

Paper reutilization in Germany: current legislative measures

LOTHAR GÖTTSCHING AND HANS-JOACHIM PUTZ

Germans push for maximum reuse of paper and packaging.

In order to avoid a further increase of the volume of nonrecycled waste, the German Federal Government issued a Packaging Ordinance in 1991, making producers, distributors and commercial users of packaging responsible for their products (made from paper, plastics, glass, metal) from cradle to grave. For the regulation of reutilization of printed material (news, magazines, brochures, directories, inserts, direct mail) and office discards, the Waste Paper Ordinance might be issued in 1994.

In both cases recovery or reutilization targets are specified that have to be fulfilled by the paper industry in the 1990s. Collection systems financed by the commercial partners of the paper chain are to be improved and extended country-wide, whereas the local authorities are released from their traditional responsibility to collect and to dispose of garbage components such as paper, glass, metal, and plastics.

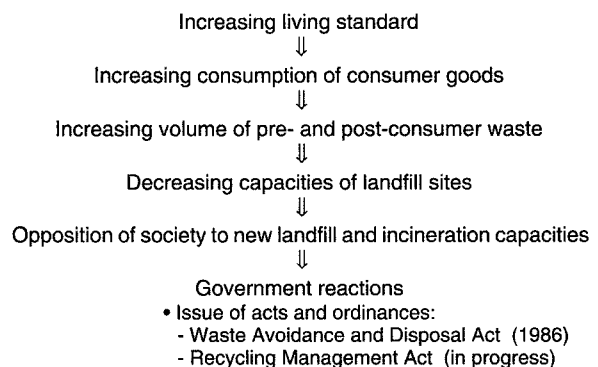
Taking the final target reutilization rates for packaging (1995) and of printed matter (possibly 1997) into account, there will be an excess of discarded paper. The extent of this excess will depend on the volumes of paper imports and waste paper exports as well as on the increase of recoverable paper utilized in graphic papers, particularly in newsprint, recycled paper, supercalendered (SC), and lightweight coated (LWC) papers.

To date, management of household garbage, including post-consumer waste such as paper, plastics, glass, and metal, has concentrated on its collection, followed by dumping (70% by weight) or incineration (30% by weight). However, in Germany the capacities of landfills and incineration plants are limited and there will be a significant shortage of disposal facilities in the future (Table I). According to government forecasts, half of the present landfill capacities will have been filled in less than five years.

Due to the restrictive attitude of society, supported by green movements, there are almost no opportunities to open new landfill sites or new municipal garbage incineration plants. Apart from the emotional hurdles, the period of time for search, design, legal procedures, and final approval for new dumps or incineration plants by the authorities would take at least five years.

Because of the increasing shortage of disposal facilities, German industries, private organizations, and local governments have in-

I. Driving forces for legislative measures in Germany



creased the export of waste and garbage to West and East European countries and even overseas. Recently the French government and its Ministry of Environment have strictly prohibited the dumping of German waste in that country. It has to be expected that other countries, at least in Europe, will be as restrictive as France in the future. However, the German paper industry, as well as organizations dealing with discarded paper, hope for increased export of surplus paper for recycling in order to avoid domestic discarded paper mountains affecting the image of the paper chain and creating further governmental measures.

In 1991, the Federal Government of Germany issued an ordinance—and will likely issue a further one in 1994—in order to reduce the volume of pre- and postconsumer waste to be disposed, including that fraction of waste paper which is not yet reutilized in the paper industry. In the context of the Waste Avoidance and Disposal Act, enacted in 1986, the German government is empowered to issue ordinances without any parliamentary legislation. However, such ordinances have to be passed by the Second Chamber (Bundesrat—comparable to the U. S. Senate). The representatives of the Second Chamber are members of the governments of Germany's 16 states, which are dominated by the

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Labor Party (Social Democrats), which is even more "green" than the conservative Federal Government.

In response to the foreseen shortage of landfill and incineration capacities, the waste management policy of Germany is aimed at the following targets:

1. Avoidance of waste
2. Reduction of waste
3. Recycling of waste.

The remaining, significantly reduced volume of waste may then be disposed in an environmentally friendly manner. In the Waste Avoidance and Disposal Act, waste pertains to garbage of households and refuse of trade and industry. This article concentrates on the paper component of municipal waste as well as scrap paper generated by paper converting including printing, distribution, and other associated trades in the paper chain. Residues of the pulp and paper industry such as bark, rejects, deinking sludge, sludge of effluent treatment, or ash of power plants are not controlled by the regulations to be discussed.

Packaging Ordinance

In 1991, the Ordinance Concerning the Avoidance of Packaging came into force. The "Packaging Ordinance" regulates the recovery and reutilization of packaging made from paper, boxboard, solid board, corrugated board, or composite materials based on paper and board. The ordinance also regulates glass, metal, and plastics packaging. The essentials of the Packaging Ordinance are as follows:

1. For the first time, producers, distributors, and commercial users of packaging have an absolute responsibility for the total life cycle of their products—from cradle to grave. In practice, this means local governments are no longer responsible for the disposal of packaging in terms of pre- and postconsumer waste as a part of household waste.
2. Packaging has to be produced from environmentally friendly material which does not hinder recycling processes.
3. Excess volume or weight of packaging has to be avoided by optimal use of packaging, with its function strictly oriented toward the protection of consumer goods.
4. Reusable packaging must be promoted.
5. Packaging has to be reused through recycling. Apart from the utilization of recyclable paper for the manufacturing of new paper and board, the recycling processes also comprise:
 - Composting
 - Processes for the separation of composite materials
 - Decomposition into molecular structures (pyrolysis/hydrolysis).

II. Recovery and utilization rates of packaging

<i>Transport and preconsumer packaging</i>			
<i>Category</i>	<i>Recovery rate,</i> %	<i>Sorting rate,</i> %	<i>Utilization rate,</i> %
Transport packaging (Dec. 1991)	100	100	100
Preconsumer packaging (April 1992)	100	100	100
<i>Postconsumer packaging</i>			
<i>Schedule</i>	<i>Recovery rate,</i> %	<i>Sorting rate,</i> %	<i>Utilization rate,</i> %
Jan. 1993	30	60	18
July 1995	80	80	64
	Legislated figures		Resulting figures
Figures related to packaging consumed in Germany (based on paper and board)			

However, burning of paper or plastics to generate energy is not regarded as an acceptable procedure.

The Packaging Ordinance divides packaging into three categories:

- Transport packaging
- Preconsumer packaging
- Postconsumer packaging.

Transport packaging is defined as shipment containers, which are removed by dealers in stores and supermarkets (e.g., fruit trays) or by service people delivering consumer goods (e.g., furniture) to end consumers. Packaging that end consumers take to their homes is postconsumer packaging, even when it has originally been used as transport package (e.g., for a television transported by the end consumer from the store to home). The proportion of transport and postconsumer packaging amounts to more than 95% (by weight) of all paper and board packaging, so it does not make sense to discuss preconsumer packaging in detail.

Table II shows that, since December 1991 and April 1992, respectively, transport packaging and preconsumer packaging must be totally recovered and recycled. According to the Packaging Ordinance, as of January 1993, a minimum of 30% of the total volume of postconsumer packaging has to be recovered. Out of this recovered volume, 60% has to be sorted, creating salvaged paper which is suitable for reutilization in the paper industry or elsewhere. From July 1995, the rates of recovery and sorting have to be increased substantially to 80% each. These rates of recovery and sorting result in reutilization rates of 18% (1993) and of 64%

III. Application of the final reutilization rates (1995) of the Packaging Ordinance referring to the figures of consumption in 1991

Category	Reutilization		Volume, 10 ⁶ tons
	Consump., 10 ⁶ tons	Rate, %	
Transport Packaging	2.8	100	2.8
Preconsumer packaging	0.1	100	0.1
Postconsumer packaging	2.2	64	1.4
Subtotal of packaging	5.1	84	4.3
Composite materials			
Transport packaging	<0.01	100	<0.01
Preconsumer packaging	<0.01	100	<0.01
Postconsumer packaging	0.4	64	0.3
Subtotal composite m.	0.4	66	0.3
Total of packaging	5.4	83	4.5
+Converting waste (not regulated by the Ordinance)			0.3
Total packaging and waste to be recycled			4.8
Packaging paper and board	6.1*)	78	4.8

*) The difference between 6.1 million tons and 5.4 million tons comprises – apart from converting waste – paper and board grades which are not covered by the packaging ordinance.

IV Draft of Waste Paper Ordinance

<i>Printed matter and office waste (Newspapers, magazines, brochures, directories, inserts, direct mail)</i>		
Schedule	Recovery rate, %	Utilization rate, %
Phase I	52	52
Phase II	55	55
Phase III	60	60
Proposed figures		
Figures related to graphic papers consumed in Germany (except paper for book production)		

(1995), respectively, of all postconsumer packaging. Additionally, transport and preconsumer packaging, which is already completely collected, has to be recycled.

Waste paper originating from converting plants and manufacturing packaging is not covered by this regulation. Nevertheless,

almost the total volume of this commercial waste is collected and recycled today, for economic reasons. Such relatively pure and clean paper grades salvaged from converting plants (e.g., corrugating box plants) are reducing the reutilization possibilities of the additional paper refuse generated by the Packaging Ordinance.

Table III shows the volumes of packaging to be recycled, based on the various proportions of transport, preconsumer, and postconsumer packaging in 1991 and the different rates of reutilization to be fulfilled in 1995. By 1995, at the latest, 84% of packaging consumed (excluding composite materials such as liquid board containers) has to be reutilized according to the Packaging Ordinance.

If the paper/board content (about 80%) of composite materials is taken into account, the paper proportion of packaging to be recycled reaches 83% of all packaging, or 78% of the total volume of packaging paper and board consumed in Germany. This figure of 78% is extremely ambitious. Furthermore, the consumption of packaging paper and board exceeds the domestic production of the corresponding grades by 33% because of imports. In respect to domestic production of 4.6 million tons, the resulting paper reutilization rate would exceed 100%.

To make it quite clear: The German paper industry will not be in a position to fulfill the 1995 requirements of the Packaging Ordinance because the low "brown" paper grades such as mixed waste and department store waste, always contain a substantial proportion of printed matter such as newspapers and magazines. Therefore, export of recovered paper resulting from packaging will become still more essential than today. If exporting such paper grades does not absorb the surplus generated by the Packaging Ordinance, the excess might have to be burned, although that is prohibited in the context of this ordinance.

Waste Paper Ordinance (draft)

In addition to the Packaging Ordinance, the German government is expected to issue a further regulation in 1994 in order to stimulate the recycling of printed matter and office waste. The Ordinance Concerning Avoidance and Recycling of Printed Matter and of Office and Administrative Paper, the "Waste Paper Ordinance," in contrast to the "Packaging Ordinance," specifies only one rate (Table IV). This defined reutilization rate is related to the consumption of graphic papers (in terms of printed matter such as newspapers, magazines, brochures, directories, inserts, direct mail) including office paper (postconsumer waste) as well as converting waste (printing mistakes, side runs) and overissues (preconsumer waste).

In the first phase, 52% of the volume of graphic papers consumed will have to be recycled. The rate will increase to 55% in the second phase, then to 60% in 1997. Table IV shows that in the draft of the Waste Paper Ordinance, only one specified recycling rate has to be achieved, without any definition of recovery or sorting rates. Because the undefined sorting rate is expected to be as high as 100%, the recovery rate to be met is equal to the reutilization rate.

The utilization rate to be fulfilled is not limited to the reutilization

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of printed matter and office waste in the manufacturing of new graphic papers such as newsprint or magazine paper. Printed matter and discarded office papers are permitted to be reused as components of mixed reclaimed paper for the manufacturing of packaging paper and board or in sanitary and specialty papers.

Reutilization abroad is permitted, too. Export of discarded paper gives the opportunity to balance the surplus of domestic waste paper volumes. On the other hand, imported graphic waste paper as well as printed matter in imported mixed paper discards will not be taken into consideration. This limitation takes into account that the reutilization of imported paper discards would not reduce the volume of domestic waste to be disposed.

Interaction between the two ordinances

Society and government are expecting that the German paper industry, which has already reached a paper reutilization rate of more than 50%, is going to increase recycling significantly. With the recycling of waste paper addressed by two ordinances, various consequences concerning waste material and raw material result for all commercial partners involved in the paper chain. The technological limitations affecting the productivity and quality of the products to be manufactured, converted, and used are ignored by the ordinances.

The different approaches of recovery and sorting rates specified in the Packaging Ordinance and of the reutilization rate in the draft of the Waste Paper Ordinance result in different principles for the calculation of the target figures. Additionally, it has to be considered that large volumes of mixed paper discards will be recovered and reused, without knowing their average composition in respect to packaging ("brown" waste) as well as printed matter ("white" waste). Applying both regulations with their different philosophies, the composition of packaging and printed matter might change because of extended recovery systems across Germany. It will be difficult to achieve the differing rates that have to be fulfilled.

A further problem will arise in executing both regulations. It is expected that the rates, defined by the Packaging Ordinance as well as by the draft of the Waste Paper Ordinance, will become minimum requirements. Pressure from local governments will push paper recovery beyond the legally required recovery levels, because:

1. The disposal of separately collected discarded paper is no longer the responsibility of the local authorities. The more paper discards collected separately by private enterprises, the more the local government budgets for financing garbage disposal will be relieved.
2. According to the reviewed Technical Instruction for Municipal Waste Disposal Management issued by the Federal Government in 1993, only refuse with less than 5% (by weight) of organic matter may be landfilled. That means, for example, that household garbage with more than this minimum proportion of paper refuse or of any organic component has to be treated before its disposal. Incineration would be the optimum

V. State of recycling of graphic paper consumed (1991)

<i>Consumption of graphic paper</i>		
<i>Parameter</i>	<i>10⁶ tons</i>	<i>%</i>
Consumption of graphic paper	7.8	
+ Converting additives (3%)	0.2	
- Net export of printed matter	0.3	
= Consumption (acc. to Waste Paper Ordinance)	7.7	100
<i>Recycling of graphic paper consumed (Printed matter and office waste)</i>		
	<i>10⁶ tons</i>	<i>%</i>
1. For manufacturing of graphic paper	1.3	16
2. For manufacturing of		
- sanitary paper		
- specialty paper	1.6	21
- packaging paper		
- board		
3. Export of waste paper ("white" waste)	1.1	14
Total volume recycled	4.0	51

treatment, but this is undesirable to society and the green movements.

3. Incineration capacity required for pretreatment of organic waste is limited in Germany. Additional plants would need to be licensed, which is almost impossible to obtain.

Considering the pressure from local governments, a maximized recovery of paper has to be expected, generating a significantly higher volume of "brown" and "white" discarded paper than the paper industry is able to reutilize in domestic paper manufacturing.

Paper recycling under the Waste Paper Ordinance (draft)

Let us apply the draft of the Waste Paper Ordinance referring to the state of recycling of graphic paper consumed in Germany in the year 1991, despite the fact that this ordinance will not be enacted before 1994. According to information in Table V, the consumption of graphic paper amounted to 7.8 million tons. Allowing for converting additives such as inks and adhesives and for export of printed matter, the net consumption was 7.7 million

VI. State of recycling of packaging (1991)

Parameter	10 ⁶ tons	%
Consumption of packaging paper and board	6.1	
+ Converting additives (3%)	0.2	
- Waste of converting plants	0.3	
- Net export of packaging	0.2	
= Consumption of packaging	5.8	100
Reutilization of:		
1. Packaging	2.6	
2. Printed matter + office w.	1.3	
3. Waste of converting plants	0.3	
(Export of "brown" waste)	(0.7)	
Total reutilization for domestic packaging paper and board	4.2	
Domestic production of packaging paper and board	4.6	80
a) Waste paper reutilization Rate acc. to Packaging Ordinance:	$\frac{2.6 + 0.7}{5.8} \cdot 100 = 57\%$	
b) Target reutilization rate: (See Table III)		78%

tons. This is the reference figure for the calculation of the paper reutilization rate.

The volume of recycled printed matter and office waste totals 4.0 million tons, which corresponds to 51% in terms of the reutilization rate. This almost equals the target figure of 52%, required by the first phase of the draft of the Waste Paper Ordinance. Where are the recycled printed matter and office paper discards utilized? Only 16% out of the 51% is reutilized for the manufacturing of new graphic paper, whereas 21% goes into the manufacturing of sanitary, specialty, and packaging paper including board. Some 14% of the recycled volume is utilized abroad.

From this we can draw the conclusion that the German paper industry, with exporting waste paper organizations, will fulfill the requirements of the Waste Paper Ordinance in the short term. However, in the final stage, 60% of printed matter and office papers have to be reutilized.

There are several driving forces affecting the required increase of the reutilization rate; the export of the relevant waste paper grades is one of the most difficult ones to forecast. According to our forecasts, we believe that the 60% level can almost be reached in the year 2000. However, the countereffect of the Packaging Ordinance is uncertain because "brown" waste absorbs a substan-

tial proportion of printed matter and office paper discards (1.3 million tons). This means that according to the significantly more stringent requirements of the Packaging Ordinance the volume of recycled printed matter and office discards absorbed by lower "brown" grades will be reduced in order to approach the recycling targets of the Packaging Ordinance.

Today, the reutilization rate of graphic paper has reached 20%. It is used in newsprint (72% reusable paper portion) and recycled paper (110% rate). Before the year 2000, on average, graphic paper has to include approximately 30% reclaimed paper. In order to fulfill this rate, SC and LWC papers have to use a certain amount of salvaged paper, whereas newsprint must be manufactured almost completely from recycled paper.

Paper recycling under the Packaging Ordinance

The effects of the Packaging Ordinance are harder to predict than those of the Waste Paper Ordinance. Table VI demonstrates the state of recycling in the manufacturing of packaging paper and board in 1991. First, we have to estimate the consumption of packaging, which depends on the consumption of packaging paper and board and on converting additives, waste of converting plants, and the net export of packaging. The first reference figure corresponds to 5.8 million tons. The total waste paper volume of 4.2 million tons used for manufacturing of packaging paper and board (domestic production: 4.6 million tons) composes packaging, printed matter, office discards, and waste of converting plants.

In Germany the average discarded paper utilization rate of packaging paper and board is as high as 93%. On the other hand, the reutilization rate according to the Packaging Ordinance is quite different and has to refer to the volumes of reutilized packaging (2.6 million tons), exported "brown" waste (0.7 million tons), and the packaging consumed (5.8 million tons). This results in a reutilization rate of 57%. According to Table III the target reutilization rate should be at least 78%. This level can never be achieved unless increasing volumes of "brown" waste are absorbed by export and burning, which is not regarded as a recycling process.

Summary

Germany is a densely populated and highly industrialized country. Its society has reached a high living standard, but it is very sensitive to environmental issues. This creates conflicts between the materialistic way of life and an attitude increasingly oriented toward protection of the environment. Industry, the Federal Government, and the 16 State Governments are aiming at compromises between economic and ecological concerns. However, it is evident that ecology has priority despite the current recession and the fact that the former West Germany has to subsidize the former East Germany because of its poor infrastructure, poor communities, and industry heavily destroyed by the former rulers.

Among other problems, Germany suffers from an increasing shortage of landfill and incineration capacities. The shortage is intensified by the opposition of society and local governments to new dump sites and incineration plants. Export of waste and

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garbage is starting to create problems with neighboring countries. The German government is taking action to reduce the volume of waste from industry and private households.

The new philosophy of waste management is as follows: Producers, converters and distributors of packaging are absolutely responsible for their products from cradle to grave, including recycling of consumed products. According to the already issued Packaging Ordinance (1991) and the draft of the Waste Paper Ordinance (expected to be issued in 1994), 85% of the paper and board consumption (with the exception of sanitary and specialty papers) will be controlled by government regulations as far as recovery and reutilization of the resulting waste paper volume is concerned.

The final recovery and reutilization targets of the Packaging Ordinance are unlikely to be fulfilled by 1995, unless the generated excess of waste paper can be absorbed either by export markets or burning, or both. It has to be emphasized that packaging paper and board produced in Germany has already reached a reutilization rate of 93%, which is close to saturation level.

In contrast to the existing Packaging Ordinance, the Waste Paper Ordinance, which will regulate the reutilization of printed matter and office waste, defines less challenging targets. The

requirements of the first phase of the Waste Paper Ordinance are already fulfilled. Probably by 1997, 60% of printed matter and office paper discards must be recovered and reutilized. Provided that, in addition to newsprint and recycled papers, SC and LWC papers start to use deinked pulp, the final target figure might be reached as long as a certain proportion of "white" recovered paper can be exported.

Because of the different terms of the two ordinances discussed, the German paper industry is calling for a common regulation to cover packaging and printed matter with identical and reasonable targets. Apart from that approach the paper industry, publishers of printed matter, and printers are trying to convince the German government and its Ministry of Environment that a Waste Paper Ordinance is not required and would involve tremendous costs for the extended recovery activities. Independent of governmental measures, the paper industry continues to intensify paper recycling by further increase of the paper reutilization rate. **[1]**

Göttsching is professor, Institut für Papierfabrikation, Technische Hochschule, Germany. Putz is Deputy Research Director, Institut für Papierfabrikation, D-64283 Darmstadt, Germany.