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1. **A Description of the Status Quo for Reuse Packaging:**

In Denmark, reuse systems only exist for beverages other than milk and juices. Milk and juices are only filled in reuse glass bottles to a very small extent. The reuse systems for milk had mostly disappeared from the market in the early 70's when beverage cartons came onto the market. The same is true for juices and non-carbonated water. Bottled water is not very popular in Denmark since most of the people there drink water from the tap. Other goods such as dry food and non food products are also not actually distributed in reuse primary packaging in Denmark to any considerable extent.

2. **Reuse Primary Packaging for Beverages**

Reuse packaging is used in Denmark in a wide range of products. Mainly for carbonated softdrinks, but also for beverages without CO2. The main products are:

- Carbonated soft drinks, water, and beer
- Alcoholic drinks
- Wine
- Juices and concentrates
- Milk mix drinks

The total consumption and the consumption per capita is shown in the following table.

**Table DK-1:** Total consumption, consumption per capita and percentage of reuse packaging for beverages in Denmark (1996)

<table>
<thead>
<tr>
<th></th>
<th>Consumption total in Mio litres</th>
<th>Consumption per capita in litres</th>
<th>Market share of reuse packaging in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottled water</td>
<td>59,8</td>
<td>11,5</td>
<td>100</td>
</tr>
<tr>
<td>Carbon. soft drinks</td>
<td>536,6</td>
<td>103,2</td>
<td>100</td>
</tr>
<tr>
<td>Beer</td>
<td>633,3</td>
<td>122,4</td>
<td>100</td>
</tr>
<tr>
<td>Wine</td>
<td>180,4</td>
<td>34,7</td>
<td>46</td>
</tr>
<tr>
<td>Juices</td>
<td>96,2</td>
<td>18,5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Milk</td>
<td>704,6</td>
<td>135,5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Alcohol</td>
<td>18,2</td>
<td>3,5</td>
<td>46</td>
</tr>
</tbody>
</table>
2.1 Carbonated soft drinks, water and beer
Since 1077, there is a law which requires carbonated drinks to be filled in reuse packaging. A ban on one-way packaging was supported by the two leading brewing and soft drink companies as a protective measure to support the reuse system which was under attack by the smaller number three brewery company which has started filling one-way cans. Bottled water is uncommon in Denmark. The average consumption per capita is only 11.5 liter. For this reason, it is contained within the report under carbonated soft drinks.

2.1.1 The Market Structure
The brewing and soft drinks industry is dominated by the two breweries Carlsberg and Tuborg, which are strongly associated, and control about 80% of the beer and soft drinks market. However, some smaller local and regional breweries still do exist.

2.1.2 The Market Share of Reuse Packaging
The market share of reuse packaging is between 96% and 98% of the consumption (see Table DK-2 i.A.), while the remainder is for one-way packaging which gets imported by private individuals primarily from Germany. The market share of draught beer and carbonised soft drinks in kegs is very small and comprises a market share of about 9.5% and 3% of soft drink consumption (see Table DK-3 i.A.).

2.1.3. Distribution / Redistribution
Beer and soft drinks are mainly sold via retailers. Only a small portion is sold via HoReC2. Actual data on door to door delivery is not available. One special feature of the Danish situation, while differs from their classical strategy, is that all distributors including ALDI sell beer, carbonised soft drinks, and alcoholic beverages in reuse packaging - and remarkably, do not have any logistical problems or economic disadvantage from doing this.

The retake of the reuse packaging for beer and soft drinks in most retailer shops is done by retake machines, only in small shops and by one discounter is this done personally.

2.1.4 Types of reuse packaging in use
Company owned and pool bottles are in use for beer and carbonised soft drinks (see chapter 1.4.1). Each of them uses individual crates with different labels / colours which have to go back to the same brewery where they came from. For that reason, even though they use standardised bottles, the pools have to be considered Type B. Besides the breweries FDB, the biggest retailer organisation in Denmark, also runs it's own crates, in which small contract fillers have to deliver their products in standardised bottles. This does not influence LCA very much since distances are not as long in Denmark and the filling plants are located near the main markets. The distribution of small and the medium sized breweries is mostly regional or local.

2.1.4.1 The Technical Standard
Two types of standardised glass bottles are in use for beer. As for carbonised soft drinks, one type of standardised glass bottle, 5 types of standardised PET bottles and several types of individual PET bottles are in use.
Standards for glass bottles:

- ISO 8164: 50cl
- DS 53: 70 and 35cl
- DS 2068: 25cl

Only a technical committee at the National Brewer's Association (10) exists for the use of the DS-Standard bottles, but there is no contract pool. The whole circulation of the standard glass bottles is very common (and unique) and does not need very much organisational support.

The standards for Reuse PET-bottles is held by the „Joint PET-bottles Committee“ a Committee of the Danish soft drink's association:

- 3 types PET: 50cl
- 2 types PET: 150cl

The private standard for PET-bottles of the „Joint PET-bottles Committee“ can be used by any company signing a contract and is also open to foreign companies as well. The standard PET bottle is actually used by a Swedish company which fills mineral water. The pool contract includes technical requirements, (i.e. each filler who starts to fill a new flavoured soft drink has to go through a test to determine flavour transfer into the PET-material) and statistical duties. The pool contract requirements are actually under revision to update the technical aspects of the PET-technology.

### 2.1.4.1.3 The Number of Trips or Rotations / Number of Fillings per Packaging Life

The average number of trips per bottle have only been analysed for glass bottles by RENDAN (7), the official information centre on waste. Calculated by the number of fillings per year and the average age of the bottles in circulation, the average number of trips per glass bottle life has been determined to be:

- Beer glass bottles, 0,35 cl: 34,8 fillings (7)
- Soft drink glass bottle, 0,25 cl: 34,9 fillings (7)
- Soft drink PET-bottles, 0,5 and 1,5 litres: 20 fillings

The number of trips for reuse PET bottles is based on statistics of the pool organisation, who balances all standard bottles coming into and leaving the pool and the number of fillings per year (9).
2.1.4.1.4 The Deposit
The deposit for beer and soft drink bottles is unique to each of the shops and varies depending on the volume and material used as follows:

<table>
<thead>
<tr>
<th>Bottle Type</th>
<th>Deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>beer bottle 0,35 l</td>
<td>1,25 DKr = 0.17 ECU</td>
</tr>
<tr>
<td>beer bottle 0,5 l</td>
<td>1,50 DKr = 0.20 ECU</td>
</tr>
<tr>
<td>soft drink glass bottle 0,25 l</td>
<td>1,25 DKr = 0.17 ECU</td>
</tr>
<tr>
<td>soft drink PET bottle 0,5 l</td>
<td>2,50 DKr = 0.34 ECU</td>
</tr>
<tr>
<td>soft drink PET bottle 1,5 l</td>
<td>4,50 DKr = 0.61 ECU</td>
</tr>
<tr>
<td>all plastic crates</td>
<td>12,50 DKr = 1,69 ECU</td>
</tr>
</tbody>
</table>

2.1.4.1.5 The Marking
The bottle shapes are so common in Denmark that everybody knows them. No marking is used but for a few bottles where the letters „RETURFLASKE“ are written which means returnable bottle.

2.1.5 The Use of Standard Reuse Bottles for Non Carbonised Drinks
The glass bottle system which has been described is used as well, but to a lesser extent for juices, juice concentrates and milk mix drinks. These products are filled in 0,25 l standard bottles and are distributed mainly by FDB, the cooperative retailer in Denmark. FDB crates are used for those products which guarantees just a small amount of additional handling and easier logistics. It gives small fillers the opportunity to deliver their products in reuse packaging without having to incur high investments for bottles and crates.

2.2 Wine, Alcoholic Drinks and Spirits
The average consumption of wine per capita is around 26,8 litres. Total consumption in Denmark was about 141 Mio litres in 1996.
All of the wine consumed in Denmark comes from abroad. The quantity of wine which is imported by way of private imports is estimated to be 17,4 % of total consumption in 1996.
This quota has been declining steadily and was around 30% in 1989.
The main exporting countries to Denmark are Germany, France, Italy and Spain (for detailed figures see Chapter 4 of main report).

Total consumption of hard liquor is estimated to be 18,4 Mio litres in 1996, which is about 3,5 liter per capita and year. Alcoholic drinks and hard liquor are levied with high taxes in Denmark. This would explain why about 20% are imported tax-free by private persons.
This quantity mainly comes from Germany but that doesn’t mean that it is necessarily produced there. Many alcoholic beverages produced in Denmark are exported to Germany and re-imported tax-free.
2.2.1 The Market Structure
A high quantity of wine is imported to Denmark in bulk. Importers are independent wholesalers/importers as well as retailer organisations which do their own imports and fillings. Most of these bottlers use reuse bottles to a certain extent for their fillings because of the economic advantage those bottles provide.

The market for hard liquor is international with a high number of foreign brands. There is not much bottling of imported spirits in Denmark.

2.2.2 The Market Share of Reuse Packaging
In 1996 about 24,6 Mio. bottles of hard liquor (spirits) and 218,5 Mio wine bottles were sold all toll. A high share of these hard liquors (imported or from domestic production) which are bottled in Denmark are filled in reuse glass bottles.

The number of fillings in reused glass bottles is about 66 Mio bottles or 27% of the consumption. An additional 47,8 Mio of the used bottles have been sold abroad mainly to be filled in Germany or France.

2.2.3. Distribution / Redistribution
Distribution proceeds along all kinds of retail systems.

Redistribution is very much differentiated. Because there is a high tax on new bottles, retake systems are launched for economic reasons. Three different redistribution systems are in place:

- bottles which customer has been paid deposit for
  redistribution in plastic crates (same as delivery)

- wine bottles of different shapes which are bought back from customer or taken back for free
  retake at the POS via retake machines or in person

- collection in bottle banks or big plastic cases (HoReCa) mixed up with other glass bottles
  sorting occurs at a sorting facility of the service companies or at the facilities of the retail organisation

2.2.4 The Types of Reuse Packaging in use
Wine bottles come from all around Europe, as well as around the world into Denmark. Several types of bottles appear which adhere to national standards for wine bottles in the wine grower's countries or to the producer's standards at the bottle factories. Common European (CEN) standards for wine bottles do not exist. This explains why, Danish glass sorting companies must separate up to 60 different bottle shapes/colours and which they then sell to the fillers. According to bottle bank collection systems (see chapter 2.2.3), the annual reuse of bottles for wine and hard liquor makes up about 102 Mio. bottles or 30% of the total use of bottles (see Annex VII).
The total collection rate is about 68% which leaves another 31% of the glass to be used as cullets in the Danish glass factories.

There are not any organised pool systems for the type A and type E reuse system. The hard liquor bottles for the domestic spirit's production are highly standardised. These standards are not based on DS-standards, but on the economic interest of the bottlers/retailers in Denmark.

A deposit for wine bottles is only charged at some retailer shops, mainly FDB. The FDB is a big bottler itself and charges:
- 2,25 DKr (0,34 ECU) per bottle of the type they fill themselves.
- and pays up to
- 0,25 DKr (0,34 ECU) per bottle for certain shapes which they have not filled themselves.

The deposit for hard liquor bottles is 1,25 DKr (0,1698 ECU) in all of the retailer shops, meaning that the incentive to bring back bottles to the retailer's shop is quite high.

Since the bottle shapes for spirit bottles are very common in Denmark markings are only used by some fillers/retailers (FDB). For this purpose, a small additional sticker is fixed onto the cap of bottles.

3. Legal laws concerning Reuse Packaging for Beverages

In 1977, the Danish government started to regulate the packaging market with legal laws. Two components have thus arisen:

1. A ban on one-way packaging for carbonised soft drinks and beer has been set (begun in 1977).
2. A tax on all new beverage packaging was levied for packaging which has appeared for the first time on the market (started in 1978).

Both of these legal acts have been revised several times. The actual law is as follows:

3.1 The Ban on One Way Packaging for carbonised Beverages:

Statutory order No. 300 of April 30\textsuperscript{th} 1997 on packaging for beer and soft drinks

- This order stipulates that mineral water, beer and carbonised soft drinks may only be placed on the market in refillable packaging
- The refill packaging systems have to be approved by the Danish EPA and have to show proof that they fulfill the following aspects:
  - a certain number of fillings is completed per lifetime of the packaging
  - the technical requirements of reusability are met
not too many systems using the same technique and size are on the market

This law is an update of the bekendtgorels No. 124 from February, 27, 1989 which had been revised after the decision of the EU-Court of Justice in 1987.

The relatively new expansion of the tax law as it pertains to flexible and rigid paper and plastic packaging can not be evaluated at this time because it has not had enough time to have reached a certain level of development in the Danish economy.

The two „old / established“ political instruments, the ban and the tax, also have had a very effective influence on the market for beverage packaging when applied together.

The ban, which is the feature most discussed on the European level, is very easy to handle and to control by the government. The well-developed reuse systems, which are also the most modern, available on the market (PET bottles of the second generation) show, that the industry can easily run their business within these restrictions.

The tax itself acts as a motor for running reuse systems outside the area of the restrictive ban. Reuse systems for alcohol and for wine may not work without that incentive. Even with the normal economic advantage for reuse systems, many retailers only run the reuse systems because of the additional economic effect the tax has.

As the impressive example of ALDI, the biggest discounter in Europe, shows, the benefit of the tax compels this company to incorporate reuse systems for alcohol bottles into it's market even without any statutory orders just because they are interested in the economic aspect. This same company in Denmark even buys wine from wholesalers who fills the imported wine into reused glass bottles. They do so because of the economic advantage they gain from using the cheaper reused glass bottles. Both of these examples are exceptions though. They are completely unlike the normally very strict basic strategies that the ALDI company is known for. It is common knowledge that they are one of the biggest opponents of reuse systems all around Europe. The repeated statements from ALDI and other discounters, that they will stop selling beverages as soon as they are forced to use reuse packaging by law, has been disproven in Denmark (see Annex I). All discounters, sell beer and carbonised soft drinks with a deposit contained within competitive prices. The retake of empties and the redistribution does not seem to pose a problem for them in Denmark.

3.2. The Tax on all new Beverage Packaging

- The following is the announcement of the law for taxes on new packaging and new paper and plastic bags:

  Bekendgorels af lov om afgift af visse emballager samt visse poser af papir eller plast m.v.; Bekendtgorels Nr. 726; official journal page 4181 - 4189 of 7th October 1997.

This law levies taxes:

- on new packaging for all beverages, vinegar and oil and denatured spirits which is made out of beverage carton, and subject to a grading scale starting with a volume of 0,01 l and finishing with packaging of over 1,6 litre.
### Packaging Volume

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 0.1 litres</td>
<td>15 ore (0.02 ECU)</td>
</tr>
<tr>
<td>&gt; 0.1 to 0.4 litres</td>
<td>30 ore (0.04 ECU)</td>
</tr>
<tr>
<td>&gt; 0.4 to 0.6 litres</td>
<td>50 ore (0.07 ECU)</td>
</tr>
<tr>
<td>&gt; 0.6 to 1.1 litres</td>
<td>1 DKr (0.13 ECU)</td>
</tr>
<tr>
<td>&gt; 1.1 to 1.6 litres</td>
<td>1.50 DKr (0.2 ECU)</td>
</tr>
<tr>
<td>&gt; 1.6 to 20 litres</td>
<td>2 DKr (0.26 ECU)</td>
</tr>
</tbody>
</table>

- On new packaging for all beverages, vinegar and oil and denatured spirits made out of all materials other than beverage carton, and set on a grading scale starting with a volume of 0.011 and finishing with packaging of over 1.6 litre:

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 0.1 litres</td>
<td>25 ore (0.03 ECU)</td>
</tr>
<tr>
<td>&gt; 0.1 to 0.4 litres</td>
<td>50 ore (0.07 ECU)</td>
</tr>
<tr>
<td>&gt; 0.4 to 0.6 litres</td>
<td>80 ore (0.1 ECU)</td>
</tr>
<tr>
<td>&gt; 0.6 to 1.1 litres</td>
<td>1.60 DKr (0.21 ECU)</td>
</tr>
<tr>
<td>&gt; 1.1 to 1.6 litres</td>
<td>2.40 DKr (0.32 ECU)</td>
</tr>
<tr>
<td>&gt; 1.6 to 20 litres</td>
<td>3.20 DKr (0.42 ECU)</td>
</tr>
</tbody>
</table>

- On several types of flexible paper and plastic bags and packages per kg used packaging material, and put on a grading scale according to packaging type:

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible paper packaging</td>
<td>19.50 DKr (2.65 ECU)/ kg</td>
</tr>
<tr>
<td>Rigid paper and textile packaging</td>
<td>7.50 DKr (1.02 ECU)/ kg</td>
</tr>
<tr>
<td>Rigid packaging of recycled paper</td>
<td>6.00 DKr (0.81 ECU)/ kg</td>
</tr>
<tr>
<td>Rigid plastic</td>
<td>4.50 up to 7.50 DKr (0.6-1.02 ECU)/ kg</td>
</tr>
<tr>
<td>Flexible plastic</td>
<td>30.00 DKr (4 ECU)/ kg</td>
</tr>
<tr>
<td>Aluminium</td>
<td>11.25 DKr (1.53 ECU)/ kg</td>
</tr>
<tr>
<td>Tin plate and other steel</td>
<td>3 to 3.75 DKr (0.5 ECU)/ kg</td>
</tr>
<tr>
<td>Glass or ceramics</td>
<td>0.75 DKr (0.1 ECU)/ kg</td>
</tr>
<tr>
<td>Laminates</td>
<td>15.00 DKr (2 ECU)/ kg</td>
</tr>
<tr>
<td>Wood packaging</td>
<td>6.00 DKr (0.81 ECU)/ kg</td>
</tr>
</tbody>
</table>

### 4. The Marking Systems for Reuse

There is not common marking used for reuse packaging in Denmark. Marking symbols or written information is not requested by law.

The retake in all of the various Danish retail shops is common, and information on which bottles are to be retaken are available at the retake counters. Additionally, some companies like FDB use customer information leaflets (see Annex II) to show the range of bottles which they will take back.

However, common markings would be useful as the range of the bottles increases in the wine sector as well as in new areas of rigid plastic bottles.
List of contacts:

Coop Denmark FDB
Roskildevej 65
DK 2620 Albertslund

Dansk Flaskegenbrog A/S - Danbottle Recycling
Agenavej 13
DK- 2670 Greve

Dansk Laeskedrikke Fabrikanter
Frederiksberggade 11
DK 1459 Kobenhagen

Emballage & Samfund
Ludervej4
DK 2100 Kobenhagen

Miliomisteret
Slotsholmgade 12
DK 1216 Kobenhagen

Miljo & Energi Ministeriet
Danish Environmental Protection Agency
Strandgade 29
DK 1401 Kobenhagen
Sources:

1 Bekendtgørels af lov om afgift af visse emballager samt visse poser af papir eller plast m.v.; Bekendtgørels Nr. 726; official journal page 4181 - 4189 of 7th October 1997; København, 1997.


3 Co-op Denmark (FDB): Nu er tomme vinflasker penge vaerd, København, 1998.


5 Dansk Standardiseringsrad (DS): Dansk Standard DS 2068; København, September 1968.


9 Dansk Læskedrik Fabrikanter, Knut Loftlund, Frederiksberggade 11, DK 1459 København.

10 Dansk Bryggeriforenigingen, Frederiksberggade 11, DK 1459 København