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ENVIRONMENTAL ISSUES :
WASTE PAPER

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
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FOREWORD

The present report on environmental issues : waste paper was prepared in 1990/1991 by the Ad Hoc Working Party on Pulp and Paper of the OECD Industry Committee. It is made publicly available under the responsibility of the Secretary General.

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PREFACE

This report was prepared by the ad hoc Working Party on Pulp and Paper of the OECD Industry Committee during the years 1990/91 in response to environmental problems related to waste paper. The information contained in it was collected at an early stage of its preparation; it is intended to provide a broad overview of the situation in order to assess the significance of the problems.

Developments in the field of waste paper are changing. In some OECD countries, Governments are thinking of introducing new regulations for the handling of waste paper and, in particular, packaging material. The German Government has already passed a packaging regulation which prescribes that by 1995 64 per cent of the consumption of packaging paper and board must be recycled. To meet this requirement, the packaging industry and the retail trade have set up a so-called dual system. This system should guarantee that packaging waste is collected. The cost of the system is covered by a so-called green dot. This green dot which is put on sales packages indicates that the packages will be recycled.

Regulations of this kind set new parameters to the waste paper market. Their effects may take a few years to become visible and it is therefore too early to pass a judgement on them in the report.

SUMMARY AND RECOMMENDATIONS

Waste paper has important environmental dimensions whose impact on societies is increasingly recognised. There is growing attention being paid in OECD countries to the need that proper usage is made of waste paper as a contribution to solving the solid waste problem. Efforts which have been made in this regard in the past are reflected in the higher rates of waste paper being recovered, which come to 30 to 40 per cent of total paper and paperboard consumption; further progress will be made and this is expected to increase recovery rates by ten to 20 percentage points in some OECD countries by the year 1995. A number of technical and economic factors, however, work to exclude a large portion of paper and paperboard from recovery. For example, significant quantities are lost to permanent use, i.e. libraries, archives, disposal (sanitary tissue). Furthermore, considerable quantities of waste are contained in and mixed with other solid waste, in particular, household waste, and thus escape recovery.

After utilisation, large portions of the paper and paperboard end up in landfill and incineration, which taken together are currently the most important destination of used paper and board; recycling in the paper industry is the second most important outlet (about 30 per cent). It is expected that landfill will lose its dominance in the future, mainly due to environmental pressures and increasing scarcity of landfill sites, and that recycling in the paper industry and incineration with heat recovery will increase.

Collection of waste paper has important commercial dimensions in that it is driven by and must satisfy the cost/benefits considerations of private business, which is the principal tool of collecting waste paper in most OECD countries. These considerations also control the extent to which waste paper is being separated according to its quality at the source or extracted from other solid waste. Lack of separation at the source is an important factor limiting the availability of high quality waste paper.

Some countries are major exporters of waste paper (the US and Germany, for example). Their exports heavily influence the international market. In contrast, there are countries which meet their demand for waste paper to a large extent by imports. Because of the quantities involved, significant changes in the collection, recycling or landfill regulations or activities of the big exporting countries, particularly the US, would have significant impacts on the prices and the availability of waste paper on the international market.

The higher rates at which waste paper is used in the manufacture of paper products reflects the increasing efforts made by the pulp and paper industry to deal with the environmental aspects of waste paper. In many cases, the rates are 40 to 60 per cent and are expected to rise by another five to ten percentage points by the year 1995. In some OECD countries, however, factors such as high wood endowment and high paper and paper board exports relative to production combine to keep waste paper utilisation rates low.

Recycling of waste paper in the paper industry, however, is not free from generating new kinds of environmental concerns. These arise from the need to dispose of the sludge which results from the ink, degraded fibre and other contaminants washed out of the waste material. Solving the environmental problems connected with recycling becomes more urgent the more the public demands and the paper industry utilises waste as raw material.

Governments in some OECD countries have adopted a clearly defined approach to solid waste management. Most of them have established the following descending order of priorities: source reduction, recycling, energy generation and combustion, and landfill. Different hierarchies exist in other countries, but recycling always ranks high and changes that are currently envisaged will put greater emphasis on recycling and incineration with heat recovery as well as on composting and less emphasis on other methods of disposal, particularly landfill. Very rare are the cases where governments provide financial incentives to the pulp and paper industry or paper users to increase use of recyclable material; disincentives to the use of virgin material are uncommon.

The industry is dedicated to addressing environmental concerns and is a responsible user of natural resources. This is reflected in the great commitment of resources by the industry to alter its production and operation processes. But it has become evident that absence of factual information and lack of proportion are often features of the proposals and demands which environmental advocates put to Governments for action in the field of environmental protection and waste paper recycling. While the industry is continuing its efforts to address environmental concerns, it is strengthening its information activities and seeking to impress upon the public the fact that it is a responsible user of national resources.

The Ad Hoc Working Party on Pulp and Paper consequently recommends:

• i) close co-operation between the paper industry and Governments at all levels to develop and implement workable policies to solve the environmental aspects associated with waste paper; measures which Governments may introduce should be supportive of the actions which the industry may pledge to take itself in order to increase use of recyclable material;

•ii) measures which Governments may introduce to deal with waste paper should not obstruct market forces or limit unduly the choice of producers and consumers with regard to the processes and products that best meet their requirements nor should they be used as
• barriers to the international flow of pulp and paper products;

iii) in those instances where recycling is not feasible, waste paper should be burned in waste-to-energy facilities; beyond that, it is important that the future availability of landfill sites be ensured; this process of diposal should also apply to sludge and other residues resulting from waste paper recycling;

•iv) more attention to recovery of waste paper from the solid waste stream and to separation at the source of different waste paper categories;

• v) research on all aspects of waste paper be encouraged, in particular, on the most effective methods of separating contaminants from waste paper and dealing with the sludge resulting from de-inking and composting of waste paper.

I. INTRODUCTION

This report deals with the present state and the future outlook of Government policies in the field of solid waste. In the face of growing public concern about the impact of solid waste on the environment, a number of governments in the OECD countries are rethinking or contemplate rethinking their policies with regard to waste paper. These considerations are primarily driven by the perception of governments of growing difficulties to site new landfill or incineration facilities. This report is therefore intended to bring together specific aspects of the waste paper issue as they are of relevance to government policies.

The report covers the most critical parts of the waste paper "cycle", i.e. from the generation of waste paper to the usual forms of disposal (i.e. recycling in the domestic paper industry, export, landfill and burning), including their technical and economic opportunities and constraints. Emphasis is being placed on government policies and regulations in these fields. An important aspect being dealt with concerns the state of public information on the pulp and paper industry in relation to its impact on the environment.

The report takes a comparative rather than an analytical approach. It is based on information that Member governments have made available for the purpose of this study.

The statistical terms are those agreed upon at the international level, i.e. by the FAO Advisory Committee on Pulp and Paper. This covers, in particular, the following indicators:

Waste Paper Recovery Rate = Waste Paper Collected for Re-use
••• Paper and Paperboard Consumption

Waste Paper Utilisation Rate = Waste Paper Used for Paper and Paper Board
 ••• Paper and Paperbxoard Production

Table 1. Production and Consumption of Paper and Paperboard
Recovery and Utilisation Waste Paper and Paperboard
1989
(1 000 tons)

	Paper and Paperboard		Waste Paper and Paperboard	
	Production	Consumption	Recovery	Utilisation
Australia	1 954	2 844	939	811
Austria	2 754	1 172	558	1 058
Canada	16 583	5 899	1 652	1 824
Denmark	328	1 051	331	223
Finland	8 736	1 424	684	419
France	6 760	8 363	2 877	3 089
Germany	11 361	13 169	5 663	5 124
Greece	375	652	196	120
Italy	5 621	6 739	1 752	2 698
Netherlands	2 570	3 010	1 475	1 671
Norway	1 790	605	157	150
Portugal	740	699	291	289
Spain	3 445	4 110	1 591	2 122
Sweden	8 362	1 914	890	953
Portugal	1 259	1 437	675	611
UK	4 495	9 600	2 880	315
USA	69 660	76 123	24 664	18 390

{Source}: Pulp and Paper International Review 1991 and country replies

Waste paper recovery and utilisation in the OECD countries and the problems related with them have to be seen against the background of the amount of waste paper that is at play and, prior to that, of the amount of paper that is produced and consumed in countries. Table 1 contains information on these four aspects. It shows the wide range of production of paper and paperboard among OECD countries (33 000 tons, Ireland; 69 660 000 tons, US), as the result of the size of the countries and their endowment with wood resources. Consumption of paper and paperboard products is in almost all countries somewhat higher than own production (318 000 tons, Ireland; 76 123 000 tons, US). Exeptions are wood-rich countries such as

Austria, Canada, Finland, Norway, Portugal and Sweden, which are important exporters of paper products. Total consumption, naturally, is a function not only of the production of a country and the size of its population but also of a series of other factors of which the level of income is the most important one, causing high differences in per capita consumption among OECD countries (e.g. 68 kg, Greece; 304 kg, US).

Production and consumption are, in their turn, the background to recovery and re-utilisation. Wide differences exist among countries as to recovery of waste paper and paperboard. These differences, as is explained in the report, are also influenced by the extent to which paper products are recovered and actually recoverable. Utilisation, i.e. recycling, of waste paper by the domestic paper industry, too, differs widely, as the result not only of the size of the domestic production into which waste paper can be recycled, but also of the differences in the rate of recovery and in availability of cheap raw materials.

II. CURRENT STATUS OF WASTE PAPER USES

Waste paper recovery rates in the OECD countries (1) at the present time (1989) run between 26 per cent (Norway) and 49 per cent (Netherlands). Countries which are on the lower end of the scale include Italy and Norway (26 per cent) and Canada (28 per cent), while those at the higher end include Finland (48 per cent), Austria (47.6 per cent) and Switzerland (47 per cent) (see Table 2).

During the 1980s, recovery rates increased in almost all countries. The increase was particularly significant in Switzerland (+17 percentage points), Austria (+15 percentage points), as well as in Sweden, Germany and Portugal (about +10 percentage points each), and generally started from levels that were already on the high side in 1980. Exceptions to this situation of growing recovery rates are the United Kingdom and Italy which, in contrast, exhibit slight falls. In the United Kingdom, although the amount of waste paper collected in 1989 exceeded that collected in 1980, the recovery rate declined due to faster growth in paper and paperboard consumption than in waste paper collection. In Greece, the recovery rate remained unchanged.

The growing trend of waste paper recovery is expected to continue in the future. Available estimates (see Table 2) show that recovery is assumed to approach the 50 per cent mark by 1995 in many countries. Particularly high increases are expected in Denmark as a result of increased collection, especially from the private business and production areas, and in Spain, through a selective collection system that is expected to be put in operation by that time. Norway expects to be able to almost double its recovery rate, provided that a big de-inking unit to produce newsprint is in operation by 1995. Exceptions are the United Kingdom and Italy, where the foreseeable growth will only lead to rates that remain in the 25 to 30 per cent range. The United States' projected 40 per cent waste paper recovery rate by 1995 represents an increase of almost 11 million tonnes in total waste paper recovery.

Table 2. Waste Paper Recovery Rate

(%)

	1980	1989	1995
Australia	30	33	n.a.
Austria	32.8	47.6	50
Canada	22.0	28	40-50
Denmark	25.8	31.5	50
Finland	42	48	n.a.
France	30.4	34.4	n.a.
Germany	33.9	43.0	48
Greece	28	30	35
Italy	29.5	26	32-33
Netherlands	45	49	55
Norway	20	26	50
Portugal	31.9	41.7	50
Spain	37.2	38.7	49.8
Sweden	33	44	50
Switzerland	30	47	50
UK	32	30	36
USA	26.8	32.4	40

Waste Paper Recovery Rate = Waste Paper Collected for Re-use
Paper and Paperboard Consumption

Source: Country replies.

The overall growth to 1995 will benefit the various waste paper grades differently. Estimates show (see Table 3) that in a number of countries, there exists a "descending order" of recovery in the sense that waste paper from newspapers and mechanical wood pulp-based publications exhibits high recovery rates while mixed waste paper shows relatively low ones. Countries such as the United Kingdom, the United States, Spain, Finland and Australia are examples. However, high recovery rates are occasionally foreseen for old corrugated paper and pulp substitutes (e.g. Sweden, Spain, Australia). The reasons why some waste paper grades exhibit higher recovery rates than others are straightforward; for example, for old newspapers, there has been a proliferation of curbside collection programs as a result of public pressure to remove newspapers from the solid waste stream; old corrugated containers are routinely collected from businesses such as supermarkets and production and assembly plants. In contrast, mixed papers show a relatively low recovery rate because they contain relatively high levels of contaminants and are often difficult to sort.

Table 3. Estimated Potential Recovery Rate, 1995

(%)

	Newsprint and other mechanical pulp papers	Old corrugated	Pulp substitutes and de-inking	Mixed paper waste	Total
Australia	30	50	30	20	n.a.
Austria (1)					
Canada	45-50	45-50	40	n.a.	n.a.
Denmark				50-55	
Finland	80	70	75	60	n.a.
Germany	n.a.	n.a.	n.a.	n.a.	48
Greece	n.a.	n.a.	n.a.	n.a.	35
Italy	n.a.	n.a.	n.a.	n.a.	32-33
Netherlands	n.a.	n.a.	n.a.	n.a.	55
Norway	50	60	30	30	50
Portugal	42.9	53.7	n.a.	44.6	50
Spain	50	65	35	25	50
Sweden	70-75	80	n.a.	n.a.	50
Switzerland	n.a.	n.a.	n.a.	n.a.	50
UK	40	50	20	25	36
USA	52	66	72.5(2)	20	40

(1) Mixed waste paper to increase slightly to 1995; others not.
(2) High-grade de-inking: 50%.

Source: Country replies.

In estimating future recovery rates by grades, experts stress the inherent difficulties and the multiplicity of factors that influence recovery of different grades. One such factor is the existence of appropriate collection systems in the locations where the respective waste grades become available. Similarly, lack of efficient waste recovery programmes (e.g. in Italy) and variable public pressure are others. Varying density of population is a fourth factor. But there are also factors both of an economic and a purely technical kind. For example, mixed waste paper is often a "swing" grade (e.g. in Canada) and its availability is dependent to a large extent on the price and availability of the other grades, since high prices for the latter make their recovery profitable and thus subdue collection of mixed waste papers. Finally, the availability in the country of plants that are capable of processing particular grades, especially of de-inking plants, has an effect on the recovery activity for those grades.

Paper represents an important part of the remaining solid waste after all recyclable materials have been recovered (see Table 4), coming to as much as 35 to 40 per cent of the remaining waste (Sweden). In most countries for which data are available, the share of waste paper in the remaining waste is

Table 4. Share of Paper in Remaining Solid Waste After Recovery of Recyclable Waste, 1989 (by weight)

(%)

Australia	15-25 (1)
Austria	27 (2)
Canada	35-45
Denmark	20
Finland	25
France	30-35 (2)
Germany	20-25
Greece	30
Italy	20-22
Netherlands	22
Norway	30 (2)
Portugal	25.3
Spain	19
Sweden	35-40 (2)
Switzerland	20-28 (3)
UK	30
USA	36

(1) 15-20% in industrial and commercial waste and 20-25% in household waste.
(2) In household waste.
(3) 1982.

Source: Country replies.

below the 30 per cent mark. In a very few countries, it comes to below 20 per cent.

Separating paper waste from the solid waste stream is to a large extent dependent on the feasibility of the recovery. The above-mentioned rates of waste paper recovery are therefore the result of a number of factors, positive and negative, that facilitxate or hamper recuperation. These factors ultimately determine how much of the total paper and board consumption of a country is actually recovered. There are technical/practical factors that prevent paper from being recovered, such as its use as tissue paper, building material, wallpaper, books or permanent documents. There are economic reasons which have an inhibiting effect on recovery, such as high collection costs in relation to the price of waste paper. These factors have to be borne in mind when one evaluates the level and the future development of recovery of waste paper in OECD countries. For example, in Italy, there exists a wide discrepancy between the north and the south in the per capita consumption of paper, which makes recovery difficult and unprofitable in the south, with a dampening effect on the country’s overall recovery rate.

Table 5 provides quantitative estimates of the effect which the technical/practical and the economic factors have on the recovery of paper.

Practical/technical factors make 10 to 30 per cent of total paper and board consumption unrecoverable. Much greater is the dispersion in respect of the economic factors which affect recovery of waste paper. In a number of countries, the economic factors are a greater barrier to recovery than the practical/technical ones. However, it is to be emphasised that it is difficult to calculate the share of waste paper that is not recoverable for economic reasons since it depends crucially on the relation between the cost for the collection of waste paper and the price of waste paper. In countries with low population density and resulting high costs of collection of waste paper, such as Australia and Canada, economic reasons appear to be a very important factor for recovery of waste paper. It is also to be noted that increased recovery of waste paper is to be weighed against the impact on the environment in the form of emissions resulting from lorries travelling long distances to collect small quantities of waste paper on each site. Recycling is to be not only economically justified but also ecologically sound. Detailed eco-balances from "cradle to grave" would be needed to determine what rate of collection is justifiable in different countries or regions of a country.

There are various ultimate dispositions of waste paper, i.e. recycling by the domestic paper industry, landfill, incineration, composting and exports. Table 6 provides quantitative indications as to the importance of these ultimate disposals. In the majority of countries, the most important means of disposing of waste paper is landfill. In many localities, landfilling is often necessary if adequate recycling structure is not available. Countries with low recycling rates have high rates for landfill, and vice versa. Recycling by the domestic paper industry is the second most important form of waste paper disposal and ranges between 26 per cent (Norway) and 53 per cent (Portugal) of total available waste paper. In six countries, recycling by the domestic industry takes up 40 and more per cent of total paper waste (Austria, Finland, Germany, Sweden, Switzerland and Portugal). At the lowest end are Norway, the United Kingdom, the United States and Canada, where less than 30 per cent of waste paper is recycled. Of the other kinds of destinations, exports range between 0 (Greece, Italy) and 16 per cent (Switzerland) and incineration rates between 0 (Australia, Austria, Greece) and 29 per cent (Sweden).

The trends to 1994/95 in the final destination of waste paper are seen to lead to higher rates for recycling and lower ones for landfill as well as to lower export rates (except for Germany and the US) as a result of increasing domestic demand. The amount of exports (in tonnes) will, however, increase in many countries, especially in the case of the US.

Recycled waste paper is highly important as fibre input for the production of paper and paperboard ("waste paper utilisation rate"), though the situation varies between OECD countries (see Table 7). Several countries that are highly endowed with wood resources and are important exporters of pulp and paper products have low waste paper utilisation (typically around and below 10 per cent). This is the case for Finland, Norway, Canada and Sweden. The low paper and paperboard consumption relative to paper and paperboard production accounts for these countries' low waste paper utilisation rates. For example, it has been estimated for Finland, that even if the recovery rate of waste paper could be brought to 100 per cent, the utilisation rate would rise to as little as 10 per cent. In contrast to those highly wood-endowed

Table 5. Paper and Paperboard Not Recoverable
(% of total paper and paperboard consumption)

	For technical and practical reasons	For economic reasons (1)
Australia	20	47
Austria	10	15.4 (2)
Canada	15	35-40
Denmark	20-30	30
Finland	17	n.a.
Germany	14	5
Greece	45 (3)	n.a.
Italy	20	40
Netherlands	20	n.a.
Norway	20	24
Portugal	23	10
Spain	18	16
Sweden	15	n.a.
Switzerland	20-25	n.a.
UK	20	15
USA	10	n.a.

(1) Such as cost of collection of waste paper and price of waste paper.
(2) Non-recoverable from household waste; non-recoverable from commercial and industrial rate: 0%.
(3) Non-recoverable for whatever reason.

Source: Country replies.

countries, practically all the others have utilisation rates for waste paper of between 30 and 65 per cent. The US is a major exception to this general situation since it is highly endowed in wood resources and is a major exporter of pulp and paper products and yet has a waste paper utilisation rate as high as 26.4 per cent and is moving higher.

The future will see increases in the significance of waste paper as an input in the pulp and paper industry. Countries expect a rise in the utilisation rate in the range of 3 to 10 percentage points by the year 1995. However, this will leave the present order of countries practically unchanged, the scale shifting to 70-75 per cent (Denmark) and 6.5 per cent (Finland). This increase is in line with the growth which is foreseen in the recovery of waste paper in these countries.

Waste paper collection systems vary considerably between the OECD countries. Table 8, which contains the quantitative information which is available on this matter, permits one clear statement to be made, namely that charity and similar organisations have little importance as agents for collecting waste paper -- a notable exception appears to be the Netherlands.

Table 6. Disposition of Total Waste Paper (*)
1989

(% of total)

[Indication between brackets = future trend]

	Recycling by the domestic paper industry	Export	Incineration	Landfill	Others
Australia	36 [up]	5 [down]	0	[ ]	55 [down] 4
Austria	45 [ ]	8 [ ]	0	38 [ ]	9
Canada	29 [up]	7 [down]	<.....	64 [down].....	>
Denmark	35 [up]	12 [down]	<.....	53.....>[down]	
Finland	48 [ ]	2	2	48	0
Germany	40 [up]	11 [up]	15 [down]	34 [down]	0
Greece	36	0	0	63	0
Italy	34 [ ]	0	<.....	66	>
Norway	26 [up]	14 [down]	20 [down]	35 [down]	5
Portugal	53	3	n.a.	n.a.	n.a.
Spain	38.7[up]	0.4	[ ] 5.2 [up]	39.3 [down]	16.4 [ ]
Sweden	44 [up]	9 [down]	29 [up]	18 [down]	n.a.
Switzerland	43 [ ]	16 [ ]	<.....	41	>
UK	27	5	5	58	5
USA	27.2[up]	8.1 [up]	11.7 [up]	52.8 [down]	0.2

[ ] Brackets without indication = stable development

Note: (*) "Total waste paper" is defined here as total consumption of paper and paperboard minus that portion of paper and paperboard that is not recoverable for technical reasons.

Source: Country replies.

In other words, pulp and paper companies and dependent merchants as well as waste paper dealers are the main agents of waste paper collection in almost all countries. This demonstrates that waste paper collection currently has an important economic or commercial dimension in that it is driven by, or must satisfy, the cost/benefit considerations of private business.

In the countries not mentioned in the table, the main characteristics of their waste paper collection systems are the following. In the US, there appears to be a "division of labour" between the different collecting agents: private merchants deal with old corrugated material from department stores and

Table 7. Waste Paper Utilisation Rate

(%)

	1989	1995
Australia	41.5	49
Austria	38.4	40
Canada	11	20-25
Denmark	67.9	70-75
Finland	4.8	6-6.5
France	45.7	50
Germany	45.1	50
Greece	32	35
Italy	48	52
Netherlands	65	70
Norway	8.4	12
Portugal	39	45
Spain	61.6	68
Sweden	11.4	13
Switzerland	48.5	55
UK	57	63
USA	26.4	31.4

Waste Paper Utilisation Rate = Waste Paper Used for Paper and Paper Board
Paper and Paperboard Production

Source: Country replies.

supermarkets, and municipalities mainly focus on old newspaper (ONP) from households; charitable groups, which mainly collect newspapers, have become marginal and are strongly responsive to price fluctuations. In fact, mandatory municipal collection programmes have driven private entities (charitable organisations, private haulers, etc.) out of the ONP collection business and at the same time sharply increased the collection of ONP. To avoid the cost of landfilling, many municipalities are paying dealers to take away the ONP, thereby, in the end, subsidising re-use of waste paper. Such payments are expected to be a short term device since increased industry capacity to use ONP and greater export demand will bring the supply/demand situation into better balance. Curbside municipal collection programmes for ONP have led to a degradation in the quality because of increased presence of magazines, unwanted mail, telephone books, etc. This has resulted in higher sorting costs and mills are asking municipalities to cover these costs. In Canada, major changes have occurred in recent years. Specialised waste management business enterprises have become the major waste paper collecting agents and the trend is toward large and efficient enterprises. In large urban centres, these

Table 8. Main Means of Waste Paper Collection
1989

(%)

	Pulp and paper companies and dependent merchants	Waste paper dealers	Governmental/ local authorities	Charities & similar
Australia	80	18		2
Austria	n.a.	75	n.a.	n.a.
Canada	n.a.	n.a.	n.a.	n.a.
Denmark		80		20
Finland		(90)		(10)
France	85	15		
Germany	15	75	5	5
Greece		100		
Italy	10	80	2	8
Netherlands		50		50
Norway	60	30	10	
Spain	28	67		5
Sweden	50	30	10	10
Switzerland	30	20	40	10
UK	70	15	7	8
USA	n.a.	n.a.	n.a.	n.a.

( ): Data between brackets indicate Secretariat estimates based on country information.

For countries for which data is not contained in this table, see the description in the text.

Source: Country replies.

specialised enterprises have completely replaced previously active charity organisations. They also tend to replace municipally operated collection systems in the smaller cities. In Switzerland, the collection system functions through three distinct channels: take-back obligations of paper and paperboard producers; private waste paper wholesale merchants collecting from manufacturing and trade companies; and municipalities and charity organisations at the local level. In Finland, one big private company handles most of the entire waste paper collection. The company has plants in different parts of the country and local waste paper merchants supply these plants, where the paper is often further sorted and baled, stored, and distributed to paper and cardboard mills. Charities have a certain role only in rural areas. This system has been functioning well for more than 45 years and does not exhibit

major deficiencies. In Sweden, most of the waste paper is collected by waste paper dealers -- some of them owned by the paper industry; about 30 to 40 per cent of the waste paper collection is handled by mill-owned merchants. Finally, mention should be made of the fact that in Italy, "differentiated" collection of waste has recently (as of 1st January 1990) been made obligatory by law. The law does not specify how the separation of waste paper for collection should be implemented. It has been launched in some cities of northern Italy where waste paper is collected at the source by collection companies. The results so far appear to justify the efforts. In Greece, there exist a small number of dealers supported by numerous collectors which work for them; relatively strong domestic demand for waste paper makes collection a profitable business.

While no country rules out the possibility for improvements in its waste paper collection system, some countries (Finland, as already mentioned, and Sweden) expressly state their satisfaction with them. However, lack of separation at the source seems to be a major deficiency in almost all countries. Occasionally, it is considered, e.g. in the Netherlands, that significant improvements in waste paper collection can only be made if the public takes action. In the United Kingdom, the government has made clear its intention to introduce a system of "recycling credits" to encourage further extraction of recyclable materials from the domestic waste stream. However, details of the scheme are not likely to be available until April 1992. Another option, which has been proposed in Switzerland, aims at reducing the generation of waste paper by discouraging the excessive use, for instance, of packaging material through pecuniary means.

In some countries, there is concern about the impact which price fluctuations have on the collection intensity of waste paper. It has been noted that price fluctuations act as an (dis)incentive not only to voluntary collectors such as charity organisations but also to the separation activities of the waste paper merchants. This concerns especially the low grade wastes, which, moreover, are in "structural oversupply"; and also white paper waste, which, in contrast, is in overdemand (Germany, the UK). Beyond that, the point has also been made (Switzerland) that, should a longer term downtrend in waste paper prices develop, this might eventually lead to the need for the public authorities to assume overall responsibility of waste paper collection. However, the experience of price impact on waste paper collection is not uniform; for example, it has been noted that in Denmark the collection of waste paper is on a fairly straight upward trend regardless of the fluctuations in prices.

In what particular paper grades is the use of waste paper likely to increase in the future? The answer is straightforward: in practically all categories and this for practically all countries. Indeed, all countries foresee advances in recycling for all major paper grades. If one wanted to differentiate between paper grades, it appears that newspaper will have a slight "advance" over the others in terms of the number of countries, but it is closely followed by container board, tissues and printing and writing papers, which all tend to be of equal importance practically, in terms of the number of countries which foresee increased input of waste paper in paper production.

Two principal factors are important in determining the future rate of growth of waste paper input. First, the levels of waste paper input already

attained or, conversely, the public pressure to increase current (low) levels; and, secondly, the existence of the necessary processing capacity, especially of de-inking facilities. As to the first parameter, in Switzerland, future growth of waste paper input appears to be relatively low since high levels have already been attained. The same applies to tissues in the US, particularly in institutional/commercial tissue products, and paper case material in the UK and Australia. On the other hand, growing pressure by the public and increased willingness of the consumer to accept recycled material even in grades of paper which traditionally do not contain high levels of recycled fibre, such as printing and writing paper (e.g. in Germany, Finland, Italy) may make relatively high growth of waste input in these grades necessary (and possible). This also applies to countries which have traditionally relied on virgin fibre in major paper products (e.g. Canada, Sweden).

As to the second factor, new processing installations are planned in a number of countries which will enable utilisation of waste paper to be increased. For example, new capacities are planned for writing paper in Denmark, the US, and the UK; newsprint capacity increases based on waste paper will come on stream in the next few years in the UK, US, France, Austria, Sweden, Spain, Australia and Norway. In Canada, recent capacity increases in newsprint, tissue, and printing and writing paper have a high utilisation rate of secondary fibre. Likewise, new capacities for container board are currently planned in the US and France, and for tissues in the UK, the US and France.

III. THE ECONOMICS OF WASTE PAPER

This section examines selected aspects of waste paper such as waste paper use and waste paper trade, the stability of the domestic supply situation and the significance of waste paper in specific paper grades. As to the first aspect, a previous report by the Ad Hoc Working Party on Pulp and Paper (2) has drawn attention to the fact that international trade in waste paper has increased in the past, with different grades being imported or exported in line with the needs of the paper industries relative to the countries' capabilities of generating the required grades and quantities domestically. Table 9 examines trade in relation to the domestic generation and recycling of waste paper. Exports of domestically collected waste paper range from 0 per cent (Spain) to as much as 39 per cent (Netherlands), the majority of countries exporting between 20 to 30 per cent of their collection. Differences in countries' export activities mainly result from differences in the effectiveness of their collection systems relative to the absorption capacity of their domestic paper industry. As for the future, most of the countries expect that, despite growth in the domestic collection of waste paper, exports will fall (relatively) due to public pressure on the paper industry to augment its input of waste paper, notably in Canada, Finland and Norway. However, in three countries (Germany, US, France), domestic recycling is not expected to keep pace with increased collection and will lead to increased shares in exportation. Of these, the US and Germany are by far the biggest exporters of waste paper in the OECD; with significant export surpluses, their exports will meet the expected large increase in demand for recycled fibre by the world paper and paperboard industry.

Table 9. Exports and Imports of Waste Paper

	EXPORTS (% of waste paper collected)		IMPORTS (% of total recycled paper)					
	1989	1995		1989				1995
		ALL	(a)	(b)	(c)	(d)		
Australia	10	6	(0)	.	.	.	.	(0)
Austria	15	(12)	56	.	.	.	.	60
Canada	18	(6)	30	2.9	14.4	0.3	11.7	50
Denmark	25	6	14	.	.			n.a.
Finland	14	1-3	5	.	.	.	.	(12)
France	17.7	19	23.3	22.6	13.7	87.5	13.5(1)	n.a.
Germany	22.6	26-27	14.3	17.6	16.9	49.2	16.3	14-15
Greece	2	2	15	.	.	.	.	20
Italy	n.a.	n.a.	34	50	31	17	41 (1)	30
Netherlands	39	n.a.	47	.	.			n.a.
Norway	37	5	26	.	.	.	.	15-20
Portugal	3	3	9	1.4	5.3	0.7	1.6	9
Spain	0	0	25.3	.	.	.	.	18.3
Sweden	16	(11)	24	(15)	(38)	.	.	25-30
Switzerland	28	n.a.	(22)	.	.			n.a.
UK	16	(10)	3	.	.			n.a.
USA	23.3	27	<1%	.	.	.	.	<1%

Grades of waste paper imports:
(a) Old newspapers
(b) Corrugated
(c) Mixed
(d) Others

(1) Higher qualities

( ): Data between brackets indicate Secretariat estimates based on country information.

Source: Country replies.

The "import intensity" (imported waste paper in relation to total waste paper consumed in the industry) is even more variable between countries than export intensity; it ranges from 0 per cent (Australia) to 56 per cent (Austria). Non-availability of specific grades is generally the reason that the respective grades are imported. The type of grades imported differs greatly between countries. To mention the principal imported grades for a few: France, corrugated and newspaper; Germany, higher grades, newspaper and kraft paper; Austria, corrugated and mixed paper and board waste; Sweden, corrugated board -- 73 per cent of total waste import; Spain, corrugated and mixed

Table 10. International Trade in Waste Paper

(1 000 tons)

	EXPORTS		IMPORTS	
	1988	1989	1988	1989
Australia	55	55	0	0
Austria	65	89	563	588
Canada	170	314	585	544
Denmark	117	137	38	48
Finland	62	56	51	85
France	546	510	646	718
Germany	1 165	1 273	699	727
Greece	4	3	27	27
Italy	2	4	774	922
Netherlands	584	588	685	788
Norway	38	57	45	39
Portugal	12	9	37	28
xSpain	16	18	509	533
Sweden	163	147	165	218
Switzerland	172	195	124	132
UK	424	479	60	80
USA	5 400	5 721	146	157

Source: Pulp and Paper International Review 1990 and country replies.

paper -- 53 per cent of total waste import; Canada, container grades -- 49 per cent); Norway, corrugated board; Switzerland, higher grades. Beside the non-availability of specific waste paper grades, another reason for waste paper imports by some countries is the need to enrich the local waste paper base with high quality waste paper. As for the future, all countries (except Greece, Spain, Norway and the US) for which estimates are available expect that imports will increase in significance in the years to come.

Table 10 contains information on international trade of OECD countries in waste paper. The US is the largest exporter (5 721 thousand tonnes in 1989), followed by Germany (1 273 thousand tonnes) and the Netherlands (around 588 thousand tonnes). Most of the OECD countries are net importers of waste paper.

Domestic supply and demand of waste paper are governed by a number of factors. The importance of price is obvious as far as demand by the paper industry is concerned but it also applies very much to collection activities, especially of charitable and similar organisations. In terms of availability, a great number of countries consider that their domestic market is fairly stable or does not exhibit instability of a magnitude which would give rise to particular concern; these include Denmark, Sweden, Spain, Portugal, Switzerland, Finland, Norway and Greece.

In those countries which, in contrast, have experienced or are experiencing market instability, this instability is of a varying nature and has different causes. For example, in the US, temporary oversupply has occurred as a result of the recent expansion of waste paper collection, particularly of old newspapers. This oversupply is expected to be absorbed with a combination of increased industry capacity and increased exports. Oversupply of a temporary nature also developed for newspaper grade waste paper in the UK, mainly as a result of increased environmental awareness, which led to more material being collected than UK mills could process; supply and demand are now considered to be in balance. Government regulations are being held responsible for a trend towards structural oversupply which is developing in Germany, where supply is no longer matched by demand and increased incineration and exports as a result are necessary. Domestic supply has occasionally also been affected by developments in the international market (Austria, Italy). In contrast, some instability was perceived in Greece as the result of temporary strong domestic demand which exceeded domestic supply. Finally, steep increases in processing capacity have in the past been a cause of market instability, e.g. in France for specific grades. As to possible remedies for instability of the demand/supply situation, these naturally depend on and vary with the causes. For example, enhanced supply stability is expected to result in Canada from refusal to permit landfill or from other government regulations; in France, from structural improvements in collection; and in Italy, from increased separation of waste. As far as the demand side is concerned, enhanced stability is expected to result from increases in paper and board production capacity (Germany, Australia) and from sharply increased demand (Canada). Most of these remedies, however, are considered to be effective only in the medium and longer term; they do not bar fluctuations as they occur, e.g. as a result of the overall business cycle.

The US will supply significant amounts of waste paper to those nations such as Canada and countries in Asia which are importers of waste papers. The demand from these countries is not expected to have a negative impact on the waste paper market of OECD countries except perhaps for Australia, where the availability for domestic consumption of high quality wastes may be affected and where, with increased demand arising out of planned newsprint recycling plants, overseas demand may affect local availability in the long term.

The paper industries in all OECD countries -- except probably in Greece because, inter alia, of the high cost of de-inking facilities -- are planning to use higher levels of waste paper as a fibre furnish. In terms of final products, this development is expected to occur for almost all paper grades, but particularly for newsprint, tissue and container board. The higher inputs of waste paper are expected to be processed, or are already being processed, mostly in existing paper mills which add the necessary de-inking facilities to their papermaking operations. The reason for this is financial: adding a de-inking facility to an existing paper mill requires much less investment (about 20 per cent) than building a new recycled content de-inking newsprint mill.

However, this does not preclude that ample scope for new domestic production capacity exists (e.g. in the UK, for newsprint) or that projects for new mills are currently underway (e.g. in the US, France, Spain, Canada, Australia, Finland, Switzerland); but these appear to be of a lesser importance than the changes occurring in existing mills.

Table 11. Waste Paper in Total Furnish

(%; by Grades)
1988/1989

	For all Grades	News-print	Printing and writing	Tissue	Packaging	Other Paper-board	Other paper & board
Australia	n.a.	0	7	5	70 (1)	n.a.	n.a.
Canada	11.4	1.4	0	52	<..... 38 ....>		40
Denmark	n.a.	n.a.	n.a.	35	97		100(2)
Finland	5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
France	45.7	45.7	9.8	40	79.4	62	22.9(3)
Germany	46	59	14.8	37.8	<..... 91.7 ...>		38.7(4)
Greece	32	n.a.	n.a.	8	70	n.a.	n.a.
Italy	48	2	3	2	<..... 88 ....>		5
Netherlands	n.a.	50	2	70	<..... 83 ....>		n.a.
Norway	8.4	0	0	90	<.... 50-60 ...>		n.a.
Spain	n.a.	25	10	65	<..... 87 ....>		n.a.
Sweden	11.4	15	0	55-60	<.... 18-20 ...>		n.a.
Switzerland	n.a.	40	5	30	90	n.a.	n.a.
UK	57	55	7	40	50	96	45
USA	24.4	21.3	5.9	33.6	5.0(5)	36.1(6)	-->

(1) Including industrial purposes
(2) Moulded pulp
(3) Industrial and special uses
(4) Technical papers
(5) Includes special industrial paper
(6) Waste paper in individual paperboard grades: solid bleached paperboard, 2.4 per cent; unbleached kraft paperboard, 10.0 per cent; semichemical medium paperboard, 31.9 per cent; recycled paperboard, 98.4 per cent.

Source: Country replies.

The degree to which waste paper is used as a raw material varies between the different paper and paperboard grades (see Table 11). According to the data provided by countries and contained in the table, furnish for packaging paper and paperboard generally has the highest waste paper content; it is followed by tissues and newsprint. In contrast, printing and writing papers generally have the lowest waste paper content.

While there is a general feeling that waste paper will increase as input material in the future, there is only little information of a quantitative kind on this. Significant increases of recycled fibre are expected in the furnish to be used for newsprint in Canada and Sweden. In the UK, the waste paper

content of printing and writing paper is expected to rise from 7 per cent in 1989 to 12 per cent in 1995. In the US, use of waste paper is expected to grow twice as fast as consumption of wood pulp over the period to 1992 and the US paper industry has recently announced a national goal of 40 per cent paper recovery for domestic recycling and export by the end of 1995.

IV. THE TECHNOLOGY OF WASTE PAPER

There do not appear to be technical limitations in principle to the recycling of waste paper in papermaking since technological progress is advancing. It should be recognised that waste paper is by now definitely established as an important fibre resource for the manufacture of paper and board; provided with a well-sorted waste raw material, technology today has the means to produce a first-class endproduct composed of up to 100 per cent recycled fibre. The limitations to the use of waste paper relate to the quality and homogeneity of the waste input material. A crucial limitation is that waste paper fibres cannot be re-used indefinitely -- since the fibre becomes degraded every time it is mixed into the furnish. Without the input of virgin wood pulp as well as virgin fibre paper, the quality of the waste fibre in circulation would quickly decline. Another important limitation is that waste paper fibres are not interchangeable. Moreover, certain paper and paperboard products cannot be made adequately from recycled fibre because of hygienic and strength requirements.

Problems with use of waste paper can stem from deficiencies in the quality of the waste paper, and these appear to be growing in importance since more waste paper is generated from municipal sources; they cause machine down-time due to the plugging of wires and to off-quality production, resulting in low productivity of the paper machine -- a factor occasionally considered to limit the use of waste paper (Sweden). Deficiencies in the quality of waste paper mainly result from the presence of particular additives such as glues, fillers, coating pigments, stickies (hot melt) and certain contaminants (US, Netherlands, Finland, Norway, Italy). Another difficulty stems from printing inks, especially the increasing variety of inks in use, such as laser, ultraviolet and flexographic inks (Canada, UK, Australia). Should use of these inks increase in the future, technological breakthroughs of a major kind are considered necessary to deal with the resulting problems in de-inking (UK). However, the problems currently associated with these inks appear to be manageable by the industry in all countries at the present time, though they are occasionally considered to be costly.

Health and hygiene requirements in some countries limit or exclude the use of waste paper in the manufacture of certain products coming into contact with food.

The operation of de-inking facilities has given rise to further waste management issues, mainly relating to the disposal of sludge. Landfill is in many countries the ultimate destination of much of the sludge, after it has been dewatered and dried (Germany, US, UK, Finland). This is also seen to save landfill space, compared to direct landfilling of waste paper. In its turn,

lack of disposal facilities for sludge is beginning to be felt (Germany, France).

Sludges resulting from the preparation of furnish using recycled fibre may also be burned (Sweden, Switzerland); flue gas emissions from well-operated facilities pose no environmental problems, although in limited instances, heavy metals may bond to the ash residue. Success has also been achieved in the use of sludge as a soil conditioner or mulch in agricultural applications (Canada). De-inking effluents, however, may have a high chemical oxygen demand content, even after sedimentation and biological cleaning, with potential negative effects on aquatic species (Australia). Overall, new types of residues are generated by waste paper recycling and this gives rise to new problems for the environment.

Naturally, individual paper companies are constantly endeavouring to improve the production of paper from waste paper and deal with the resultingx environmental requirements. In some countries (Austria, Greece, Sweden, Spain, Portugal, Switzerland, Norway), no major research on the environmental impact of waste paper recycling is undertaken. Where research is done, it is carried out by a variety of institutions and focuses on a number of problems:

US:• Private and public organisations conduct research, primarily focused on development of machinery, but also conduct research related to technical problems related to de-inking, contaminant removal, etc.

UK:• PIRA (Paper Industry Research Association) conducts research aimed at improving utilisation of waste paper and is carrying out further work on removal of stickies and de-inking. The DTI's Warren Spring Laboratory includes a Recycling Advisory Unit and an Environmental Enquiry Point, and carries out research mainly in the area of environmental technology.

France: Programmes funded by the public (i.e. Environment Ministry, ANRED, EEC) focus on de-inking and decontamination and waste reduction, and on reduction of (investment and energy) costs. Private research organisations (e.g. Centre Technique du Papier) work on waste paper treatment.

Germany:• The PTS (Papiertechnische Stiftung) and the Institut für Papierfabrikation do research on alternative waste paper utilisation.

Canada:• The Pulp and Paper Research Institute of Canada and the University of Quebec have programmes to investigate problems associated with de-inking, including sludge disposal and fibre quality.

Australia: The Commonwealth Scientific and Industrial Research Organisation (CSIRO) conducts some research into paper recycling.

V. GOVERNMENT POLICIES AND ACTIONS REGARDING WASTE PAPER

Governments in some OECD countries have adopted a clearly defined approach to the management of solid waste. In view of the priority governments give to alternative forms of waste handling, it is occasionally termed a "hierarchical" approach. This situation exists in the US, Germany, Austria, Finland and Italy. It establishes four priorities in descending order: waste avoidance at the source ("source reduction"), recycling, energy generation and combustion, and landfill; in some countries (Canada, US) composting is gaining interest as an alternative for waste paper handling. Different "hierarchies" exist in other countries: in Australia, landfill, recycling, source reduction and energy/combustion, and a new approach is being developed which emphasises waste minimisation and waste recycling; in Denmark, clean technology and recycling; in Norway, recycling as well as combustion for heating; in Sweden, sorting at the source, recycling and reduction of packaging. In a number of Swedish cities, a large quantity of household waste, including paper and packages that cannot be used as raw material in the paper industry, is burned for energy generation and district heating. This use of waste paper is accepted and will increase after sorting at the source for recycling. If landfill is to be avoided, the burning of non-recyclable waste paper must be politically acceptable to a greater extent in order to cope with the increase in waste flow. In all these countries, the responsibility for implementing these policies generally rests with the regional and municipal governments. Nation-wide defined approaches do not exist in the UK, France, Greece, Spain, Portugal and Canada. However, efforts are being made in these countries to reduce the volume of waste and to eliminate hazardous materials.

The outlook for developments in government policy regarding recycling and waste-to-energy varies between countries. No major changes in the field of recycling are expected in France, Greece, Austria, Finland, Norway, and Italy. In contrast, there is a trend towards increasing emphasis on recycling in some countries (Sweden, UK, Denmark, Canada, Australia, Germany, Switzerland, US). The following are examples of specific quantitative targets. In the UK and Denmark, the government has announced a recycling target of 50 per cent of the recyclable content of the domestic waste stream by the year 2000. Provisions contained within the UK Environmental Protection Bill (which received Royal Assent in November 1990) and the measures contained in the White Paper on the Environment are expected to lead to a greater recycling effort with a view to achieving the target set. The Canadian government has announced its intention to reach a target of a 50 per cent diversion of total solid waste from disposal by the year 2000 and definite plans to meet this target are being developed. In the US, the federal Environmental Protection Agency has set a national recycling target of 25 per cent for total solid waste. However, several states are considering overall recycling goals of up to 50 per cent. Recycled content requirements, particularly for newsprint, are receiving increasing attention; in a few US states, specific regulations have been passed. In some countries (US, Germany, Portugal), incineration too is expected to increase, although it ranks low in the hierarchy of national policy options and often creates public resistance. In France, there is some encouragement for recycling over incineration and attention is also given to the risk of ground water pollution

resulting from landfill. There is also some pressure that the methane from landfill be recovered and utilised (Australia, Sweden).

Separation of waste paper from other waste at the source is practiced in a great number of countries but is a legal requirement only in a few: Denmark, Sweden and Italy. In the US, several states and municipalities require the source separation of waste paper from other waste materials. Source separation is currently being tested in some municipalities in Norway. On the other hand, environmental laws and regulations in place are deemed to provide general impetus for separation at the source. This is believed to be the case in the UK (through the Environmental Protection Bill and the White Paper), France (through general framework provisions), Austria, Canada, Australia and Finland.

Occasionally, public authorities, usually at the municipal level, are involved in different ways in the collection of waste paper. In Denmark, the local authorities have set up schemes for the collection of waste paper from households and of paper and paper board from private enterprises. In Finland, the Government offers low interest loans for the development of paper collection facilities. In Switzerland, some support is given to private collecting organisations. Co-financing of collection containers and vehicles exists in Austria, where municipalities make disposal-contributions to the collection of waste paper in line with the cost being saved for garbage disposal and landfill. Some municipalities in Germany subsidise waste paper collecting merchants up to the amount they would have to spend for their own waste paper collection. Similarly, in Australia, a small number of local authorities pay subsidies for the collection of waste paper. In Canada, financial assistance is given to the "Blue Box" programme for curbside collection of waste materials, including newspapers. All these measures may have the side effect of making the supply of waste raw material cheaper for the paper industry.

Incentives of a financial kind targeted directly at the paper industry to boost recycling are rather rare. In 1978, a scheme in the UK provided grants of up to 25 per cent of expenditures on plants for the processing of waste paper; this is now terminated. Currently, in the US, some financial incentives exist at the state level and a few states (New Jersey, California and Virginia) offer tax benefits to businesses that invest in facilities to recycle materials. At federal level, there are no significant incentives, although they will be contemplated in 1991 as Congress considers amendments to the Federal Resource Conservation and Recovery Act. In Denmark, the Recycling Council can grant support for investment in recycling production. In Australia, some incentives for waste paper recycling exist at Commonwealth level in the form of exemption from wholesale sales tax for paper products made wholly out of recycled fibres; there is also a commitment to examine wholesale tax exemptions for plants purchased for recycling operations and to make R&D funding available for waste management, including recycling projects.

As for incentives to paper mills to switch from virgin fibres to waste paper, only Denmark provides such specific assistance; one company has used provisions which are given mainly to solve environmental matters. Measures taken in other fields may actually work in the same direction. In the UK, there are pan-sectoral schemes whereby companies involved in waste paper recycling may be eligible for grant assistance. In Australia, the tax exemption on products made from secondary fibres, mentioned above, is an

indirect assistance. And the financial incentives under consideration in Norway, aimed at avoiding instability in the domestic supply of waste paper, may also be an incentive in this direction.

In contrast, in no OECD country are there governmental measures that are aimed at discouraging the use of virgin fibres by the paper industry and none appear to be planned for the future. In Denmark, the possibility is mentioned in the law and several proposals have been made in the Parliament but until now with no results.

Furthermore, as to legislation that assures recyclers first access to recyclable waste paper before it goes to other destinations, such provisions exist only in Denmark and in several US states and municipalities. In the former, the entire body of environmental legislation is deemed to have the effect of giving priority to recycling over incineration and landfill; in the US, the Federal Resource Conservation and Recovery Act requires that current and future recycling needs be considered when waste-to-energy facilities are being planned; a number of states in the US give priority to recycling over incineration, and at least three states have passed laws prohibiting certain recyclable waste materials from landfill. However, some government jurisdictions in the US have instituted certain kinds of flow control restrictions in order to guarantee a steady flow of municipal solid waste to waste-to-energy facilities. In some other countries, the situation with regard to priority access is mixed. In Germany, the waste disposal act gives equal importance to recycling and energy use, and regional and local authorities decide in the light of their possibilities and constraints. In the UK, the source separation schemes in place in various locations virtually ensure that recyclers have first access to recyclable materials. Finally, in Sweden, the government has taken the standpoint that waste paper usable for papermaking must be recycled and not burned for energy generation and has strongly requested of the communities that the paper industry be given first access to waste paper.

In a very few countries, there are also provisions that are based on specific product characteristics. This is the case in the US where regulations have been adopted at some state and local levels with regard to newsprint and packaging material, using criteria such as biodegradability, recyclability and recycled fibre content. In Germany, the waste disposal act has provisions to encourage recyclability of products; a recent ordinance directs the paper manufacturers to use only those raw filling and chemical materials, and the paper and board processing industry to use only those printing and chemical materials, that do not affect recyclability of the paper and board productxs at a later stage. In Canada, a voluntary programme has been instituted by the Federal government through which manufacturers can, upon official approval, affix the symbol "Environmental Choice" to their processes and products. Similar systems exist in some other countries. The best-known among them is probably the "blue angel" ("Umweltengel") in Germany, which is a label to characterise "environmentally friendly" products. It is granted by the environmental authorities upon application. In Australia, the Australian Environmental Council can give permission to producers to place the "Green Spot" on their products to mark them as "environmentally friendly". In other countries, such as Norway, Sweden, Austria, the UK, Italy, and the EEC, official bodies are currently examining the possibility of creating labels for products that are considered friendly to the environment.

Occasionally, industry itself identifies its products as environmentally-sound and creates and affixes symbols (Austria); or the paper industry encourages packers to use the recycling symbol for recyclable products (Netherlands, US) or marks its products with advice to the user to recycle them after use (Finland). These are all voluntary actions which are taken without any official reference or obligation. Such actions occasionally tend to become a marketing tool for companies, unsupported by facts. In the UK, the term "environmentally friendly" is even gaining an unenviable reputation, as sellers often make ill-supported claims that their products fall within this category. And in the US, the possibility of misleading claims has led the Federal Trade Commission and Attorneys General in several states to investigate. New York, Rhode Island and some other states are in the process of passing or considering regulations to control the use of symbols indicating a product's recycled content, recyclability or re-usability.

Use of recycled products is sometimes encouraged by government and usually begins "at home", namely in government offices themselves. Regulations of different stringency requiring governmental bodies to increase the use of paper with recycled fibre content either in their office work or in outside correspondance and publications exist in Denmark, the US, the UK, France, Switzerland, Italy, Australia and Germany. In the US, the Environmental Protection Agency has promulgated guidelines for the federal government to purchase paper products with a recycled content. Some state governments also have such fibre content guidelines. Government procurement guidelines have had an impact beyond the government sector in the area of printing-writing papers where buyers are increasingly specifying paper with recycled fibre content. As for the non-governmental area, moral support or persuasion is sometimes exercised by the public authorities to increase use of recycled material. For example, in Sweden, environmental organisations are with a good deal of success putting pressure on chainstores and producers of notepads, school books and the like, to utilise environmentally-sound products (i.e. made from recycled material or from chlorine-free bleached pulp). Incentives of a financial kind, however, appear to exist only in Australia, where as already mentioned paper products made wholly from recycled fibre are exempted from the sales tax. Also, there are states in the US where laws exist that mandate the purchase of some recycled newsprint by the private sector.

On the other hand, with the exception of Denmark where a charge is levied on certain packagings including board material, governments do not operate disincentives on the use of particular types of materials, for example of packaging material, apart from moral dissuasion and provision of information. But the matter is being discussed in a few countries, e.g. Switzerland, in respect of packaging materials for beverages, and in Sweden, where an official committee is at present working specifically on this question; it will present its proposals in October 1991. A few cases exist in the US, where states or local municipalities have passed laws mandating the degradability of disposables and of packaging materials or requiring certain recycled fibre content in newsprint and directory paper. In Finland, the authorities have the possibility of imposing a special tax on materials that are harmful and not easily degradable. And in Italy, a tax of 100 lire is being levied on non-biodegradable plastic bags.

Most OECD countries do not have regulations that specifically limit or prohibit the use of waste paper in particular product uses, e.g. for reasons of health or hygiene, since packaging made from recycled fibre must meet the same set of health and sanitary requirements as packaging based on virgin fibre. However, in some countries (e.g., Greece, the UK, Austria, Finland, Germany, Switzerland), specific regulations exist regarding the use of certain grades of waste paper for food packaging.

Environmental standards for waste paper mills are the same as for virgin pulp mills in all countries. An exception, however, is a recent development in Australia, where environmental guidelines for new kraft pulp mills are being developed. Also, in Austria, new laws are to come for pulp mills on the one hand, and for processing of waste paper and production of mechanical wood pulp on the other.

With particular regard to the de-inking process, there are no special regulations in any country which discriminate between the existing de-inking processes. An exception is Austria, where only flotation is licensed.

Relatively little information is available regarding environmental regulations for waste-to-energy facilities. In some countries (Austria, Sweden), there are nation-wide standards for burning of waste; in Finland, decisions are taken on a case-by-case basis at the national, regional or local level. In the US, many states and some local jurisdictions have specific air and ash disposal regulations for waste-to-energy facilities and the Federal government is expected to promulgate air emission standards for such facilities shortly.

In a number of countries, there exist regulations requiring toxic components to be separated from the waste stream; these are the US, UK, France, Sweden, Canada, Australia, Finland and Italy. These regulations usually stipulate that toxic refuse is not allowed to be landfilled with other waste but to be treated, stored or disposed of separately. In terms of paper products, no products are designated as toxic, though PCB containing paper is prohibited (Denmark and Sweden).

Governments do not normally provide financial incentives for the construction of waste-to-energy facilities (Germany, Greece, Austria, Sweden, Spain, Australia, Switzerland, Finland, Norway, the US). However, on a non-regulated or very limited basis they do exist in Canada and Italy. But they are usually given for waste reduction in general and not for waste paper specifically.

Disposal of waste paper in landfill is not free of charge and waste disposal fees are levied in all countries, usually by the municipalities concerned. Whether these cover the full cost of landfill is, however, uncertain. In some countries (e.g. the UK, Germany, Austria, Italy), it is full cost recovery; in others (e.g. Canada, Australia, Finland, Greece, Norway), it is generally not the case. In the US, many older landfill facilities are often considered not to be charging fees which cover the full cost of disposal. Generally, there is a move towards full costing. The question has, however, come up as to whether it might be possible in the future to pass on to customers the rapidly increasing costs that result from the need to create new landfill sites.

VI. PUBLIC INFORMATION: PRESENT STATUS AND FUTURE NEEDS

The pulp and paper industry faces "public image" problems, often due to public misconceptions. The prime areas of concern are: i) the perception about the destruction or overfelling of forests; ii) the perception that the chlorine bleaching process results in water pollution; and iii) the perception that remaining traces of dioxin in certain paper and paperboard products could be hazardous to health. Public opinion is being mobilised by a number of organisations and social movements that are active in protecting the environment.

The pulp and paper industry has increased its efforts to deal with the substance of the environmental concerns and to correct misconceptions which the public holds with respect to some of them. As for water pollution resulting from the chlorine bleaching process, the industry has addressed this matter effectively in the past by making important process changes; the switch from elementary chlorine to chlorine dioxide has led to a considerable reduction of chlorinated organic emissions. Important efforts have also been made to reduce the traces of dioxin content in paper products; as a result, only very few paper grades contain traces of dioxin, which are minute and have been proven not to be hazardous to health.

The most important misconception is that of destruction or overfelling of forests. The present report shows the limitations of such arguments: In the majority of OECD countries, pulp and paper products are made from 40 to 60 per cent of recycled waste paper -- conversely, only 40 to 60 per cent of the raw material is virgin wood material -- and the use of virgin wood material is expected to fall further in the years to come. However, in the important pulp and paper producing countries of the OECD, the waste paper utilisation rate is much lower, though on the increase (Table 7). In some paper grades, such as paperboard, packaging board, and tissue, input of virgin raw material is even lower than those averages (Table 11), being nil in a few cases. The situation of course varies between OECD countries and those that are highly endowed with forests, e.g. Canada, Sweden, Finland and Norway, tend to have higher virgin wood inputs than the others but they, too, are planning to increase the use of waste paper. Furthermore, it is often not known to non-experts that the virgin wood component of paper products does not necessarily require felling of forests; virgin wood input does to a large extent stem from saw mill and similar residues, as well as from the necessary clearing of forests and from plantations. The pulp and paper industry is heavily involved in reforestation.

Currently, the most important issue which needs to be addressed by the industry concerns the collection and separation of waste paper at the source. Source separation is lacking in many countries and often even meets with public indifference or resistance. There is a lack of information on the need for source separation of waste paper, especially at the household and office level, as a precondition for increased recycling. As mentioned in this report, it is possible to increase recycling of waste paper far beyond present levels if more waste paper were sorted by grades. The public should know and be aware of the

technical and economic limitations to recycling. Some paper grades, e.g. printing and writing paper, require a high virgin fibre content, especially when intended for long preservation. Problems with public acceptance of waste-containing paper products often renders the industry hesitant to augment the recycling content in paper products.

The industry recognises the need for better communication with the public regarding the concerns advanced by the environmental organisations. It is active, usually through its associations, to correct, through factual information, existing misconceptions. The industry associations also provide information to legislative bodies on specific issues pertaining to environmental concerns (3). The industry and its federations place important financial means behind their information campaigns and are increasing the funding in a number of countries. Information campaigns are occasionally conducted by individual firms in the context of their respective localities, supported by the industry federations. But the bulk of the information is handled xby the pulp and paper federations, sometimes in collaboration with the federations of related industries. A good example of this is in the UK, where various sectors of the industry (including merchants, manufacturers, printers and importers) have combined resources to launch the Pulp and Paper Information Centre, an authoritative source of information for public government, media, etc. on all paper and printing matters, with particular emphasis on environmentally related topics. In some countries, action already has had a possitive effect. For example, in Germany, paper now has the image of an "environmentally friendly" industrial product. Notwithstanding the specific mechanisms used and the results achieved, the nature and perseverance of the misconceptions about the pulp and paper industry appear to be such as to call for information campaigns directed for the longer term to a broad range of audiences and based on factual information on the opportunities and constraints existing to protect the environment.

NOTES AND REFERENCES

1. Unless mentioned otherwise in this report, the term "OECD countries" is to mean those countries which have supplied information for the present study.

2. "Structural Adjustment in the Pulp and Paper Industry", OECD, Paris, 1989.

3. Relevant organisations are: in Canada, Canadian Pulp and Paper Association, the Pulp and Paper Research Institute of Canada, Canadian Paper Box Manufacturers Association, Canadian Corrugated Case Association, Canadian Paper Trades Association; in Denmark, Dansk Returpapir og Plast and RENDAN; in Finland, Central Organisation for Waste Paper Paperinkeräys Oy; in Germany, Verband Deutscher Papierfabriken; in Greece, SEVIHA (Greek Association of Paper and Pulp Industry); in Italy, Assocarta; in Spain, Associacion de Fabricantes de Papel y Carton; in Sweden, Skogsindustrierna (Swedish Pulp and Paper Association); in Switzerland, Association de l'industrie suisse de la cellulose, du papier et du carton; in the US, the American Paper Institute and the American Forest Council.

END-OF-TEXT