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Organizing Waste Reduction in the Dutch Waste Sector

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5. PRODUCT RESPONSIBILITY IN NORTH RHINE-WEST-PHALIA

5.1 Introduction

This case study of the structure of the Dual System in North Rhine-Westphalia, one state of the Bundes Republik Deutschland (BRD or Germany), shows how the principle of product responsibility has been applied in practice. The take-back ordinance on packaging waste required industry, not the public waste management system, to take back, re-use or recycle one-way packaging in the German market. Private industry took the financial responsibility, but proposed a collective system. The implementation of this alternative plan, which could meet the required, specified goals for collection, sorting and recycling or refilling of packages, was granted by the federal government and is now known as 'the dual system', run by the (private) company *Duales System Deutschland GmbH (DSD)*.

The extension of industry's life-cycle responsibility has already taken place: concept ordinances on other products like automobiles, electronic equipment, newspapers and batteries have been proposed. Further legislation has been prepared as well: the 'Closed-loop Economy and Waste Management Act' was to come into force in October 1996. Under this act, the strategy of making industry responsible for its packages from the beginning to the end of their life cycles is going to be extended to all products.

The German model of the dual system offers great potential for application in the Netherlands and elsewhere. It is very interesting to study the changes in the structure of the waste market that can be attributed to application of the take-back strategy.

The ordinance has already had enormous influence on the structure of the waste sector. Respondents are expecting that governmental bodies will be increasingly withdrawing from the waste market as a consequence of closing the life-cycles of more products. The pre-existing tendency towards privatization of several functions in the waste market is expected to be strengthened. It is this tendency of privatization that provides us with another reason for choosing the German packaging waste market as a case-study. In the Netherlands, the question is being discussed as to whether a reliable waste collection and disposal system can only be assured when public authorities, as representatives of environmental values, play an important part in the waste market. In the Netherlands public authorities often argue that their participation remains necessary. It appears that in Germany

all waste handling activities, including disposal, are exclusively done by private organizations in a free market.

Of course Germany differs from the Netherlands in several ways; for example, from an administrative, demographic, and socio-economic point of view. Therefore one state, North Rhine-Westphalia, has been chosen for a case study. The first reason for selecting this state was the fact that relatively many municipalities in this state resisted the creation of a dual system. Düsseldorf and Münster, for example, did not permit DSD to contract either private or public collectors.

Another reason for selecting North Rhine-Westphalia was the fact that this appeared to be the only state that altered its legislation in response to the creation of DSD. The idea that public interests can best be served when local authorities do not reject the responsibility for collection and disposal fits in with current thoughts about the role that governmental bodies should fulfill in the Netherlands.

The purpose of this chapter is to describe the effects of the application of this new concept of product responsibility on the structure of the waste sector in North Rhine-Westphalia. To start with, the Packaging Ordinance will be illuminated briefly. Then, the way the take-back obligation was achieved, by setting up a collective initiative, DSD, will be described. Thereafter, the contemporary structure of the North Rhine-Westphalia waste market, of which the packaging market forms a part, will be examined. Then, the Packaging Ordinance and the dual system will be evaluated. Finally, the concluding paragraph discusses whether the concept of product responsibility must be evaluated negatively or positively in terms of waste reduction. The case 'producer responsibility in North Rhine-Westphalia' was selected among others, because it is an example that applies a policy instrument to reduce packaging waste, and not for the structuring of the whole waste management system in this state. The results of this case have to be comparable with the other cases. Therefore, after describing the dual system, the conclusions will include explicitly the analysis of the relationship between waste reduction and five central elements in the structure of a waste sector: the division of functions in the waste market, the conditions for transactions, the role of public authorities, the scale of planning and the responsibility for waste reduction.

5.2 Packaging Ordinance

On June 12, 1991, the German Packaging Ordinance, 'Verpackungsverordnung', went into effect. The ordinance applied 'the polluter pays principle'

to packaging waste: those who produce packages are responsible for their recycling and disposal after consumers discard them. Leading material flows back to production processes is supposed to stimulate waste reduction and create a closed-loop economy.

Concrete goals of the Packaging Ordinance are: reducing the amount of packaging waste that must be landfilled and incinerated, and developing a sound materials policy. The ordinance sets out four major objectives: (BMU, 1991):

1. Packaging should be made from 'environmentally-responsible' materials that can be recycled
2. Weight and volume should be minimized
3. Packaging should be refillable
4. Packaging should be recycled if the conditions for refilling are not obtained.

The basic strategy is to force industry to take back packaging waste in order to re-use or recycle it. In the meantime the public infrastructure for the collection, processing and disposal of municipal solid waste stays intact. By making manufacturers, distributors, and retailers take back the packaging, the ordinance gives private industry the incentive to incorporate waste management considerations into the design and materials selection processes (Fishbein, 1994).

The Packaging Ordinance underwent a number of stages before the ordinance became fully effective. The first stage started January 1, 1992: manufacturers and distributors had to take back transport packaging (e.g. crates, pallets and corrugated containers) from retailers. The second stage started April 1, 1992: consumers were obliged to leave secondary packaging (e.g. additional packaging designed to facilitate self-service sales, to prevent theft, or to advertise the product, such as outer boxes, foils and blister packs) in the stores after use. Retailers were required to install marked bins within their shops and they were obliged to store this packaging for further separation and processing. The third stage started January 1, 1993: manufacturers and distributors were obliged to take back the primary packaging (the basic package that contains the product like soup cans, jam jars and soap powder boxes). Customers could return primary packaging to retailers. Meanwhile, a mandatory deposit was imposed on non-refillable beverage containers (0.5 DM), plastic washing and cleansing agent containers (1 DM) and paint containers (2 DM).

The obligation to take back and impose deposits on packaging generated resistance from distributors and manufacturers of beverages, washing detergents and paints. Retailers, who are the connecting link between manufacturers and consumers, did not like the idea of allocating space and workforce

in order to provide the needed service for the collection of packaging waste. The regulation of transport and secondary packaging went into effect as scheduled. However, an exemption to the primary packaging regulation was provided when industry initiated an alternative, privately financed plan for the collection and sorting of packaging materials, and the refilling of beverage containers collectively instead of individually. The collective system for the collection and sorting of packages was developed separately from the already existing system for municipal solid waste. For this reason the new system of waste collection was called the 'dual system'.

The ordinance allowed an exemption from the mandatory deposits and from the requirements to take back primary packages, but only if the use of re-usable would stay at the level of 1991 and re-use would not exceed the goal of 72%. In exchange for this exemption Töpfer, Germany's Environment Minister, made a firm guarantee. By July 1, 1995, at least 80% of the weight of the packaging waste, which would have been part of the municipal solid waste, must have been collected separately by DSD, the industry-operated company *Duales System Deutschland GmbH*. Depending on the kinds of materials, 80 to 90% of the separately collected packaging waste should have been sorted out and 64 to 72% should have been processed. Finally, at the end of 1995, the dual system had to be implemented throughout Germany (Benzler *et al*, 1995).

5.3 **Duales System Deutschland (DSD)**

The private organization DSD was founded in September 1990 by 95 companies. By April 1993, nearly 600 firms had joined. DSD is a non-profit company. It was commissioned to model the idea of a cooperative system for the collection and sorting of packaging waste. DSD has roughly three tasks.

5.3.1 *Authorize the use of a green dot*

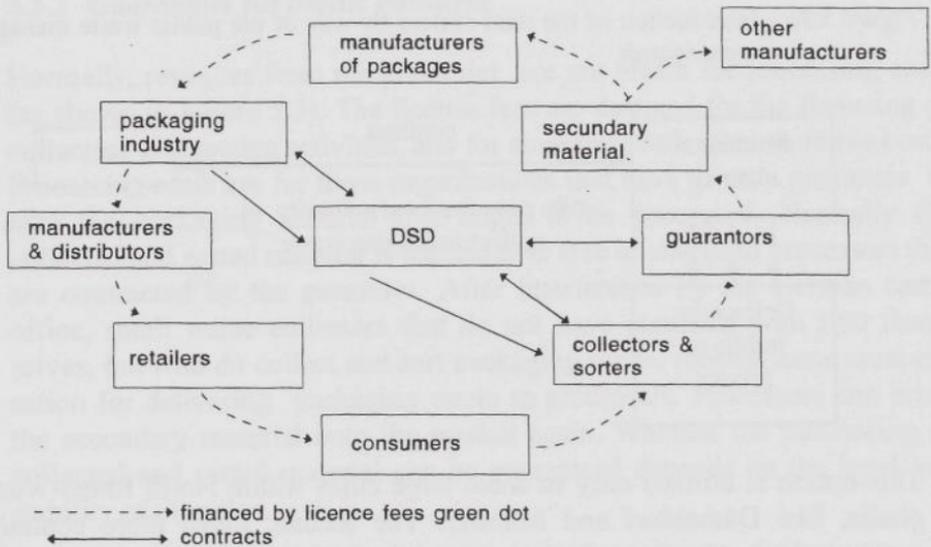
The first task of DSD consists of issuing permits for the use of green dots. A green dot on the package of a product shows that the package will be collected and recycled under the DSD scheme. Firms within the scheme pay a license fee. The fee is passed onto the consumer by raising the price of products.

In order to receive a license, one has to first sign a contract with DSD, indicating that a license fee will be paid per package. The fee is based upon the costs for collection and sorting, the weight and the volume of the mate-

rial used for packaging. An organization that wants to become a licensee has to assure DSD that it will have its used packages processed according to the rules of the ordinance. They have to show DSD a guarantee from a designated recycling company assuring that the specific type of packaging in question will be recycled. For each kind of material processed, organizations act as guarantors (see Figure 5.3 for these guarantors). When general guarantees state that packages made of materials like glass, tinplate, aluminum, paper and plastics will be recycled, individual agreements are not necessary anymore.

The most important link in the packaging cycle (see Figure 5.1) is that of the retailers. It is in their interest (logistic and economic advantage) that the dual system becomes a success. They do not want the federal government to put the take-back obligation into force again. Retailers can put pressure upon manufacturers and distributors to become licensees of DSD. It is in their power to include or exclude certain products in their assortment.

Figure 5.1 Packaging cycle and DSD



Threatening the exclusion of a product can bring manufacturers to use materials with a green dot on their packaging. It is in the interest of manufacturers and distributors that retailers purchase goods from them. As a result, they join DSD: in practice, mostly packaging industry and packaging manufacturers are licensees of DSD. Retailers choose their supplier not only because of the quality and the price of products, but also based on their approach to the packaging problem and the provision of logistical ease. In

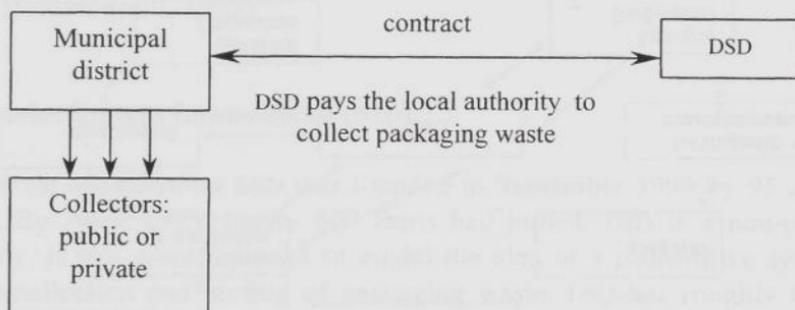
case the dual system fails, the obligation to take back individual packages and to impose deposits on non refillable containers has to be complied with. There are also manufacturers that cannot be put under pressure by the threats of retailers, such as manufacturers of shoes or clothing who have their own shops, and can thus sell their products independently from retailers. Manufacturers may decide not to join the dual system, there are no legal requirements for wrapping products in licensed packages.

5.3.2 *Contracts for collection and sorting*

A second task of DSD includes contracting for the collection and sorting of packaging waste. DSD uses only one collector in contracting within one 'Kreis': a district that sometimes is limited to the territory of one municipality, but in most cases contains a much larger domain.

Two kinds of contract appear to be possible. The first option involves the use of public waste management infrastructure, after making agreements about the collection and sorting of packaging waste (Figure 5.2a).

Figure 5.2a Introduction of the dual system by way of the public waste management system

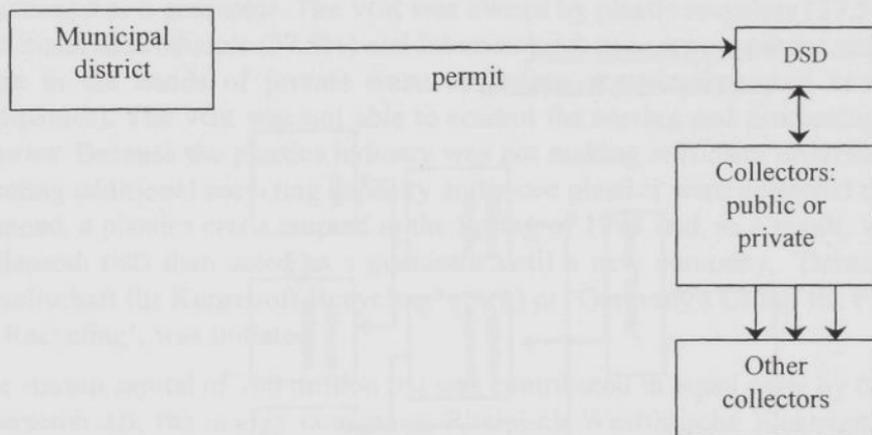


This option is utilized only in some large cities within North Rhine-Westphalia, like Düsseldorf and Münster. The second, much more common option is the contracting of private or public collection and sorting bodies by DSD itself and by courtesy of the municipalities (Figure 5.2b).

In 1993 DSD set out contracts for the collection of packaging waste in 61% of the cases with private collectors, in 16% with public bodies and in 23% with cooperating private and public bodies (Sitterz, 1994).

The DSD system includes a combination of drop-off and curbside collection. Households can continue to bring paper and glass packages to 'igloos' and containers. Packaging materials like plastic, composite, aluminium and tinplate, can be put in a yellow bin or bag which is picked up.

Figure 2b Introduction of the dual system outside of the public waste management system (Bünemann and Rachut 1993a)



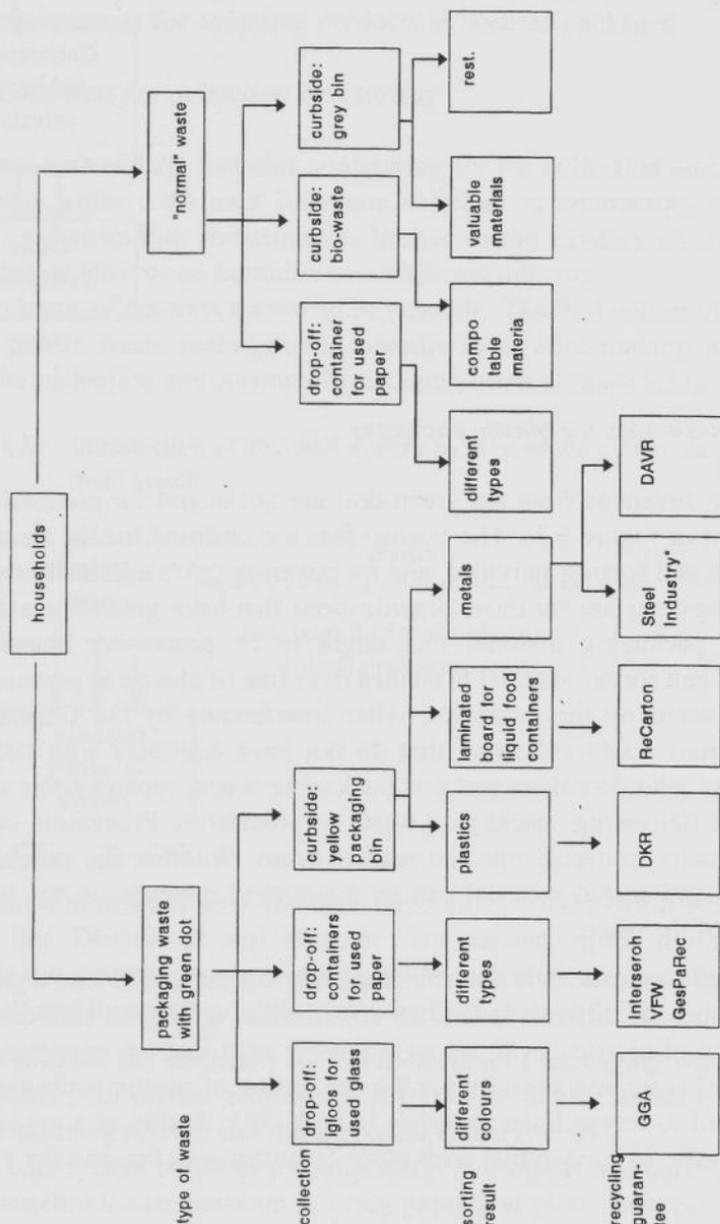
5.3.3 Guarantors for plastic packages

Normally, revenues from the green dot are not meant for processing costs (as shown in Figure 5.3). The license fees are destined for the financing of collection and sorting activities, and for covering DSD's administrative costs. Processing costs are for those organizations that have given a guarantee to take the packaging material that ought to be processed. Normally the collected and sorted material is handed over free of charge to processors that are contracted by the guarantor. After interference by the German cartel office, small waste collectors that do not have contracts with DSD themselves, but who do collect and sort packaging waste, receive some compensation for delivering packaging waste to processors. Processors can bring the secondary material onto the market again. Whether the purchasing of collected and sorted material can be guaranteed depends on the level and stability of the price.

Because of fluctuations in the price for paper it was hard to find a guarantor. It also appeared difficult to find an organization willing to take care of the processing of plastics, or to act as guarantor. DSD took an important role as initiator of recycling capacity for the processing of plastic packaging waste after it had to face a financial crisis in mid-1993. Acting as a guarantor for plastic waste, in cooperation with other organizations, became the third task of DSD.

Figure 5.3 The dual system (Fischbein, 1994 and Bünemann & Rachut, 1993)

* Krupp Hoesch Stahl,
Thijssen Stahl, Rasselstein



Originally (since February 1991), the Recycling group for used plastic packaging (*Verwertungsgesellschaft Kunststoff Verpackungen mbh* or VGK) functioned as a guarantor. The VGK was owned by plastic recyclers (37.5%), raw material producers (37.5%) and Interseroh AG (a company whose shares were in the hands of private waste-collecting organizations and energy companies). The VGK was not able to control the sorting and processing of plastics. Because the plastics industry was not making sufficient progress in creating additional recycling capacity and more plastics were collected than planned, a plastics crisis erupted in the Spring of 1993 and, as a result, VGK collapsed. DSD then acted as a guarantor until a new company, 'Deutsche Gesellschaft für Kunststoff Recycling' (DKR) or 'Germany's Group for Plastic Recycling', was initiated.

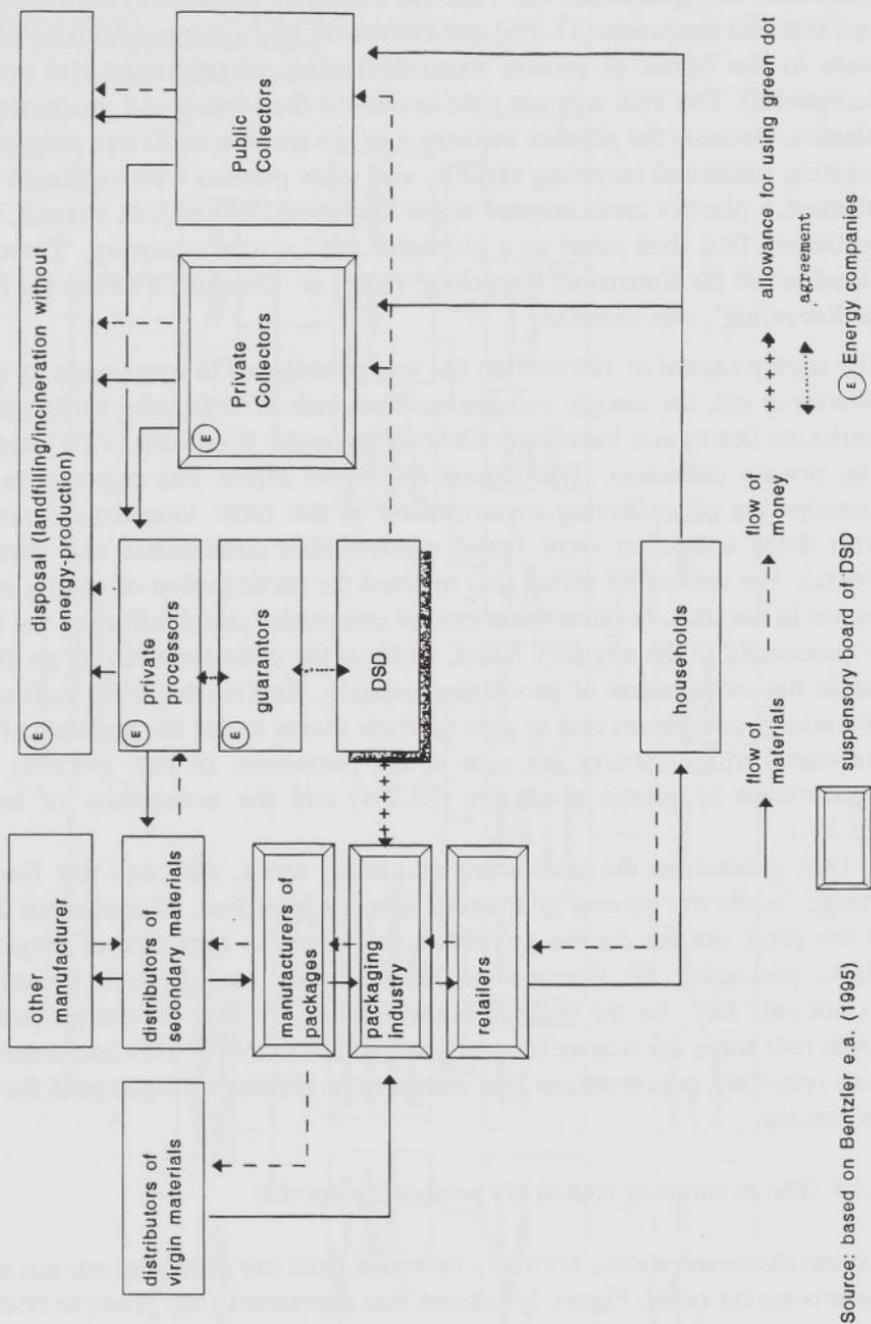
The startup capital of 100 million DM was contributed in equal parts by DSD, Interseroh AG, the energy companies Rheinisch Westfälische Elektrizitätswerke AG (RWE) and Vereinigte Elektrizitätswerke Westfalen (VEW) and the big, private collectors. The federal anti-cartel office was opposed to the participation of collecting organizations in the DKR: long-term contracts with those collectors were found unacceptable (Bünemann and Rachut, 1993a). The anti-cartel office also rejected the participation of energy companies in the DKR, because these energy companies could influence the type of processing in the advisory board, while at the same time having an interest in the exploitation of processing capacity. In October 1994 collectors and energy companies had to give up their shares under the pressure of the anti-cartel office. Shares are now in the possession of DSD (49.6%), the organization of plastic producers (25.2%) and the consortium of banks (25.2%).

DKR guarantees the processing of plastic waste, although not free of charge. While the general guarantees have all been free, DKR charged 25% of the green dot fee for the guarantee, owing to the high cost of recycling plastic packaging. So, licensees of DSD that make use of plastic packaging do not only pay for the collection and sorting, but also for the processing costs. DSD earns the license fee and gives DKR a part of it. DKR has contracts with recycling organizations that process the plastics and get paid for the processing.

5.3.4 The position of DSD in the packaging market

As was discussed above, normally revenues from the green dot are not used for processing costs. Figure 5.4 shows that agreements are given to DSD by the guarantor of a certain material. However, the figure does not show the

Figure 5.4 Structure market for packaging waste (based on Bentzler e.a., 1995)



exception to the rule, namely that the guarantor of plastics, DKR, gets money from DSD to finance the processing costs.

The advisory board of DSD is composed of 12 persons. These are representatives of the manufacturers of packages, the packaging industry, retail trade, and, as will be discussed in section 5.4, since 1993, also the private collectors and sorters.

Figure 5.4 illustrates which organizations are involved in the collection, sorting and processing of packaging waste, as well as demonstrating the relationships between them.

5.4 The Waste Market in North Rhine-Westphalia: Participants and Transactions

In this section, a description will be given of the contemporary structure of the waste market in North Rhine-Westphalia. It is meant to clarify the development of the dual system next to other developments, such as the privatization of the waste market, the entry of international concerns and energy companies onto the waste market, and the adaptation of legislation.

5.4.1 Collection

In North Rhine-Westphalia local authorities are responsible for the collection and disposal of municipal solid waste. Industrial solid waste is normally collected, processed and disposed of by private organizations.

Collection by local authorities is organized in three ways:

- As a public collection service; the normal choice of large cities
- In cooperation with other municipalities as a public collection service; the option preferred by smaller municipalities within a district ('Kreis')
- By hiring a private collecting organization; the option often chosen by more rural areas ('Kreisfreie Städte').

A general tendency in the German waste market is the privatization of the collecting function. The beginning of the privatization development can be traced back to the early seventies. In that period, cities and municipalities began to hand over their waste collection tasks to private collectors. In the seventies the activities of those small private organizations were restricted to the collection and transport of waste to landfills. Nowadays local authorities are more often choosing the option to have waste collected by private organizations. Furthermore, there is a noticeable tendency for municipal collection services to be privatizing. In 1990, the total waste stream of North Rhine-Westphalia was 91,200 million tonnes; 7,500 million tonnes of it was

municipal solid waste coming from households. About 40% of the household waste was collected by 69 private organizations in North Rhine-Westphalia. The other 60% was collected by public or privatized municipal or regional collection services. (Koll, 1994)

In the eighties, adaptation of production processes and changes in consumption behavior gave rise to an alteration of the waste law. The 'Abfallbeseitigungsgesetz' ('Law for Waste Management') of 1972 was transformed into the 'Gesetz für die Vermeidung und Entsorgung von Abfällen' ('Waste Avoidance and Waste Management Law'). The objectives of this law were to minimize the impact of landfilling and incineration, prevent the generation of waste or at least reduce waste flows, and stimulate recycling and recovery.

Increase in the volume of waste flows and change in the kinds of waste gave a stimulus to the processing of waste flows: investments in installations for sorting, treatment and recovering were made. As a result, the waste collecting branch was divided into two parts: one part with a large number of relatively small private collectors concentrating on labor-intensive activities, and a second part with some big international enterprises that invested huge amounts of money into processing and disposal capacity. Energy companies like RWE joined the waste market as well. This gave a new impulse to the trend towards privatization in the eighties. Concentration of activities owned and operated by some big private companies took place when energy companies like RWE took over more and more small enterprises. (Rachut & Bünemann, 1995)

In the nineties, the German waste market continuously opened itself to the international market. The biggest waste companies, like WMX Technologies Inc. (in 1993 Waste Management's volume of trade was 9 billion DM worldwide), Browning Ferris Industries (BFI, volume of trade in 1993 was 9 billion DM) and Lyonnaise des Eaux-Dumez (27 billion DM in 1993) entered the German waste market and tried to establish themselves in this growth market. (BDE, 1995)

5.4.2 *Processing*

Processing waste has always been an activity of private companies. In the seventies, private companies were trading materials like metal scrap, furnishings, paper and clothing, all collected from households and companies.

In the eighties it was difficult to start new processing activities in the western states of Germany, because of the low rates for raw materials and few possibilities for the cheap collection of wastes. Meanwhile, as a result of a chronic shortage of secondary materials, collection and processing activities

developed rapidly in its eastern states. Another growing market was the one for private organizations that traded and shipped waste to the eastern German states that were part of the former Warsaw Pact countries. The export of waste from western states was also to the advantage of waste receiving states: in exchange for the waste, foreign currency was received. (Rachut & Bünemann, 1995)

In the nineties, an increase in processing activities has been due to a shortage in disposal capacity. As in the Netherlands, stricter environmental standards and a growing opposition to the locating of facilities made it difficult to realize disposal capacity. Huge investments were required, while the financial possibilities of municipalities and regions were limited. These governmental bodies could not afford investments in expensive large-scale processing technology such as, for example, cogeneration (incineration with energy production). The favorable effect that economic incentives can have on the use of secondary materials could not be attained while the prices of materials and energy had been pushed down artificially. Politicians had to be inventive and had to come up with new solutions.

Making manufacturers take back what they produce is an inventive solution. This idea was made concrete in the ordinance for packaging waste of 1991, but in 1994 a new act was issued, the 'Kreislaufwirtschafts- und Abfallgesetz' (KLWAG, 'Closed-Loop Economy and Waste Management Act').

The new act was to come into force in October 1996. The closed-loop economy refers to making industry responsible for collecting and recycling its products after they are discarded by consumers or other end-users. Under this legislation, all components in the solid waste stream of households that are convertible can become subject to take-back ordinances. After the Packaging Ordinance came into effect, some other ordinances were announced, namely take-back ordinances on automobiles, paper, electronics and batteries and accumulators (storage batteries). These ordinances have not been made definite yet. One exception has been an experiment in which the concept ordinance on discarded paper has been transformed into an agreement between the Federal Environment Ministry and the printing and allied trades. The latter have voluntarily committed themselves to recycle 60% of all post-consumer paper by the year 2000.

5.4.3 *Disposal*

It is local governments that are held responsible for creating environmentally-sound disposal facilities. As has been mentioned, local governments could not afford to make the huge investments that were needed. Therefore, the local governments looked for partners that wanted to invest in landfilling

and incineration capacity. Energy companies are seen as preferable partners, because they have substantial financial resources, and as reliable because municipalities are often shareholders of the companies (20-30%). Most of the respondents are expecting the withdrawal of public bodies as participants in the waste market when the new Closed-Loop Economy Act (KLWAG) is definitely implemented. This does not mean that the disentanglement of functions will also take place. As long as the act is not in effect, nothing can be said definitively about the responsibilities and executable tasks of public authorities.

In any case, according to some of the respondents, the problem that invested capital in disposal capacity attracts waste is also true in Germany. The financial necessity to use the expensive incineration plants at their full capacity hinders financial and human investments in source reduction, recycling and other waste reducing activities. In North Rhine-Westphalia contracts between public waste collectors and disposers cover even longer periods than in the Netherlands: the average is 30 years.

In North Rhine-Westphalia, waste is disposed of not only at public facilities, but about 40% is also disposed of at facilities that are owned by companies themselves or by cooperating companies. In 1990, 60% of the waste, 24.6 million tonnes, was deposited at public facilities. About 55% of the waste went to landfills, 29% to a landfill for construction waste, 13% was incinerated and 3% went to a composting facility or elsewhere. (Koll, 1994)

5.4.4 *The entrance of energy companies into the waste market*

The volume of trade of the German 'Entsorgungswirtschaft' or 'waste handling economy' is about 77 billion DM a year. Half of the trade volume is handled by only ten companies. Included among them are the energy companies: RWE, VEBA, Vereinigte Elektrizitäts- und Bergwerkschaftsgesellschaft (VEW) and the Vereinigte Industrie Unternehmungen Bayernwerk (VIA/Bayernwerk). A volume rise to 200 billion DM a year is expected in the next ten years. For smaller, private waste companies, this rise in sales will require investments that are far too high. Moreover, the restrictive loan policy of the Bundesbank would have a negative effect on the possibilities for the capital growth of the branch. (BDE, 1995)

The increase in participation of the energy companies in the waste market can be explained by the fact that the privatized energy companies stopped putting aside profits meant for investments in nuclear power at the moment that politicians decided not to install more nuclear power plants for energy generation in the near future. An analogous situation with the

development of an electricity market, was the waste market turning into an oligarchy. This tendency was strengthened by the installation of the dual system, which was conducive to a concentration of power. In 1987/1988 30 mergers were established, whereas in 1989/1990, there were 55, and in 1991/1992, 140 mergers occurred. Small tradesmen especially merged with energy companies.

Besides selling electricity, energy companies entered different markets varying from: logistics, insurances and horticulture, as well as all segments of the waste market. (Bünemann & Rachut, 1993b)

The first segment of the waste market that energy companies are involved with is the collection and sorting of valuable recyclable materials. The second segment forms the 'market' for research and development on sorting, but particularly on processing technology. Experiences with DSD have encouraged energy companies to develop technology for the sorting and processing of products and materials that will become important as soon as take-back ordinances on automobiles, electronic goods and batteries and accumulators also come into effect. The purpose of developing technology is to gain large market shares.

The third segment of the waste market concerns the market for disposal. Energy companies are marketleaders in this segment. They own facilities themselves, or are shareholders.

The fourth and last segment of the waste market in which energy companies operate is the market for packaging waste. The participation of energy companies in that segment will be described in section 5.6.

5.4.5 DSD and the structure of the waste sector

The situation in the waste market can be characterized by the increasing privatization of all functions: collection, processing and disposal. Some other developments support this tendency:

- The division of activities between those that are labor intensive and those that are capital intensive;
- The emergence of internationally-operating private companies;
- Concentration as a result of the taking-over of small companies;
- The emergence of energy companies into the market.

With the tendency towards privatization, the tasks and roles of governmental bodies in the waste market changes. State governments have to reduce risks, like environmental pollution, disturbance of the visual landscape, and the probability that future generations will be confronted with environmental problems that are currently hidden.

Local governments are increasingly withdrawing as participants in the waste market. Collection services are more often rendered by third parties. Local governments cannot raise the investment capital, and therefore energy companies and other private investors are tolerated. The roles of governmental bodies as legislators and maintainers of policy goals will become increasingly important. These roles may be given a new form when the new act comes into force.

The trade volume of the dual system is about 3.2 billion DM, which is an amount that appears to be little in comparison with the volume of the total German waste market. In 1993, the collection of household waste by public and private organizations turned over 45 billion DM. The volume of the total German waste market is 75 billion DM, when the turnover of the private collection of industrial waste is also included, as well as the turnover of private companies, such as BASF, DASA and energy companies, that lend services like technology development and installation of processing and disposal capacity. (Benzler, 1995) Energy companies and internal waste management concerns are attracted by the market for the collection, sorting, processing and disposal of waste, because it is a growth market in Germany.

5.5 Evaluation of the Packaging Ordinance and the Dual System

In this paragraph those aspects of the introduction and endurance of the dual system will be described that are relevant to our own study of the waste structure in the Netherlands. In principle, the discussion will include those aspects dealing with the relations between waste sector organizations and aspects concerning the reduction of packaging waste. When possible a chronology will be provided.

The Packaging Ordinance and the installation of DSD seems to be successful. In North Rhine-Westphalia packaging waste decreased by 4%. This figure matches another figure found for Germany as a whole, which states that in 1993 a reduction of 3.1% was achieved for packaging waste compared to 1992 (Anonymous, 1993c).

In North Rhine-Westphalia, 12.3 million tonnes of packaging waste was collected in 1992, compared with a total of 11.8 million tonnes in 1993. In 1990 the average generation of municipal solid waste was 353 kilograms per person; in 1993 the average was 300 kilograms. A tendency towards an autonomous structure is held responsible for a decrease in the average of almost 3 kilograms. The rest of the reduction is attributed to the collection of packaging waste by DSD: about 50 kilograms of waste per inhabitant per

year, or 15% of the total waste stream, was collected in 1993 by DSD. (Koll, 1994)

Although the dual system seemed to succeed, many critical remarks about the functioning of the system have been made since its introduction. The criticism concerns:

1. Tension between source reduction and recycling
2. The 'free-rider' problem
3. The shortage of processing capacity
4. Financial crises of DSD
5. Conflicts of interest of municipalities
6. The dominant position of energy companies and the monopolistic position of DSD

The first two problems are due to mistakes in the Packaging Ordinance. The third, fourth and fifth issues concern problems resulting from mistakes in the design of the dual system and DSD. The last issue concerns a pre-existing but latent problem that manifested itself after stimulation of the dual system.

5.5.1 Tension between source reduction and recycling

The ordinance emphasizes re-use of products and the recycling of materials. Huge amounts of money have, however, been invested in processing capacity. The same problem arises for investments in disposal capacity: as soon as large investments for processing have been made all capacity that is not fully utilized costs money. Investors want to avoid uncertainty; they only have interest in the full use of processing capacity. They are therefore not interested in source reduction.

The ordinance does not remove this structural problem of clashing interests between source reduction and recycling. The ordinance gives recycling quotas for several packaging materials. This change is an improvement compared to the goals formulated in the Dutch Packaging Covenant (VROM, 1991), which only prescribes a 60% level of recycling of the total packaging waste stream in 2000, and does not specify goals for each packaging material. However, in the German packaging ordinance there are no specific aims formulated for source reduction.

A weakness in the dual system is the fact that packaging manufacturers and the packaging industry only require processors to guarantee that they will process the material and transport it to manufacturers in order to get a license. In this way, licensees are not pushed to choose other packaging materials or concepts of packaging that could be better recycled. When guarantees are made, no incentives to innovation are given. (Bünemann & Rachut, 1993a)

DSD has to prove to the federal government that certain recycling quota for primary packaging have been met. Not one similar organization exists that can be held responsible for the collection, sorting and re-use and recycling of secondary or transport packaging, while this kind of packaging is the most used by companies. (Auge & Hamm, 1992).

The ordinance does not exclude the use of disposables, nor does it stimulate the use of refillable packages. Moreover, the installation of a dual system was meant to avoid having to take back packaging and to impose deposits. The strong emphasis on processing can be used as an argument for retailers and the packaging industry not to use refillable packages. It is likely that manufacturers will only choose refillable packages when it is economically favorable to avoid the costs of processing disposable packages (Oosterwijk, 1993).

The green dot is confusing for those consumers that interpret it as an indication that the product is environmental friendly. The green dot is printed on packages not only in Germany, but also on many products sold in many countries in Europe and the rest of the world. Another common misconception is that packages with the green dot are better than refillable packages without a green dot. (Fishbein, 1994)

5.5.2 The free-rider problem

An important problem is the fact that participation in DSD is not required. Only 80% of the manufacturers participate voluntarily. The other 20% are difficult to involve in DSD. These manufacturers do not support the system, but share in the profits as long as they are not obliged individually to take back their products. Another argument for not joining DSD is that by not doing so they have a small competitive advantage over other manufacturers. Their products are priced a little lower, because the costs for collection, sorting and processing are not necessarily included. As long as participation in DSD is voluntary and the ordinance does not provide a way to force these manufacturers to participate, it is not likely that they will change their attitude.

5.5.3 Shortage of processing capacity

Soon after installation of the dual system, a shortage in processing capacity appeared. The problem was mainly associated with paper and paperboard and plastics. For paper and paperboard, the main cause of the problem was the fluctuating prices for recycled paper. The problem with the recycling of plastics was due to a lack of sorting and recycling technologies. One of the

solutions to deal with these problems was to export packaging waste. Paper and paperboard were exported as valuable material, 'Wertstoffe', to such places as the Netherlands. In the Netherlands this resulted in a fall in prices for collected paper. Those prices had already been kept artificially high by the national government. Any subsequent decrease in prices meant a risk that the market and the infrastructure for the collection of paper and paperboard would collapse. (Knip, 1993)

For a long time, there was also a problem with the processing of plastics. According to the ordinance, plastics may not be disposed of or incinerated (with or without energy production), but must be recycled ('Stoffliche Verwertung'). Plastic packaging waste was stored or was sent to several countries, but mostly to China as useful secondary material. Recycling can only take place when the plastics have been sorted, but this means labor intensive activity, because of the absence of efficient mechanical sorting techniques. Other reasons have been given for a lot of plastic packaging waste being shipped to countries like China, such as: plastics are accepted there at landfill sites (Straathof, 1995).

In order to guarantee certainty in the market for plastic recyclables and profitability, DKR pursued a policy of diversification of applied recycling technologies. DKR acted very cautiously when it came to contracts with processors. They deliberately contracted as many organizations that were interested in the recycling of plastics as they could find, because all the available processing technologies were in the development stage. It is not yet sure which option will turn out to be the best and most economically favorable.

To stay independent and keep all recycling options open, only short term contracts have been signed. As a result, prices rise and sometimes contractees have to end the development of new processing technologies, because it is no longer financially feasible. This implies that microeconomics determines the application of a technique, while rather environmentally sound techniques may be neglected. At this point in time, even the techniques that are the most environmentally-sound can be rejected first. As long as the contracts between DKR and the several processing organizations that use hydrolysis, gasification or corroding processes remain short term, DKR has the ability to easily change contract partners when more favorable prices are offered.

The use of plastic packaging waste as a reduction material in steel-making plants has been presented lately as a new possibility to recycle waste. In order to make steel out of iron ore, carbon compounds are needed. Oil or coke can be used as reducing agents, but a cocktail of plastic packaging

waste could also be used (DSD, 1995). In North Rhine-Westphalia an experiment has been performed in the steel plant 'Stahlwerke Bremen'.

One ton of plastic packaging waste can replace 1 ton of raw oil. The steel plant can save the purchase cost, which is about 160 DM per ton of raw oil, and it receives 200 DM from DKR for each ton of plastic packaging waste that they 'process'. Even if DKR continues to pay for these alternative reducing agents, the shipping of plastic packaging waste to the steel plants seems to be the most attractive processing option, because other contractees have to be paid about 400 DM more per ton of waste. However, the option of using plastic waste as a reducing agent within steel production processes is not a high grade application at all. The question arises as to whether this application can be seen as a form of recycling, as prescribed by the ordinance. The politicians in Bremen and North Rhine-Westphalia argue that the use of plastic packaging waste in steel plants does indeed fall under the definition of waste recycling.

5.5.4 *Financial crises of DSD*

In May 1993 DSD had to deal with a financial crisis due to a shortage of 180 million DM. On the one hand, the crisis was due to the success of the dual system: more packaging material, especially plastic waste, was collected and sorted than expected. As a result, the license fees could not cover the collection and sorting costs. On the other hand, an explanation could be found in the contracts with municipal sanitary services that were much more expensive than previously calculated. The Environment Minister, Töpfer, acted as an intermediary between DSD and the shareholders, and between DSD and the municipalities.

In June 1993, the crisis was overcome. First, the waste handling industry, chain stores, the packaging industry and some manufacturers of packaging materials together injected an additional 180 million DM to DSD. The contribution of the packaging industry and packaging manufacturers included a two-month loan on the license fee.

Second, the conditions of the contracts between DSD and municipalities were changed. Instead of paying municipalities for the provision of suburb collection schemes (for glass and paper) and the provision of information services about the yellow collection bin to households, municipalities were paid a flat rate of 5 DM per inhabitant. In exchange, DSD promised to recycle all collected plastic packages, instead of the 30% they are obliged to by the ordinance. Part of the deal was also that municipalities would provide DSD storage facilities for a period of three years.

In September 1993, DSD again found itself in a financial crisis: a shortage of 1 billion DM appeared. The reason was the huge amount of defaulters. About half of the licensees did not pay properly. In order to ward off this second crisis, the following measures were taken:

- More control on defaulting licensees
- The debts of DSD were transformed into interest-bearing loans
- A restructuring of DSD, whereby private collectors got a larger share of influence

Since October 1993, debt-collecting agencies have been examining whether licensees are paying their contribution to DSD. These agencies are also brought into action against manufacturers that make use of DSD's services without becoming a licensee. Besides that, manufacturers are obliged to use an external accountant.

Waste handling organizations only agreed with the transformation of debts of DSD into interest-bearing loans after they were given more influence on the advisory board in exchange. Despite protest from environmental organizations, and the federal anti-cartel office that warned about conflicting interests, waste handling organizations were given the right to nominate three of the twelve members of the advisory board and to choose a representative to be one of the three managing directors of DSD. The advisory board decides about prices and conditions in contracts for collection and sorting, and advises about all other matters of business policy. (Schäfers, 1993; Anonymous, 1993b)

5.5.5 Conflicts of interest of municipalities

To be assured of the collection and sorting of packaging waste, DSD closes contracts itself or forces municipalities to do the contracting. Of all contracts, 61% concern private organizations, 16% municipal waste handling organizations and 23% a private/public partnership (Sittertz, 1994). These contracts were settled with only one partner per district. The partners were mainly big companies, like energy companies that were able to invest in sorting technology. Energy companies could also make use of the fact that they were already known to municipalities and districts. DSD has a fairly dominant position in the waste sector, where they mainly have contracts with big companies. In addition, when municipalities finalize contracts, they are showing a preference to the one private company that is already doing services for them. By doing so they believe to be able to minimize the risk that the dual system will interfere negatively with the household waste handling infrastructure. Implicitly, they stimulate the process of monopoli-

zation with this procedure. When they act as contract partners themselves, conflicts of interest take place anyway.

5.5.6 The dominant position of energy companies and the monopolistic position of DSD

Energy companies participate in all levels of the dual system and their influence is increasing. The most important way they gain influence is by ownership of shares.

In section 5.4 the financial crises were described. In order to solve the first crisis, loans were given and commitments made: 180 million DM from retailers, 180 million DM from manufacturers, and 180 million DM from private waste handling organizations (among them energy companies). When another crisis appeared, private collectors declared themselves willing to transform the debts of DSD (860 million DM in total) into interest-bearing loans. The most important credit-granting organizations are, again, energy companies like RWE and VEW. In exchange, they gain influence in the advisory board. The new compilation of the board was: 5 representatives from manufacturers, 4 from retailers and 3 from private waste handlers. Two of these waste handlers were: RWE AG and Trienekens (49% RWE). Furthermore, one of the three managing directors of DSD was a former employee at the 'Viersener Gruppe'. The Viersener Gruppe consists of two waste collecting companies: R&T (51% RWE) and Trienekens (49% RWE). (Bünemann und Rachut, 1993b)

The functioning of DSD depends on the collecting and processing guarantees. Energy companies are important shareholders in those organizations, guaranteeing the leveling off and recycling of packaging waste that consists of paper and paperboard, glass, aluminium and plastics. Energy companies do not own shares of tinsplate-producing organizations, but assert influence on research and development. In this area, the guarantors cooperate with energy companies.

One has to conclude that energy companies are dominant actors in the packaging market. The crucial efforts they have made in solving both financial crises of DSD show the interest that energy companies have in the continuation of the dual system. None of the organizations whose shares are owned by energy companies has interest in waste reduction.

5.6 Conclusions: Structural Elements and Waste Reduction in North Rhine-Westphalia

5.6.1 *Separation/Integration of functions*

The case study in North Rhine-Westphalia gives an example of a market which is functionally integrated in a vertical direction, although the market for packaging waste is separated from the rest of the waste market. Within the packaging market there are organizations that provide the collecting service apart from processing-related activities, while in the rest of the solid waste market there exists functional integration. It seems as if horizontal separation of the market has a positive effect on waste reduction, because the total use of packaging materials decreased about 4%. Positive results have also been achieved regarding the different packaging materials, due to the fact that DSD incorporated recycling targets per packaging material. As a result, new recycling concepts that were not applied before have been developed for materials like plastics. Although horizontal functional separation appears to give positive results, it has stimulated vertical integration in other parts of the waste market.

5.6.2 *Conditions for transactions*

DSD does not contract private collectors and processors that are too small to provide their services on a district scale. Smaller organizations can only hope to make contracts with the larger organizations already contracted by DSD, or these smaller organizations can try to get contracted by the municipalities in favor of DSD. The small collectors and processors become dependent and are thereby deterred by DSD *to participate on the market*. Furthermore, many of those organizations are bought by big private companies, such as energy companies that want to consolidate their market share.

The ordinance should be redefined and the contracts of DSD should be tested. There is a need to stimulate competition, and especially to facilitate the accessibility of new organizations to the market, and to encourage the innovation of collection, sorting and processing techniques. For this purpose, municipalities could make use more often of their authority to refuse permission to organizations that want to provide collection services within their domain.

Competition for contracts to process packaging waste components like plastics seems to have worked out positively for the development of recycling techniques for materials that were not previously recycled on such

a large scale. Therefore, it seems favorable to restrict the period of competition for contracts in terms of time, for example, three to five years.

5.6.3 *Roles of governmental bodies*

One of the tendencies determining the outcome of the market for packaging waste is that of privatization. The tasks and roles of governmental bodies are changing. It is necessary that somebody take a more explicit role as legislator and guardian of environmental policy goals in order to resist powerful cartels, which are formed by large private waste handling organizations and energy companies. Such a role is especially needed in the transitional stage from the current waste market to the closed-loop economy. Local authorities could take on this role of legislator. However, as a condition, they should not have the possibility of getting involved with organizations participating in the waste market.

5.6.4 *Scale*

The ordinance was meant to be neutral with regard to competition, but its consequences nonetheless have appeared to stimulate the creation of positions and arrangements that are not independent of the pre-existing concentration of power in the waste market. Concentration of power stimulates the process of cartel formation. The creation of DSD and the dual system has strengthened the position of energy companies especially, like RWE, VEBA and VEW, in the waste market. The creation of the dual system gave these organizations, as well as the large, international, private waste management groups an opportunity to enlarge their influence. The interests that these organizations have to maintain the dual system were evident in the efforts they were willing to make to solve both financial crises. These interests have nothing to do with waste reduction. This type of growth of scale is not favorable for waste reduction.

5.6.5 *Responsibility for waste reduction*

The ordinance does not stimulate source reduction, but it heavily supports recycling and recovery. The latter is especially suspect from both an economic and environmental viewpoint. As a result of the recycling quota in the ordinance, investments are made in processing facilities. In essence this must be seen as a positive tendency, but the question arises as to whether investments in processing facilities would have been as large as they are now under the conditions of a free market. Moreover, not all of the recycling methods are environmentally sound. In particular, when incineration

installations or 'energy recovery facilities' are considered as recycling for political reasons, this cannot be seen as a high grade application of materials.

Waste reduction would receive a stimulus if the use of refillable systems for packaging was stimulated, deposit systems or other systems for taking back packages were standardized and the total amount of plastics manufactured was decreased.

5.6.6 *Conclusions*

This case-study of the waste structure in one state of Germany, North Rhine-Westphalia, shows how the principle of product responsibility can be applied in practice. Since the Packaging Ordinance came into effect, the use of packages has decreased by about 4%. Another positive effect is that the ordinance prohibits the disposal of packages, although in doing so the definitions of recycling have been stretched. Officially, incineration with energy production is not seen as recycling. Most of the respondents, however, expect that within a few years incineration of plastics will be seen as 'Energetische Verwertung' (energy recovery). The case of the use of plastic packaging waste as a reducing agent in processes for steel production shows that lobbying in order to create political support for altering definitions such as waste reduction, re-use and recycling can be rewarding.

Some more questionable aspects need to be summarized. The market conditions, conflicting interests and patterns of behavior that were formed during the introduction of the ordinance and the creation of the dual system have to be evaluated as undesirable from the perspectives of structure, environmental policy and economic efficiency. Unintended results of the dual system include the formation of a cartel for supplying collection services, and also the formation of a cartel on the demand side. These cartels control parts of the waste market aside from the packaging market. So, in fact the vertical separation is undermined, which can be threatening the waste reduction that is achieved in the horizontally-separated market.