Organizing Waste Reduction in the Dutch Waste Sector

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7. WASTE REDUCTION AND THE STRUCTURE OF WASTE SECTORS: A COMPARATIVE STUDY

7.1 Introduction

Officially, in all countries of the European Union, the first priority in waste policy is source reduction. The hierarchy in waste management is in the following order: avoidance and minimization (source reduction), recycling and composting (processing), and as a last resort, incineration and landfilling (disposal). In practice, however, investments are not at the top levels of the waste hierarchy, but rather at lower levels, especially in processing and disposal (Wilson, 1996). This situation also holds true for the Netherlands, which functions as the main case study for the present investigation.

In most countries, the government endeavors to bring about waste reduction through the use of regulation, as well as economic and communicative instruments. As a result, waste reduction is then a governmental responsibility, although specific instruments should be implemented by manufacturers and retailers, such as obligatory deposit refund systems. The question is whether government policy is sufficient to stimulate source reduction and recycling.

7.2 Five Core Elements

Usually, waste policy is implemented by actors other than the ones whose task it is to formulate goals on waste management. Both categories of actors have their own goals and interests. Therefore, for a proper analysis of the (im)possibilities of policy, the structure of the policy field must be considered (Pressman & Wildavsky, 1984). When we examine the Dutch policy field, it quickly becomes clear that even when policymakers are responsible for implementation, they often simultaneously have interests as participants in the waste market. The entire complex of actors and organizational factors in the waste sector, such as property relations, rate systems and the market situation, is not aimed at the stimulation of waste reduction. Rather, the complex is aimed at the reliability and low costs involved in waste disposal, and at affirmation of historically developed interests. The attention and investment are aimed at the organization and process of waste disposal, which actually has the lowest priority in the waste hierarchy. For producers and end-users, spending money on source reduction and recycling is often

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not a logical option in the current market situation, because costs are increased without gaining assets. In a review of twelve countries of the European Union, Wilson (1996, p. 385) concludes: “People have merely paid lip service to the hierarchy, acknowledging the supremacy of waste avoidance, minimization and recycling, while in practise, the vast majority of wastes in all of the EU Member States have either gone to landfill or incineration”.

Eberg (1997) observes a similar tendency in the Netherlands, in his discussion about a ‘reversed Lansink Ladder’ (see section 1.2.2).

In order to diminish the amounts of waste after the consumption phase, the structure of the waste sector should be adjusted in some areas (de Jong & Wolsink, 1997). Is it possible to modify elements in the structure of the waste sector in such a way that the first priorities in the waste management hierarchy are properly addressed? In order to answer this question, a comparative study was carried out. An analysis of the structure of the Dutch waste sector resulted in the identification of five core elements that are relevant for creating the conditions under which waste reduction can be stimulated. These five core elements also formed the basis for selection of the case studies. The Dutch waste sector and three other case studies were compared in order to specify the relevance and the relations between the core elements and source reduction and recycling.

The five core elements that appeared to be essential for the reduction of waste streams are described in the following.

I. **Separation/integration of functions in the waste market**

Through high investments in infrastructure, such as incineration facilities, an interest develops in guaranteed waste supply in the long term, while the artificially long depreciation period keeps the incinerating procedure affordable. Incineration facilities are often in the hands of organizations which are also involved with collection. They show a tendency to optimize the collection in order to make best use of the disposal capacity. Fleurke & Huizenga (1996) believe that vertical integration between collectors and incinerators is desirable. They pose this idea with an aim toward efficient planning of waste disposal. Whether vertical integration promotes waste reduction, however, is questionable (de Jong & Wolsink, 1997).

II. **Transaction conditions**

The waste sector consists of actors that operate in the waste market and meddle with policy, but also of other actors that are primarily concerned with policy formation, such as government bodies, interest groups, and research and consulting groups. The relationships between these actors vary from material and financial transactions to juridical interactions. The
conditions that are placed on these relationships can raise obstacles to waste reduction.

III. The role of the government

Government organizations and public bodies formulate and implement policy, are responsible for the collection of household waste, and also bear the responsibility for establishing environmentally sound waste disposal. However, they are also market participants, a situation which provokes conflicts of interest. Authorities simultaneously regulate, participate, plan and promote market forces.

IV. Scale level of planning

The administrative planning of the Dutch infrastructure for waste lies formally at a provincial level until January 1999. However, the logistical practice of company waste collection in particular already lies on a higher level, because the collection service is provided by (inter)national operating private organizations (de Jong & Wolsink, 1997). Obviously these do not match very well, but are there any consequences in terms of conditions for waste reduction?

V. Responsibility for waste reduction

Although policy goals in the Netherlands for prevention and recycling are quantified, the responsibility for achieving these goals does not lie with any specific organization or actor, but on the sector as a whole. To whom should the responsibility for achieving waste reduction be given?

In this chapter an attempt will be made to find answers to the following questions concerning the relation between each core element and waste reduction:

a. Does vertical separation of market functions stimulate waste reduction?

b. Does the posing of conditions on market transactions have a positive effect on waste reduction?

c. Should the government be more or less involved with the waste market?

d. Does organization of the waste sector on a national scale encourage waste reduction?

e. On whom must responsibility for waste reduction lie in order to stimulate source reduction and recycling?

Each core element will be used to compare the cases and the analysis will also include the situation in the Netherlands.
7.3 Case Selection

After exploration of the waste situation in twelve OECD countries, three cases were selected for research. The selection was based particularly on differences regarding the first, third and fifth elements: functional separation/integration; the role of the government, and responsibility for waste reduction (Table 7.1). Literature studies were carried out and additional information was obtained through interviews with representatives of important actors involved in the waste sector.

Table 7.1 Results of the first screening for core elements in the three selected cases

<table>
<thead>
<tr>
<th>Core elements</th>
<th>Denmark</th>
<th>New Jersey (USA)</th>
<th>Dual System NorthRhine-Westphalia (FRG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation of functions in the waste market</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Conditions for transactions</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Waste market with mainly private actors</td>
<td>+</td>
<td>?</td>
<td>+</td>
</tr>
<tr>
<td>Planning of waste management at a state scale</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Responsibility for waste reduction lies with the producer</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

* Not all the information needed for comparison of the 12 potential cases was available. Missing information on an item at the time of selection, February 1994, is marked by ‘?’

The United States is seen as the cradle of 'pollution prevention' and 'source reduction' concepts. The American state of New Jersey was chosen as a case study where, because of a lack of disposal and processing capacity, the government was forced to take responsibility for waste reduction, and prevent the export of waste by direct regulation.

Denmark was chosen as a case where government interference in the planning and management of waste streams was reduced in favor of market-oriented instruments, such as incineration and dumping taxes, which are aimed primarily at the promotion of recycling.

Also examined in this study is the 'Dual System' for packaging waste in the German state North Rhine-Westphalia (DS-NRW), which is an example of a waste market in which producers are responsible for the achievement of
waste reduction. The producers are spared from the individual responsibility of taking back and reusing their packaging by the establishment of a collective system, which is managed by Duales System Deutschland GmbH (DSD). Since the Verpackungsverordnung (Packaging Ordinance) came into effect in 1991, a dual system for handling household waste has existed in North Rhine-Westphalia as well as in the rest of Germany. Next to the usual collection, processing and disposal circuit, a separate infrastructure for the collection, transport and reuse of packaging materials has arisen which is financed and controlled by private companies.

According to the method of multiple-case study design (Yin, 1984), reports have been written for all of these cases discussing each one separately. These were then commented upon by key respondents and, after correcting the original texts, were described in chapters 4, 5 and 6. Conclusions about single cases are not reported here, unless they are significant for comparison with the other cases. The analysis in the following sections concentrates only on a comparison with respect to the five core elements in the structure of the waste sectors.

7.4 Comparison of Core Elements

7.4.1 Separation/Integration of functions

In Denmark, the non hazardous solid waste market is structured in such a way that the actors are usually oriented towards only one of the functions: collection, reuse or disposal. Therefore we call these functions ‘vertically separated’. When more functions are united within a company or within a joint local authority-waste management company, we are referring to ‘vertical integration’. In New Jersey, DS-NRW and the Netherlands the functions are often integrated: companies do not confine themselves to the execution of only one task. In DS-NRW, originally the collective system for handling packaging was set up so that the collection function was separated from the processing function. Packaging was not supposed to be disposed of. However, in practice, these functions are increasingly integrated. In all of the examined cases, including Denmark, there are situations in which the disposers take on processing activities in order to attract collectors who supply waste. The collector is able to reduce transportation costs, while the disposer remains assured of an adequate waste supply.

In all case studies, respondents claimed that (vertical) integration of collection and disposal tasks is undesirable for waste reduction, because the collection task perpetuates the disposal task. The temptation to direct collected materials and products to capital-intensive disposal facilities,
although they could have a higher destination in the waste hierarchy, is too
great. Many practical examples of these ‘lower destinations’ concern the
withdrawal of paper and compostable waste from the waste stream to
incinerators. A specific example in DS-NRW is the use of collected plastics
as a reduction material in steel production. The Verpackungsverordnung
has
not stimulated reusable packages, but has mainly been a stimulus for mate­
rial recycling. Even more important is the tendency of using packaging
waste as input for incinerators that produce electricity as a by-product. The
ban on the landfilling and incineration of packaging waste is negated by
putting incineration on a par with recycling. This is not only what follows
from vertical integration, but is also the result of privatization and a
tendency towards monopolization (see section 7.4.3).

Table 7.2 Vertical and horizontal integration/separation in the waste market

<table>
<thead>
<tr>
<th>direction</th>
<th>New Jersey</th>
<th>DS-NRW</th>
<th>Denmark</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical</td>
<td>integrated</td>
<td>Integrated</td>
<td>separated</td>
<td>integrated</td>
</tr>
<tr>
<td>Horizontal</td>
<td>integrated</td>
<td>Separated</td>
<td>integrated</td>
<td>integrated</td>
</tr>
</tbody>
</table>

Denmark has chosen vertical separation of functions to prevent conflicts of
interest in property relations. The separation of functions has gone the
furthest in Denmark. Whether vertical separation of functions does indeed
stimulate waste reduction is difficult to say, because in Denmark the
government strictly regulates the market. Regional governments that have
invested in composting, landfill and incineration capacity are able to grant
permits that service their own interests (see section 7.4.2).

The splitting of the market for the handling of packaging waste next to
the market for ‘ordinary’ household waste in North Rhine-Westphalia is an
example of horizontal separation of markets. After the establishment of a
divided market for packaging material, it became clear that the total use of
packaging material decreased. Furthermore, DSD has committed itself to
agreements on the achievement of recycling objectives by category of pack­
ing waste. This commitment encouraged the development of recycling
concepts for other kinds of waste, such as plastics, that were not employed
earlier, because they were not expected to be profitable. The horizontal
division appears to work in a positive manner in the sector of packaging
waste. On the other hand, horizontal separation has strongly supported ver­
tical integration. In the Dual System, vertical separation now barely exists,
which has had a negative effect on waste reduction (described in chapter 5).
7.4.2 **Conditions for transactions**

**Physical transactions**

The movement of waste forms the most important transaction on the waste market. Products and materials are collected integrally or separately after consumption. The collected waste streams are transported to processors (for reuse, composting or recycling) or to disposers (for landfilling or incineration). These physical transactions take place within the following juridical and financial relationships.

**Juridical relationships**

Usually, it is the municipality, which is responsible for collecting, that must sign a contract with a collector (Table 7.3). However, in New Jersey, where the consumer himself is responsible for waste handling, a household can also sign a collecting contract. A permit for the collecting contract partner must be granted by a local authority as a precondition for each contract. Denmark applies a similar juridical regulation in which the collector must have approval from the municipality, in the form of a ‘flow control ordinance’, to perform its services.

| Table 7.3 Juridical relationships in collection and transport of household waste |
|---------------------------------|-------------------------------|---------------------|---------------------|
| **Contracts**                   | **New Jersey**                | **DS-NRW**          | **Denmark**         | **The Netherlands** |
| **Partners**                    | municipality or household with collector | DSD with collector  | municipality with collector | municipality with collector |
| **Preconditions**               | permit                        | One main contractor | permit              | permit              |
| **Permits**                     | **Granting Body**             | **Preconditions**   |                      |                      |
|                                 | counties                      | flow control        |                      |                      |
|                                 | **DSD or municipalities**     |                     |                      |                      |

In the Dual System the producers of the packaged products, rather than municipalities or consumers, are responsible for the collection and processing of packaging material. As representative of the producers, DSD contracts only one main collector in each district. A tendency towards concentration is the result, because small ventures that perform collection and sorting activities can become minor contractors at most. This concentration makes
the small ventures vulnerable: they are bought out or pushed out of the market.

In all cases, contracts between collectors and disposers or between collectors and processors are meant mainly to pass the risks of investments on to the contractors. So-called ‘put-or-pay’ contracts are used often (Table 7.4). In this type of contract a period is set during which a collector has to supply a certain amount of waste against a set price. A supply of less waste leads to extra costs, which is the reason why such contracts conflict strongly with waste reduction. As long as the set amount of waste has not been provided, the collector has no interest in waste reduction. There are examples of contracting that goes together with waste reduction: ‘down payment contracts’, in which a certain amount of waste is paid beforehand and only a surplus of supplied waste needs to be adjusted, or ‘cost accounting contracts’, in which it is agreed that differences in prospected and supplied amounts of waste are settled afterwards.

Table 7.4 Contracts for collection and disposal/processing

<table>
<thead>
<tr>
<th></th>
<th>New Jersey</th>
<th>DS-NRW</th>
<th>Denmark</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>**Broad term</td>
<td>3 years</td>
<td>several years</td>
<td>10 years</td>
<td>15 years</td>
</tr>
<tr>
<td>Conditions</td>
<td>put-or-pay</td>
<td>permit for</td>
<td>put-or-pay or</td>
<td>put-or-pay or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green Point</td>
<td>down payment</td>
<td>cost accounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and guarantee umbrella</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>organization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The contract period in particular determines the effect on the market forces. DSD has made a well-considered decision to keep the contracts between collectors and processors of plastic packaging waste short term. Where long-term contracts limit market forces, short-term contracts will stimulate new developments. The market can then offer possibilities to new participants, which can be favorable for the development of new technologies for source reduction and recycling (van Leenders & de Jong, 1996).

The contract periods in New Jersey and Denmark are significantly shorter than in the Netherlands. Although, the incineration capacity is not covered by long-term contracts, but by the granting of permits to collectors. Through permits, local governments in Denmark and New Jersey can force collectors to use certain disposal facilities (see section 7.5).
Financial relations

In terms of household waste, the money generally travels in the same direction as material streams. In Denmark, New Jersey and the Netherlands, the consumer pays for the collection, processing and disposal of household waste (Table 7.5). The processor and disposer are paid for handling the collected waste. The apportionment of the total costs of waste management in the form of an annual standard waste levy, which is fixed and therefore independent of the amount of waste, does not give a single incentive for waste reduction. Another charging system for household waste would have a greater chance of bringing about change (Slingerland & de Jong, 1998).

Table 7.5 Waste collection rates

<table>
<thead>
<tr>
<th></th>
<th>New Jersey</th>
<th>DS-NRW</th>
<th>Denmark</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Households</strong></td>
<td>guided ‘rate setting’</td>
<td>producer pays for Green Point license</td>
<td>fixed charge</td>
<td>fixed charge</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td>guided ‘rate setting’</td>
<td>transport and additional packaging at the producer’s expense</td>
<td>free</td>
<td>free</td>
</tr>
</tbody>
</table>

The collection rates for industrial waste in Denmark and the Netherlands are established in competition between collectors. Private collectors that collect company waste seldom bind themselves to long-term contracts with disposers. Without a contract, they stipulate relatively low incineration rates. In addition, private collectors offer material to processors for payment. In this case, therefore, the finances go in the opposite direction of the waste stream. Both processes ensure relatively low rates, which limit the incentive toward waste reduction for companies.

Until 1997 in New Jersey, collectors of household and industrial waste were not able to fix rates on their own. They had to have these rates approved by the government in order to prevent the formation of monopolies or cartels, to prevent the penetration of the market by criminal organizations, and to protect clients from large price differences for services from the same company. In the meantime, the so-called “rate setting system” has been abolished; the reason is that the maintenance of a strongly regulated market has become untenable.

The rates for packaging material in the German dual system certainly give an incentive for waste reduction. [The producer responsibility includes
the financial balancing of the collection system. Green Point license holders must fulfill two preconditions: i) the payment of the licenses must depend on volume, weight and type (with plastics, also on the processing costs); and ii) there must be an umbrella organization for material processors that guarantees the recycling of the packaging material that the license holder uses. Products with the Green Point on the packaging contain so-called internalized costs without a system of indirect Pigovian tax (Pearce & Turner, 1990). That is to say, environmental costs are built into the price without direct government intervention.

7.4.3 The role of governments

In spite of official policy, in none of the four cases have governmental bodies truly withdrawn from the market. Government involvement exists through ownership of incineration facilities, as well as landfilling and processing capacity, and in the collection of household waste (Table 7.6). In New Jersey and Denmark, governments are the least active as market participants. Attempts are made to influence waste streams through regulation, but the situation in New Jersey teaches what the negative side of this specific kind of government involvement can be. Local governments lack the means to monitor and enforce the rules. Besides, the control of waste streams by the use of flow control ordinances, and the ban on export of waste (see section 7.4.5), was successfully appealed by business owners, based upon the right to free enterprise and unimpeded trade.

When the encouragement of source reduction and recycling options is attempted through direct regulation, it is still doubtful whether or not control in favor of waste reduction is actually possible. Maintenance of regulations is required if the desired effects are to occur. Moreover, in practice, we can see that regulation is not even directed primarily at waste reduction. In the end, in both New Jersey and Denmark juridical regulation was used to balance supply and demand, and not to actively stimulate waste reduction.

The handover of the packaging market to the private organization DSD in Germany is seen as the first step towards a ‘closed-loop economy’, in which the responsibility for collection up to and including disposal is taken out of the hands of public bodies. According to the scenario in the Kreislauf Wirtschafts- und Abfallgesetz (1996), the role of public bodies is limited to setting preconditions for the market and to supervision. If policy goals are not met, then there is still the law. In the case of packaging waste for instance, the introduction of an individual obligation to carry out the take-back policy has meant a strong push in favor of the success of the collective system.
Packaging use already decreased slightly in 1993 (4%), however, there were some doubtful developments as well. For example, the privatization caused by the establishment of the dual system has had negative consequences for the system of treatment of other solid, non-hazardous waste. It has already been mentioned that small, private collectors were pushed out of the market. The creation of a dual system favors the creation of market positions and market agreements which are not independent of the pre-existing concentration in the waste market. Capital intensive power companies (with reserved but unused money for nuclear power plants) and international collection concerns have made use of the changes by taking a strong position in the waste market, which has led to more connected interests (see section 7.4.4 ‘Scale’). As a result, there is a demand to redefine incineration as ‘(thermal) recycling’ (Gandy, 1994a). This is the result of relations of ownership and integrated market functions.

Table 7.6 Property relations in the waste market

<table>
<thead>
<tr>
<th>Functions</th>
<th>New Jersey</th>
<th>DS-NRW</th>
<th>Denmark</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household waste</td>
<td>public/private</td>
<td>public/private</td>
<td>private</td>
<td>public/private</td>
</tr>
<tr>
<td>Industrial waste</td>
<td>private</td>
<td>private/E</td>
<td>private</td>
<td>private</td>
</tr>
<tr>
<td><strong>Processing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycling</td>
<td>private</td>
<td>private/E</td>
<td>private</td>
<td>private</td>
</tr>
<tr>
<td>Composting</td>
<td>private</td>
<td>(not applicable)</td>
<td>private</td>
<td>public</td>
</tr>
<tr>
<td><strong>Disposal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landfill</td>
<td>private</td>
<td>(not applicable)</td>
<td>public</td>
<td>public</td>
</tr>
<tr>
<td>Incineration</td>
<td>public</td>
<td>public/E</td>
<td>public/E</td>
<td>public/E</td>
</tr>
</tbody>
</table>

Public = shares owned by public bodies  
Private = shares owned by private bodies  
E = participation by power companies

7.4.4 Scale of planning

To give a better idea of consensus problems, in the Netherlands the Waste Management Council (AOO) was installed to establish mutual agreement on policy by different governing bodies. Within the domain of waste the AOO
Paulien de Jong has become the central policy actor, concentrating on planning policy and waste infrastructure (de Jong & Wolsink, 1997). In the other three cases, there did not appear to be a need for such a body on an intermediate level, although there is a general need for planning. The other countries' approach to solving the planning problem differs from the Dutch way, but the planning in all cases has shifted to a national level. The logistical infrastructure for the handling of waste, in particular industrial waste, has already shifted to a national or even international scale. (Inter) nationally operating private companies dominate this market. Deviation in scales of planning and actual waste management cause partial streams to disappear (temporarily) and planning to be unsuccessful. A lack of supply increases the financial attractiveness of incineration capacity in general, from which private companies can profit by supplying waste in a well-timed manner and bargaining for much lower prices. This process can be explained by the fact that when incinerators cannot calculate financial risks into their rates, they have to charge their customers fixed costs, while in times of overcapacity they tend to only charge variable costs.

As in the New Jersey and Dutch systems, the Danish system is based on the principle of self-sufficiency (Basse, 1994b). New Jersey has prohibited transboundary transport of waste materials in order to keep a grip on the waste streams. The number of illegal transports that occurred demonstrated that New Jersey had many problems maintaining the rules, and thereafter, the private collectors and carriers successfully disputed the prohibition in Supreme Court.

If we draw a parallel with European regulation, the same situation might occur within the European Union. Waste ready for disposal must still be disposed of within national borders, but it can be expected that these borders will be removed. The big international collection and transportation organizations could dispute the regulations successfully, as was done in the United States, where the outcome was significant for the New Jersey regulations on interstate waste shipment.

The most probable reason that Denmark does not have problems with illegal transports thus far is that disposal prices in Denmark are (still) lower than in surrounding countries, so that a net import of waste is more likely than an export. In addition, there are few internationally operating collectors active in Denmark. In the future, the European regulation, which prescribes the call for tenders on an international level, will probably change the current scenario.

In Table 7.6, the scale increase caused by the entry of the energy companies in to the waste market is also visible. In the Dual System, Denmark and the Netherlands, the energy companies prove to be substantial investors in
incinerators. In North Rhine-Westphalia, energy companies have expanded their activities into the ‘normal’, non-hazardous waste market, after the Dual System came increasingly under the influence of a few large energy companies (Benzler e.a., 1995). Scale increase has taken place in the form of breaking through the horizontal division of market functions. Although packaging forms only a limited part of household waste, the concentration of power within DSD has important consequences for the rest of the waste sector. DSD has acquired a dominant position in the waste market, and in some segments has a monopoly. DSD has survived two financial crises, mainly because of the capital injection of energy giants, such as RWE (Rheinisch-Westfälische Elektrizitätswerke AG). This development is disadvantageous for waste reduction. Energy companies’ interests lie mainly in investing in hardware such as incineration facilities, and they consider waste primarily as fuel for power generation. They also invest in companies whose activities are concentrated on processing and not on source reduction.

From the above it may not be concluded that scale increase through connections with the energy sector is always harmful for waste reduction. In Denmark there are also connections between the energy and waste sectors. However, because of government-imposed conditions, the connections in Denmark encourage waste reduction. Combining incinerators with the central heat supply stops the unbridled expansion of incineration capacity, because incinerators may only be built when extra capacity is required for district heating. In this way, the limited possibilities for new district heating systems also limit the construction of new incinerators.

7.4.5 Responsibility for Waste Reduction

An overview of the most important instruments for waste reduction (Table 7.7) is divided into the types of behavioral relations on which they are based: coercion, exchange and persuasion (Lindblom, 1977). In New Jersey and Denmark, the achievement of waste reduction is not a task allotted to particular actors, but rather it is primarily a policy responsibility. The interest in waste reduction in New Jersey was increased by the government due to the seriousness of the waste problem: waste in the nineteen-eighties could not be disposed of in a responsible manner, neither within nor outside state borders. This situation led to investment in incineration capacity, the formulation of recycling objectives (quantitative only), and the initiation of a number of policy instruments (Table 7.7). The absence of policy goals for source reduction is a gap in New Jersey waste policy. The financial instruments would be more effective if the recycling levy were applied not only to landfill, but also to incineration. The instrument of waste auditing, a volun-
tarily drawn-up waste reduction plan based on an inventory of material streams within the organization in question, is not effective in New Jersey. The lack of success is because the task of convincing organizations to perform waste auditing was allotted to private collectors. These collectors then feel a risk of losing their clientele.

*Table 7.7 Initiation of policy instruments according to behavioral relations (Lindblom, 1977; WRR, 1992)*

<table>
<thead>
<tr>
<th>Relation Type</th>
<th>New Jersey</th>
<th>DS-NRW</th>
<th>Denmark</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coercion</td>
<td>ban on export revoked</td>
<td>regulation stipulating bring-back obligation</td>
<td>ban on land-filling combustible waste</td>
<td>ban on land-filling combustible waste</td>
</tr>
<tr>
<td>Exchange/Transaction</td>
<td>levies on incineration/landfilling; 'tonnage grants'</td>
<td>deposit on drink packaging; initialization of including waste costs in product price</td>
<td>taxes on incineration and landfill subsidies for recovery and cleaner technology</td>
<td>deposit on drink packaging; experimentation in rate differentiation</td>
</tr>
<tr>
<td>Persuasion</td>
<td>'waste auditing'</td>
<td>Green Point</td>
<td>covenants</td>
<td>covenants</td>
</tr>
</tbody>
</table>

The official Danish policy is: less emphasis on participation of the government and public bodies and more initiation of policy instruments using market conditions and market mechanisms. However, in practice the public bodies have barely pulled back from the market, while the regulating responsibility has been limited. The initiated amount of policy instruments is limited and the policy goals are not highly ambitious. Notably, only one goal has been formulated for recycling, and none for source reduction.

In the Netherlands, waste reduction must also be stimulated by policy. Delegation of responsibilities mainly takes place within the scope of negotiations about covenants (agreements). Policy formulation, in large part, is also a question of deliberation and negotiation within the Waste Management Council. This council, a central actor in the policy network, is formed by the gathering of representatives of regional and local authorities and the
national Ministry of Environment. These different governmental bodies deliberate in the presence of trade and industry, consumer organizations, environmental organizations and research organizations.

Complete transfer of responsibility exists only in the dual system. In DS-NRW, the responsibility for waste reduction has been privatized and lies with producers, as a result of 'coercion' by public law. The implementation of transaction instruments and persuasion instruments then lies in the hands of the sector itself, in contrast to the other three cases. It could be concluded that under well-chosen conditions the separation of a part of the waste market could be beneficial, because in the horizontally separated market for packaging waste some modest waste reductions have been found. These reductions are in large part due to the internalization of environmental costs in the product prices, meaning that what customers pay for their products is directly related to the volume, weight or kind of waste that is produced.

The use of the regulation task for protection from financial risks connected with investments in disposal has already been discussed extensively. But the stimulation of waste reduction through transaction and persuasion instruments also shows fewer results when these instruments must be imposed by policymakers. The collective apportionment of costs made for collection, transport, processing and disposal in a fixed waste charge that does not depend on the amount of delivered waste materials, as is the case in Denmark and the Netherlands, gives no incentive for waste reduction. The 'rate setting' system was initialized in New Jersey in order to prevent cartel-forming, and to prevent organized crime from coming in to the market. This form of economic regulation restricts open competition. Theoretically it is plausible that the higher the rates go, the stronger the stimulus towards waste avoidance could become. This example of guided rate setting is meant to prevent rate increases for consumers, and therefore probably would not have a positive effect on waste reduction.

While direct regulation stays within limits, transaction instruments are certainly experimented with by municipalities. These methods have a strong resemblance to a tax levy, in comparison to the method of internalizing costs in the dual system. Basic micro-economic theory suggests that charges based on waste volume will contribute to waste reduction, and there certainly are options for waste management systems that include such tariffs (Slingerland & de Jong, 1998). The effects of differentiated rates are not always clear, however; undesirable side-effects might occur. There are clues that the motivation of citizens to separate waste, reuse, and recycle could be damaged by economic incentives (Thogersen, 1996). Experiments with varying waste collection tariffs show that the reductions achieved are paired with side effects (avoidance behavior, acceptance problems) that are inher-
ent in the method by which the rates are made dependent on the amount of waste generated (Zelle & Van der Zwaan, 1997). Nevertheless, the overall conclusion with varying waste collection tariffs is that the positive results in terms of waste reduction and system costs are more significant than the undesired side-effects. This assessment is in agreement with experiences in the United States (PAYT, 1998).

7.5 The Combination of Structural Elements

Generally it must be concluded that the effect of each distinct core element in the structure of the waste sector finally appears to also be dependent on the filling in of other core elements. In methodological terms, the interaction effects (combinations of factors) are more important than the separate effects (single factors).

*Table 7.8* Summary of interaction effects of waste sector core elements on waste reduction.

<table>
<thead>
<tr>
<th>CORE ELEMENT</th>
<th>NECESSARY CONDITIONS</th>
<th>FAVORABLE CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>vertical separation of functions</em></td>
<td>If any public body or authority has a market function, then no regulatory power (introduction of independent regulator)</td>
<td>Independent (from ongoing public decision making in public bodies) regulator; Regulation against long term contracting and put-or-pay contracting</td>
</tr>
<tr>
<td><em>horizontal separation of a part of the waste market</em></td>
<td>Regulation maintains horizontal separation within the waste market; Regulation of admittance to a partial market for actors of other sectors; Vertical separation of waste collection and waste disposal within a separated part of the market</td>
<td>Avoidance of monopolizing tendencies (for example by an independent regulator); Regulation against long term and put-or-pay contracting</td>
</tr>
</tbody>
</table>
Table 7.8 presents the main conclusions of our comparative multiple-case study; these are all interaction effects. Not all core elements are mentioned explicitly in this table of main conclusions. In practice, the issue of the increase in the scale of planning is often an aspect of the other elements and therefore we do not consider it as an independent factor in the structure of the waste sector anymore. Conclusions on the ‘conditions to transactions’ can be found in table 7.8.

The problem of the attractive force of large-scale, expensive incineration capacity is solved in none of the cases. In general, it can be concluded that integration of collection and disposal is undesirable, because the short-term (individual) company interest is to use the full disposal capacity. This interest has more weight in decision-making than the long-term (collective) interest in the application of ‘waste’ at the highest level of the waste management hierarchy possible. Vertical separation between the collection and disposal tasks is favorable for waste reduction. Nevertheless, it is difficult to achieve along with maintaining vertical separation and preventing conflicts of interest. Separation of functions is evidently an important factor, but not a deciding factor. Separation only works when the participants have no other

| privatization (withdrawal of public bodies/authorities from market functions) | Clear and strict regulation (general rules and specific permits); Effective control and maintenance of rules and conditions for permits; Regulated vertical separation of market functions | Responsibilities for waste reduction attributed to market actors through regulation; Internalization of environmental (waste management) costs in products; Regulation against long-term and put-or-pay contracting |
| Responsibility for waste reduction attributed to market actors | Regulation and maintenance of regulation directed at conditions instead of prescriptions for actions; Regulation of responsibility includes market incentives (internalization of costs); Avoidance of monopolies or cartels; No participation of public bodies with regulatory power in the market | Horizontal separation of parts of the waste market (makes producer responsibility easier); Regulatory body independent from daily waste management policy; Regulation against long-term and put-or-pay contracting |
means ofcountering the risks oftheir investments in disposal capacity. Because of this factor, governmental bodies should never be involved with more than one function when vertically separating the market. Therefore, the element ‘role of governments’ is inseparably intertwined with a division of functions.

It can be concluded that when the responsibility for reduction lies at the policy level, and must be enforced with regulation, the effectiveness of functional separation will likely be undermined. Local governments can force collectors to use specific disposal facilities through permit granting. This may result in an unfavorable situation for waste reduction when these local authorities are directly involved in the exploitation of facilities themselves. Therefore, governments that have invested in capacity for composting, landfilling and incineration can send waste streams in whichever direction they choose. In order to prevent such a situation, local governments should not be permitted to act simultaneously as regulators and as market participants. They should choose one out of two options: either to have an interest in the market, or to have regulating power to direct waste to a particular disposal capacity. Local governments should not be allowed to do both. In the former case, the regulation could be controlled by an independent body, such as in the electricity sector in some countries. The withdrawal of authorities from the market to a maximum of one function is a condition for reaching waste reduction as a result of functional separation.

The effect of governmental bodies withdrawing as participants from the waste market also depends on choices made with regard to other core-elements. An example of a privatized market is the packaging market in Germany. Here, the horizontally separated market part shows some positive results for waste reduction. However, in the transition from the old to a new system, action had to be taken against the negative effects of privatization. The dual system in North Rhine-Westphalia demonstrates that a share in one market provides a good base for activities in other waste markets. Leaving the market to private companies offers possibilities for particular companies to build up a strong position, even a monopoly, within that market. From that firm base other markets can be penetrated. When we take a look from the other side, we see that the separated market could be of interest for companies in other sectors, especially energy, to set up waste collection to serve their own agenda. Waste collection is used as a springboard to becoming involved with other services, and this not a favorable condition for waste reduction initiatives. Although a conflict of interest between energy generation and waste collection can be controlled via regulation, as we can see in Denmark, concentration and monopoly in a separated part of the market are a threat to waste reduction. It would, on the other hand, be a stimulus to
combine waste collection and disposal, especially when collecting, recycling, and disposal are vertically integrated into the market. From the strategic position of energy companies in DSD (in Germany) and from the powerful lobby that they represent, this appears to redefine incineration for producing electricity as ‘energy recovery’ (Wertstoffliche Verwertung), which is debatable (Powell, 1993a). Another disputable application is the ‘reuse’ of plastics as a reduction material in steel works. Neither case is a high grade application and, for this reason, does not agree with the waste management hierarchy. The question then is whether the dual system still exists and has survived two financial crises, because of a tendency towards concentration. This leads to a more fundamental question, namely, whether producer responsibility for stimulating waste reduction should be organized in a way other than a dual system. In any case, privatization itself is not favorable for waste reduction, as long as concentration (or a monopoly) is not being prevented.

Regulation should be used to ensure that materials and products are recycled such that they retain the highest possible grade of quality. Regulation and planning remain difficult, because the official waste sector borders do not mark a closed system. Both New Jersey and Denmark demonstrate that without strict maintenance, including conditions in permits and banning exports of waste streams, ‘top-down’ is not efficacious in steering waste streams. Even if permits and bans are used to promote reduction, much effort would be required to enforce regulation. An ordinance that regulates product responsibility involves the setting of conditions rather than the prescription of actions, which makes maintenance much easier.

Effective regulation, especially that which leads to different conditions for market transactions, is more easily brought about when the regulator itself is not involved in the waste market. Therefore, governmental bodies and local authorities should not be participants in the market when they are supposed to act as regulators. In all cases, the contract terms appear to be more directed at the covering-up of investment risks in disposal rather than at reduction of waste streams. Where no contracts can or need to be used, this role will be taken over by regulations through governments, which also carries investments risks. Collectors or carriers who have put-or-pay contracts with disposers do not benefit from reduction as long as the set amount of waste supply has not been reached. In general, long-term contracts do not benefit reduction. Short-term contracts offer space for reduction initiatives, because these need flexibility and involve no ‘punishments’ for realized reductions. Aside from that, payment for supplied services is preferable to payment for possible use of services. This rule is also valid when costs made for collection, transport, and processing or disposal are collectively
apportioned among customers, with a set standard amount (fixed waste charge) which is independent of the amount of waste.

7.6 Conclusions and Discussion

The effect of a core element cannot be judged separately from one or more of the other elements. The interaction effects are the most significant, especially the combination of the four remaining core elements. The level and method by which privatization of the waste market occurs determine both the effectiveness of regulation as well as the effectiveness of functional separation. On the other hand, privatization should not always be seen as the only effective solution. Only under specific conditions can privatization have positive results for waste reduction. In none of the examined cases have governmental bodies stepped back from direct involvement in the waste market, and focused strictly on regulation and the maintenance thereof. In all cases, governments want to direct the waste streams in the market externally, while having simultaneous (in)direct interests in the functions on the market. The guidance that governments are able to give from the outside could be more effective if market functions lay primarily in the hands of private companies. Steering by independent control and regulation could help achieve the desired result. The 'desired direction' is not toward disposal, but rather toward prevention and recycling, the real priorities of the waste management hierarchy. Meanwhile, in the interest of stimulating waste reduction, vertical separation is also necessary in a privatized market.

Vertical separation on its own does not create sufficient conditions for stimulating waste reduction. Functional separation has to be accompanied by privatization. A condition for the effectiveness of vertical separation is the withdrawal of governmental bodies from the market to a maximum of one function (or to the task of regulator). Certainly, as long as local and regional authorities are active in the different waste markets, the responsibility for policy and especially regulation should be independent from the authorities. In planning terms, the tendency toward this independence is already there, but in the Netherlands the influence of local governments is ensured for the long term through the central position in the sector occupied by the AOO (Waste Management Council). The cooperating provinces and the union of municipalities are both significant participants in this council. In this way, the interests of local authorities involved in disposal are institutionalized.

Policy planning for the management of waste streams is moving from the regional to the national level in all cases. In the Netherlands, a special advi-
sory commission on the organization of future waste management (CTOA, 1996) has suggested staying within the national borders, and the legislator has followed this advice by opening the provincial borders for waste incineration as of January 1999.

It remains important that the national government, which must set conditions, does not itself have interests in waste collection and disposal. On its own, waste reduction is unaffected by planning or competition. From that viewpoint, the question is whether a function should be in public or private hands. It is clear that conflicts of interest more often occur within governments, because they not only participate in the market, but also try to steer waste streams with the use of policy. If the market functions are kept in the hands of private companies, the desired direction can be followed through independent control and regulation. Stepping out of the waste market would likely better enable governments to achieve policy goals, reinforce their role as regulator, and be a more effective incentive for others to create conditions in favor of source reduction and recycling. The development of policy and the formulation of policy goals is important, but creating conditions for realizing policy goals is equally important. However, when good conditions for reaching policy goals have been achieved, that is if governmental bodies are not hampered by their vested interests in the market, the next step is that the national government takes its responsibility and effectively regulates the market.