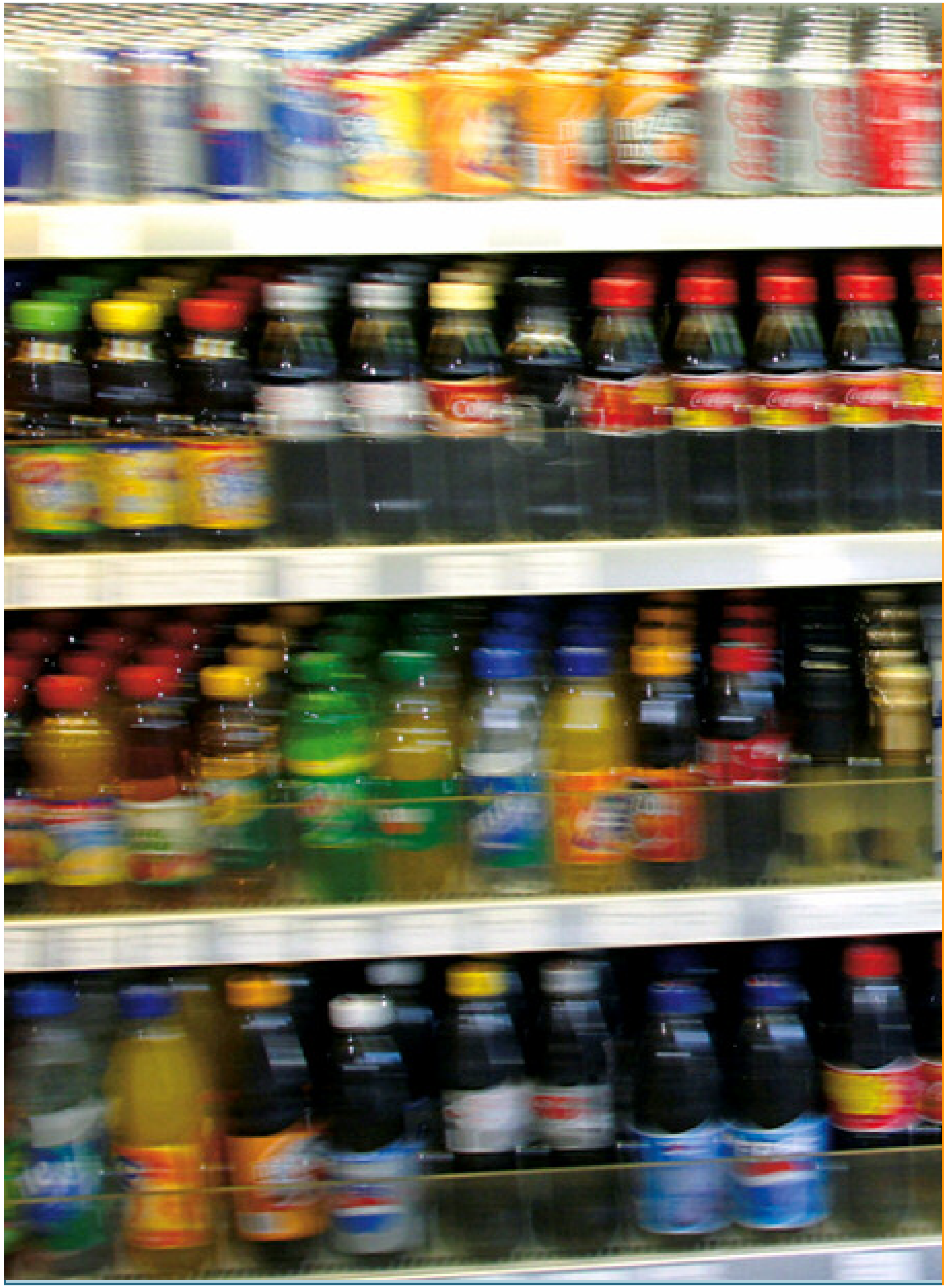


Roland Berger
Strategy Consultants

Experience with the introduction of a mandatory deposit system in Germany

PRO EUROPE Deposit Workshop

Felix Pintgen

Budapest, February 22, 2008

Contents

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

AGVU | HDE BVE | DPG DEUTSCHE PFANDSYSTEM GMBH

PHASES	Period	ACTIVITY PROGRAM
Study on mandatory deposits	12/2000 – 07/2003	• Study of the efficiency and impact of compulsory deposits for disposable drinks packaging • Findings: Compulsory deposits do not serve the in-tended economic and ecological purpose
Preparation of security labels	09/2004 – 04/2005	• Introduction of security labels • Three-phase project – Investigation of technologies – Short list of technologies and suppliers – Final selection of suppliers, beauty contest, contractual negotiations
System design	04/2005 – 01/2006	• Launch of DPG • Design of modular service strategy • Creation of three focus groups for technology, legal issues and procedural organization – 22 work modules defined in all
Preparation for implementation	01/2006 – 04/2006	• Finalization of DPG's work, focusing on – Contracts – Integrated field testing – Accreditation – Quality units – Public relations – Special issues
Support after system launch	04/2006 – 02/2007	• Support following launch May 2006, focusing on – Technical issues – Clearing – Managing conflicts/ arbitration – Income statement – Updating DPG contracts

Source: Roland Berger, DPG

Roland Berger
Strategy Consultants

The major political goal of the German Packaging Ordinance is to stabilize and increase the share of refillable packaging

Political goals of the German Packaging Ordinance in respect of drinks

Goal	Intended impact	Description
Refillable packaging quota	↗	To stabilize and increase the refillable packaging quota
Littering	↘	To reduce litter from disposable drinks packaging thrown away in public spaces
Recovery/ recycling	↗	To increase recycling of materials from which disposable drinks packaging are made of

Source: Packaging Ordinance, Roland Berger

Roland Berger
Strategy Consultants

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 …

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

… of 25 cents ...

20
5

25 cents

- **Uniform compulsory deposit** of **25 cents** regardless of the type of drink and size of the container

… applies only to certain types of drinks …

- **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

… sold in certain types of packaging (type and size)

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

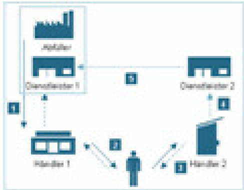
B. Set up of the system and organizational implications for stakeholders

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

Pack-aging Ordin-ance

CLEARING



- **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

GUARANTEED ACCEPTANCE

- **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

ORGANIZATION/CONTRACTS

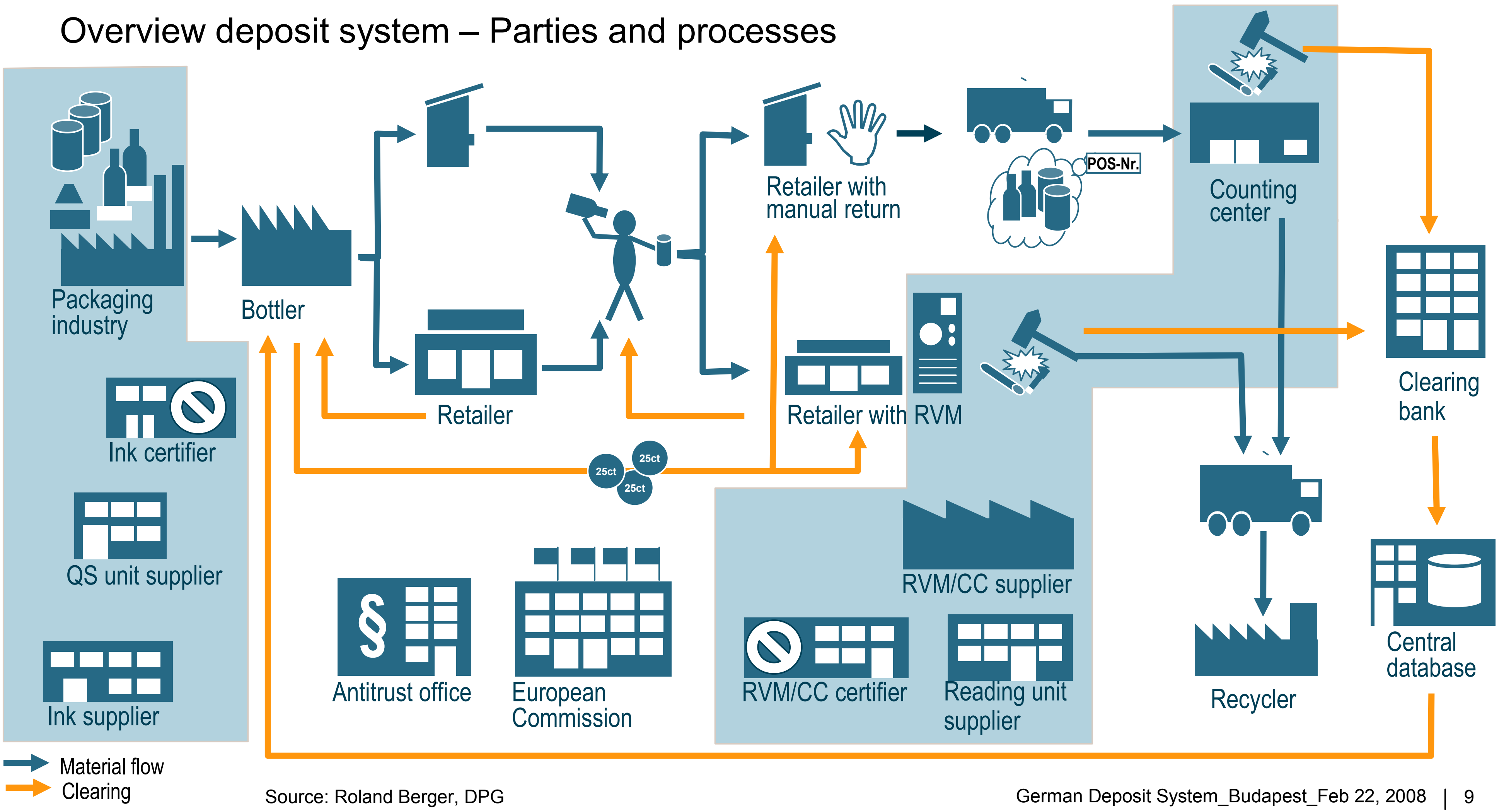
- **Entire value chain involved**, including a large number of companies **with no legal relationships** to each other
- **Organizational anchor** is the **DPG** (Deutsche Pfandsystem GmbH) and a network of contractual relationships

Source: AC Nielsen, Roland Berger, DPG

Roland Berger
Strategy Consultants

After fulfilling all requirements an extremely complex process came into being involving retail, industry and many other parties

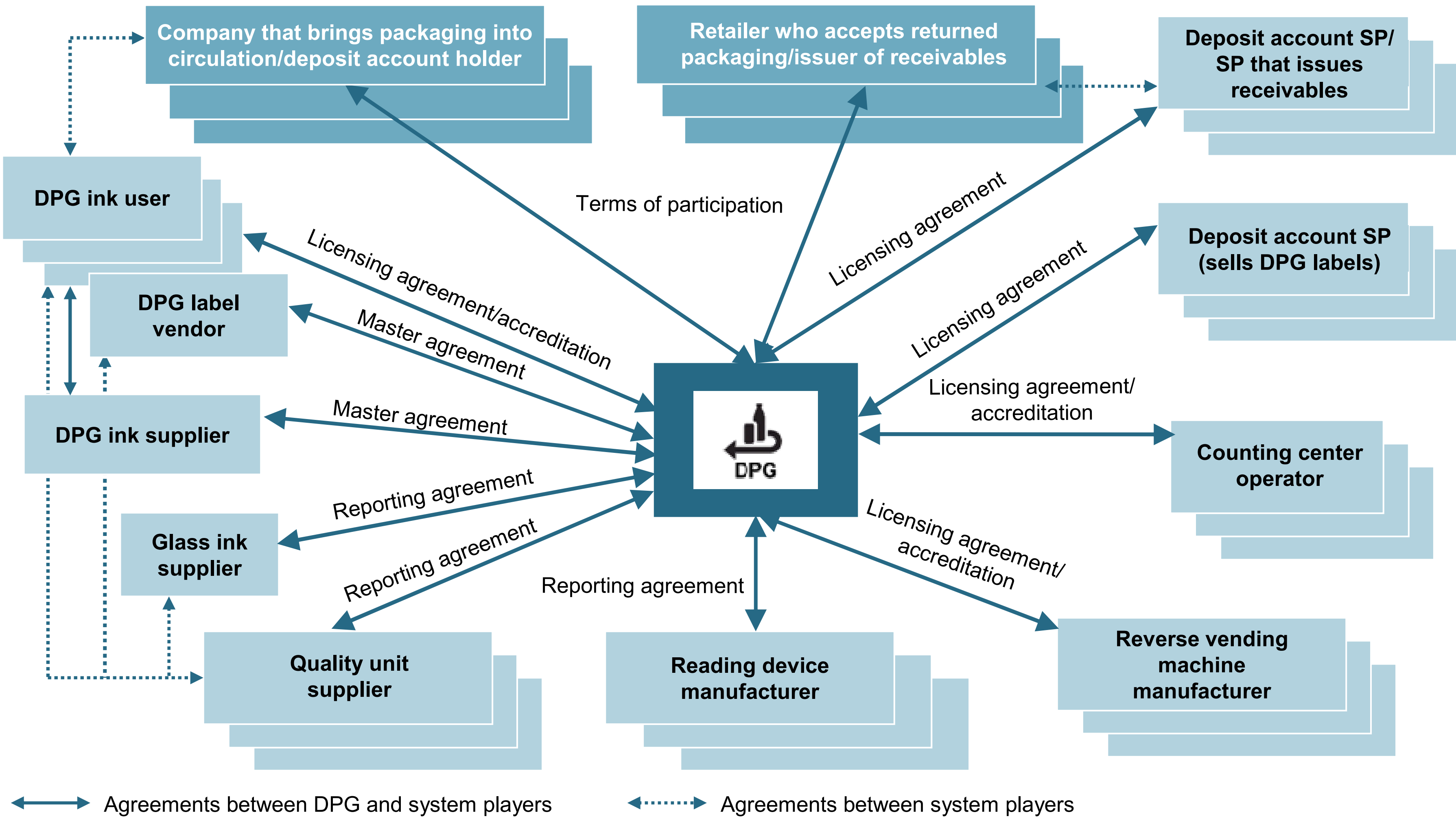
Overview deposit system – Parties and processes



Source: Roland Berger, DPG

Roland Berger
Strategy Consultants

All participating parties had to be legally involved into the system – a highly complex contractual framework was established



Source: Roland Berger, DPG

Roland Berger
Strategy Consultants

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

Numerous neighboring countries

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

Need for secure technology

- 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

- 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

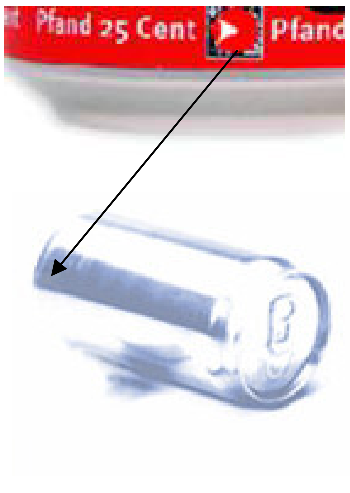
Existing markings

- Additional markings
  - Top engraving
  - UV-strip

Value label

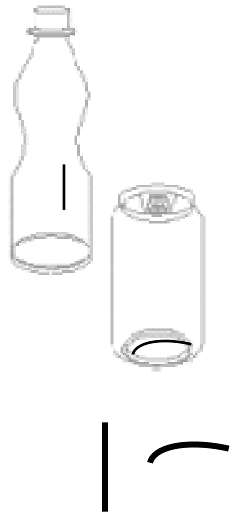
- Visible and invisible security markings

Code-Label



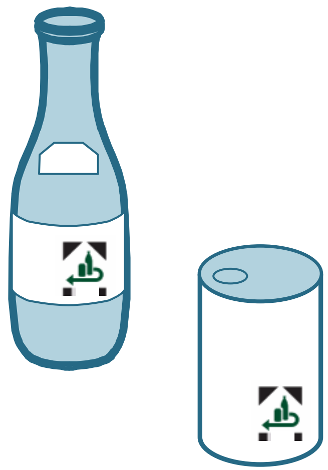
- Unique code for each container

Transponder



- Micro wire produced from a special material composition

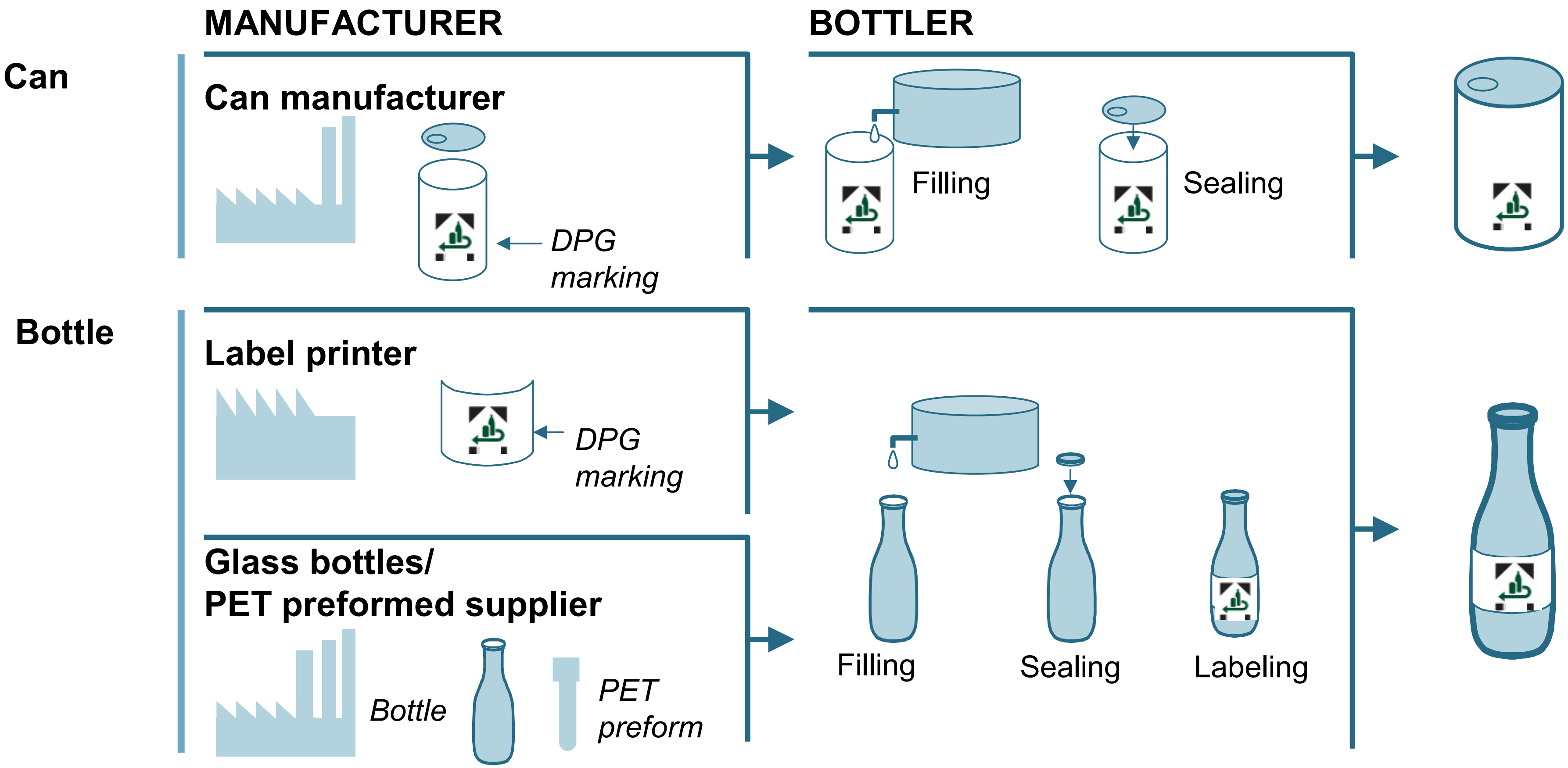
Direct marking



- Direct application of security ink on label / can

Production of packaging is heavily affected by introduction of DPG marking with special DPG-Ink – bottling process remains the same

Production process

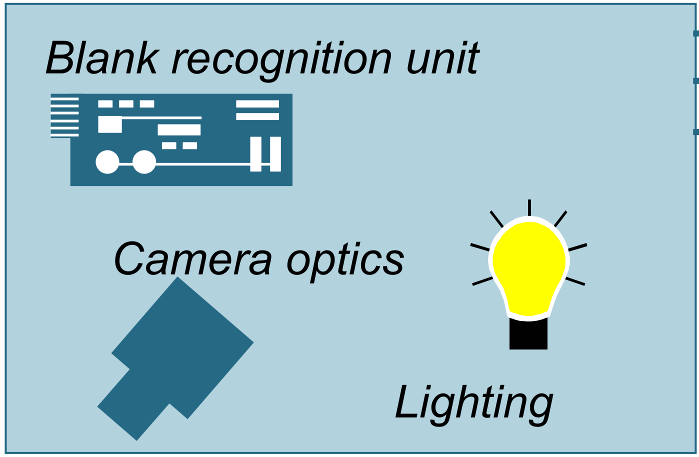


Source: Roland Berger, DPG

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



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

- **Overall costs for German mandatory deposit system**
  - **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

- **Retail** 1

- **Industry** 2
  - Bottlers
  - Packaging manufacturers
    - Label printers
    - Can manu-facturers

Parameters analyzed

Investment to develop the deposit system

- Assumption: **Replacement investment** is effected **in each period**
- **Depreciation** is based on useful life and is **factored into the annual cost**

Annual cost to operate and maintain the deposit system1)

- Assumption: Market volume of **14 billion disposable containers** p.a.

Costs

Initial investment:

EUR 726 m
Retail 702 m
Industry 24 m

Annual cost:

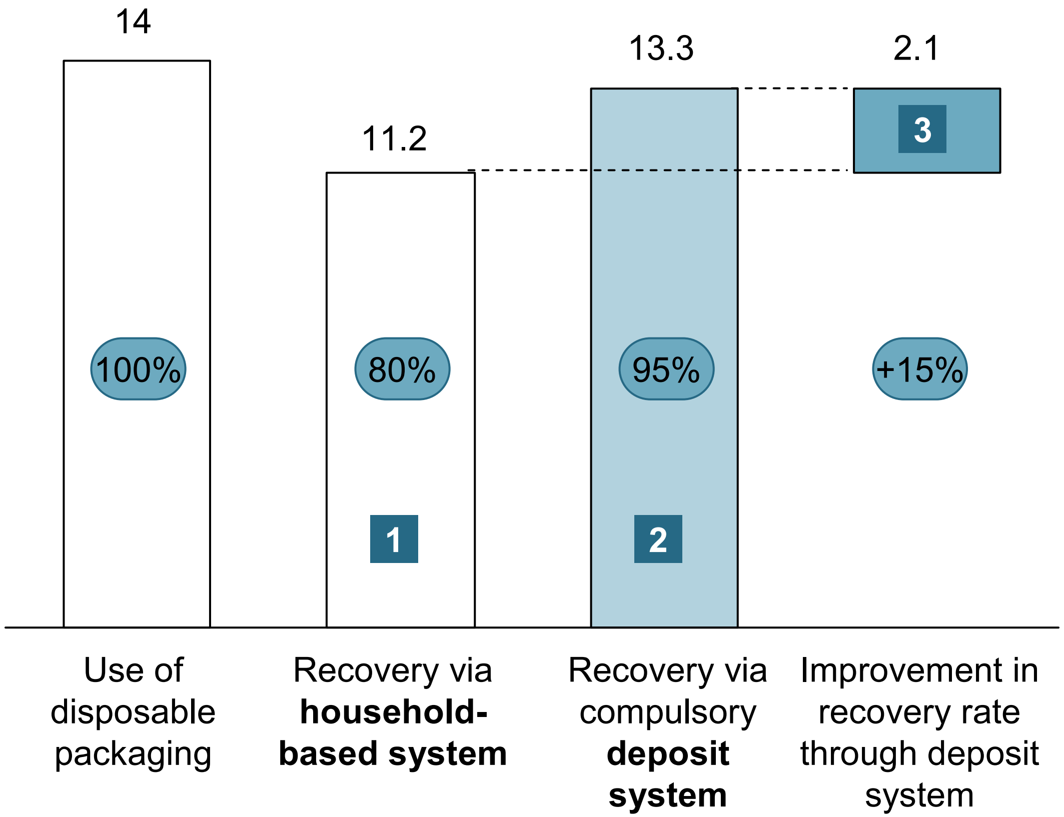
EUR 793 m
Retail 699 m
Industry 94 m

1) Annual costs calculated for market in steady state

Source: Roland Berger

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]



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

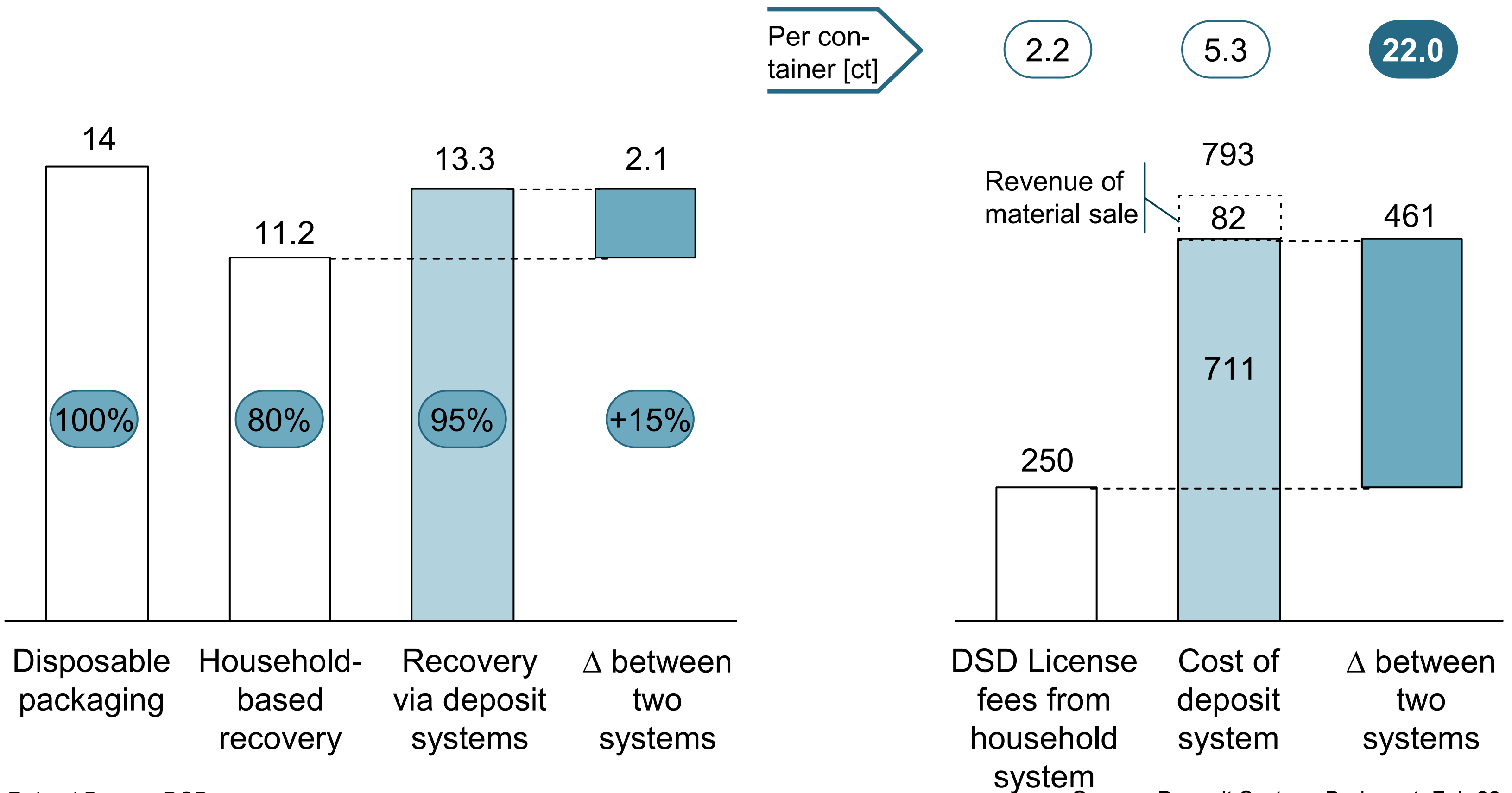
Roland Berger
Strategy Consultants

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

Volume [billion units]

Annual cost [EUR m]



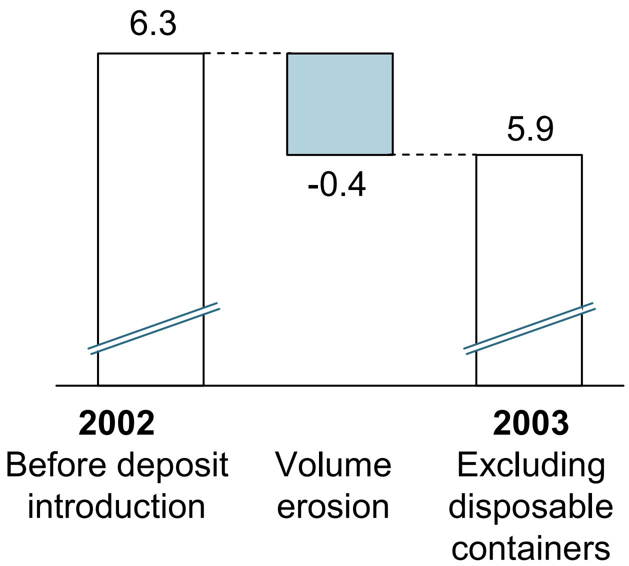
Source: Roland Berger, DSD

Roland Berger Strategy Consultants

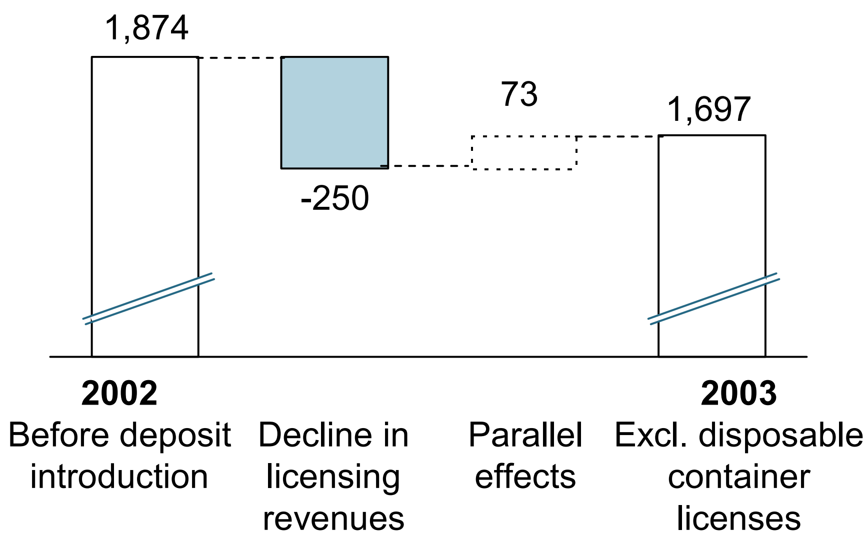
Compulsory deposits have deprived DSD of 400,000 t of recyclable materials – Licensing revenues thus down by EUR 250 million p.a.

Household-based collection, 2002-2003

Collected volume [million t]



Sales [EUR m]



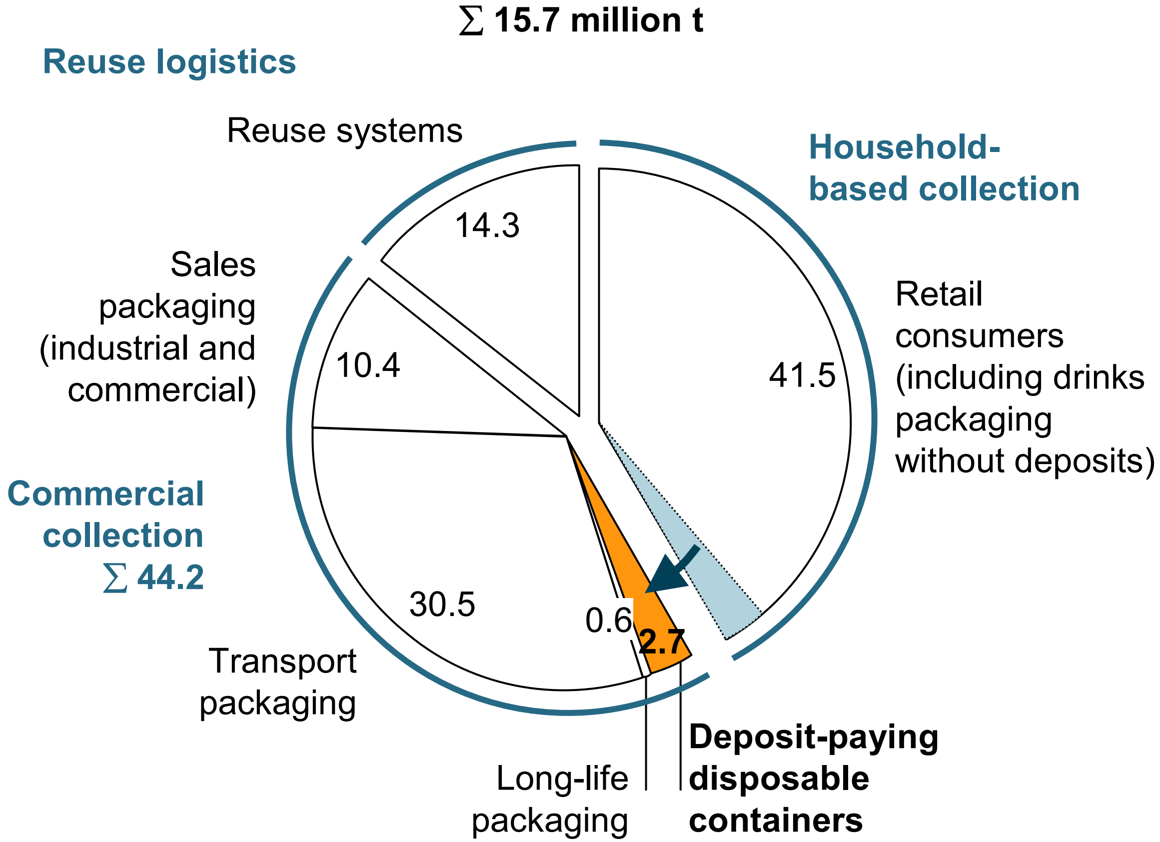
- Since **compulsory deposits** were **introduced** in 2003, disposable containers were no longer collected **via household-based systems**
- Dual **systems are thus losing** around **400.000 t** of good **recyclable material per year**

- **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**

Source: DSD, press

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 [%]



Notes

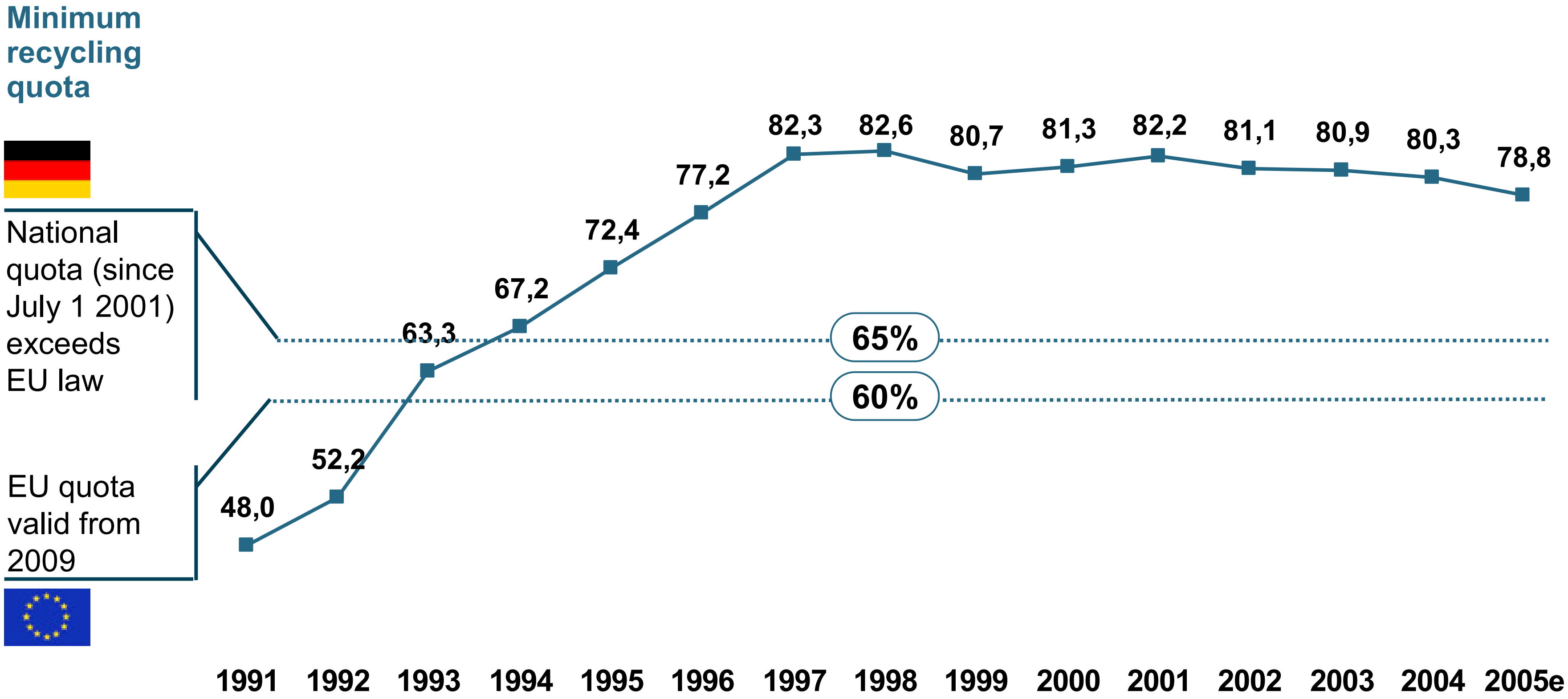
- The market defined by the Packaging Ordinance consists of three parts:
  - Household-based collection
  - Commercial collection
  - Reuse logistics
- Introduction of compulsory deposits took disposable drinks packaging out of the household-based collection segment and fed it into a separate collection system

Source: GVM

Roland Berger
Strategy Consultants

Germany already meets the minimum national recycling quota (Packaging Ordinance) and the EU standards valid as of 2009

Recycling quotas for selected materials[1)] 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

Roland Berger Strategy Consultants

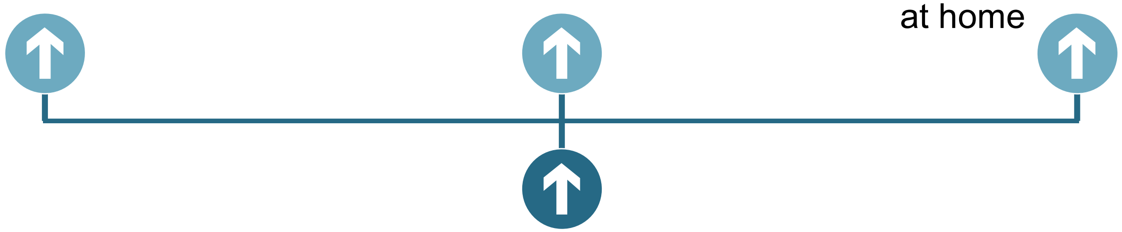
Despite the introduction of the mandatory deposit system, the drivers for disposable drinks packaging remain intact

Drivers for disposable drinks packaging

	Bottlers	Retailers	Consumers
Drivers	• **Innovation** in the design and functionality of **packaging** • Disposable packaging permits superior **brand-specific differentiation** • **Innovative products tested** using disposable packaging • Bottlers want to recoup their investments • Disposable containers **less complex** to handle	• **Efficient returns** – Economies of scale • **Less retail space needed** than for refillables • Revenues from raw materials in some cases • **Product diversity** • **Discounter** business model **not suitable for refillable packaging** • Low barriers to entry for private labels • **Increasing automation**	• **Price-driven shopping** • Availability • **Distinction** between disposable and refillable **becoming blurred** – Deposits levied on both • Consumers choose functional packaging that suits their situation • **Disposable packaging can be returned anywhere** • **Little space needed** at home

Effect on disposable packaging

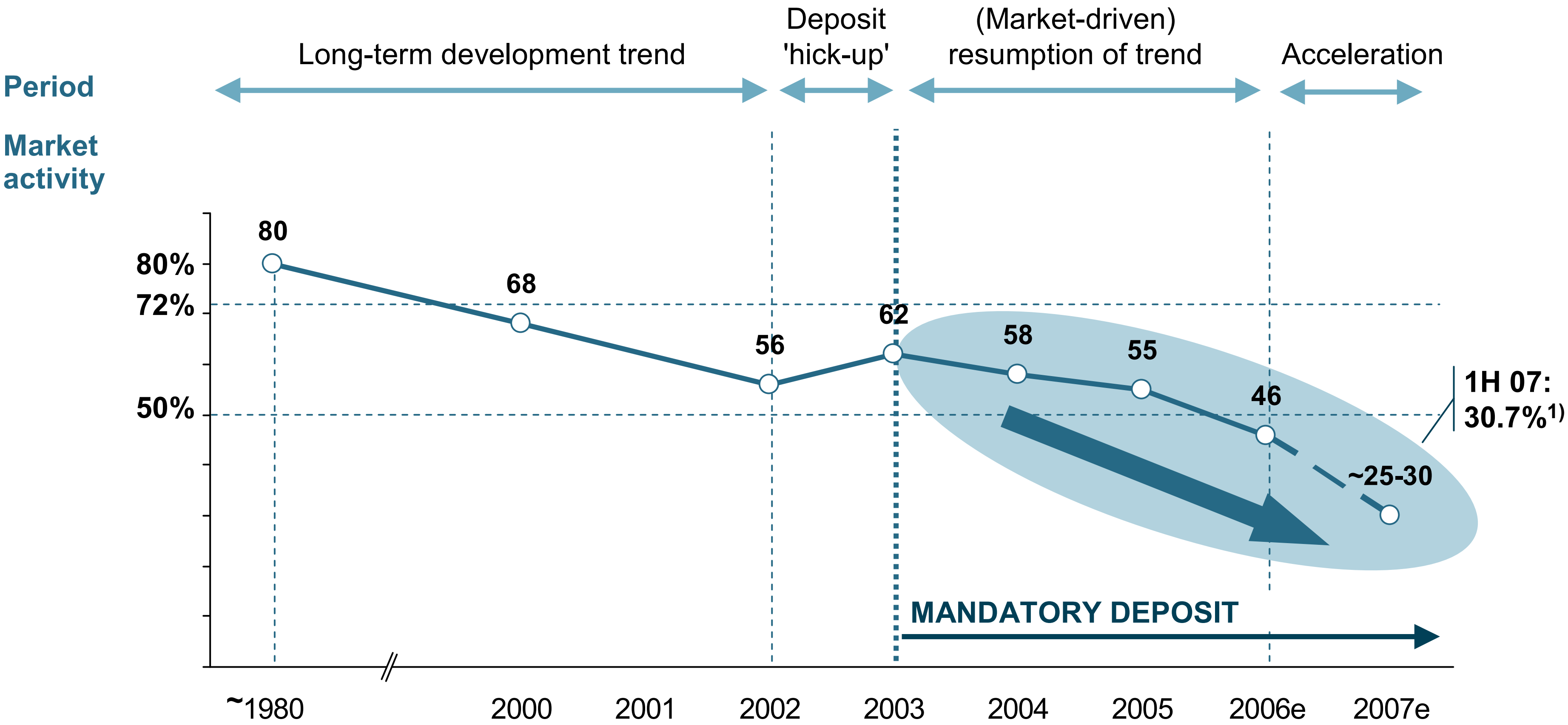
Total effect on disposable packaging



Roland Berger
Strategy Consultants

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 [%]



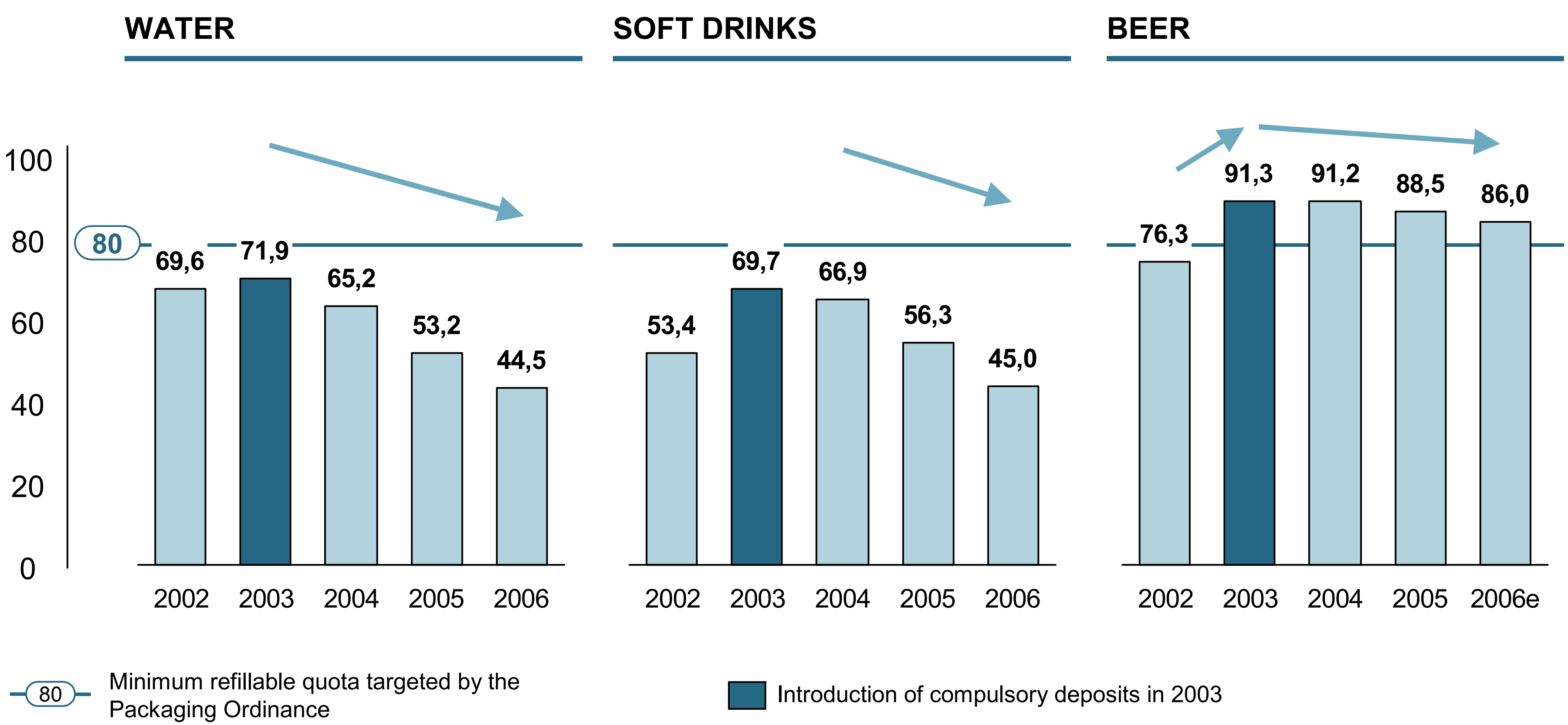
1) Only nonalcoholic beverages

Source: Roland Berger, GfK, packaging summit, press

Roland Berger
Strategy Consultants

Brief improvement in share of refillable packaging only directly after introduction of deposit in 2003 – since then decline in all categories

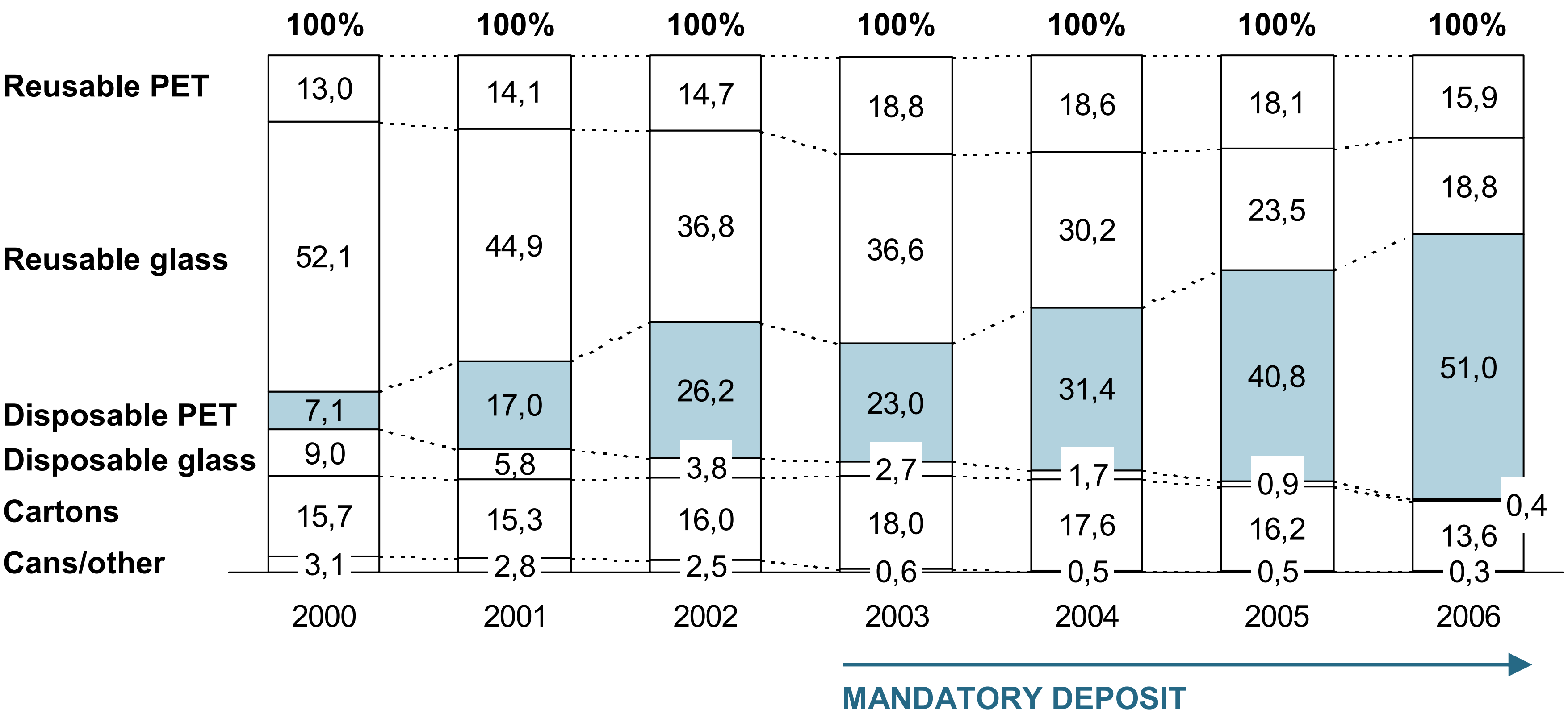
Trend in share of refillable drinks packaging



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 [%]



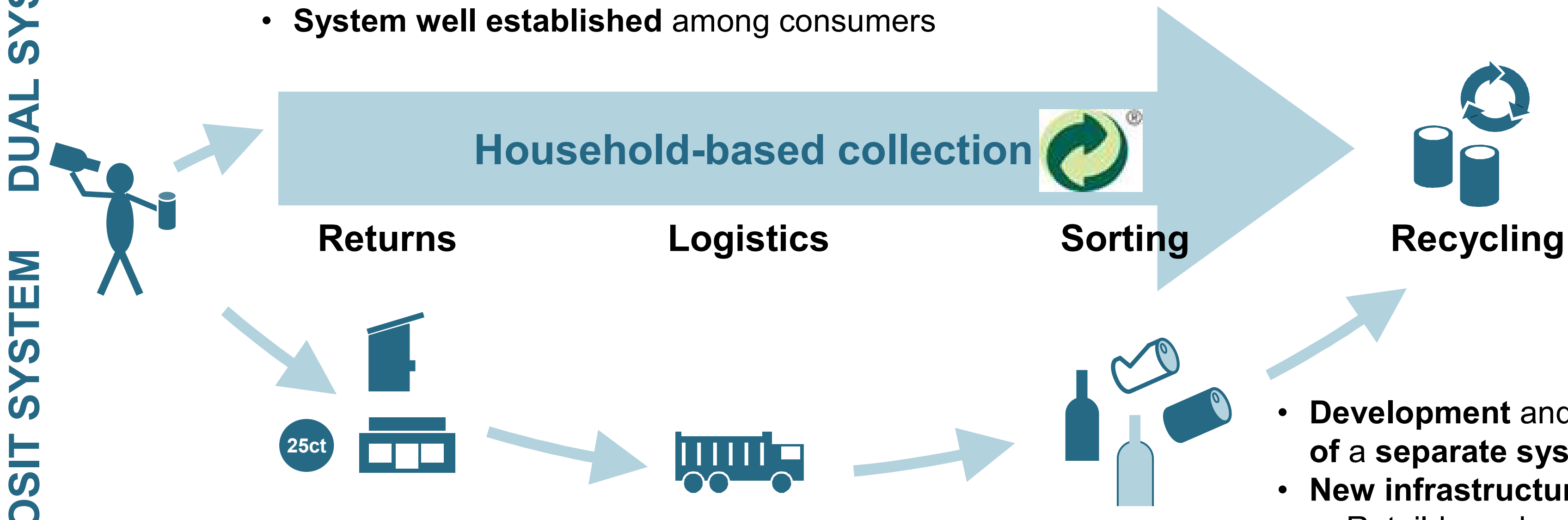
Source: GfK

Roland Berger
Strategy Consultants

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



- **Development** and operation **of a separate system**
- **New infrastructure needed**
  - Retail-based machines
  - Counting center capacity
- **System difficult** to understand for 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

Environ-mental policy goals for compulsory deposits

Intended impact	Actual impact
MORE REFILLABLE PACKAGING	• Introduction of **compulsory deposits** significantly **accelerated** the **destabilization of the refillable packaging system** • **Refillable quota is falling** consistently
LESS LITTERING	• **Drinks packaging** account for **only 6%** of littering, so hardly any material impact • The **majority** of **litter** in the form of non-packaging materials – film/foil, cigarettes, etc. – **remains unaffected**
MORE RECYCLING	• **Drinks packaging** account for only **2.7%** of packaging consumption, so no material impact • **Recycling rates already high** – mainly thanks to dual systems

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!

Contacts at Roland Berger Strategy Consultants

Felix Pintgen

Principal

Phone: +49 (0) 89-9230-8677
Mobile: +49 (0) 160-744-8677
Fax: +49 (0) 89-9230-8391
E-mail: felix_pintgen@de.rolandberger.com

Oliver Beck

Senior Consultant

Phone: +49 (0) 89-9230-8154
Mobile: +49 (0) 160-744-8154
Fax: +49 (0) 89-9230-8176
E-mail: oliver_beck@de.rolandberger.com

Source: Roland Berger

Roland Berger Strategy Consultants is a strategy consulting company working on top-management issues all over the world

Our current global presence

Amsterdam I Bahrain I Barcelona I Beijing I Berlin I Brussels I Bucharest I Budapest I Detroit I Düsseldorf I Frankfurt I Hamburg I Kiev I Lisbon I London I Madrid I Milan I Moscow I Munich I New York I Paris I Prague I Riga I Rome I São Paulo I Shanghai I Stuttgart I Tokyo I Vienna I Warsaw I Zagreb I Zurich

33 offices in 23 countries, with 1,700 employees

76% of the projects with cross-border assignment

International teams with specialists from 14 Competence Centers

Source: Roland Berger