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# The Evolution of Municipal Waste Management in Europe: How Different Are National Regimes?

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**ABSTRACT** The 1994 European Directive on Packaging and Packaging Waste allowed a diversity of conceptions of waste management to be developed and tested in various countries. Such a diversity may raise drawbacks related to the achievement of the single market and the European law of competition. The paper describes the main differences in waste management regimes in five countries: France, Germany, the Netherlands, Italy and Greece. This comparative approach allows us, first, to identify four main variables in order to characterize policy regimes, explaining the degree of orientation of waste regimes to cost-effectiveness. Second, we will show that implementation has resulted, in each country, in learning, correction and self-regulation, thus reducing the initial divergences between national regimes. Hence, efficient harmonization of waste management regimes may be achieved unexpectedly in a soft way without passing stringent European directives. Moreover, if policy-makers were to adopt explicitly the option of experimenting with competing organizational and policy concepts, as an approach to European harmonization, it would reveal, by 2004, the cost-effectiveness of alternative solutions at a time when European policy has to be reconsidered. Copyright © 2001 John Wiley & Sons, Ltd.

*Key words:* waste management; European harmonization; environmental policies; public policies; evolutionary theory; economic instruments

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## Introduction

Municipal waste management has experienced significant changes in most European countries from the beginning of the 1970s onwards. The legitimacy of dumping and plain incineration has been exposed to severe questions regarding their compatibility with long-term economic sustainability. Reduction of wastes at source, sorting of waste and recycling of materials, composting and, to a lesser degree, incineration with energy recovery have been put forward by new policies. At the same time, severe cost increases had to be borne by local bodies and households for waste management over the past twenty years; this raised a new interest in innovative and cost-effective instruments (Turner & Pearce, 1993, 1994). Economic instruments (taxes) and financial organizations based on

voluntary agreements, such as the *Duales System Deutschland AG (DSD)* in Germany and *Eco-Emballages* in France, have been put into practice in several European countries.

Despite the widespread concerns about waste, however, municipal waste policies still differ to a remarkable degree from one country to another. Within the European Union, the need for harmonization among national waste policies has often been stressed, because of the externalities and disturbance created by different rules and conventions (in matters of classifications, for instance) of waste management among member states. Such differences, it is often claimed, generate obstacles to the free trade of products (for example, beverages), but also induce *waste tourism*<sup>1</sup> that may disorganize local systems and impair the environmental objectives of leading countries. Constraints introduced at the end of the 1980s in Denmark or Germany in favour of multiple-use systems, or *ecotaxes* adopted later on by Belgium, are the emblematic examples

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of such obstacles to free trade. Claims and legal procedures on these topics are at the origin of a new thinking about the need to achieve some harmonization of the rules of the waste game in Europe. Started in 1988–1989, the harmonization drive gave birth to the EU Directive on Packaging and Packaging Waste (94/62/EC, OJ L 365, 31 December 1994, pp. 10–23) adopted in December 1994 after a rather chaotic and cumbersome negotiation process (Buclet & Godard, 1997).

Nevertheless, the benchmarks given by the packaging directive allow, to a large extent, each member state to develop its own model for meeting the directive's targets, without imposing one organizational or technological model. Indeed, from a policy development perspective, it may be wise to give to several organizational models an opportunity to develop in parallel and indirectly compete with one another so that different outcomes can be evaluated. For example, what is the best technology mix? How can practical solutions best be related to lifestyles, social values and social representations about health risks, including the personal inclination to commit oneself to civic attitudes on a regular basis? These points converge to stress the need for an experimental approach of various solutions without closing up the scope of solutions too early.

However, there is also a chance that, due to a lack of coherence, increasing negative externalities between national regimes hurt both free trade and environmental protection. The final result of this contradictory process of evolution may greatly depend on the extent of divergence in national management systems and technologies that separate waste. There is a pressing need to understand differences in national regimes for municipal waste management and to trace them back to some basic conventional choices typical of the development of each national system.

The paper identifies four main key variables to explain differences in national waste management regimes: the nature of objectives, technical options, the role of dialogue between public authorities and industry, and the degree of responsibility between actors. This analysis will provide a rationale to identify the key elements to be taken into account at the European level to renegotiate the 'packaging directive' to ensure that

it delivers public policy goals in a more effective manner. Our paper will study five European countries: France, Germany, Greece, Italy and the Netherlands.<sup>2</sup> Germany and the Netherlands represent the category of environmentally aware countries, whereas Italy and Greece are, in part or as a whole, in a situation similar to other parts of Europe in the early 1970s. France is an intermediary case. In Germany and the Netherlands, the modernization of municipal waste management started in the 1970s, while in the case of Italy and Greece, most of the opinion and economic actors do not consider the environment to be as important as it is in northern Europe. Hence, these five countries collectively give a good panorama of the diversity of attitudes and approaches to waste management that can be met within the EU.

### **A common starting point: substituting or completing policies focused on waste elimination**

The evolution of municipal waste management in Europe did not follow the same timing in different countries. Nevertheless, the five countries under analysis here—and, more generally, a majority of European countries—are faced with the same problem: how to define a new municipal waste management policy substituting or completing a regime that in the past was focused basically on elimination? For a long time, waste management policies had favoured technical solutions (landfilling, incineration without energy recovery; see Table 1 for information on landfill) that allowed financial costs to be at their minimum. These policies were based on the assumption that treatment plants and landfilling were able to absorb and solve the waste management problem in a definite way, without hazards for human health and damage to the environment. In the late 1980s, various elements were combined to change the social and policy landscapes. A general protest movement arose against the technical choice based on elimination. In addition to the growing public concern for the harmfulness of landfilling, local populations showed an increasing hostility towards the establishment of new landfill sites. This opposition movement concerned incinerators too, which

Table 1. Share of landfilling in selected European countries (1990)

Country	Percentage of landfilling
Greece	100%
Ireland	100%
United Kingdom	90%
Italy	80–85%
Finland	78%
Spain	74%
Germany	70%
France	52%
The Netherlands	52%
Belgium	49%
Austria	48%
Sweden	35%
Denmark	15%

Sources: Leppänen (1994); Royal Commission on Environmental Pollution (1993); Department of the Environment (1992); DSD (1995).

were accused of emitting various atmospheric pollutants dangerous for human health (heavy metals, hydrochloric acid, dioxins). At the same time, the household waste systems had to cope with an increasing volume of waste, putting pressure on treatment capacities. This led to the consideration of a change in technological and organizational models. Techniques used were reconsidered and the scope of waste management schemes has been opened up to options that either were new or had been neglected in the past.

A solution used frequently to promote better waste management was the reorientation of national policies in order to ensure the development of reuse, sorting and recycling, which had been neglected and in some cases nearly abandoned in almost every country since the 1970s. When implementing these new policy directions, emphasis has been placed on household packaging waste, since this type of waste had the highest rate of increase in industrialized countries since the 1970s. Packaging came to reach between 25% and 30% of the total amount of household waste in weight and nearly 50% in volume in the early 1990s. It is also the type of household waste that constitutes the primary source of secondary raw materials.

Another common feature of new initiatives lies in the use of organizations designed to promote 'voluntary agreements' to reach defined objectives regarding packaging waste: this was the case of DSD in Germany, Eco-Emballages

in France, material consortia in Italy and the packaging covenant in the Netherlands (Whiston & Glachant, 1996). Voluntary agreements are often considered a 'third generation' of policy instruments, following traditional regulatory and economic instruments (Dente, 1995). The choice of this type of approach expresses the clear intention of national regulators to have firms involved in the organization of the new regime and taking new responsibilities for an activity previously devoted to local authorities only. To some extent, this shift was an implicit acknowledgement of the failure of authoritarian approaches for dealing with matters having a huge economic and behavioural dimension. At the same time, national regulators intended to take advantage of decentralized choices for pushing materials recycling and develop appropriate cooperation between actors, once basic targets and principles are set by the authorities. In that way, organizational costs and negative side-effects of information asymmetries will hopefully be minimized. Yet such gains may be expected only if the decentralization of choices is guided by price incentives set at the appropriate level and strong enough to guide decision-making on the basis of the social costs involved; setting up a financial organization is not sufficient in this regard (Godard & Beaumais, 1994; Godard, 1999). Without the right economic signals, decentralization on its own cannot lead to economic efficiency.

## Differences in objectives and organizational solutions

### Objectives

The nature of objectives and their ambition to introduce upstream solutions represent the first key variable characterizing municipal waste management policies in Europe. Despite a common concern about the replacement of elimination techniques as the cornerstone of national policies, public authorities did not adopt the same objectives. Governments set different objectives for implementation (for the type of waste) and the requirements they set. Italy was the first European country to adopt quantitative objectives dealing with packaging waste for very specific products

(beverage packaging), while France focused on domestic packaging waste, and Germany and the Netherlands on the whole packaging field. In Greece, the emerging tendency seems to follow the French solution. Besides this heterogeneity in targeted waste categories, objectives and timetables imposed on the actors are different.

Each country points out the necessity of developing recycling and energy recovery. Beyond this common ground though, there are some countries emphasizing reduction at the source and refilling, while others do not mention any specific measure aimed at these goals, and in fact did not seem to really wish them to be developed at all (see Table 2). For example, Germany and the Netherlands have set regulatory arrangements specifically limiting the use of packages and, therefore, reducing the production of waste at the very source. Furthermore, Germany has set up a regime intended to influence the production and composition of household packaging waste

flows by imposing high and differentiated charges on packaging materials. However, Germany has not defined any clear objective regarding the overall production of packaging waste, while the Netherlands has set such a limit: in the latter country, the volume of packaging waste generated in the year 2001 should not be larger than in 1986. In Greece, France and Italy, reduction at source is not set as a policy objective. France and Italy do favour valorization, but without measures on prevention, while the main concern of Greece lies in the development of controlled elimination schemes, instead of frequent, uncontrolled disposal of waste by the population.

This comparative landscape allows for the identification of three main categories of countries: those aiming at prevention plus valorization, those only looking for valorization, and the latter mainly concerned with elimination. Underlying these categories, there are not only objective differences in the problems to be solved and

Table 2. Packaging objectives in the five study countries

Country	Objectives	Timetable
France	Domestic packaging: 75% of valorization <sup>a</sup> Municipal waste: 100% of valorization except for ultimate waste <sup>b</sup>	1992–2002
Germany	Packaging: 60–75% of recycling <sup>c</sup> Deposit refund scheme and a quota of 72% of rebottling for beverage Strict treatment hierarchy Separate collection of organic waste	1991–1998
Greece	Packaging recycling specific <sup>d</sup> objectives of the 94/62/EC directive: 25% of recycling	1994–2005
Italy	Beverage packaging: 50% (glass, metal) or 40% (plastic, composites) rates of recovering Since a decree of 1997, between 50% and 65% of recovering for the whole packaging waste (between 25% and 45% of recycling) and 35% of separate collection	1988–1992 (regularly postponed) 2002 for 1997 objectives
The Netherlands	Packaging waste volume generated in 2000 should not be larger than in 1986. No more landfilling for combustible waste. Minimum of 60% of recycling of packaging waste. No specific goals for municipal waste <sup>e</sup>	1998–2001

<sup>a</sup> Valorization is a generic term that includes recycling, composting, incineration with energy recovery and any other form of energy recovery (methanization, co-generation, etc.). In April 1998, an indicative objective of 50% of recycling for household waste has been announced by the Ministry of the Environment. No date for the meeting of the targets has been fixed.

<sup>b</sup> Ultimate waste includes any waste, resulting or not from treatment, the pollutant charge of which cannot be reduced by additional treatments and which cannot be valorized, under prevailing technical and economic conditions.

<sup>c</sup> For plastics, recycling quotas have been lowered. Sixty per cent has to be recovered as a whole and at least 36% has to be recycled (material recycling). Chemical recycling is therefore limited to 24%.

<sup>d</sup> Greece, Ireland and Portugal benefit from specific and less stringent measures.

<sup>e</sup> Objectives are fixed at a more general level, including the whole waste flow. The management of municipal waste, as a part of it, contributes to its achievement.

a different position on the path of economic development, but also different basic conventions about exploring directions for finding long-term solutions. Those concerned with the elimination of waste, and operating in countries as different as Greece and the UK, express the confidence that pollutants can be brought under control in appropriately managed landfill sites, without any leakage to affect ecological health. The focus on recycling expresses a confidence that organizing new materials cycles in society can overcome entropy and run like a sort of perpetual movement, allowing economic growth to be based on a material running only implying a small impact on the environment. Those countries promoting prevention and valorization respond to a concept of post-modern society as a society of services, having succeeded in escaping from materialism and the drive for possessing material objects. This concept of the 'dematerialization' of modern societies is expressed well by slogans such as the 'factor four' programme (Weizsäcker *et al.*, 1997). Quite naturally, such fundamental differences shape the types of policy instruments being used.

### *Responsibility and levels of coordination*

As in any field, the structural organization of municipal waste management is a crucial point to make objectives effective. It is therefore the second key variable analysed in this paper. In most countries, municipalities or equivalent local authorities were and are still responsible for the overall management of household waste. This was the case in France, Greece and the Netherlands. However, some countries have introduced specific regimes for specified types of waste. In Germany, for example, the regulator has limited the field of competencies of local authorities and given to DSD the responsibility of managing and financing the whole chain of valorization of packaging waste, from the collection of waste to the final use after sorting. This is still an exception rather than the rule in Europe. With that system, industry has to bear the total cost for managing packaging waste, while in France, for instance, industry has to bear only a part of it, namely the over-cost

generated by the separate collection and sorting of waste.

Beyond this broad distinction, several organizational models of the management of waste flows and of sharing responsibilities and charges between public and private actors can be identified. Germany chose to divide waste flows (packaging waste on one side, other waste on another side) and to associate to each type of flow a completely distinct operational and financial responsibility, borne by different actors, even if over-costs are generated due to the multiplication of overlapping organizational schemes. Other countries preferred not to divide the operational responsibility, and to set only a partial link between organizational and financial responsibilities, in order to preserve the opportunity of rationalizing collection and recovery schemes. This last approach has been reinforced by the existence of departmental (in France), provincial (in the Netherlands), or regional (in Italy) waste management plans. These plans aim at giving coherence to various local, decentralized initiatives, and ensuring compliance to national regulatory objectives.

In the Netherlands, the Waste Management Council (AOO) has been set up to contribute to waste planning at the national level. It consists of the main actors: the Ministry of the Environment, the Association of Netherlands Municipalities, the Inter-Provincial Council and environmental and consumer organizations. While in other countries coordination is mainly achieved at the level of municipalities and territorial authorities of a higher level, in the Netherlands it is reached at both local and national levels. For example, close coordination exists between the provinces with regard to improving the use of existing capacities of treatment, which implies some coordinated procedure to allocate waste to different facilities.

### *Technical and economic choices*

#### *Imposing or not imposing a hierarchy of techniques?*

The important point, regarding the third and fourth key variables presented here, is linked to the existence, or non-existence, of a belief in the capacity of the actors involved to find by their own means the best way to reach policy objectives.

The more strongly held such a belief, the more intense the dialogue between public authorities and industry on the rules to be adopted, and the more flexibility is left to the actors regarding the choice of techniques.

Some countries (such as Germany and the Netherlands) have decided to impose a strict hierarchy of technical options for managing waste as a basic component of national policy. Other countries have preferred to give decentralized actors the opportunity to choose between several techniques, without any clear mention of preference, in order to find the best combinations adapted to local conditions. The latter is the case for France, Italy and Greece. In France, while the orientations defined by the law of July 1992 pose a severe limit on landfilling in order to favour valorization, there is, nevertheless, no hierarchy among valorization techniques. Thus, packaging waste management, recycling, composting and incineration with energy recovery were to be considered in the same way. Germany and the Netherlands, on the contrary, gave great importance to the principle of having a general hierarchy of techniques as an expression of national priorities. The priority order is as follows: prevention, material reuse, material recycling, incineration with energy recovery, disposal other than landfill, landfilling. All private and local public actors have to respect this hierarchy. A lower-level solution in the hierarchy can be used only if higher-level ones are not available in practice. For example, in Germany, the DSD has to reach the valorization objectives of packaging waste only with regard to recycling. The use of incineration with energy recovery is a valid option if, and only if, recycling targets have already been met (DSD, 1995). This hierarchical approach may have a great influence on the development of new thinking about and new technologies for waste management; it may be the starting point for specific trajectories of technological innovation intended as a basis for a more sustainable organization of economic activities. This is the view currently developed in Germany and the Netherlands. Thus, several countries have opted for a hierarchy favouring prevention and recycling, while others have not. Consequently, we can predict that divergent technical and industrial trajectories relating to waste management can be expected to emerge in Europe.

The second important consequence of the hierarchy, or of its absence, regards the level of costs of household waste management. The countries that choose a kind of 'public technological interventionism', by pushing new technologies ahead of the state of the art, have to support much higher management costs than the others, at least in the first phase. There are two elements that explain the higher costs of this 'technological challenge' approach: first, a country that asks the actors to adopt mainly or exclusively one technique loses the expected benefits of a complementary use of other solutions better adapted to some fractions of the waste flow (Bertolini, 1994); second, regulated agents have to pay additional costs linked to R&D investments, and costs involved to develop, adapt and diffuse the new technology at an industrial scale. For example, it seems that about half of the overall 1996 budget of DSD in Germany has been used to support and develop the separate collection, sorting and recycling of plastics, which represent only 11% of recycled sales packaging (Argus, 2001). These two types of factors explain, in part, the differences of costs observed—for instance, between France and Germany—in the field of packaging waste management (Defeuilley & Quirion, 1995).

#### *Economic instruments*

Besides the direct regulatory measures (quotas, the banning of some techniques), most countries have introduced financial mechanisms in order to raise the money needed to help reach their objectives. The Netherlands are an exception in this regard, since they stick to a mix of regulatory measures and voluntary agreements. However, the nature and level of financial mechanisms are slightly different from one country to another. Many types of instruments are used: landfilling levies in France and in Italy (and also in other countries not being specifically considered here, like Denmark and the UK); contributions paid by firms using packages to business-oriented organizations in charge of packaging waste management (France, Germany); levies put on some products, like the levy on plastic bags in Italy, which was introduced at the beginning of the 1990s but then suppressed after a few years.

These instruments combine in a variable proportion an incentive purpose and a financing one. Landfilling levies are used in order to finance the development of valorization techniques and partly fill the existing price gap between these techniques and landfilling. The contributions on packaging aim at financing selective collection and sorting and may also have a structural effect on the use of packaging (choice of the materials, type of filling technique, nature of the flow to be treated). Some instruments may incorporate an explicit incentive dimension. For example, Eco-Emballages adopted a progressive scale of subsidies to local authorities for recycling plastics in June 1996, the unit payment increasing with the rate of sorted materials per inhabitant; this tariff should encourage local authorities to reach a higher productivity for selective collection and sorting.

Those instruments (levies, contributions, subsidies) can be considered as an incentive when economic agents (firms, households, local authorities) modify their behaviour in response. In practice, these instruments demonstrate some differences, but most of them have a financial dimension without significantly influencing behaviours. These are accompanying, not leading, instruments, and, in those cases, the main impulse for behavioural change comes from regulatory constraints. The level at which the instrument is set is crucial: a reduced levy on landfilling will generate a signal too weak to weigh on the choice of actors. It will really motivate actors only if it modifies the relative prices between two techniques (landfilling and valorization), two materials (glass and plastic, for instance) or two types of packaging. The case of the Netherlands appears as an exception in this panorama. Since the early 1980s, the use of voluntary agreements has been favoured by the trend towards deregulation and the disappointing assessments of command-and-control approaches. 'By deliberation directly with the affected interest groups in society, support for a more powerful implementation was expected to increase' (Neumann, 1997). Goals were set on a sectorial basis through negotiated agreements. The latter took the form of common declarations of intents (covenants), including substantive targets and procedural aspects, between the government and industry. Though the inspiration is

voluntary or negotiated, what has been accepted in the covenant is enforceable under civil law. The packaging covenant is one of the many covenants adopted in the Netherlands, as an alternative to the use of economic instruments such as charges and tradeable permits. The only compulsory instrument used here in order to motivate actors to change their behaviour is the landfill tax, which has been effective since 1996. Its level, 15 ecu per ton in 1996, is far more likely to induce changes in actor behaviour than the level adopted, for example, in France (see Table 3).

The countries with the most demanding fiscal instruments generally have objectives requiring a modification of the behaviour of actors regarding their technical choices or production processes. This is the case in Germany, or Italy for non-biodegradable plastic bags. It could have been the case of the Netherlands if they had not chosen the alternative approach of voluntary agreements. When Italy introduced a tax on non-biodegradable plastic bags, the intention was to dissuade their consumption and encourage the

Table 3. The incentive content of instruments

Country	Instruments	Degree of motivation
France	Levy on landfilling: 6.15 ecu/t (1998)	Weak
	Average contribution on packaging: 0.0015 ecu	Weak
Germany	Contribution per kg of packaging: between 0.07 ecu and 1.53 ecu. Differentiation of 1 to 19 between glass and plastic	Strong
Greece	No instruments. Process of adaptation of Eco-Emballages to the Greek regime	None
Italy	Contribution on plastic bags: 0.07 ecu per unit	Strong
	Levy for packaging unit from 0.01 to 0.05 ecu per packaging	Weak
The Netherlands	Landfilling tax: 15 ecu/t (1996)	Medium
	Covenant	Non-measurable <i>ex-ante</i>

use of substitutes. Through the DSD, Germany has adopted differentiated rates according to the types of material. Rates have been calibrated to ensure the financing of recovery and usage of materials matching specific targets. The goal was not to use incentive charges as such, but to raise enough money to cover the costs of all the chain for each material. The sheer ambition of the objectives (recycling plus prevention), and the technological interventionism involved in packaging waste management, explain the high level of the DSD taxes. The expected effects of high and differentiated contributions—viability of the recycling sector, reduction of packaging flows introduced on the market, substitution between materials—should help to reach very demanding objectives in an efficient manner. According to Argus (2001), it is indeed expected that costs of the DSD will decrease by about 20–30% within 5–10 years.

The constraints introduced by the Dutch policy are slightly different. The change in behaviour of the actors, and particularly the industrial ones, is not supposed to be induced by any financial mechanism, but comes from the negotiated commitment of all parties and a cooperative approach, which create a favourable climate for innovation and creativeness in finding low-cost solutions. Of course, the enforcement of the covenant could be undermined by free riding. Until now, even if all the objectives have not been reached in the same proportions, there is no case of clear failures. In the specific case of the packaging covenant, however, firms unwilling to follow the covenant prescriptions automatically place themselves under the jurisdiction of the Dutch transcription of the European Directive. In the eyes of industry, this mechanism prevents a free-riding strategy by firms.

In France and Italy, the levies on landfilling are rather low and cannot by themselves close the cost gap between recycling and elimination. The main political drive has to be derived from other means. In France, the driving force for valorization is the obligation to valorize any waste but ultimate waste by 2002. Hence, levies on landfilling merely aim at facilitating the adoption of technical and organizational schemes for valorization. The same reasoning applies to packaging waste. The instruments used in France are not sufficient to

motivate firms deciding to use packaging to modify their behaviour. While Eco-Emballages does support actions taken by municipalities by financing part of the costs of selective collection and sorting, the mechanism does not have any effect upstream. Yet, the choice not to impose a national hierarchy among techniques of valorization, and the absence of intermediary (before 2002) valorization objectives for each type of technique, should have called for stronger incentives to ensure that targets fixed by the authorities will be met in practice (Defeuilley *et al.*, 1997; Godard, 1999).

### The obstacles to implementation

Whatever the specific objectives, organizations or policy instruments chosen by individual countries, national policies have all encountered various obstacles and difficulties. In spite of real achievements in improving waste management, modifications were necessary during this implementation phase. The interesting point is to see to what extent a decentralized procedure is able to facilitate the evolution of the regime through the (economically) required corrections.

In the Netherlands, the goal to reduce packaging introduced in the market in 1994 were already attained for aluminium, tin-plate, glass and paper/cardboard in 1996. Not surprisingly, it is not the case for plastics.<sup>3</sup> This led the actors involved in the packaging covenant to elaborate various subcovenants, one for each material. This new subdivision gives more responsibility to the producers of specific materials, thus avoiding the failure of the whole covenant because of the lack of efforts of some material producers, which could penalize other producers having made the necessary efforts. The Dutch regime also encountered financial problems for some local authorities, because of a trend of under-utilization of existing, though retrofitted, incineration capacities that were too costly to compete freely with landfilling either in the Netherlands or in neighbouring countries. A shift in the hierarchy of technologies has reappraised the status of incineration in order to enforce a better use of capacities.

In Italy the system of Obligatory Syndicates, grouping producers for each material, did

not bring the expected results. For glass and paper/cardboard, such syndicates have been useful in consolidating the already good recycling results, grounded in traditional practices, but they did not succeed in reaching the more ambitious objective within the established time-frame. The progression in plastics, though insufficient to comply with the objective of 40% of recycling, is impressive, with an official 31% of recycling in 1996. However, most of the plastic recycled did not belong to the domestic packaging waste category! A serious problem for increasing the rates of recycling arose from the limited participation of the municipalities in the running of the system. The Obligatory Syndicates had the responsibility to manage the recycling of materials, but not the separate collection schemes, which remained in the hands of municipalities. Many municipalities made no effort at all to improve their recycling rates until very recently, and no sanctions were forthcoming for them for this defect. There is clearly a missing link in the recycling chain in Italy, and this problem has not been overcome.

In Germany, problems that have been met were not directly related to the issue of goal attainment. They mostly regarded the externalities caused by the functioning of the DSD due to the unexpected success of separate collection and sorting, as a result of a high level of response by the population. The sorting objective has been reached even more easily than initially scheduled. As a result, the waste management system has had to face a number of challenges. First, the system had to face a financial crisis in 1993–1994, because of a rapid take-off of separate collection, which had to be funded, and major deficiencies in the payment of contributions by packaging firms. This crisis may be seen as a 'growth crisis'. A second problem was more fundamental: the lack of capacity to recycle all sorted materials. This problem has been escaped mainly by exporting huge quantities of sorted materials abroad. This 'solution' has generated shocks on secondary markets abroad, which have experienced a sudden influx of low or negatively priced materials. Since the German DSD financially supported all of the collection and sorting operations, materials could be sold at any price necessary to decrease stock of unused sorted materials. Meanwhile, financial support in other countries was only partial (such

as in France) or even non-existent (such as in the Netherlands), entailing *ex ante* higher equilibrium prices for secondary materials: in these countries, recyclers had to make their living by selling those materials. Furthermore, quite often the materials collected and sold by the DSD have been disposed of as 'waste' and not as a 'secondary' commodity. At the same time, for industrial circles, the main problems of DSD are not linked to this export issue as such, but to their excessive overall cost. From several parts of industry there have been criticisms of a lack of appropriate controls against the rent-seeking strategy developed by the waste management operators. Added to the dual system of management, this led to many inefficiencies, now almost completely resolved, the most intense period of exports of sorted materials now being ended.

In France, the objectives fixed in 1992 were not as ambitious as they were in Germany or in the Netherlands. Yet, from the outset of the implementation phase of Eco-Emballages some difficulties emerged. The number of municipalities committing themselves to the new course of valorization has remained limited, in spite of significant experiments. Only a minority of municipalities have made the appropriate investments to reach the expected valorization rates. Financial costs involved are more important than expected, confronting municipalities with real budgetary difficulties in a period when several other environmental (water treatment, urban noise) and non-environmental issues (unemployment, urban security) call for an increasing amount of resources, and authorities are reluctant to increase local taxes. Besides, the total amount of investment for implementing the national waste management legislation have been underestimated (by 10 times!). Furthermore, according to the departmental plans elaborated between 1996 and 1998, incineration with energy recovery, a technological fix, would have to treat between 65% and 70% of the total amount of household waste by 2002 (27% in 1989). Other valorization techniques would then be condemned to a relatively limited share. Composting (8%) and recycling (19%) would represent together 27% of valorization, versus 8% for landfilling and incineration without energy recovery (Denby-Wilkes, 1996). This intense focus on incineration does

not square either with the idea that preserving decentralized choices from command-and-control approaches would allow for a diversified adaptation to locally specific conditions, nor with the initial objectives announced as the reference for the new packaging waste policy. Yet, after seven years of running, the results of Eco-Emballages were finally approaching the expected one (Argus, 2001). In 1999, Eco-Emballages had reached a valorization level of 1.88 million tons of packaging waste compared to the 4.03 millions tons of its responsibility (32% of recycling, 15% of energy valorization). The overall valorization rate (recycling and incineration) of household packaging waste reached 49% (30% for recycling alone), but with a target of 75% in 2002.

In Greece, implementation problems are radically different. Illegal landfilling is still the implicit 'standard' of municipal waste management in many places. The Greek industry, in agreement with the public authorities, has taken the initiative to experiment with a system of separate collection closely related to the concept of the French Eco-Emballages. The limited scale of the experiment (140 000 inhabitants concerned) does not allow any comment on the results obtained.

### Policy development as a correcting evolution

Obstacles at the implementation stage required adjustment from each type of national regime and the introduction of revising the means in order to improve the progress towards policy objectives, and sometimes a reconsideration and change in the objectives themselves. Thus, implementing new regimes for waste management also meant learning and adapting initial concepts. What lessons can be learnt on the adaptability of various regimes? Two questions deserve some attention: To what extent do systems rejecting central command-and-control prescriptions, and based on decentralized decision-making, demonstrate a greater ease than others in introducing changes in the regime through timely corrections? To what extent do corrections that have been introduced increase or reduce the conceptual distance between regimes in different countries?

Except for Greece, which is still in the first stage of the elaboration of its waste management regime, the four other countries analysed decided to adjust the initial design on the basis of feedback from the early years of operation.

In Germany, because of the excessive cost of the recycling of plastics, a debate was raised about the quantitative target that should be imposed for this type of material. After many negotiations, it was decided to lower the quota for plastics: 60% has to be recovered in total and at least 36% has to be recycled. Such distinction is new and brings it closer to the French approach, since it gives more room for manoeuvre to a plurality of techniques. Moreover, measures have been taken in order to avoid the DSD becoming too expensive. Operators are no longer paid on the basis of the input 'waste' they receive but on the outputs of sorting, and supports are progressively increasing on the basis of cost–efficiency ratios. This should reduce the cost of the German regime. Measures have also been taken to limit the export of secondary material, which had been strongly criticized by other countries and by non-governmental organizations. The Deutsche Gesellschaft für Kunststoff–Recycling mbH, responsible for the recycling of plastics, intends to stabilize exports at 10% of the flow and to stop financing plastic recycling in 2003, once valorization technologies are stabilized. A clear tendency to correct the most important sources of problems can therefore be observed in Germany. More attention paid to the incentive dimensions of the rules of the game and a less strict interpretation of the national hierarchy of technologies are two features of this adaptation.

In France, with the renewal of the Eco-Emballages agreement in 1996, a first correction has been brought to the regime, with changes in the method of calculation of the direct payments to local authorities, in order to favour more recycling and give a smaller incentive to incineration. After this revision, an official policy note from the Ministry of the Environment went on 28 April 1998 to modify the framework of the French regime. The note insists on the higher priority to be given to recycling (including composting), with a long-term indicative goal of at least 50% of all household waste. It also clarifies

the notion of *ultimate waste*, which, until now, was conceived of by many actors as just the output of incineration. The note specifies that ultimate waste is 'the non-recoverable fraction of waste and not only the output of incineration'. This point is important since it underlines for local authorities that they are not sticking solely to incineration and that in defined conditions landfilling may be an acceptable solution for waste being discarded from sorting or composting activities. Finally, the note tries to give a more operational interpretation of the proximity principle. Mainly because of the lack of flexibility of incineration capacities, and of the required economies of scale, the geographical limits of local government (that is, departments) are often felt to be too restricted. So the note calls for the development of cooperation between adjacent departments around the use of incineration plants for the best environmental and economic benefits. Concluded in April 2000, a new round of discussion modified the tariff of contributions paid to Eco-Emballages by industry and subsidies attributed by Eco-Emballages to local authorities. New financial mechanisms aim at rewarding efforts to lightweight packaging, not penalizing a packaging made heavier because of its recycled content, and penalizing rigid packaging that used to be recycled but is no longer. Besides an increase in the overall level of support given by Eco-Emballages, it is important to note several points: a differentiation of contributions paid according to materials, so as to achieve an overall financial balance; a generalization of the progressive mechanism of subsidy that increases the unit rate of support according to the rate of recovery obtained by local authorities; and the introduction of a fixed fee per unit, so as to penalize small packaging units more difficult to recycle. If we add the still not achieved modification of the plans of departments, in order to reach at least 50% of recycling of waste, all this will give a new drive to the national policy of household waste management in the years to come.

In Italy, the regime was changed fundamentally in 1997. The responsibility for the achievements of the objectives is assigned to a new private compulsory consortium: Consorzio Nazionale Imballaggi (CONAI). This new organization joins two new categories to the packaging producers

already involved: the fillers and the distributors. Its mission is to overcome one of the main difficulties experienced by the previous Obligatory Syndicates, which was the lack of involvement of packaging users who seem to be very sensitive to environmental pressure. Since October 1998, packaging producers and fillers have to pay a fixed entry fee to CONAI and a contribution depending on the packaging volumes they introduce onto the market. The fees are used to finance collection and sorting operations of packaging waste, in a way that has some similarities with the DSD and Eco-Emballages. However, the exact role of CONAI, and the articulation of packaging producers and fillers responsibilities, are not yet well defined and are subject to many criticisms from the Ministry of the Environment. After a period without guarantee that the waste management system of CONAI would be consistent with the legislation, the system is evolving favourably, as shown by the cooperation agreement signed in July 1999 between CONAI (representing the industry) and the municipalities. There are, however, still difficulties, particularly in the south of the country.

In the Netherlands, we have already noted that the packaging covenant has been divided into many co-covenants in order to better identify the responsibilities of the various materials. Besides this, the proximity principle is progressively diminished, so that demand and supply of waste management fit better on a national level. Yet, as the results are globally satisfying (a reduction of about 15% of produced packaging in 1997 compared to 1986) but extremely long to assess, and the quantitative objectives are to be reached in 2000, it is too early to assess the overall capacity of the regime to reach the fixed goals.

Whatever the initial features of national waste management regimes, the implementation of policy forced each of them to pay more attention to the economic dimension of household waste management; these included ensuring that incentives were more clearly embedded within the rules of the waste regulatory game, sensitivity to economies of scale, and level of costs imposed by various targets. For each country, the possibilities for policy learning were circumscribed by economic factors. Those countries that started with a rigid, prescriptive and hierarchical approach

have introduced more flexibility in their system to ease and make more efficient the allocation of waste flows to treatment facilities. Those countries starting with a loose approach, confident in the ability of local decisions to achieve efficiency, came to establish a more solid structure of targets, rules, organizations and incentives. Thus, initial divergences among countries have not increased through experience but, on the contrary, decreased to some extent.

### The key policy variables of municipal waste management

The comparative approach to national regimes for household waste management is useful as it allows us to extract bottom-up views on the key variables characterizing implementation. With this approach, four main variables may decide the essential features of a regime (see Figure 1).

- The basic conventions ('myths' related to the content of a sustainable society) supporting the chosen policy objectives with, most significantly, the representation of landfilling in one side and prevention at the source on the other side. Within these boundaries, three main myths relating to waste management are in competition in Europe: a 'myth of mastering' (neutralization and control) of pollutant flows in landfills without environmental spill-over; a 'myth of perpetual materials cycles' (recycling), able to support economic growth with little external material input and output; a 'myth of a dematerialized post-modern society' (prevention at source).
- Policy towards technological options: central intervention and a hierarchical approach can be counterposed by the denial of any general national waste hierarchy, which implies that no specific means are given intrinsic superiority; individual waste management choices have to be made on the basis of a context-specific appraisal of costs and benefits.
- The process of design of the new regime can be viewed from the pattern of relationships that emerge between public authorities and industry, with the two extreme positions of a pure delegation of design of the waste regime

to the regulated agents (firms, local authorities) and an imposition of a new regime by public decision-makers without real dialogue.

- The splitting of practical and financial responsibilities between actors in relation to the distinctions introduced between waste categories according to their nature, origin or destination.

In combination, these four variables explain to a considerable extent the degree of orientation of regimes towards cost-effectiveness. For example, a policy aiming at prevention of waste production at source and ambitious objectives for valorization (for example, Germany and the Netherlands) require strong targets and important financial means that acquire an incentive dimension even without explicit intention to do so. Indeed, important changes in the behaviour of actors have to be obtained if the policy strategy is to be effective.

An in-depth dialogue between actors favours the acceptability of policy innovation but also tends to lead to a regime that neutralizes the incentive structure for competing industrial activities, as in the case of French policy (Defeuilley & Godard, 1997). In France, industrialists played a leading role in the formulation and the implementation of the packaging waste legislation. Eco-Emballages is the product of a long negotiation process and has resulted in the quasi-delegation of the design of the packaging waste regime to industrial circles. This rather unusual approach in France was intended to motivate all industrial firms to enter into common action to promote household packaging waste valorization, despite possible conflicting economic interests. A key issue was to fill the gap between fillers and material producers. This consensus-driven process has led to important initial drawbacks. First, the initial tariff of contributions paid by fillers was not differentiated according to materials but only to volumes in order to avoid any disturbances in the sharing of markets between materials. In that way, it was possible to reassure fillers that they would continue to be allowed to use the whole range of packaging materials without specific restrictions. Second, industry elaborated a scheme that would minimize the financial burden they had to bear, by pushing the concepts of 'shared responsibility' with local authorities and

'subsidies for overcost' of selective collection and sorting. In several ways, this meant a transfer of uncertainties and technological and financial risks to municipalities in practice. Third, industry tried to gain maximum control over their involvement in collection operations. As a result the green dot put on household packaging has lost almost all its incentive properties.

The above four variables also explain the differences of direct running costs between countries, for example between the German and the French regimes. The attribution of responsibility for waste and the options taken in the field of techniques are the main variables explaining the huge gap in financial figures publicized by the two organizations: the DSD and Eco-Emballages. A regime combining ambitious objectives, technical interventionism and the division of waste flow into several fractions can only lead to a strong increase of the direct costs borne by private and public actors. Those who criticize one system or another<sup>4</sup> often forget that a comparison between regimes has to take differences in objectives and techniques (and their respective environmental standards) into account.

### Conclusion

The 1994 EU Directive on Packaging and Packaging Waste (1994) set the following objectives: between 50% and 65% of packaging waste (in weight) ought to be valorized; the part given to material recycling in the valorization techniques must be equal to 25–45%. Fifteen per cent of every packaging material has to be recycled. The directive's objectives will be re-evaluated 10 years after their implementation in the member states, in order to renegotiate another set of goals for packaging and packaging waste.<sup>5</sup> For almost every European country, these objectives are not onerous commitments. In some cases, the objectives have already been met, because of the high recycling rates traditionally obtained for industrial and commercial packaging waste in industrialized countries. In spite of initial intents, the European directive has not set stringent objectives, and lets each country decide upon its technical and organizational choices in a broad common framework. The result is a diversity of approaches as each country has pursued their chosen course, each of them based

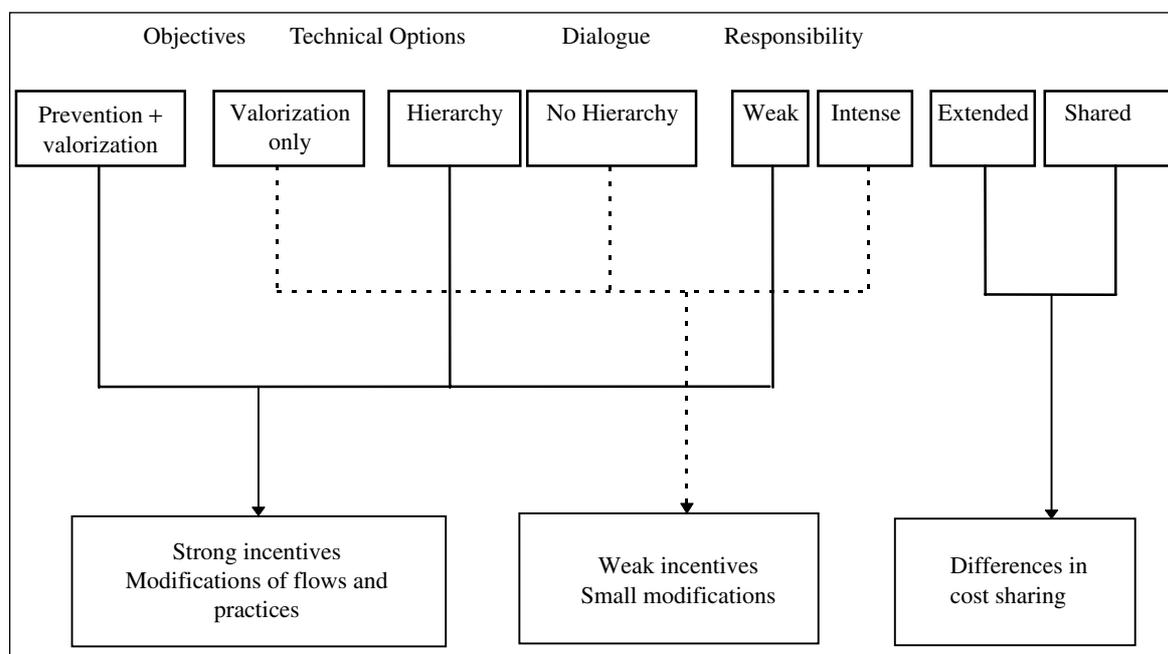


Figure 1. The key variables of national policies.

on different principles, institutions and instruments. Meanwhile, experiences have induced learning and corrections, which, in turn, have reduced divergences between national regimes. With a broad harmonized framework given by the directive, including the perspective of future revisions, a rather good circulation of information across Europe, joined to self-regulation to bring national regimes in comparable countries (France, Germany, the Netherlands, Italy) nearer to one another than was initially the case. On the basis of demonstration effects, Spain and Greece are more or less following one of the few models developed by the others. A real harmonization of national policies, enabling a reduction in the drawbacks of several institutional and technical trajectories, can only be engaged in through a negotiation process focusing on the key variables identified above (that is, nature of objectives, technical options, dialogue and responsibility). Having accepted to play the game of experimenting with various competing organizational concepts, policy approaches have emerged that allowed an insight into the cost-effectiveness of alternative solutions, which would not be at hand if one unique model of waste management had been imposed throughout Europe. It may be that harmonization happens more cost-effectively with a soft approach than through the difficult political way of rigid European directives.

The existing mixes between key variables ought to be analysed at the end of the 10 years between the implementation of the European directive into national laws and the definition of a new set of policy objectives. The efficiency of each national trajectory not only depends on its capacity to reach the initial objectives, but also on its flexibility through time. As has been shown, with the increasing experience due to feedback on results, improvements in performance are apparent. While such flexibility undeniably depends on the articulation between key variables, there remain a number of interesting issues of which further understanding is needed. For example, are the absence of an *a priori* technical hierarchy, or of an intense dialogue between public authorities and industry, elements really favouring an improvement in performance? In other words, questions are open regarding the

long-term efficiency of the several combinations of the key variables here presented.

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## Notes

1. That is, the tendency of waste (sorted or not) to cover long distances, throughout Europe, so as to reach financially more convenient places for waste treatment. Such a phenomenon may be legal or illegal, as for example in the south of Italy. Generally, it moves waste to countries or regions with lower or unimplemented environmental standards.
2. A more in-depth analysis of these five national regimes is developed in Buclet & Godard (2000).
3. It is a similar story in almost any country. Reasons are roughly the following. Plastic recycling is only developed for industrial waste, where it is easy to get large quantities of homogeneous materials. Regarding household waste, plastics are heterogeneous, each category having to be sorted, which is an extremely expensive process. The required economies of scale are hardly reached by sorting units. This leads to new potential solutions, such as the conception of more homogeneous—in terms of plastic composition—packaging, i.e. easier to sort. Industry now 'tends' to conceive of packaging in such a way.
4. Strong rivalries arose, for example, between France and Germany during the 1990s.
5. The process of renegotiation has already started, in its unofficial part.

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