Experience with the introduction of a mandatory deposit system in Germany

PRO EUROPE Deposit Workshop

Felix Pintgen

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A. Political goals of the mandatory deposit system in Germany
Roland Berger has been involved in the discussion around a mandatory deposit system in Germany since the very first beginning.

Time line and milestones

**ACTIVITY PROGRAM**

**PHASES**

- **Study on mandatory deposits**
  - 12/2000

- **Preparation of security labels**
  - 09/2004

- **System design**
  - 04/2005

- **Preparation for implementation**
  - 01/2006

- **Support after system launch**
  - 04/2006
  - 02/2007

**Source:** Roland Berger, DPG
The major political goal of the German Packaging Ordinance is to stabilize and increase the share of refillable packaging quota.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Intended impact</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refillable packaging quota</td>
<td>↑</td>
<td>To stabilize and increase the refillable packaging quota</td>
</tr>
<tr>
<td>Littering</td>
<td>↓</td>
<td>To reduce litter from disposable drinks packaging thrown away in public spaces</td>
</tr>
<tr>
<td>Recovery/recycling</td>
<td>↑</td>
<td>To increase recycling of materials from which disposable drinks packaging are made of</td>
</tr>
</tbody>
</table>
Since May 2005, a uniform deposit of 25ct has been compulsory, e.g. for beer, water and soft drinks sold in disposable packaging

Compulsory deposit regulation in Germany

A compulsory deposit ... ... of 25 cents ... ... applies only to certain types of drinks ... ... sold in certain types of packaging (type and size)

Compulsory deposits
- Deposit is levied initially by the bottler and then passed down through every link in the retail chain
- Consumers pay the deposit when they buy

Obligation to accept returns
- Retailers must take back empty packaging ...
  ... in return for the deposit ...
  ... free of charge ...
  ... in the vicinity of the place of sale

• Uniform compulsory deposit of 25 cents regardless of the type of drink and size of the container
• Beer, mixed drinks containing beer and non-alcoholic beer
• Water
  – Carbonated or not
  – Flavored or not
• Soft drinks
  – Carbonated or not
• Energy drinks
• Fruit juice drinks
• Mixed alcohol drinks
• Exception: Diet & sugar free drinks

From 0.1 to 3 l

• Ruling applies to volumes from 0.1 liter through 3 liters
• Materials covered:
  – Metal
  – Glass
  – Plastics

Source: Packaging Ordinance, Roland Berger
B. Set up of the system and organizational implications for stakeholders
Clearing, guaranteed acceptance and organizational set up were the main requirements arising from the Packaging Ordinance

Requirements arising from the Packaging Ordinance for a deposit system

- **Settlement of disparities in deposits** arising from sale and return via different outlets
- **Establishment of a uniform clearing** system between around 100,000 POS that sell disposable packages

- **High deposits** in absolute terms, **potential for fraud** in neighboring countries, **EAN alone easy to copy**
- **Security solution needed** to verify deposit authorization on return
- **DPG logo printed** in **security colors** straight onto containers/labels

- **Entire value chain involved**, including a large number of companies **with no legal relationships** to each other
- **Organizational anchor** is the **DPG** (Deutsche Pfandsystem GmbH) and a network of contractual relationships

Source: AC Nielsen, Roland Berger, DPG
After fulfilling all requirements an extremely complex process came into being involving retail, industry and many other parties.

Overview deposit system – Parties and processes

Source: Roland Berger, DPG
All participating parties had to be legally involved into the system – a highly complex contractual framework was established.
All involved stakeholders are facing major changes – adaptation of production, warehouse and logistics processes necessary

Implications for stakeholders

**Packaging industry**

- **Certification** needed for production plants
  - *Initial* certification
  - *Annual* re-certification

- **Alignment of production processes** according to certification guidelines

- **Set up** quality control system for DPG-symbol

- **Investment** for in-line or off-line inspection systems

**Bottlers**

- **Redesign** of labels / decors on cans in order to show DPG-symbol

- **Use of new** and separate **EAN** for products under mandatory deposit

- **Identify certified label printer / can manufacturer** for production of packaging

- **Build secure warehouse** for storage of empty cans / labels (danger of theft)

**Retailers**

- **Extensive investments** in **reverse vending machines**
  - Acquisition of new machines
  - Adaptation of existing machines

- **Use of shop space** for reverse vending machines and storage for returned containers

- **Set up of separate logistics** for returned containers

Source: DPG, Roland Berger
C. Technical details of security system
High deposits and considerable potential for fraud necessitate the use of security technologies – EANs alone insufficient

Details of the need for security technology

Deposit amount and manufacturing costs

- At 25 cents, deposit is high in absolute terms
- It is also very high relative to the price of the drink and the container

EAN code is easy to copy if it is the only security feature
- Weight and form recognition systems for disposable packaging are unsuitable

Existing recognition methods unsuitable

Numerous neighboring countries

- Neighboring countries
  - Sell drinks without levying deposits
  - Have varying income levels

Use of reverse vending machines creates an anonymous environment, which significantly lowers the threshold for fraud relative to manual, face-to-face returns

Containers returned anonymously at machines

Source: Roland Berger, DPG
From five fundamentally different security solutions the direct marking for labels and cans was chosen.

**Technology security solutions**

<table>
<thead>
<tr>
<th>Existing markings</th>
<th>Value label</th>
<th>Code-Label</th>
<th>Transponder</th>
<th>Direct marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Additional markings</td>
<td>• Visible and invisible security markings</td>
<td>• Unique code for each container</td>
<td>• Micro wire produced from a special material composition</td>
<td>• Direct application of security ink on label / can</td>
</tr>
<tr>
<td>• Top engraving</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• UV-strip</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Roland Berger, FG Technik
Production of packaging is heavily affected by introduction of DPG marking with special DPG-Ink – bottling process remains the same

Production process

Source: Roland Berger, DPG
Reading units had to be integrated into RVMs for recognition of DPG-marking – retrofitting RVMs possible – high investment for retailers

Retrofitting reading technology

**Reading unit**

- **Blank recognition unit**
- **Camera optics**
- **Lighting**

**Reverse vending machine**

- Production of reading units is possible by use of operating descriptions distributed by the DPG with the use of available standard components

RVM – Reverse Vending Machine

Source: Roland Berger, DPG
D. Financial implications for stakeholders
The overall costs for the deposit system depend on numerous system specific variables

Selection of major system cost variables Germany

- Security solution
  - Intended security level
  - Height of deposit amount
  - Number of different packaging types involved
- Return process / logistics
  - Level of automatic return
  - Nationwide obligation to take back containers
  - Transport / logistics
- Clearing
  - Level of security / encryption technology
  - Design of system without central clearing house
  - Number of involved clearing service providers during set-up

Source: DPG, Roland Berger
The various stakeholders involved in the system in Germany have to shoulder high investments and significant ongoing annual costs.

Overview system costs

**Stakeholders**

<table>
<thead>
<tr>
<th>Retail</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottlers</td>
<td>Bottlers</td>
</tr>
<tr>
<td>Packaging manufacturers</td>
<td>Packaging manufacturers</td>
</tr>
<tr>
<td>Label printers</td>
<td>Label printers</td>
</tr>
<tr>
<td>Can manufacturers</td>
<td>Can manufacturers</td>
</tr>
</tbody>
</table>

**Parameters analyzed**

<table>
<thead>
<tr>
<th>Investment to develop the deposit system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumption: Replacement investment is effected in each period</td>
</tr>
<tr>
<td>Depreciation is based on useful life and is factored into the annual cost</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual cost to operate and maintain the deposit system</th>
</tr>
</thead>
</table>

**Costs**

<table>
<thead>
<tr>
<th>Initial investment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR 726 m</td>
</tr>
<tr>
<td>Retail 702 m</td>
</tr>
<tr>
<td>Industry 24 m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR 793 m</td>
</tr>
<tr>
<td>Retail 699 m</td>
</tr>
<tr>
<td>Industry 94 m</td>
</tr>
</tbody>
</table>

1) Annual costs calculated for market in steady state.
In comparison to the existing household-based collecting system, the deposit system can only slightly increase the recycling rate.

Recovery volumes by collection system [billion units]

<table>
<thead>
<tr>
<th></th>
<th>Use of disposable packaging</th>
<th>Recovery via household-based system</th>
<th>Recovery via compulsory deposit system</th>
<th>Improvement in recovery rate through deposit system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery</td>
<td>14</td>
<td>11.2</td>
<td>13.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Percentage</td>
<td>100%</td>
<td>80%</td>
<td>95%</td>
<td>+15%</td>
</tr>
</tbody>
</table>

Comments

1. Recovering disposable containers via household-based systems leads to a recycling rate of ca. 80%.

DSD’s container recovery rate stood at around 80% before compulsory deposit was introduced.

2. Compulsory deposit systems can achieve around 95%.

3. Increase of 15% is realized thanks to superior return levels:
   - Deposit creates incentive to return containers
   - Containers that consumers throw away are mainly returned via other collectors.

Source: Roland Berger, DSD, expert interviews
For this slight increase in recycling rate a second complex and costly system had to be organized – marginal cost of 22ct for each container.

Marginal cost analysis: household-based recovery versus compulsory deposit

<table>
<thead>
<tr>
<th>Volume [billion units]</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable packaging</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household-based</td>
<td></td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>recovery</td>
<td></td>
<td>13.3</td>
<td></td>
</tr>
<tr>
<td>Recovery via deposit</td>
<td></td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ between two systems</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual cost [EUR m]</th>
<th>Per container [ct]</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.2</td>
<td>5.3</td>
<td>22.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Revenue of material sale</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD License fees from household system</td>
<td>793</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of deposit system</td>
<td>82</td>
<td>711</td>
<td></td>
</tr>
<tr>
<td>∆ between two systems</td>
<td>461</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Roland Berger, DSD
Compulsory deposits have deprived DSD of 400,000 t of recyclable materials – Licensing revenues thus down by EUR 250 million p.a.

Household-based collection, 2002-2003

**Collected volume [million t]**

<table>
<thead>
<tr>
<th>Year</th>
<th>Before deposit introduction</th>
<th>Volume erosion</th>
<th>Excluding disposable containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>6.3</td>
<td>-0.4</td>
<td>5.9</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sales [EUR m]**

<table>
<thead>
<tr>
<th>Year</th>
<th>Before deposit introduction</th>
<th>Decline in licensing revenues</th>
<th>Parallel effects</th>
<th>Excl. disposable container licenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>1,874</td>
<td>-250</td>
<td>73</td>
<td>1,697</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Since **compulsory deposits** were **introduced** in 2003, disposable containers were no longer collected **via household-based systems**
- Dual **systems are thus losing** around **400,000 t** of good **recyclable material per year**
- **DSD sales** hit **EUR 1.9 bn p.a.** before deposits
- Since deposits were introduced, **licensing revenues** have **declined** by around **EUR 250 million p.a.**
- Positive business development has provided little **compensation**
Disposable drinks packaging account for only a small fraction of the total packaging waste volume – 2.7% in 2005

Packaging consumption by form of collection in 2005 [%]

Source: GVM

Notes

- The market defined by the Packaging Ordinance consists of three parts:
  - Household-based collection
  - Commercial collection
  - Reuse logistics

- Introduction of compulsory deposits took disposable drinks packaging out of the household-based collection segment and fed it into a separate collection system
Germany already meets the minimum national recycling quota (Packaging Ordinance) and the EU standards valid as of 2009

Recycling quotas for selected materials in Germany, 1991-2005 [%]

1) Glass, tinplate, aluminum, plastics, paper and liquid packaging board account for around 82% of total packaging consumption

Source: GVM, BMU, EU Packaging Directive, Packaging Ordinance
E. Market development since introduction of the system
Mandatory deposit has not reached its goal of stabilizing share of refillable packaging – inefficiencies due to parallel collection systems

Overview market impacts of deposit system

1. Impact on retail and industry
   - Refillable packaging quota not stabilized
   - Drivers for disposable drink packaging remain intact
   - Investments necessary in systems to accept returned packaging and in a clearing system

2. Impact on the recycling market
   - Dual systems, which work efficiently, have been deprived of a large share of the packaging volume
   - Efficiency of dual systems has been eroded – Remaining licensees may face price increases
   - A separate collection system for disposable drinks packaging had to be set up and operated at considerable expense

Source: Roland Berger
Despite the introduction of the mandatory deposit system, the drivers for disposable drinks packaging remain intact

Drivers for disposable drinks packaging

<table>
<thead>
<tr>
<th>Bottlers</th>
<th>Retailers</th>
<th>Consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drivers</strong></td>
<td><strong>Drivers</strong></td>
<td><strong>Drivers</strong></td>
</tr>
<tr>
<td>• <strong>Innovation</strong> in the design and functionality of packaging</td>
<td>• <strong>Efficient returns</strong></td>
<td>• <strong>Price-driven shopping</strong></td>
</tr>
<tr>
<td>• Disposable packaging permits superior <strong>brand-specific differentiation</strong></td>
<td>• <strong>Less retail space needed</strong> than for refillables</td>
<td>• Availability</td>
</tr>
<tr>
<td>• <strong>Innovative products tested</strong> using disposable packaging</td>
<td>• <strong>Revenues from raw materials in some cases</strong></td>
<td>• Distinction between disposable and refillable <strong>becoming blurred</strong> – Deposits levied on both</td>
</tr>
<tr>
<td>• Bottlers want to recoup their investments</td>
<td>• <strong>Product diversity</strong></td>
<td>• Consumers choose functional packaging that suits their situation</td>
</tr>
<tr>
<td>• Disposable containers <strong>less complex</strong> to handle</td>
<td>• <strong>Discounter business model not suitable for refillable packaging</strong></td>
<td>• Disposable packaging <strong>can be returned anywhere</strong></td>
</tr>
</tbody>
</table>

**Effect on disposable packaging**

**Total effect on disposable packaging**

Source: Roland Berger
As drivers for one-way packaging are intact the share of refillable packaging keeps on declining.

Trend in the proportion of refillable packaging in Germany, 1980-2007 [%]

1) Only nonalcoholic beverages

Source: Roland Berger, GfK, packaging summit, press
Brief improvement in share of refillable packaging only directly after introduction of deposit in 2003 – since then decline in all categories

Trend in share of refillable drinks packaging

**WATER**

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share</td>
<td>69.6%</td>
<td>71.9%</td>
<td>65.2%</td>
<td>53.2%</td>
<td>44.5%</td>
</tr>
</tbody>
</table>

**SOFT DRINKS**

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share</td>
<td>53.4%</td>
<td>69.7%</td>
<td>66.9%</td>
<td>56.3%</td>
<td>45.0%</td>
</tr>
</tbody>
</table>

**BEER**

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share</td>
<td>76.3%</td>
<td>91.3%</td>
<td>91.2%</td>
<td>88.5%</td>
<td>86.0%</td>
</tr>
</tbody>
</table>

---

Source: Roland Berger, GfK, packaging summit, Packaging Ordinance, wafg
Growth in disposable PET bottles for non-alcoholic drinks halted briefly after deposit introduction – and has since doubled

Packaging structure for non-alcoholic drinks [%]
Operating a compulsory deposit system in parallel erodes efficiency of household-based collection – existing infrastructure is not used

Collection systems

- Complete infrastructure to collect, sort and recycle packaging in place
- Costs are governed by license fees – Higher volumes improve efficiency
- System well established among consumers

Source: Roland Berger, DSD, DPG
F. Concluding remarks
In terms of environmental policy, the mandatory deposit in Germany did not meet the goals of the Packaging Ordinance

### Intended impact

<table>
<thead>
<tr>
<th>Environmental policy goals for compulsory deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MORE REFILLABLE PACKAGING</td>
</tr>
<tr>
<td>LESS LITTERING</td>
</tr>
<tr>
<td>MORE RECYCLING</td>
</tr>
</tbody>
</table>

### Actual impact

<table>
<thead>
<tr>
<th>Actual impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduction of compulsory deposits significantly accelerated the destabilization of the refillable packaging system</td>
</tr>
<tr>
<td>• Refillable quota is falling consistently</td>
</tr>
<tr>
<td>• Drinks packaging account for only 6% of littering, so hardly any material impact</td>
</tr>
<tr>
<td>• The majority of litter in the form of non-packaging materials – film/foil, cigarettes, etc. – remains unaffected</td>
</tr>
<tr>
<td>• Drinks packaging account for only 2.7% of packaging consumption, so no material impact</td>
</tr>
<tr>
<td>• Recycling rates already high – mainly thanks to dual systems</td>
</tr>
</tbody>
</table>

Source: Roland Berger, BMU
A clear definition of goals wanted from the deposit system should be prepared prior to a detailed introduction planning

Concluding remarks

When discussing the introduction of a deposit system the following questions should be answered first

- What are the **major goals** and **motivations** for setting up a deposit system? What should be **achieved**?
- Are all involved parties **aware of** the **complexity** and the **costs** for the design / set up of the system?
- Are there **alternatives** for achieving the same goals and achievements in a less complex way?

Always keep an eye on the overall goal in order to prevent suboptimal solutions

Source: Roland Berger
G. Contacts
Please contact us with any questions or issues you would like to raise. Thank you!

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Source: Roland Berger