In addition, EU waste policy is based on the principle of subsidiarity, leaving Member States the freedom to design waste management systems which are best suited to their local conditions, consumption and distribution patterns, and reflect their preferences, whilst meeting, or exceeding, the targets set by the EU legislation. Within this framework, Member States can set up appropriate systems, including DRSs, to achieve high collection targets for metal beverage cans. However, a harmonised solution for the collection and recovery of metal beverage cans may fail to integrate

the local circumstances and specificities in each country and would, therefore, not be aligned with the principle of subsidiarity. Furthermore, the approach would entail an overall re-thinking of EU waste policies and national waste policies.

Because all Member States have already developed systems for responding to the requirements of the Packaging Directive, implementing a new system covering only metal beverage cans is likely to prove costly. Some countries, for example, the Netherlands, or Belgium, report a high level of metals recycling in the absence of DRSs, and might gain little additional benefit, but incur significant additional costs, if required to implement a DRS for metal cans. As discussed above, setting up additional systems on top of those that have already been set up to meet the requirements of the Packaging Directive would imply additional costs and a new administrative burden for the Member States, even taking into account reductions in cost associated with the existing system. The cost implications would vary depending on the specific circumstances of each of the existing collection systems. Our analysis above suggests that in the central case, the financial costs of implementing a DRS for metal beverage cans across the EU would exceed the environmental benefits by as much 150 € million. This central estimate for this option can be compared with the costs and benefits, under the central case, of the other 5 options considered in this report. In the best performing options, the costs are exceeded by the benefits, whilst in the worst performing option, costs exceed benefits by a comparatively small 18 € million. This highlights the poor value for money of the EU wide DRS for cans in the central case, both as judged on its own merits, but also, as a means for addressing the specific problem of interoperability.

The impacts on different Member States would vary depending on the level of existing infrastructure for the collection of cans and the costs of implementing the DRS. For some countries with lower levels of existing infrastructure, and with lower disposal costs, this would imply greater additional costs than countries which already have robust logistics and reprocessing systems in place. As described above there are environmental benefits from higher levels of recycling metal beverage cans, but these are not necessarily greater than the additional costs of a DRS for metal beverage cans. For some Member States, additional financial costs in the current economic environment are likely to be difficult to justify. If a high level of recycling of metal beverage cans is desired by some Member States, it would, in that case, be appropriate to consider a range of possible options for delivering the desired recycling rate, not solely a DRS.

Finally, it should be noted that there was no support from any organisation (either producer group or NGO) for a harmonised EU-wide refund system in the stakeholder consultation. In responding to the question as to whether, given the problems identified, an EU-wide refund system would be appropriate, no respondent answered either ‘Yes’ or ‘Unsure’: all answered ‘No’. The top four reasons for responding in this way were:

1. An EU-wide scheme is too difficult/not currently feasible/unreasonable burden;

2. Producer responsibility/other waste collection schemes are sufficient/better;
3. A single DRS would infringe the principles of subsidiarity, proportionality, and discrimination; and
4. The approach would be too costly.

These broadly reflect the line of argument presented above. Further detail on these responses can be found in Appendix 5.

5.4 Additional Considerations in Evaluating Options

In addition to a CBA, the Project Specifications asks the contractor to consider a number of factors in relation to the interoperability options identified. These are considered in the following sections.

5.4.1 New Opportunities and Benefits Generated by the Measures

The benefits from recycling, material revenue etc. have already been described in the results of the CBA, and as such are not repeated here. The following additional, benefits and opportunities could be indentified from the introduction of any interoperability measures:

1) Greater co-operation between Member States – joint working on solving transboundary waste issues will improve waste management practices across the EU-27. It will also provide other Member States with experience for future co-operation with regards to improving waste management in the EU;

2) Reduction in future issues relating to incompatibility – if more Member States implement DRSs in the future, they can use the experience of interoperability measures elsewhere in the EU to design interoperability requirements into the development of the system, from the start;

3) Greater resource security – from the interoperability arrangements it has been shown that recycling of, mainly, aluminium will increase. This will increase the 'resource security' of the EU, as less primary material will need to be imported from elsewhere, albeit that this change is not very large. This is in-line with the aims of the aims of the Europe 2020 strategy, one aim of which is to head towards a resource efficient Europe;[11]

[11] *E U R O P E 2 0 2 0: A European strategy for smart, sustainable and inclusive growth* http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf

4) Strengthen the culture of take-back – with the inclusion of the German border cans in the deposit refund systems, for most options, take back of beverage containers would be more convenient, further supporting all recycling services. This would be increased further if beverages sold on ferries were to be included in the deposit systems;

5) Other materials would most likely have to be included as well – if interoperability solutions were implemented just for cans, there may be additional trade barriers or other issues that would arise (this is discussed further in Section 5.4.3 below). Thus it is likely that glass and PET would have to be included as well, which would result in additional (probably marginal, because they are not so widely traded) benefits from recycling and the like;

6) Impacts on fraud / black market – it would be less attractive to shops / canteens purchasing in border shops for commercial benefits, to buy these goods as it may be limiting having to take back large quantities of empty containers to collection points in the country of consumption. Thus this activity may be reduced;

7) Technical development in deposit pay-back – paying deposits back to consumers between countries with different currencies may well be handled more effectively and efficiently if direct transfer of monies could be made into consumers' bank accounts. This development in payment onto debit or credit cards, could be used across all existing or future deposit systems to make them easier to use for the consumer;

8) Harmonisation of deposit levels – if deposit levels were harmonised across the DRSs then this would be easier for any consumers who travel across borders to understand the system and enable the more effective use of recycling services.

5.4.2 Degree to Which Matters are Improved by the Options

The impacts associated with interoperability identified in Task 2 were:

1) Beverage cans which are privately imported into countries with DRSs are not recycled to as high a level as national cans. Not only do more arise as residual waste, but evidence suggests that a higher proportion arise as litter;

2) Beverage cans privately imported into countries with DRSs are not recycled to as high a quality as national cans (especially where they are recycled from ask in incineration plants);

3) Deposits on beverage cans are not paid back to consumers outside the country in which they are paid; and

4) The management of waste packaging from privately imported cans is not funded by the producers who placed the packaging on the market (in the country of purchase). This is true irrespective of whether or not the country into which the cans are imported operates a DRS.

The following matrix gives a simple indication of the extent to which the impacts identified above would be reduced by each of the interoperability options.

Table 5-5: Extent to which the Options Improve Matters Related to Interoperability

Option	1) Increase Recycling	2) Increase Quality	3) Reduce Unredeemed Deposits	4) Improved Link Between Producers and Funding
Op. 1 - DE Dpst Redm DE in DE	Medium	High	High	High
Op. 2 - DK non-deposit Schemes	Medium / Low	Medium	None	High
Op. 3a - DE Dpst Redm DK in DK	Medium	High	Medium	High
Op. 3b - DE Dpst Redm DE in DK	Medium	High	High	High
Op. 3c - DK Dpst Redm DK in DK	Medium	High	High	High
Op. 3d - BD Dpst Redm BD in DK	Medium	High	High	High
Op. 4 – All Interoperable	High	High	High	High
Op. 5 – Existing form One System	High	High	High	High
Op. 6 – Single EU Refund System	High	High	High	High

5.4.3 Risks of Possible Unintended Environmental, Social and Economic Side-Effects

The risks of possible unintended consequences of the options are discussed below:

- Additional costs / presence of deposit causes consumer shift to other product types, away from cans. If cans with deposits are sold alongside glass or PET bottles without deposits, consumers may shift away from canned beverages to other products and there may be reductions in the canned beverage market. However, many of the alcoholic beverages are export beers which traditionally are canned due to the transportation benefits. The extent to which consumers are strongly tied to their existing consumption patterns is unknown;

- Depending on the security requirements of the system the potential for fraud could be increased. For example, if deposits were paid back to the consumers on the basis only of EAN codes in a fully interoperable environment, then the common EAN codes across the Baltic States may be problematic. It was indicated to us that some products are sold in Poland, Latvia, Lithuania and Estonia with common EAN codes due to the market size. Thus at the Polish / German border there may be some risks. If cans sold in Poland were taken to German RVMs then they may consider them as part of the Estonian system and pay out a deposit which was not first paid by a consumer. Thus an alternative approach to enabling clear identification of deposit bearing cans may be required;

- If expensive security marks were not required to be read for the border cans, then the propensity for fraud may increase. However, in the Nordic countries, where the level of security is lower than in, for example, Germany, there have been few cases of fraud. In fact, the insurance fund paid into by producers to compensate for fraud has been significantly reduced over time; and

- Under the single systems options, there is the possibility that the central system would put pressure on the new country to minimise costs at the expense of service provision, safety or effectiveness. Thus it would be important to have some external representative on the board of the system operator to ensure fair distribution of funds.

5.5 Commentary on Feasibility of the Identified Options

The following task was to be performed:

> *'In addition, the contractor shall assess any elements that might influence the feasibility of the identified options, such as legal, technical and operational constraints…'*

There are a number of general points to consider first:

1) The feasibility of systems that deal with *cans only* deserves some consideration. Although much of the trade is considered to be in metal cans, there are still significant volumes of beverages in PET and glass bottles. Introducing changes to just one material stream and not all, may be confusing for the consumers, and might, at the margin, influence the choice of beverage packaging materials. Moreover, it would not appear sensible to further partition the market in terms of the return of empty beverage packaging.

2) The feasibility of a number of options appears to be influenced by how the VAT on the unredeemed deposits is paid. If existing arrangements could not be altered then it would appear as though VAT may have to be paid between Member States in addition to the raw deposit value. Other arrangements may mean this only has to happen on the unredeemed amounts, or alternatively if a zero rate of VAT could

be set on deposit payments, then the feasibility of many of the interoperability options would be increased.

The assessment in Table 5-6 below indicates that the feasibility of a number of Options is perceived to be low. Options 2, 3b, 3c and 4 would appear to have the prospect of being implemented. No specific solution emerges as an obvious front-runner on the basis, for example, that its benefits far exceed the costs. In addition, the distribution of costs is an issue which would need to be agreed in any of the cases being considered. The Copenhagen Workshop indicated a split among those attending between those who felt that the costs should be borne by producers / consumers of border shop cans, and those who felt that it was for the Danish authorities to arrange for appropriate solutions to be provided for the border shop cans.

Option 1 does not find favour with the key stakeholders expected to be involved in implementing the Option.

Option 3a potentially acts as a tax on border-shopping. It may also be open to fraud. As indicated above, it is also the Option for which the costs exceed the benefits by the greatest margin, with the exception of the EU-wide scheme.

Option 3d effectively requires a separate system to be developed, and is unlikely to find favour for that reason.

Option 5 would require harmonisation and agreement across relevant Member States on DRS design which is likely to be difficult to achieve.

Option 6 – the EU-wide scheme – is deemed non-feasible as a solution. Some other reasons for not considering this option as a solution to this problem are also highlighted in Section 5.3.2 above.

Table 5-6: Considerations on Feasibility of Interoperability Options

Option	Feasibility	Comment
Op. 1 - DE Dpst Redm DE in DE	Low	This is does not appear as a preferred option politically, the intention of the relevant Governments is to enable Danish consumers to be able to take empty containers to locations close to their residence, not the border shops in Germany. In addition, there would be legal issues associated with the definition of 'exported cans' in German Packaging Ordinance, and how this has been interpreted by the Courts in Schleswig-Holstein.
Op. 2 - DK non-deposit Schemes	Medium	This option would provide some link between producers placing on the market in Germany and the management of the waste packaging in Denmark. However, it does not address some interoperability issues, especially the payment and return of deposits across borders.
Op. 3a - DE Dpst Redm DK in DK	Low	In this case, consumers lose a significant amount on the deposits paid and received by the system (the system acts like a tax on consumption in the border shops). In addition, there may be a greater incentive for fraudulent activities where the difference in deposit levels provides a potential revenue stream. Thus the option is unlikely to gain much political support.
Op. 3b - DE Dpst Redm DE in DK	Medium	This is a more feasible option as it is consistent with the general political aims, reduces most of the interoperability impacts to a medium or high extent, and clearly enables consumers to return empty containers to the Danish deposit system and redeem the deposit paid. There are, however, still issues to be resolved. Namely around labelling, security and VAT payments, and how to consider the existing arrangements of DPG where the producers maintain the balance of lost deposits. This would form a key part of the funding requirement for the management of border cans in Denmark.
Op. 3c - DK Dpst Redm DK in DK	Medium	This option would appear simpler as the labelling and security issues would be reduced, as the cans would be part of Dansk Retursystem. However, there are still issues relating to the payment of VAT on deposits to be overcome. Moreover, this arrangement does little to address the interoperability with countries other than Denmark, to where border shoppers may also take beverages purchased in German border shops.
Op. 3d - BD Dpst Redm BD in DK	Low	Although this is a technically feasible option, developing a completely separate system from the existing DRSs is unlikely to gain support, especially if the system is confusing for the border shoppers – despite the ability to redeem the deposit in the country of consumption
Op. 4 – All Interoperable	Medium	This option is potentially feasible on a technical level, although issues relating to VAT payments on deposits may need to be resolved to make the system less complex.

Option	Feasibility	Comment
Op. 5 – Existing form One System	Low	This would be a difficult option to implement with unharmonised waste policy across the EU. Different Member States have different policy objectives, making even the setting of the deposit level problematic.
Op. 6 – Single EU Refund System	Low	Again, this would be a difficult option to implement since it would require Member States with differing solutions to converge to a single model. Different Member States have different policy objectives, which would make the setting of the deposit level and minimum return rates etc difficult to agree upon. The costs are disproportionate to the size of the problem identified, and may well exceed the likely benefits by some margin.

5.6 Assessment of Potential Solutions

To make any clear policy recommendations, all of the different assessments on the interoperability options must be considered, as no single criterion captures all the relevant considerations. Table 5-7 shows the main criteria used to assess the options. Following this, the rationale for considering the option as a potential solution, or not, is given.

Table 5-7: Overview of Assessment Criteria

Option	Benefits Outweigh Costs	Proportional to Scale of the Problem	Degree to Which Impacts Reduce	Risk of Side Effects	Feasibility	Support from Consultation	Potential Solution
Op. 1 - DE Dpst Redm DE in DE	Equal	Yes	Medium / High	Medium	Low	Low	No
Op. 2 - DK non-deposit Schemes	Yes	Yes	Medium	Low	Medium	Medium	Yes
Op. 3a - DE Dpst Redm DK in DK	No	Yes	Medium / High	Medium	Low	Low	No
Op. 3b - DE Dpst Redm DE in DK	Equal	Yes	Medium / High	Low	Medium	High	Yes
Op. 3c - DK Dpst Redm DK in DK	Equal	Yes	Medium / High	Low	Medium	High	Yes
Op. 3d - BD Dpst Redm BD in DK	Equal	Yes	Medium / High	Medium	Low	Low	No
Op. 4 – All Interoperable	No	Medium	High	Medium	Medium	Medium	Potentially
Op. 5 – Existing form One System	No	No	High	Medium	Low	Low	No
Op. 6 – Single EU Refund System	n/a	No	High	Medium	Low	None	No

Table 5-8 summarises the performance for each of the interoperability options:

Table 5-8: Consideration of Potential Solutions

Option	Comment
Op. 1 - DE Dpst Redm DE in DE	The benefits appear to be matched to the costs, and the option is proportional to the scale of the problem. However, there is the risk of unintended consequences (for example barriers to trade in the single market), the feasibility of the option is considered low, and there is little support from technical stakeholders. Thus this option is not considered to be a potential solution.
Op. 2 - DK non-deposit Schemes	This is the only option where the social benefits appear to outweigh the costs (under the central case). In addition, the option is proportional to the scale of the problem, the risks of unintended consequences are low as the scale of the option is limited, the feasibility of the option appears acceptable and there was some support for this from the consultation. However, the reduction in the incompatibility impacts is less than the other options due to the smaller increase in recycling. In spite of this, the option is still considered to be a potential solution, or part of a potential solution.
Op. 3a - DE Dpst Redm DK in DK	In this case the costs are likely to outweigh the benefits, mainly due to the monetary loss to the consumers from receiving a lower deposit than they paid out. Despite the proportional scale of the solution, there is a medium risk that barriers to trade would occur, the feasibility of the option is low, and stakeholder support for this option was low also. Therefore, this option is not considered a potential solution.
Op. 3b - DE Dpst Redm DE in DK	Under the central case, it appears as though the costs are more or less equivalent to the social and environmental benefits. The option is proportional to the scale of the problem, the impacts reduce to a good extent and there is a low risk of unintended consequences as the consumers would be able to redeem their deposits in Denmark. Some issues may arise due to the different deposit levels that could be redeemed in Denmark (i.e. the national system would return a lower deposit value than the border cans), but the impact may not be significant. The option is feasible, although there are still some issues to resolve (around VAT payments) and it did receive the highest level of support in the consultation. Thus this option is considered a potential solution.
Op. 3c - DK Dpst Redm DK in DK	As Op. 3b, but there would be less risk of side effects as the system would be familiar with the Danish consumers. This is also a feasible option, but there are still complex issues relating to VAT payments on the deposits that would have to be resolved. Again, this option is considered a potential solution.
Op. 3d - BD Dpst Redm BD in DK	This option may result in equivalent costs and benefits, be proportional to the scale of the problem and mitigate the interoperability impacts, but the risks of unintended consequences is higher due to the stand-alone system being implemented, the feasibility of the system is questioned and support from industry stakeholders is low. Thus, this option is not considered a potential solution.
Op. 4 – All Interoperable	Under the central case the costs do appear to outweigh the benefits by a more significant amount than any of the bi-lateral options, but not by a very significant margin (+20%). The option is perhaps proportional to some of the interoperability impacts, although the significance of the impacts in other countries with DRSs (other than Denmark and Germany) is limited. In addition, there may be some risk of unintended consequences from transfer of payments between countries with different exchange rates, for example. However, the option could currently be technically and politically feasible, and there was some support from the technical consultation (although it is recognised that there are a wide range of views on the

Option	Comment
	feasibility of this option). Thus this option could potentially be considered a solution depending on the exact nature of the arrangements and the political will to implement the solution at expense.
Op. 5 – Existing form One System	Despite the high extent to which the impacts identified would be reduced, this option is likely to result in higher costs than benefits, is not proportional to the scale of the problem, may result in unintended consequences from forcing existing national system to alter their operational practices, has low feasibility and did not gain much support from the stakeholder consultation. For these reasons, this option is not considered a potential solution.
Op. 6 – Single EU Refund System	A detailed cost benefit analysis of this option was not carried out, but a consideration of the likely costs and benefits of the systems indicates that the social costs may outweigh the benefits, but there is a relatively high degree of uncertainty in the environmental benefits, so no strong conclusions can be made either way. The option would reduce the interoperability impacts identified, but it is not considered proportionate to the scale of the problem. Moreover, there may be high risks with requiring all Member States to utilise the same collection system, controlled in a central way. Reaching consensus on the detailed operation of the system would also be very challenging. Politically, this option may be preferred by some stakeholders, but EU policy making is to be carried out in line with the principle of subsidiarity, which this option would not meet. Finally, there was no support at all from the technical consultation for this option. Thus, the option is not considered a potential solution.

5.7 Consideration of Key Principles

In a situation where different impacts arise for multiple actors, especially where these impacts occur in different Member States (MSs), the overall costs and benefits are only one part of the picture and may tend to abstract from some underlying principles which could be important in deciding which option might be most preferable. Options that were deemed 'potential solutions' (see Section 5.6 above) are now considered in this context. These are:

- Op. 2 - DK non-deposit Schemes
- Op. 3b - DE Dpst Redm DE in DK
- Op. 3c - DK Dpst Redm DK in DK
- Op. 4 – All Interoperable

The following key principles were considered in this assessment:

1) MSs should implement collection systems which are able to manage the volume of wastes arising in their boundaries, in line with the stated aims of the Revised Waste Framework and Packaging Directives. Ideally, they should do this such that the systems in place are equally accessible, irrespective of the origin of the packaging.

'Member States shall take measures to promote high quality recycling and, to this end, shall set up separate collections of waste where technically, environmentally and economically practicable and appropriate to meet the necessary quality standards for the relevant recycling sectors.'

(Revised Waste Framework Directive)

2) In the spirit of the polluter pays principle, producers and the consumers of the packaging should be financially responsible for the costs of managing the packaging from products they place on the market. As much as MSs should be responsible for managing waste packaging which arise from products brought into the country, producers, and hence, presumably, consumers, should be responsible for funding the collection of packaging material they place on the market. This is obviously not possible in all cases, but where the origin and destination of packaging materials are clearly known (as with the border shops), it seems reasonable to suggest that this principle should be adhered to.

3) The additional costs of interoperability should ultimately fall on the consumers who are benefiting from purchasing goods from the border trade. It is not equitable for all consumers in a country to see increased prices for beverages to pay for interoperability arrangements, when the additional costs effectively relate to a sub-set of beneficiary consumers.

4) The Packaging Directive also makes clear that Member States' systems:

   'shall also apply to imported products under non-discriminatory conditions, including the detailed arrangements and any tariffs imposed for access to the systems, and shall be designed so as to avoid barriers to trade or distortions of competition in conformity with the Treaty.'

   In principle, public policy ought to apply evenly to all relevant actors, whether they are domestic producers or importers. A feature of the German deposit system is the removal of the deposit applied to cans sold in the border shops. One argument that has been used is that the border shop cans are actually 'exports' and not products sold in Germany. Logically, this would make all Danish consumers of border shop cans 'importers', and in order that such cans were to be treated in a non-discriminatory way, they would need to be dealt with as imported products. The reality is that at present, however one views the matter, policy is being applied in a discriminatory manner. More importantly, as a point of principle, policies ought, as far as possible, to be designed to be applied to all products sold domestically, except for very good reasons.

The application of these principles to the interoperability options noted above is considered in Table 5-9.

Table 5-9: Application of Key Principles to Policy Options

Option	1) MSs Manage Packaging Waste which arises within their Borders	2) Producers Fund Management of Packaging	3) Consumers (border shoppers) Pay for Interoperability	4) Non-discriminatory Application of Policy
Op. 2 - DK non-deposit Schemes	Increase in capacity of national collection systems for metal cans in Denmark would enable increased ability to manage waste beverage packaging from privately imported products, without the co-operation of any other MS.	Direct link between those placing products on the market and the funding of the collection system used to capture and recycle the material. However, the system would have to be comprehensive enough to ensure the producers' fees paid, actually met the full costs of collection.	Given that the border cans are placed on the market in Germany separately to domestic products, then it would seem possible for additional costs to be passed on directly to the consumers who are border shopping.	Under this option border cans are still sold in Germany without deposits, whereas in the rest of Germany all cans are sold with deposits. Therefore, the DRS policy is applied in a discriminatory manner as some cans are sold in German shops with deposits and some are not.
Op. 3b - DE Dpst Redm DE in DK	Increased infrastructure to enable take-back of privately imported cans, that include deposits, will enable Denmark to better manage waste packaging from privately imported products. This solution would need some support from Germany if it was required to transfer VAT payments on unredeemed deposits to Denmark.	Producers would pay fees to Dansk Retursystem to help fund the collection of waste packaging from products placed on the market in Germany, so a direct link would be made between the producers and the funding of the collection system.	Given that the border cans are placed on the market in Germany separately to domestic products, then it would seem possible for additional costs to be passed on directly to the consumers who are border shopping.	All beverage cans sold in Germany would include the German DPG deposit. Therefore, the application of the Federal policy would be non-discriminatory across the whole of the country.

Option	1) MSs Manage Packaging Waste which arises within their Borders	2) Producers Fund Management of Packaging	3) Consumers (border shoppers) Pay for Interoperability	4) Non-discriminatory Application of Policy
Op. 3c - DK Dpst Redm DK in DK	Increased infrastructure to enable take-back of privately imported cans, that include deposits, will enable Denmark to better manage waste packaging from privately imported products. This solution would need some support from Germany if it was required to transfer VAT payments on unredeemed deposits to Denmark.	Producers would pay fees to Dansk Retursystem to help fund the collection of waste packaging from products placed on the market in Germany, so a direct link would be made between the producers and the funding of the collection system.	It may be possible to pass the interoperability costs on directly to the border shoppers, but as the cans would be part of the wider Dansk Retursystem operation, the costs may end up being distributed over all consumers in Denmark, including those who do not partake in border shopping in Germany.	There would be a variation in the level of deposit levied, but in principle some deposit value is charged so the national policy in Germany, for a DRS, is more complete.
Op. 4 – All Interoperable	Ability to take-back and redeem deposits from any privately imported cans through national DRSs, will certainly increase the capture of waste packaging. All MSs would be required to support the arrangement which would benefit some more than others.	A direct link would be made between the packaging placed on the market and the funding of the collection system used to capture it for recycling within any MSs with DRSs.	As all consumers would be able to redeem deposits in any country with DRSs, and not just specific isolated border shopping markets, it would be difficult to isolate the relevant consumers and thus the costs of interoperability may well fall over all consumers purchasing beverages in any MS with a DRS.	National deposits would be levied on all beverage cans sold in Germany and consumers would be able to redeem them in any other country with a DRS. Again, the DRS policy would be fully implemented for all beverage cans sold in Germany.

Colour Scheme: Green – no / minor issue, Orange – potential issue, Red – greater issue

The principles described above make reference to some issues which relate to the distribution of costs across relevant actors. To further explore where the financial costs and benefits fall, the options are considered in further detail in what follows. Firstly the distribution of costs and benefits from the bi-lateral options are compared.

Table 5-10 shows that for Option 2, the benefits associated with increased funding for collection systems would lie with the Danish Municipalities. The additional *cost* from this option is borne by the producers placing packaging items on the market in German border shops. Currently there are no producer fees paid for the management of waste packaging from the beverages sold in the border shops: there are fees paid by producers for all other domestic sales in Germany and in Denmark (or a packaging tax). Thus it does not seem unreasonable to include additional fees on these items.

Table 5-10: Distribution of Financial Costs – Options 2, 3b & 3c, € million

	Option 2	Option 3b	Option 3c
Producers (System Fees)	0.9	14	7
Producers (Interoperability)	0.01	1	1
Border Shoppers (Lost Deposits)		7	10
Municipalities (Non-DRS)	-0.8	-1	-1

Notes: 'Producers' refers to those placing canned beverages on the market in the German border shops; positive figures represent costs, negative figures represent savings

Under Options 3b and 3c Municipalities benefit from reduced waste collection costs, as the border cans are now managed through the DRS. Those consumers based in Denmark who are travelling to the border shops and do not redeem the deposit are affected by a new cost (though clearly, the extent to which they forego deposits is likely to influence their decision as to whether to border shop in the first place). There are again costs to producers placing on the market in German border shops from the additional fees they would pay. The distribution and magnitude of costs between Options 3b and 3c is mostly affected by the level of the deposit and the return rate.

In addition, the German border shops may lose sales to the extent that demand is affected. There would also be a loss in revenue experienced by the German Tax Ministry as a consequence of any reduction in the sales of beverages in border shops, as the take from VAT and alcohol excise duty would fall.

In relation to the VAT payments on the unredeemed deposits, the premise has been that, ultimately, some solution would be found to ensure the VAT is either transferred to the country of destination or set at a zero rate. The current situation is that difficulties have been identified with regard to transferring the VAT on the unredeemed deposits to Denmark. If this was the case, the tax take in Denmark would reduce, and conversely it would increase in Germany.

Next, the distribution of costs and benefits for the multi-lateral option (4) are considered. The effect on different groups in the five countries with existing DRSs are shown in Table 5-11 below, with negative figures indicating a saving, and positive figures indicating a cost.

Table 5-11: Distribution of Financial Costs under Option 4 (All Existing Systems become Interoperable), € million

	Denmark	Germany	Sweden	Finland	Estonia
Producers (DRS Fees)	0.4		-7.4	-0.02	1.3
Producers (Interoperability)	0.8	1.6	1.6	1.6	0.3
Consumers (Lost Deposits)	17		9	-3	
Municipalities (Non-DRS)	-1.1		-0.3	-0.1	

Note: Positive figures represent costs, negative figures represent savings

Table 5-11 shows that there are both costs and benefits that arise in Denmark, Sweden and Finland. In Germany, the main costs are associated with producers addressing the interoperability issue, but no savings occur in Germany because there is no significant 'flow' of beverages into Germany from other countries with DRSs – thus there are no changes to the management of any canned beverages in the domestic market. The same is true in Estonia. However, the national deposit system (EPP) will not maintain the deposits which are paid by Finnish consumers (as they are now paid back to border shoppers in Finland), so the revenue generated from unredeemed deposits falls. As a consequence, producer fees have to increase to meet the funding gap.

In this distributional analysis we have considered which groups bear what costs. It is clear that the costs mainly fall upon the consumers who are taking advantage of border shopping, but decide not to redeem the deposits they have paid – they do now of course have the option to redeem their deposit in any country with a DRS. Producers placing canned beverages on the market may face additional costs associated with funding the operation of the DRSs and the interoperability arrangements. A small reduction in costs is seen by municipalities (or other organisations) responsible for the current management of cans not returned through the DRSs. It is also clear, however, that the costs vary in magnitude between the different countries. In the main, this distributional analysis indicates that it will be producers and consumers who share the cost of the system change. This is aligned with one of the principles that was proposed above. The key question which remains is which country (or countries) should bear which costs.

6.0 Conclusions and Recommendations

6.1 Conclusions

The key results from the cost benefit analysis are summarised in Table 6-1. The Table shows the financial costs likely to be incurred, and the external costs (including the monetised effects from changes in recycling, the monetised impacts of changes in transport emissions, and the effect on disamenity of changes in the level of litter) associated with each Option. The figures shown are for our Central case only.

Table 6-1: Financial and External Costs of Options (million € per annum)

	Op. 1	Op. 2	Op. 3a	Op. 3b	Op. 3c	Op. 3d	Op. 4	Op. 5	Op. 6
Financial Costs	13.1	0.1	32.2	21.0	17.2	15.4	25.5	30.8	490.0
External Costs	-14.2	-2.9	-14.2	-15.8	-14.2	-13.2	-16.6	-21.2	-340.0

Note: a positive figure denotes a cost or a detrimental environmental impact, a negative figure denotes a saving or environmental improvement.

The key observations are:

1. In respect of Options 1 to 5:

    a. The worst performing Option is Option 3a, in which consumers lose considerable sums of money as a consequence of paying a much higher deposit on cans purchased in German border shops than they obtain as a refund when returning the cans in Denmark. The financial costs exceed the additional external benefits by a reasonable margin;

    b. Options 1 and 2 are both systems for which the additional financial costs are exceeded by the external benefits;

    c. Options 3b, 3c and 3d are all systems for which the additional costs are slightly greater than the external benefits, though the outcome is sensitive to some key parameters (and hence, the costs and benefits seem likely to be in close balance);

    d. Options 4 and 5 offer somewhat more comprehensive solutions, but the margin by which the costs exceed the financial benefits is greater than under Options 3b, 3c and 3d.

2. The scale of the financial and external costs for Option 6, the EU wide DRS, are disproportionately high when compared with other Options;

3. For Option 6, the financial costs far exceed the environmental benefits;

Some of the key parameters driving the analysis are subject to some debate and uncertainty. They include:

- the level of disamenity associated with litter, and the extent to which proposed Option contributes to reducing this;

- the effect of implementing deposits on the behaviour of border shoppers. To what extent, for example, would the implementation of a deposit in the border shops be expected to change the behaviour of those purchasing in the border shops?

On the basis of further considerations, it is suggested that there were 4 front-running options:

- Op. 2 - DK non-deposit Schemes
- Op. 3b - DE Dpst Redm DE in DK
- Op. 3c - DK Dpst Redm DK in DK
- Op. 4 – All Interoperable

6.2 Recommendations

The Project Specifications suggest that:

> *'On the basis of the cost benefit analysis, the contractor shall make policy recommendation(s) and develop implementation scenarios for the best identified option(s).'*

Our analysis suggests that the magnitude of the problem arising is small in relation to the total quantity of material being handled as waste metal beverage packaging across the EU. Moreover, the vast majority of the issues arise in a small number of countries. Therefore, implementing any EU-wide measure in response to what is essentially a localised problem seems inappropriate to its scale. More appropriate solutions are likely to be based around a bilateral approach (with some other parties also involved, and with the potential for more to become involved in future), or an approach covering a small number of countries. We note also that recycling rates for beverage containers in northern Europe, including in Denmark and Germany, exceed those required by the Packaging Directive for metal packaging so that performance is far from being sub-standard.

As has already been made clear, there are ongoing bilateral discussions between Germany and Denmark, with both parties seeking to resolve the interoperability

issues. The Danish Environmental Protection Agency (Miljøstyrelsen) offered the following statement for this study:

> *"Denmark and Germany have a common understanding of the border trade issue. Therefore, we are currently negotiating to find a joint solution".*

It is hoped that this study can contribute, in whatever small way, to these negotiations, and that they reach a successful conclusion in the near future.

As noted above, the options that would appear to be front-runners in being able to provide potential solutions to the problems in hand were:

- Op. 2 - DK non-deposit Schemes
- Op. 3b - DE Dpst Redm DE in DK
- Op. 3c - DK Dpst Redm DK in DK
- Op. 4 – All Interoperable

The likelihood that requiring all DRSs to be interoperable would result in net costs to society would suggest that Op. 4 might not find favour. These costs, however, are not evenly distributed across the Member States. If greater harmonisation of deposit systems was sought it might be beneficial to include only those deposit systems that are similar in nature and operation (so as to keep the costs of the change to acceptable levels).

Based upon all the evidence presented in this study, the principle policy recommendation would be that:

- ***The Danish Government should continue to seek a solution to the bi-lateral problems identified with co-operation from the German Government.***

It is important to reiterate that our analysis has not incorporated an estimate of the benefits from avoided alcohol consumption. We made clear in Section 3.2.1.1 that a key reason for cross-border movements of beverage containers, and hence, of interoperability problems, is the differential in the excise duties which Member States apply to alcohol. Some countries clearly see the use of excise duties as one means of curbing alcohol consumption, and hence, reducing social problems associated with excessive drinking. In many of our policy scenarios, where there is a significant drop in demand for alcohol, this is deemed to increase the overall costs of the option to society (for example, where a drop in consumption results from the imposition of a deposit). Such results might reasonably be set in a broader context which acknowledges the potential benefits which might flow from a reduction in alcohol consumption. At the same time, reduced consumption would also lead to a decline in consumer surplus, which would work counter to the increase in social benefits from reduced alcohol consumption.

6.3 Additional Observations

The analysis in the report has highlighted many other matters arising which are, perhaps, worthy of mention. They include the following:

1) If more deposit systems were implemented in Member States across Europe, there could be a need for some general guidelines and principles regarding the use of interoperability solutions;

2) There appears to be a lack of clear understanding, and associated uncertainty, with regards to the appropriate handling of VAT payments on deposits within and between Member States. Further clarification would be valuable in this regard, including assessing the possibility for, and legality of, a zero rate;

3) Better data and reporting on the costs and performance of packaging waste collection systems appears necessary. The level of knowledge regarding this matter is poor in most Member States. Better information would enable a sensible comparison of the efficiency of national packaging waste collection systems (not just for metal cans) to take place across the EU. Such an analysis should differentiate between the systems for collection of packaging from different sources (e.g. households, commerce, industrial producers), recognising that the systems used, the packaging materials collected, and the associated costs are likely to considerably across the sources of packaging;

4) An assessment could be made as to how cross-border flows of products influence the actual recycling rates achieved in Member States (i.e. understand to what extent private imports increase or decrease national recycling rates across the EU);

5) Member States could consider whether it is appropriate to implement cross-border financing of collection systems when the flow of privately imported containers is known;

6) Research into the disamenity associated with littering could be undertaken to increase confidence in the potential social benefits associated with measures that reduce littering; and

7) Research into the impact of the presence of a deposit on the consumption patterns of consumers could be recommended to understand better the impact of an introduction of a deposit, or a change in its level. This could include surveys or consumer focus groups.