

# Evaluation Report

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*Operations Evaluation Department (EV)*

EIB Financing of Solid Waste  
Management Projects



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## EIB financing of Solid Waste Management Projects

Prepared by

**EIB Operations Evaluation Department:**

Juan Alario  
Cees Post  
Monique Bianchi

**External Consultants:**

ERM-Environmental Resources Management

Simon Aumônier  
Wim van Breusegem  
Peter Faircloth  
Bernd Hasel  
Bert Wellens

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**NOTICE**

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# Evaluation



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## EXECUTIVE SUMMARY

### 1. Findings and conclusions

The present evaluation covers the European Investment Bank (EIB)'s loan portfolio for solid waste management projects financed in the period 1984-2000<sup>1</sup>. It was carried out during 2001. The evaluation examines the Bank's activities within the European Union, with some consideration of loans to solid waste management projects outside the Member States. The assessment was undertaken in two principal phases:

- A high level assessment of the loan portfolio in the sector, focusing on the key features of a representative sample of 28 projects, together with a review of the Bank's strategy and practices relating to financing in the sector.
- Individual in-depth field evaluations of 13 projects out of 28.

During the period 1984-2000, EIB financed 62 solid waste management projects (55 in the European Union and seven outside). The majority of the lending in this sector consists of individual loans; less than 20% of the loan volume went through global loans. Financing is not spread evenly between Member States. With regard to lending through individual loans, Italy leads with 32%, followed by Germany (17%), the Netherlands (17%) and France (10%). Incineration leads clearly by number of projects (40 out of 62) and total finance provided, followed by municipal landfill, composting and/or recycling and industrial waste treatment.

#### Project performance

Weak institutional capacity, changes in the regulatory framework and competition from other facilities within the country or from outside were significant factors in projects facing problems or failure. The evaluation shows that the promoters and the Bank have commonly and sometimes significantly underestimated waste production. For the German projects however, waste arisings were generally overestimated.

Nearly all the projects evaluated (10 out of 13 individual operations) were built to the initial project specifications and at the budget estimated at appraisal. The main exceptions were four composting plants (two of which were financed under a single loan and never built) that experienced significant implementation problems. In the broader sample of 28 projects there was a similar general consistency with specifications at appraisal and the expected implementation costs corresponded with actual costs for most of the projects examined, where actual cost was reported. Most of the cases in which modifications were noted were small projects grouped into a single loan.

As regards the operational performance, nearly all the incinerators evaluated individually are operating as planned, but some of them experienced difficulties in the first years of operation, mainly on the technical side or to acquire the expected amounts of waste. In contrast, the two composting plants in operation have experienced severe technical problems, while the landfill project faced serious commercial problems. Operating costs per tonne were lower than expected in 6 out of the 12 projects in operation. Economic revenues from energy production (excluding subsidies) and recovered materials were lower than expected at appraisal in 6 out of the 10 projects for which the information was available. High waste tariffs have caused problems for some projects in northern Europe, particularly in Germany, where competition from facilities with lower gate fees compromised financial sustainability. In contrast, no such tariff problems were experienced in projects located in southern Member States.

In general, the environmental impact of the projects evaluated in-depth is under control, although additional expenditure was required in some cases. The EIB has a good understanding of the principal environmental issues associated with incineration and puts the emphasis on flue gas treatment

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<sup>1</sup> In 1984, the EIB's Governors endorsed the Board of Directors recommendation to extend the Bank's eligibility criteria to include projects helping substantially to protect the environment regardless of their location. Before 1984, environmental projects could only be financed in regional development areas.

standards for incineration. However, the case studies indicate that the Bank may be overlooking some other environmental impacts that effect sustainability, such as odour. Odour has been a common nuisance for the composting plants evaluated and significant additional investment has been, or will be made to reduce it to an acceptable level.

Both the portfolio review and the in-depth project evaluations demonstrate the relevance for European waste policy objectives of the projects evaluated and of the portfolio as a whole. In the main, the projects support European waste policies and deliver significant environmental benefits. However, in terms of efficiency and effectiveness, 4 of the projects evaluated were rated unsatisfactory to poor. As to sustainability, 2 out of the 13 projects proved unsustainable, 2 others are, or have been, at serious risk, while the remainder is clearly sustainable. Not surprisingly, the 4 projects with unsatisfactory or poor efficiency and effectiveness are the same as the 4 that are unsustainable or confronted with serious risk.

### **EIB contribution, strategies, policies and procedures**

Solid waste management projects have been identified primarily through the strong relationship that the Bank has developed with intermediary banks and promoters. The 1999 Corporate Operational Plan, and subsequent COPs, have clearly given priority to the financing of environmental projects. However, the loan volume nature of business targets of the COP may penalise many of the solid waste management projects, as they are relatively small in loan volume terms and they are normally rather complex. The Bank's deep understanding of practices and technologies across Europe has ensured the selection of sound projects in most of the cases. Indeed, some 110 projects have gone through the internal screening procedure in order to provide the 62 projects financed.

The appraisal process allows the Bank to add value by bringing its technical and economic expertise to enhance project viability. Indeed, in about half of the sample of 28 projects examined, the Bank requested the promoter to make changes to the project specifications, in some cases making these changes conditional to the loan. However, involvement in project preparation was in general rather limited. It is striking that beyond the fact finding at appraisal, the Bank does not communicate more with promoters on key project risks and issues.

The way in which EIB finance adds value and influences project sustainability varies markedly, depending on project characteristics. This influence can be seen as a continuum, with extremes where at one end, and most commonly, the Bank adds to sustainability by providing large loans for long periods at competitive rates and, at the other end, and in a minority of the individual projects analysed, EIB is the decisive source of the finance enabling the project to progress. The approach of the Bank should be adapted to the place of the project on the continuum between what we term the *Top-Up Finance* and *Make-Or-Break Finance* models respectively, but common policies and practices force the Bank's procedures and product to suit both models. As a result, in both cases there is potential for the Bank to adapt its approach, and to perform more effectively.

The know-how acquired working with experienced promoters in the *Top-Up* model can usefully be transferred to *Make-Or-Break* projects. There are opportunities for supporting more *Make-Or-Break* projects, particularly outside the EU, where there is a clear need for environmental protection through waste management, where institutional arrangements are weak and promoters are less experienced. Nevertheless, the Bank has financed few of these projects, as shown by the limited financing outside the EU and in some Member countries with a poorly developed solid waste management infrastructure, such as Greece and Ireland. Securing viable projects in such cases would require more involvement in the project preparation phase, flexibility in project appraisal and a sustained dialogue with promoters.

The Bank has generally attached limited priority to project follow-up in this field. This situation has prevented the Bank from identifying the problems that some of the evaluated projects faced and from proposing remedial measures. Follow-up is often limited to Project Completion Reports (PCRs), which moreover were frequently lacking in detail, incomplete or pending. One problem with PCRs is that they are completed at the time of commissioning. This is rarely the appropriate time at which to assess the success of many of the solid waste projects. For *Make-Or-break Finance* projects it seems thus appropriate to carry out a full review after a minimum of 18 month of operation, focusing on any issues requiring further action.

## 2. Recommendations

This evaluation shows that the solid waste management sector offers many opportunities for the Bank to add significant value, despite the limited loan amounts generally involved, because the public authorities concerned often have limited experience and expertise with this kind of investment. Other environmentally related sectors, such as wastewater treatment or renewable energy, offer similar opportunities. In order to maximise value added we propose the following general recommendations:

- The Bank high level environmental strategy should be made more explicit with sectoral targets for solid waste management projects inside and outside the European Union. These targets should be complemented by measurements of added value (par. 3, 4.2 and 4.3).
- The Bank should consider adapting its products for solid waste projects and possibly for other environmental projects (as it intends to do for renewable energy investments), in particular for small-scale projects (par. 3)
- Project follow-up of solid waste projects should be modulated and higher priority given to Make-or-Break projects, which should be fully reviewed after 18 months of operation. (par. 5.2)

In addition, with regard to the project cycle as applied to solid waste management, we propose the following specific recommendations:

1. A programme of background notes related to solid waste management technologies and markets should be developed (par. 5.2)
2. The Bank should consider providing additional technical and economic support for *Make-Or-Break* solid waste projects, in particular in the project preparation phase (par. 4.2 and 2.2.)
3. As a service, the Bank should provide promoters of solid waste projects with a summary of the risks and issues identified at appraisal (par. 5.2)
4. In weak institutional contexts, the Bank should define minimum institutional requirements for solid waste projects, which would not only support appraisal, but also encourage public sector stakeholders to introduce appropriate institutional change (par. 2.1)
5. Because of their high failure rate, the Bank should adopt a more rigorous approach to appraisal for composting/recycling projects (par. 3).

### EIB response to the above recommendations

The general recommendations above have to be seen in the context of the development, implementation and follow up of the Bank's Corporate Operational Plan. The environment is one of the current COP's top priority objectives, with an overall annual target of 25 to 33% of individual loan signatures in EU and accession countries. Solid waste projects are in line with this objective and have been contributing to the target. It is questionable whether introducing specific COP sub-objectives and targets for solid waste projects is justified. The development of sound solid waste projects is heavily dependent on local, regional or national regional conditions and it would seem more effective to maintain operational flexibility within the overall environmental COP objective, rather than create a set of unrealisable targets. The recommendations concerning small-scale projects and monitoring are reasonable, but they also need to be put into the framework of the COP on these issues and be applied to all sectors.

Most of the recommendations concerning the project cycle (background notes, summary of risks and issues, institutional requirements) are already in line with Bank practice, although there is always scope for reinforcement in particular cases. The provision of additional technical assistance for "Make-or-break" projects has to be seen within the general policy of the Bank and its deployment of limited professional staff resources. The point of having a rigorous approach for composting projects is recognised, although these form only a minor share of the Bank's portfolio. The high failure rate seen in the past can be largely attributed to over-optimistic expectations of market acceptance, given the technical constraints in this sub-sector. However, these expectations were shared by many of the parties involved and Bank's position was therefore in line with the industry's contemporary consensus.

# 1 INTRODUCTION

## 1.1 APPROACH FOLLOWED IN THE EVALUATION

This report presents the conclusions and recommendations stemming from an assessment of the European Investment Bank (EIB)'s loan portfolio for solid waste management financed in the period 1984-2000, which was carried out during 2001. The assessment was undertaken in two principal phases:

- a high level assessment of the loan portfolio in the sector, focusing on the key features of a representative sample of 28 solid waste management projects, together with a review of the Bank's strategy and practices relating to financing in the sector, and reported in a *Portfolio Review*, and
- detailed evaluations of 13 of these projects through in-depth field evaluations to confirm and to add further detail to the observations of the *Portfolio Review*. These projects included 8 municipal waste incinerators (2 in Germany, 1 each in the Netherlands, Denmark, France, Italy, Spain and Portugal), 3 recycling/composting projects (2 in Portugal and 1 in Italy, the latter project consisting of 2 separate facilities), 1 landfill in Germany and 1 industrial waste project, with treatment through incineration.

The study examined the Bank's activities within the European Union, with some consideration of loans to solid waste management projects outside the Member States. The Mediterranean Action Programme (METAP), launched by the EIB and the World Bank to finance project preparation studies in the environmental field in that region and the EFTA facility (grants and interest subsidies), inter alia for environmental projects, were not covered.

The overall aim of this evaluation was to determine whether the EIB's strategies and practices lead to the financing of sustainable projects consistent with EU objectives. The specific objectives of the evaluation were to identify and draw conclusions on the strengths and the weaknesses of the EIB's project cycle and to make recommendations on where there is scope for improvement.

The EIB's Operations Evaluation Department (EV) selected 13 projects for an individual field evaluation. For practical reasons, projects were selected from those financed in the European Union since 1989, for which a portion of the Bank's loan was still outstanding. The objective was to have each of the various categories of projects (incineration, landfill, recycling/composting, industrial waste) represented in the sample. For the last three categories, in which there are fewer EIB loans, this necessarily implied a relative over-representation. In the case of incineration projects, the project population was large enough to allow for a sufficient geographical spread and inclusion of both large and small projects. Whenever possible, the sample selection was made randomly.

For the 28 projects included in the *Portfolio Review*, detailed information was collated in *Project Profiles*, completed on the basis of a review of the available project-related documents and discussions with representatives of the Bank's Lending and Project Directorates. These included technical and economic appraisal reports, notes on individual promoters, notes to the Board of Directors and project completion reports (PCRs). Thirteen of the 28 were selected for the field evaluations. The remaining 15 projects were selected using criteria that assured that the total sample of 28 projects was representative, to the greatest extent possible, of all the 62 projects financed in the period 1984 to 2000.

In parallel with the *Portfolio Review*, major EU trends in policy and investment in the waste management sector were summarised in a *Policy Timeplan*. This general understanding of the policy context was used to support both the analysis of the whole portfolio and the individual project evaluations.

For the 13 in-depth field evaluations, meetings were held with the promoter and as appropriate with intermediary banks and other stakeholders. The objective of the individual evaluations was to verify and expand upon the preliminary conclusions and recommendations of the *Portfolio Review*. This *Synthesis Report* presents the combined conclusions of both phases of the study, the *Portfolio Review* and the *Individual Project Evaluations*. The external consultants performed this evaluation under the supervision and with the support of the Operations Evaluations Department. Based on the external

consultants' final synthesis report and taking into account the comments of the EIB departments, EV has prepared the final version for publication.

## 1.2 WASTE MANAGEMENT IN THE EU

In its beginning, European waste policy targeted problematic waste streams, such as hazardous titanium dioxide waste. Following the 1992 Maastricht Treaty, the focus of European policy on environmental protection shifted to the more encompassing aim of protection and mitigation. The waste sector has followed this trend, with subsequent policy and legislation setting out a more general framework for the handling, storage, treatment and disposal of all waste streams. This is reflected by the principles that are included in the Fifth EC Environmental Action Programme - *'Towards Sustainability'*, currently the foundation of waste management legislation in Europe. Some of these principles are particularly relevant to the EIB's strategy for financing solid waste management projects, and these are outlined in the table below. The waste sector is considered a special priority in the recent Communication on a EU strategy for sustainable development endorsed in the Gothenburg summit (COM(2001)264). In addition, solid waste management is estimated to be the largest environmental sector in the EU in terms of expenses<sup>2</sup>.

**Table 1: The Principles of EU Waste Management Policy**

<b>Principle</b>	<b>Description</b>
<b>Waste Management Hierarchy</b>	A ranking of waste management options, from the most to the least desirable: reduction, reuse, recycling, recovery and optimum final disposal as well as improved monitoring.
<b>Proximity</b>	Waste should be disposed of as close as possible to its point of origin, in order to reduce waste movements.
<b>Self-Sufficiency</b>	A network of integrated waste disposal facilities should exist throughout the Member States in the Community, with co-operation between countries ensuring that waste generated within the Community is only disposed of within the Community.
<b>Best Available Techniques Not Entailing Excessive Cost (BATNEEC)</b>	Processes should be optimised and associated emissions from installations should be minimised, while still being economically efficient.

### 1.2.1 Waste Quantities

It is difficult to obtain an overall picture of wastes across Europe and to identify trends. Annually, the Community generates circa 2000 million tonnes (Mt) of wastes, over 40 Mt of which are classified as hazardous<sup>3</sup> and around 200 Mt as municipal solid waste (MSW), an average of over 1kg per person per day<sup>4</sup>. The total amount of waste treated by all the EIB-financed projects in the EU amounts to circa 10 Mt tonnes per year, of which circa 0.3 Mt are industrial waste and the remainder MSW<sup>5</sup>. Although the figures are not precise in either case, and there are considerable differences in the definition of MSW between the Member States, the figures nevertheless indicate the substantial proportion of MSW that is managed in EIB-funded facilities across the EU, more so when one considers that the significant majority of wastes are still disposed to landfill, few of which the EIB has supported. Arisings of MSW continue to increase across the Member States, in parallel with economic growth, changes in the quality of life and patterns of consumption.

<sup>2</sup> The EU Eco-Industry's Export Potential, European Commission, September 1999

<sup>3</sup> According to estimates from the European Environment Agency.

<sup>4</sup> EU focus on waste management, Directorate-General Environment of the European Commission, 1999. Evidence from the case studies carried out in this evaluation suggest waste generation rates of 1.3-1.7 kg per person per day, although this might be because of the Member States involved or the generally urban location of facilities.

<sup>5</sup> The figures are taken from the project completion report, where available, otherwise from appraisal reports.

### 1.2.2 Waste Management Methods

In Europe, the majority of municipal wastes are disposed either to landfill or by incineration. Landfill is generally the cheapest available option, despite the introduction of landfill taxes in some countries, and the proportion of MSW landfilled is high, reaching 85-90% in some Member States. In some countries, the use of landfills for MSW is legally limited, by bans on the landfill of certain waste types, including incinerable or recyclable waste. There is tendency for closure of small landfills and for restriction of new sites in advance of the implementation of the *Landfill Directive*. In some cases, there is an acute shortfall in incineration capacity, with constraints on new incinerators following public debate on the health effects of incinerator emissions. The recovery of energy from MSW is a policy priority in most countries.

Although there is an increasing awareness of the need to prevent, minimise and recover wastes, and in countries with advanced waste management systems recycling is increasing rapidly, in general the recovery and recycling of wastes remains underdeveloped. In particular, only a small proportion of biodegradable wastes are composted. Separate collection of these wastes, a prerequisite for good quality, marketable compost is the exception rather than the rule.

There are no comprehensive and comparable data held at the EU level on the levels of investment in the waste management sector<sup>6</sup>. The most readily available information from European agencies and national waste management associations relates to recent projects completed and forthcoming commercial opportunities in the area of waste treatment. ASSURRE (the Association for the Sustainable Use and Recovery of Resources in Europe) recently carried out a survey of municipal waste combustion technologies in Europe, and estimates the market for the construction of MSW combustion facilities in the EU to be €500-900 million a year. By comparison, the EIB financed MSW incineration by an average of €230 million per year from 1995-2000, funding 19 projects for a total of €1165.33 million.

### 1.2.3 Recent Legislation

The *Landfill Directive* aims to prevent or mitigate harmful impacts on the environment and human health by imposing strict controls on the type and quantity of wastes that may be landfilled and through technical requirements for the operation and aftercare of landfill sites. The Directive also requires all wastes to be treated before being disposed to landfill. Biodegradable municipal waste (BMW) can be accepted for disposal to landfill under the Directive, but there will be a tightening of controls in order to reduce the amount landfilled and to promote alternative disposal routes. Member States must reduce the amount of biodegradable municipal waste going to landfill to 75% of 1995 disposal levels by 2002, to 50% by 2005, and to 25% by 2010. A derogation of four years is granted to those countries that landfilled more than 80% of their BMW in 1995.

There is a clear preference for BMW to be treated via biological treatment processes such as composting and anaerobic digestion. There is no separate legislation for biological treatment, but various EU policy documents, such as DG Environment's *'Biowaste Paper'*<sup>7</sup>, strongly favour separate collection of biodegradable wastes. This is seen as a prerequisite for the production of high quality and marketable composts.

The EU has also developed Eco-Label criteria for compost that are valid from 1 April 1998 to 30 September 2002, with new criteria under development. Producers are not required to apply the Eco-Label, but it is seen to provide a competitive advantage for products that comply with the criteria.

The new Incineration Directive (2000/76/EC) has a broader scope than the previous directives<sup>8</sup> and introduces stricter provisions, with the aim of ensuring that facilities operate more efficiently and that emissions of key pollutants to air and water are reduced. The residues from incineration are also included under the Directive.

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<sup>6</sup> Eurostat is currently in the process of publishing data from the most recent survey of environmental indicators in Member States, which is understood to contain some data on investment.

<sup>7</sup> Working Document Biological Treatment of Biowaste, second draft, 12 February 2001, European Commission, ENV.A2-Sustainable Resources, Brussels.

<sup>8</sup> 89/369/EC and 89/429/EC (existing and new installations for the incineration of municipal waste) and 94/67/EC (incineration of hazardous waste).

These developments at the European level will have a significant impact on the projects the Bank has financed in the solid waste management sector and on those it will finance in the future. In particular, the timing of the obligations they contain reflects the need for projects in this field to be able to adapt to significant and progressive changes in the regulatory environment.

Directives have been transposed differently by the individual Member States, but, although the policy and regulatory context still varies substantially from one country to another, they are gradually converging. All the countries where individual project evaluations were undertaken as part of the review have transposed the *Waste Framework Directive*<sup>9</sup>. All, except Italy, are in the process of enacting legislation to meet the requirements of the *Landfill Directive*. All are preparing the ground for the implementation of the *Incineration Directive*. Although development of waste management practices in southern Europe has been behind other Member States, there have been major developments in recent years. The Cohesion Fund has been a driving force for this step change.

### 1.3 OVERVIEW OF EIB'S SOLID WASTE MANAGEMENT PORTFOLIO

#### *Distribution of Projects and Financing by Country*

In 1984, the EIB's Governors endorsed the Board of Directors' recommendation to extend the Bank's eligibility criteria to include projects helping substantially to protect the environment, regardless of their location. In the period 1984-2000, EIB has financed 55 solid waste management projects in the European Union and seven projects outside the Member States. *Figure 1* in *Annex* shows the financing per country through individual loans (EUR 2.5 billion in the same period). Italy leads the list (€783M), followed by Germany (€424M), the Netherlands (€421M for only 3 operations), and France (€246M). There have been 21 projects financed in other countries, at an average of circa €30M each. The EIB has not financed projects through individual loans in Finland or Luxembourg, nor in Greece or Ireland, two countries where the waste management infrastructure is poorly developed and where EIB could play a key role. In addition, total allocations from global loans for solid waste treatment are in the order of EUR 500 million.

#### *Distribution of Project and Financing by Technology*

*Figure 2* in *Annex* presents the number of projects financed per technology. It should be noted that several of these projects involve more than one technology, although one always is the 'lead' waste management route. Most EIB-financed projects are for MSW, while there are only 4 industrial waste facilities that have received support from the Bank. Incineration leads clearly by number of projects (40) and total finance (€2018M), followed by municipal landfill (11 projects and €171M), composting and/or recycling (7 and €117M) and industrial waste treatment (4 and €91M).

#### *Proportion of Project Costs Financed by EIB*

The proportion of project costs financed by the Bank has been highest in composting and/or recycling projects, with an average of 46%, and lowest for industrial waste treatment (31%). The average participation of the Bank across all project types is 40%.

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<sup>9</sup> i.e. Denmark, France, Portugal, Italy, Spain, Germany and The Netherlands.

## **2 PROJECT PERFORMANCE**

Both the portfolio review and the in-depth project evaluations demonstrate the relevance for European waste policy objectives of the projects evaluated and of the portfolio as a whole. In the main, the projects support European waste policies and deliver significant environmental benefits. However, in terms of efficiency and effectiveness, 4 out of the 13 projects evaluated in-depth were rated unsatisfactory to poor. As to sustainability, 2 out of the 13 projects proved unsustainable, 2 are or have been at serious risk, while the remainder is clearly sustainable. Not surprisingly, the 4 projects with unsatisfactory or poor efficiency and effectiveness are the same 4 that are unsustainable or confronted with serious risk. The various aspects of project performance are analysed in more detail below.

### **2.1 INSTITUTIONAL CONTEXT**

Major problems were faced in a number of cases by projects that were developed in a weak institutional context, which demonstrates the importance of this aspect of solid waste treatment. In the case of two composting plants in Italy, combined in a single loan, weak institutional capacity and a legally and administratively complex framework were significant factors in project failure. The situation was exacerbated by contradictory political actions, including the granting of a permit to a competing private landfill. Two composting plants in Portugal also suffered from weak institutional capacity, problems being associated with the separation of waste collection and disposal functions. Only for one of the Portuguese projects did the Bank make a substantial effort to resolve the institutional problems.

Other projects experienced difficulties in adapting to changes in the regulatory context, such as two projects in Germany, where the costs of treatment resulting from the influence of regulatory change turned out much higher than expected at appraisal. The Bank should give considerably more attention to the institutional, regulatory and policy context in which projects are developed when appraising project proposals. Where problems are identified, it should also make a serious effort to help solve them. The Bank should consider minimum institutional requirements for EIB finance, which would not only support appraisal, but also inform public sector promoters towards introducing appropriate institutional change.

A related issue is waste tariffs. Although the case studies and the portfolio review did not look at tariffs in detail, full-cost charging for waste management services is an important complement to the polluter pays principle and in ensuring that projects are financially sustainable. At one of the Portuguese composting plants, the Bank's loan conditions stipulated that the municipalities cover operating expenses, which was necessary for the long-term financial sustainability of the project, particularly in the face of uncertain revenues from products. In the other composting plant, the Bank did not intervene in this way, and the municipalities do not pay the promoter a gate fee. Instead the facility's operations are financed from the regional budget. Tariffs may be an even more important issue outside the EU, where projects may not be viable because of current low tariff levels. Clearly, examination of the structure and calculation of charges are important elements of the assessment of project viability.

### **2.2 WASTE QUANTITIES**

With respect to the waste arisings in the areas covered by the projects, information has been obtained during the field evaluations for 9 out of the 13 projects, but the information is not always reliable. In 8 evaluations, the amount of waste generated 5 years after the project was commissioned is higher than foreseen at appraisal. For only one project was the amount of waste generated estimated correctly at appraisal. The large majority of projects for which the amount of waste was underestimated at appraisal are located in Southern Europe. In 4 cases, the waste production is significantly higher, at 32%, 42%, 61% and 104% respectively (see *Figure 3 in Annex*).

Clearly, waste production has been commonly and sometimes significantly underestimated by the promoters as well as the Bank. Where the difference is the greatest, at 2 Portuguese projects<sup>10</sup>, waste production was not analysed in detail by the promoter prior to appraisal. This led to significant problems with the dimensions of the plant when waste was centrally collected. In these cases, at appraisal the Bank did not highlight the need for further work before the proposal could be approved. However, for 2 German facilities waste forecasts were overestimated at appraisal and both faced problems because of competition for waste streams.

Both the under- and overestimation of waste quantities demonstrate that to forecast arisings is difficult, and the consequences illustrate the need for a thorough assessment. To address this issue it should be considered to require promoters to undertake a basic minimum of research on waste arisings and growth, to be checked by EIB at appraisal.

Nearly all the projects involved treatment of municipal wastes generated in the region and collected by the shareholder(s). The supply of municipal waste is normally secured through long-term contracts or because the plant is owned by the authority that collects the waste. However, in one German project, only 60% of the required throughput was secured at the time of appraisal, an issue that the EIB raised with the promoter as a major concern.

## **2.3 IMPLEMENTATION PERFORMANCE**

### **2.3.1 Project specification**

Nearly all the case study plants were built to the initial project specifications, taking into account other investments after completion, with or without EIB financing. The exceptions were the 2 composting plants in Italy and the 2 in Portugal as well as the composting element of an incinerator in Spain. The operations of one of the Portuguese composting projects had to be altered significantly. The existing equipment will be decommissioned shortly (about 10 years after commissioning, with the lifetime of the equipment having been halved because of unexpected increases in throughput). To be noted that all the projects that underwent significant changes in the course of their operations were composting plants. The necessary additional investment was primarily aimed at reducing the environmental impact, mostly odour. The additional investment was for the larger part financed by EU Cohesion Fund grants.

Clearly, relevant environmental issues influencing sustainability were not raised at appraisal in these cases. EIB understands the principal environmental issues associated with incineration very well. It focuses on air pollution by requiring emissions standards in line with the *Incineration Directive*, or tighter where possible. Less attention is paid to other environmental concerns. The key issue of odour was overlooked in the composting facilities and there was also a problem with the recirculation of leachate in the landfill associated with one incinerator. Even if the Bank requires an EIA to be carried out, issues such as odour and vehicle movements, that have the potential to compromise project sustainability, may not be given sufficient emphasis.

One Italian composting project consisted of two waste management sub-projects. The construction of one of the composting plants was halted at an advanced stage, due to public opposition. Despite a court order being overturned, no further work has been carried out. The existing works would need complete re-design as some of the installations are now obsolete. In the case of the second sub-project, initial plans for a composting plant were replaced by a project involving transfer and landfill. The project failed because of disagreement on the siting of the landfill, and was completely abandoned. A facility combining reception of separately collected wastes and landfill was subsequently established elsewhere using other funds. EIB funds were reallocated to the closure of uncontrolled landfill sites. Both for the original landfill and for the recycling/composting plant the promoters' preparatory work appears totally inadequate.

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<sup>10</sup> In one of these projects, estimated generation of 0.6 kg per person per day at appraisal was revised to 0.9 kg in 1993 and to 1.1 kg in 2000.

The Italian case is a notable exception. In the broader sample of 28 projects, there was a general consistency of specification at appraisal and implementation. However, in 10 cases there was insufficient detail in project documentation to establish whether the specifications had been altered. Of those where modifications were noted, 5 were related to the abandonment of various sub-projects. In 3 cases, changes to the project were related to upgrading gas cleaning equipment, whilst the others were changes to project capacity, or various minor adjustments.

The results suggest that the grouping of small projects into a single loan as 'sub-projects' complicates the appraisal. The relative economic merits of individual components are hard to distinguish and the poor performance of some activities may be disguised. Nevertheless, the Bank can bring considerable added value to these smaller projects through its expertise, but minimum information requirements should be reinforced, so that subprojects can be appraised individually.

### **2.3.2 Promoter**

Most of the projects in the loan portfolio are promoted by municipalities, either in the form of a publicly owned company, where the shareholders are an association of local, provincial or national authorities or a private-public partnership, usually with the authorities as shareholders. In these cases, the contracts with the authorities are sufficient to assure the supply of wastes to the facilities. Only in one case of the 13 projects evaluated in depth the municipality is not represented. However, in this case, the promoter has a 20-year contract with the City and is thus assured of supply of waste.

In the German landfill project, the participating authorities were not able to provide sufficient wastes to make the project financially sustainable. At the time of the evaluation, a new private sector partner in the joint venture was to guarantee sufficient additional waste throughput to make the project sustainable.

The participation of the private sector can bring additional strengths to projects, where companies bring considerable project management experience and, in some cases, the financial strength to see through problems in implementation. This was the case with the promoters involved in the Spanish incineration project in the in-depth evaluation.

In contrast, the promoters of the composting projects tended to be weak and inexperienced, and their projects were conceptually poor. As mentioned above, the Italian facilities were never built as a result of the lack of expertise of the promoter and inadequate project preparation. On top, the project was led by available subsidised funding. The drawbacks of 'fund-led' projects are discussed in *Section 4*.

### **2.3.3 Time Schedule**

Out of the 54 completed projects, there were 23 projects with a project completion report in October 2001. *Figure 4* in *Annex* provides an overview of the average in delay for these 23 projects. The majority of the 23 projects have been completed with a delay of 6 months to 2 years. Seven projects suffered delays of over 2 years and the rest were implemented with negligible delays or, as was the case for 6 projects, on time or in a shorter time than foreseen. However, the Bank's late intervention in many of the projects means that the delays reported in PCRs often underestimate the real delay. In at least one case, project costs were lower purely because of rapid project realisation. The three projects composed of several sub-projects experienced longer delays, of 4, 8 and 11 years.

The most common delays in project implementation were related to technical problems in commissioning or in acquiring permits to operate or these having changed. Public or other authority objections to the project were also cited as reasons for delay in several cases. Also common were problems associated with acquiring sufficient wastes to enable operation (one German project took 4 years to reach its target throughput), and uncertainties or ongoing negotiations over wastes or residue disposal contracts. In 2 cases, delays were caused by a lack of suitable landfill to receive residual wastes and rising costs of disposal due to changing regulations.

Some of the reasons given for late implementation in the wider sample of 28 projects should have been foreseeable or manageable, including project competitiveness, the market for the products (compost and recycled materials), a lack of operating experience and delays in publishing an invitation to tender and in finding complementary finance. Further assessment of each of these cases would be

needed to establish whether *ex ante* appraisal failed adequately to assess the risks that resulted in the delays. However, some of the reasons quoted point to an inadequate assessment of downstream factors, specifically markets and residue disposal. Other delays that could not be foreseen included political changes, delays with other infrastructure, bad weather and industrial action.

### 2.3.4 Investment Costs

The *ex post* investment cost per tonne/year has been estimated by dividing the base cost without interest during construction by the tonnes treated at plateau level. This allows a comparison of different projects regardless of the timescale for project implementation. The cost includes other investments realised a few years after project completion, even if they have not been financed by the EIB. This kind of investment has mainly taken place in composting plants to mitigate odour problems.

For incinerators, the investment cost per tonne/year varies substantially. At one end of the scale, cost per tonne/year was € 287 for a Portuguese incinerator, on the other the cost for a German incinerator reached € 1073. On average, northern European incinerators require a two to three times greater investment cost than those in southern Europe. The difference is caused mainly by the environmental standards applied<sup>11</sup>. Although all incinerators conform to EU standards, those in northern Europe comply with even tighter standards. The portfolio analysis of 28 projects confirms the conclusion of the 13 in-depth evaluations (see *Figure 5* in *Annex*).

Plant size also has an impact on the investment cost, but in the size range of the projects evaluated the impact is not very significant. In addition, some of the plants with low investment costs will need additional expenditure before 2006 to comply with the *Incineration Directive*, but these investments are minor in comparison to the initial investment.

All stand-alone composting plants included in the case study evaluations treat mixed waste. Of the 4 projects in the in-depth evaluation, only 2 were actually commissioned, and one of these is about to be closed after 10 years' operation. The final investment costs per tonne for the 2 projects in operation are similar, even if the costs for the larger facility are somewhat lower because of economies of scale.

Where both were reported, the expected implementation costs of the wider sample of 28 projects corresponded with actual costs for most of the projects examined. In seven cases, it was not possible to establish from project documentation what the actual projects costs had been. In several cases however, project costs had risen very significantly due to considerable delays (3 years and 11 years respectively). On the other hand, the implementation costs for 2 projects were significantly less than forecast, because sub-projects had been cancelled or substantially altered.

The investment costs considered here include interest during construction. It appears that all the incinerators evaluated have been built at or below the budget estimated at appraisal, with the exception of one, where composting was also part of the activities. The slight increase in this case was due to additional investment required to reduce composting-related odour problems. The additional costs were financed by the city council (20%) and a Cohesion Fund grant (80%). The two composting plants however experienced significant cost overruns of 53% and 149%.

The in-depth evaluations and the wider sample of projects from the portfolio suggest that, in general, incinerator projects deliver to time and budget, except for some details, and complicating issues with the innovative fluidised-bed technology in one project. The Bank understands the technology well and appraisal is generally accurate. By contrast, the composting and recycling projects have suffered from significant cost overruns and often from delays, reflecting inherent uncertainties in the technologies employed, and an inability of the Bank to account fully for these risks in project appraisal.

### 2.3.5 Grant Financing

One Portuguese project received a Cohesion Fund grant for the major part of the significant investment required to meet the project's goals. Another Portuguese project also received a Cohesion Fund grant of 85% of the investment costs of the composting plant re-design and extension needed to solve odour problems. These costs were equal to 40% of the initial project costs. The third Portuguese project in the sample received a Cohesion Fund grant of 42.5% of the total investment

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<sup>11</sup> Mainly NOx and treatment of ashes.

costs, following EIB assistance in preparing the application, as well as an EFTA grant. The Spanish project received a Cohesion Fund grant for 80% of the costs of environmental impact and nuisance control associated with the composting plant. Again, this investment was significant compared to the total project costs. In these cases, the Cohesion Fund has complemented the Bank with subsidies that secured environmental benefits. The 2 incinerators in Spain and in Portugal are examples of the synergy between EIB and Cohesion Fund support. Grant finance has allowed the 'rescue' of the projects after environmental issues not identified at appraisal manifested themselves.

## **2.4 OPERATIONAL PERFORMANCE**

### **2.4.1 Throughput**

In the majority of the case study evaluations, the amount of waste currently treated in the plants is in line with projections. However, three German projects initially suffered from an insufficient supply of waste. The reasons for the shortfall varied, ranging from changes in German legislation that prevented commercial waste from being collected with municipal waste, to strong competition from cement kilns, a legal ban on attracting wastes from other districts, short-term high demand for waste from a closing landfill and technical problems with flue gas cleaning systems. The plants made a serious effort, both commercial and political, to increase throughput to a sufficient level, and one plant now operates above design capacity following the closure of another incinerator in the area. The Project Directorate (PJ) specifically advised on the risk of excess capacity in the German market in a note in December 1995, and suggested screening criteria to assist in identifying facilities that would not be competitive in the long term. The note's key message was that proposed incinerators <200 kt/yr warranted extremely close scrutiny, and that a market and competitiveness assessment would be useful for the *ad hoc* screening of larger projects.

In three projects evaluated in depth, waste throughput was significantly higher than initially expected (32%, 63% and 214%). This can endanger the efficiency of a plant, as was the case in a composting facility in Portugal, where the plant is essentially used for mass reduction. Following composting, 70% of the incoming waste is landfilled, rather than the 15% estimated at appraisal. In another Portuguese facility, the excess throughput considerably surpassed appraisal expectations and goes directly to landfill. Originally, it was expected that 37% of the waste input would be recovered as compost or recyclables. In 2000 however, the plant was actually recovering only 6%.

One incinerator in southern Europe successfully responded to growth in arisings (available wastes increased by 40% from 1996 to 2000). The initially low project throughput prompted concern at appraisal over technical risk to the durability and performance of the plant. The much larger capacity, 2.8 times the initial throughput, has led to an extremely efficient plant, working close to full capacity, exploiting electricity subsidies and yielding significant economies of scale in operating costs.

In most cases where the data are available for the wider sample of 28 projects, the capacity at appraisal and completion are similar. However, for many projects discrepancies cannot be identified because no project completion reports exist. In a number of cases, it took time before throughput matched total capacity.

The case study projects and the remainder of the portfolio demonstrate the need for waste arisings, growth rates and contracts to be given very careful consideration at appraisal. Clearly, there will be benefits from guidance to assist promoters in a robust assessment of these issues and in providing EIB with appropriate information for checking at appraisal. Nevertheless, there will always be uncertainties associated with forecasting arisings, particularly over the lifetime of major projects such as those financed by the Bank. Consideration of contingencies for dealing with variation in throughput would be an obvious way to assess the risks involved and how they might be managed.

### **2.4.2 Technical**

Nearly all the case study incinerators are operating as planned, taking into account their availability, energy recovery and environmental impact. Most of the incinerators had to solve common initial technical problems before their operations were optimised. In the case of one of the German incinerators, the operational problems faced with the flue gas cleaning system were serious, but a solution, through electrostatic precipitators, was implemented after four years. Initially, another incinerator plant also had significant technical problems associated with the maturity of the fluidised-

bed technology. Yet another facility had minor difficulties in commissioning, with a shortfall in electricity production resulting from a design flaw in the boiler-turbine interface. All the incinerators, with the exception of one, apply conventional grate incineration technology.

By contrast, the 2 projects involving stand-alone composting suffered from severe technical problems. In one project, planned capacity was 5 times higher than the German reference plant. The planned tunnel reactors did not work properly and product valorisation is far below the expected level. In addition, significant investment was required to solve odour problems and the quantities of compost produced were lower than projected. The other plant is also suffering from odour problems that require remedial work, is operating above design capacity, resulting in mechanical wear, and is merely used for mass reduction. The shortfall in waste diversion from landfill has been mentioned in *Section 2.4.1*.

### **2.4.3 Operating Costs**

For incinerators, the operating costs per tonne appear generally lower than estimated at appraisal, except for two cases (see *Figure 6 in Annex*). The lower operating costs seem mainly due to throughput being higher than originally forecast, although, since scale affects investment more than operating costs, it is probably also a reflection of conservative assumptions at appraisal. However, for the composting and landfill projects, the operating costs are significantly higher than estimated at appraisal (from 78% to 133% higher). At one composting plant, operating and maintenance costs are eight to nine times higher than projected, which can only partly be explained by the doubling of throughput. Unit costs at the German landfill exceed appraisal estimates, but the difference is largely a result of the poor *ex ante* assessment of throughput.

### **2.4.4 Economic Revenues of Energy and Recovered Materials**

For about half of the incinerators, the actual economic revenues are lower or significantly lower than estimated at appraisal and for the other half they are similar or significantly higher. This is mainly a result of the level of electricity production, since subsidies were not considered in the assessment of revenues.

For the two composting plants, the revenues are significantly lower than expected initially (-31% and -95%) (see *Figure 7 in Annex*). In both cases, a major reason for this shortfall was the inability to deliver the quality and quantity of compost and other materials that were expected at appraisal. Neither the promoter, nor the Bank realistically assessed the projects' prospects.

### **2.4.5 Total Waste Disposal Costs**

This analysis has been conducted for the situation at appraisal, starting from EIB's *ex ante* assumptions, and from information collected during the field evaluation considering the past and the most likely evolution of costs and waste quantities<sup>12</sup>. Two projects have been excluded from the analysis. One was excluded because the composting plants envisaged have not been built. The second was excluded because it deals with hazardous waste and the information disclosed during the field visit was not sufficient to assess the current costs of the project.

The total waste disposal costs are the ratio between the net present value of the total cost minus revenues from energy and materials recovered and the net present value of waste quantities treated

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<sup>12</sup> The information is presented in 2001 €. Costs have been normalised using the EU-15 GDP deflator and the average exchange rate of the different currencies in 2001. The general assumptions considered are the following:

- 5% discount rate;
- the opportunity cost of the electricity produced has been established at €35/MWh and the same assumption applied for all projects. In this way, the variations in the level of electricity subsidies by country are not reflected in the calculation. The price for electricity generated by incineration plants varies from about 35 to 140 €/MWh in the sample of projects considered; and
- the estimation of the opportunity cost of the heat produced is based on the economic savings from the supply of heat to district heating systems. Savings in existing district heating stations would correspond mainly to fuel oil 1%S or natural gas.

during the life of the project, excluding subsidies and taxes. In addition, current gate-fees have been analysed.<sup>13</sup>

With respect to the incinerators in the field evaluation, in 5 out of 8 cases the *ex post* costs are lower than the costs at appraisal (see *Figure 8 in Annex*). The difference between the *ex ante* and the *ex post* cost is considerable in only one case (at 53% of the cost at appraisal, which results from the significant difference in project scale at appraisal and completion). For the rest of the projects the final cost is +/-20% above that estimated at appraisal.

In one German incinerator, gate fees had to be lowered in order to maintain waste throughput in the face of competition from other disposal routes, including cement kilns. Nevertheless, once subsidies are accounted for, revenues were generally accurately assessed for incineration facilities at appraisal.

High waste tariffs were noted as a concern in a number of projects, particularly those in northern Member States, and especially in Germany. The introduction of complex waste separation systems, and the requirement for emissions control tighter than European standards, inevitably places a considerable burden on the public purse and may pose a significant project risk. Waste tariffs had become an issue for two German projects, where the facilities faced competition for waste streams from facilities with lower gate fees. As a consequence, there is pressure to redirect wastes within the country, or even to export waste to facilities with lower costs. In such circumstances the financial sustainability of the project may be severely compromised, as indeed happened for one of the projects. In the southern Member States the cost of waste treatment were much lower and waste tariffs were no problem.

With respect to the two operating composting plants, the costs at evaluation were significantly higher than the expected cost at appraisal (207% and 507%). If the plant in Italy is ever finalised, cost increases will be even higher. The total disposal cost of the landfill project was 28% higher at evaluation than estimated at appraisal.

Treatment costs were rarely known in the wider sample of 28 projects examined, and no conclusions can be drawn from the available information. It is recommended that, as a reflection of project viability, treatment costs are included in appraisals, and also specified in all Project Completion Reports. Comparison of costs *ex ante* and *ex post* can be a measure of success. The adequacy of the information provided on project operating costs also depends on the timing of the PCR, as will be discussed in *Section 4*.

#### **2.4.6 Financial Sustainability**

All projects are operated by either a public company or a public-private joint venture. The financial sustainability of the operating plant is secured to a large extent by the involvement and commitment of the authorities assuring the supply of wastes. Revenue from the sale of products is often lower than projected, but this does not normally affect sustainability since it concerns a small proportion of total revenues. Although in some cases additional investment was required to control environmental impacts, all projects are currently financially sustainable. One German project seemed financially unsustainable until recently because of market issues, but will now receive guaranteed additional waste input through a new partner. In the Spanish and Portuguese projects the additional costs were significant, but covered to a large extent by Cohesion Fund grants.

#### **2.4.7 Environmental Impact**

In general, the environmental impact of project operations is under control, although this has required additional expenditure in some cases. Considerable environmental benefits have been achieved through diversion from landfill. With respect to regulatory compliance, all projects comply with both national and European standards. The operators of some incinerators will need to make some limited additional investment by 2006, in order to meet the emission standards of the *Incineration Directive*. In all cases the promoter has such plans in hand. As observed above, odour is a common problem for the composting plants and significant additional investment has been, or will be, made to reduce odour to an acceptable level. Most of these necessary investments were not identified at appraisal. Rising

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<sup>13</sup> The gate-fees are not economic cost, as subsidies and taxes are not taken into account.

concern about the potential hazards to health from composting plants may mean additional issues will need to be addressed at these plants in the future.

Many incineration projects, including those in Germany, the Netherlands, Denmark and Italy, not only meet European standards, but go beyond them. They also use advanced technologies to reduce the amount of residual wastes generated or to treat these wastes. Generally, these facilities are either ISO 14001 or EMAS certified. The operators of all facilities are committed to controlling the environmental impact of their operations and have made all necessary investments. In several cases the projects replaced old facilities that did not meet legal standards.

#### **2.4.8 Social**

In general, the public object to waste management facilities, because of perceived health risks, visual impact, odour nuisance or waste transport. Composting plants in particular cause odour nuisance, compelling operators to invest in cover and/or bio-filter installation. Incinerators can also cause odour nuisance, as seems to be the case in one of the projects evaluated, where this issue is likely to complicate an application for a permit for an additional incineration line. However, a composting plant in Portugal is relatively well accepted despite odour nuisance, because of the extensive and open communication with the public by the operator. Similarly, the incinerator in the Netherlands encountered some public opposition initially, but the problem was solved through communication and good environmental performance.

One German plant is accepted because it generates employment, though this is the only project in the sample of 13 projects that appears to have been accepted for this reason. Another plant faced minor opposition on the grounds of vehicle movements to and from it, but the problem was mitigated by the restriction of traffic hours.

Public acceptability is largely determined by plant location. One German incinerator, for example, is not located in a residential area, and the public appreciates its high environmental performance and largely accepts it. Another German incinerator is poorly accepted, which is not surprising given its location in a residential area and the fact that it is a hazardous waste facility. The additional traffic provoked by the plant is a problem, but as the incinerator operates in compliance with the legal provisions, residents' objections do not compromise its sustainability. In general, accepting wastes from municipalities other than the owning consortium is also likely to provoke public opposition.

No enforcement actions have been taken against any of the plants that were visited for this evaluation. One can conclude that the case study facilities have their environmental impact well under control. The need for additional measures in certain cases, particularly where odour was concerned, suggests however that opposition could be avoided in future by being more attentive to impacts of this nature at appraisal. Communication with the public about the benefits of facilities, pursuing minor mitigation initiatives and good housekeeping are all beneficial in avoiding public opposition.

#### *Employment*

For many of the 28 projects examined, it was claimed that jobs had been created or stabilised as a result of the project. The numbers involved ranged from 9 to 94, and average 38 for those projects where new jobs were reported. For 5 projects no new jobs were claimed, whilst for 3 projects no information was available. A figure for employment during project construction was provided for 15 of the projects, with an average of 500 man-years per project.

### 3 CONTRIBUTION TO THE COMMUNITY'S POLICY

The Bank's high-level strategy towards the environment and to European waste policy is clear and based on the DG Environment corpus of law. Information on the European and national waste management policy context is available in PJ. However, the Operational Departments are not given specific guidelines on taking this information into account in the development of their strategies. It is recommended that the link between the high level strategy and the Operational Department strategies is made more explicit, with sectoral targets, and potentially, targets on added value in the solid waste management sector, developed as a complement to loan volume.

#### *Reflection of Waste Policy*

Both the portfolio review and the case studies show that the Bank's motive for the selection of projects was often a reflection of environmental objectives, as well as of banking imperatives. This demonstrates the relevance of individual projects, and the portfolio as a whole, to European waste policy objectives and the Bank's declared strategy. The protection offered to the environment by projects included the replacement of outdated plants, the provision of state-of-the-art emissions control equipment, sound integrated waste management strategies and the environmental benefits of energy recovery over disposal to landfill.

Most of the projects complement European policy in relation to environmental protection by virtue of providing superior technology. Even the landfill projects in the portfolio are improvements on the previous situation, providing state-of-the-art facilities or replacing uncontrolled landfill. In several cases, the projects were needed to ensure legislative compliance, to replace or expand existing facilities or were part of integrated waste management plans.

Clearly these benefits are relevant to the environmental policy background. Nevertheless, the composting projects evaluated in-depth did not achieve their objectives in full. Also, the contribution of the landfill project to policy objectives was limited, even if it was of a higher standard than other sites and some landfill will always be required as part of integrated strategies. The operational effectiveness of the projects has been discussed in *Section 2*.

Although many of the projects are integrated in nature, recycling and composting do not form a significant element of the loan portfolio, as shown in *Annex, Figure 2* and *Section 2*. In order for the Bank to be seen to embrace European policy, a greater proportion of projects in these areas would be desirable. However, the in-depth evaluations show that projects at this 'cutting edge' present more risk because of the instability of the inherent economics, product quality and markets and regulatory requirements. By contrast, large incinerators, the majority of the solid waste management loan portfolio, are less risky from a technical and financial perspective. It is recommended that, should the Bank desire to include a greater number of recycling and composting projects within its portfolio, it should adopt a very rigorous approach to their appraisal. Clearly, studies reviewing the techno-economic viability of such projects, examining how risk can be mitigated or avoided, would be valuable in providing guidance for securing effective projects of this kind.

In practice, the Bank has no procedures for directing funds towards waste management projects *per se*, nor a mechanism for securing, by preference, technologies which are towards the top of the waste management hierarchy, provided that these are sustainable. Indeed, the Bank applies the same financial conditions, loan pricing and guarantee requirements, to solid waste management projects as to any other project, despite this sector being a priority for the Union.

Sectoral priorities were defined in the 1999 Corporate Operational Plan, and subsequent COPs, but are not yet reflected in specific directions for loan officers. This may be symptomatic of a general failure in cascading policy imperatives from the top down. Each Operational Department should adopt a strategy tailored to the needs of sustainable waste management in, and the environmental priorities of the Member States concerned, with lending targets complemented by measurements of value added, as discussed in *Section 4*. Such targets will be aspirational, recognising the uncertainties associated with projects at the cutting edge. These strategies should be consistent with the Bank's overall plan, be informed by PJ background papers and the technical officers themselves, and, above all, be pragmatic with respect to practice within the country concerned.

There is a precedent for targeting of this nature. The Bank has recently considered the establishment of an annual lending window for renewable energy projects where a greater emphasis would be placed on environmental benefits, lending allowed in excess of 50% of project costs and smaller projects favoured. The Bank should consider a similar window for solid waste management projects with special conditions aimed at meeting the specific requirements of projects in the sector (or alternatively a generalised window for environmental protection projects). Because of their low loan volume, and the effort required for project screening and appraisal, giving a priority to specific project types might require additional resources for Operational Departments, which might need to be ring-fenced. Alternatively, measures of added value, such as those presented in *Section 4*, might provide sufficient incentive.

Targeting specific needs in different Member States may necessitate flexibility in the dialogue held with promoters leading up to *ex ante* appraisal, and in the level of Bank contribution, as raised in the discussion of the *Top-Up Finance* and *Make-Or-Break Finance* models in *Section 4* and *Figure 4.1*. Clearly, however, all projects must be bankable, with their intrinsic viability established to the Bank's satisfaction. The experience with the case study composting projects demonstrates that there is no case for relaxing appraisal standards to encourage projects towards the top of the waste hierarchy in countries where there is a policy gap.

As a complement to a plan for securing solid waste management projects, the Bank should also increase support of innovative technologies. Clearly, there is a potential role for the Bank in this area, demonstrated by one of the projects evaluated individually. The conservative approach adopted by the Bank in the past is understandable, but a more forward-thinking stance, and sustained dialogue with credible promoters of new technologies, would be appropriate to target policy needs. It is difficult to determine how efficient the projects in the Bank's portfolio of solid waste management projects have been in contributing to European policy objectives. Disposal costs vary significantly across the Member States, and there is little contextual information with which to judge their competitiveness. Nevertheless, as discussed in *Section 2*, the majority of incineration projects have delivered on budget, and in most cases disposal costs are below *ex ante* estimates. Generally, it is reasonable to assume that expected costs were realistic and that these projects are an efficient means of achieving policy goals. However, there is some concern about the scale of waste tariffs in some northern Member States, as discussed in *Section 2.4.5*. In such cases, particularly where the project suffered from competition as a result of high tariff levels, one might ask whether the environmental standards adopted are too stringent and the continued pursuit of policy goals may no longer prove cost-effective.

The recycling and composting projects differ markedly from the incinerators. As shown in *Section 2*, these projects have actual costs well in excess of those forecast at appraisal. Although this does not necessarily mean that these projects were inefficient in addressing policy objectives, there must be concern that this is the case. As outlined above and in *Section 4*, the Bank would be advised to take a more rigorous approach in appraising such projects.

#### *Integration in Regional Context & Policy*

In many cases, the portfolio projects were explicitly identified as part of a regional or local waste management plan, environmental protection plan or a programme to modify incinerators to new national standards for air emissions. For example, in some projects incineration was deployed as a complement to high levels of recycling, with the plant scaled appropriately. Elsewhere, the link to regional planning was less explicit, and justified on the basis of need, as a contribution to rationalising and improving the waste treatment and disposal system, or to reducing landfill and promoting prevention, re-use and incineration. The hazardous waste facilities reviewed were justified on the basis of the growth in this waste stream and the demand for an appropriate treatment route.

#### *Conformity with Existing and Emerging Legislation*

All the projects conformed to both national and European legislation. These included the projects outside the European Union. Five of the projects in the in-depth evaluation performed to a higher level than the relevant European standard.

## *Project Scale*

There is anecdotal evidence that some loan officers avoid the solid waste management sector, because the projects are seen as small, complicated and difficult. This is due, in part, to the loan volume nature of business targets, which render Operational Departments more pre-disposed to larger and easier to handle operations with a lower cost to loan volume ratio. Smaller projects fall below the Bank's minimum (direct) loan size. In addition, financing these projects under global loans is actually discouraged because of their complexity, which would merit a detailed appraisal that for allocations from global loans does not take place.

Barriers to smaller scale projects and the solid waste sector in general could be removed through specific bank products adapted to them, by focusing the Operational Departments' strategies, by reviewing the Bank's needs with regard to project appraisal and ensuring adequate resources for the appraisal of smaller proposals. An opportunity exists for the Bank to support smaller projects through dedicated global loans. To employ this channel successfully, EIB would need intermediary banks that are knowledgeable about Member State waste management requirements.

## **4 THE BANKS CONTRIBUTION TO PROJECTS**

### **4.1 LOAN BENEFITS**

From the case study projects and the portfolio review, it is clear that the principal route the Bank has used to add value is by providing large loans for long periods at competitive rates. Several promoters noted the assistance fixed rate loans provide in ensuring a stable gate fee. Few other banks can look to the long term in this way, and such loans are difficult to obtain in some of the Member States and outside the EU. The financial benefits to the promoter offered by EIB depend on the following:

- the guarantees requested by the Bank, with bank guarantees and other types of securities increasingly replacing government guarantees;
- loan conditions, in particular pricing, where the cost of EIB loans is the same for all borrowers, equivalent to the cost of funds plus a fixed margin; and
- the extent to which loan benefits are transferred to the promoter or captured by an intermediary bank.

In the major European markets, and increasingly in the smaller markets too, the advantage offered by EIB over alternative sources of funding is limited, with increasing competition from other sources of finance. Relatively speaking, the financial benefits of EIB loans were much larger for the older projects reviewed. Where the Bank became involved in the project through an intermediary bank, the benefits of the loan were at least partially captured by the intermediary. Nevertheless, in these cases the Bank's lending rate was still the major advantage of securing a loan with EIB.

A significant minority of the case studies (5 cases in total) involved guarantees from the State or municipality, and the loan benefits were transferred in full to the borrower. However, in the other case studies, EIB lending was guaranteed by first class banks, and the financial benefits significantly reduced because of the premium payable to the guarantor. One of the evaluated projects involved an innovative technology and significant technical risks were borne by the promoters. In this case the Bank did not support the development of the project by adjusting its guarantee requirements to the project's successful implementation, accepting some project risk, as requested by the promoters. Incidentally, a project promoter in Germany described the Bank *acting as if* it did take all project risk. The Bank's security requirements were widely considered cumbersome and time-consuming, particularly where the principal source of added value was financial (as in most northern European projects).

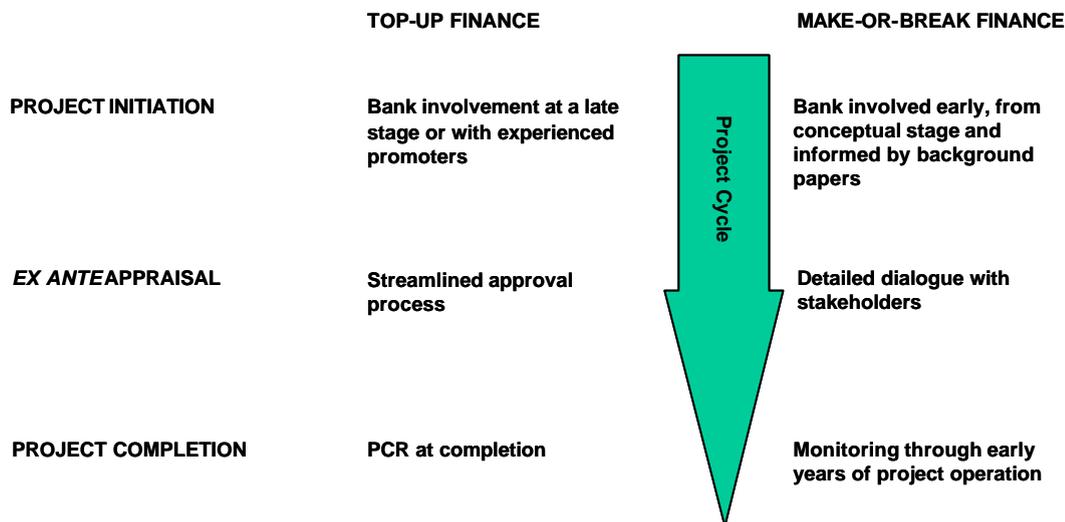
Where the Bank intervenes sufficiently early in the development of the project, it appears that a loan from EIB may facilitate securing loans from other sources. Clearly, this would be another benefit of the Bank's involvement. However, the tendency is for the Bank to intervene when projects are well underway, often just before the start of construction, when uncertainties have mostly been clarified, projects are easier to assess and other loans already secured. There may thus be scope for adding value through earlier engagement.

## 4.2 VARIATION IN THE EIB'S ROLE

The way in which EIB finance influences project sustainability varies markedly, depending on project characteristics. This influence can be seen as a continuum, with extremes where: at one end, and more commonly, the Bank adds to sustainability by providing large loans for long periods at competitive rates; and, at the other end, and in a minority of projects analysed in-depth, EIB is the decisive source of the finance for the project to progress. Both types of projects were found in the review and amongst the field studies. The former case was most clear-cut in a re-financing for one project, whilst the latter case held for one Italian and two Portuguese projects and is likely to be more common outside the EU.

Clearly, the role of the Bank should be adapted to the place of the project on the continuum between the two extremes, which we term the *Top-Up Finance* and *Make-Or-Break Finance* models respectively, but common policies and practices force the Bank's product to suit both models. As a result, there is potential for the Bank to adapt its approach and perform more effectively in both cases. The two models are shown in *Figure 4.1*, with an indication of where we believe a different approach across the project cycle would be valuable.

**Figure 4.1 The Top-Up Finance and Make-Or-Break Finance Models**



With respect to the *Top-Up Finance* model, in a mature market the Bank adds value to projects through advantageous financial conditions. Critically, EIB also has an exemplar function in this model, acting as a benchmark for co-financing banks and providing maybe a European quality stamp. In some of the case studies, competing banks modified their proposals once they learnt that EIB was becoming involved. In this model, projects are typically with experienced promoters, employing established technologies. Further value could be added by nurturing contacts with promoters and aiming to become involved with projects at an earlier stage, limiting where possible reliance on intermediary banks, because this erodes the margin offered by EIB (the promoters of a German project, for example, would have welcomed this). Since project viability is seldom an issue in this model, there may be a case for a more streamlined loan approval process, widely perceived as bureaucratic with little value added and a barrier to the Bank's involvement.

Earlier involvement would allow technical and economic appraisal to provide additional added value to *Top-Up Finance* projects. This was seldom seen in the case studies, the Bank raising the issue of contracts at one German project being a rare example.

### *Make-Or-Break Finance*

Whilst the Bank also adds value through interest rates in the *Make-or-Break Finance* model, here its technical and economic contribution is paramount. The transfer of know-how acquired working with experienced promoters in the *Top-Up* model is central to the *Make-Or-Break* approach. In this case, because the Bank is the decisive source of finance, engagement at a late stage is possible. However, advanced projects with weak promoters and institutional arrangements are difficult to recover, and early involvement is clearly to be preferred. The resources required for appraisal, and, indeed, screening and informal guidance, will greatly exceed that for the *Top-Up Finance* model. With two of the three composting projects, superficial appraisal of *Make-or-Break* projects, and a failure to become involved in project preparation, led to severe problems occurring at a later stage.

The *Make-or-Break Finance* model may apply to innovative projects in mature markets where the *Top-Up Finance* model is the Bank's principal role. Arguably, there is considerable potential for adding value in such circumstances, where the Bank has a thorough understanding of the technology and promoter, and can expend greater effort on its technical contribution, to the benefit of project viability. EIB has been extremely prudent in this regard to date, rejecting most innovative projects because of technical risks. Note that some of these projects have turned out to be technical failures.

The *Make-or-Break Finance* model is a less common role for the Bank, and more likely to occur in less mature markets, or where the technology is innovative for the market concerned. The model applies when practices are insufficiently clear-cut to remove all technical and financial risks, or in countries outside the Member States, where there is a gap with European policy and where promoters are also less experienced. The Bank has financed very few projects outside the EU, despite the substantial need for solid waste management projects. In addition, there have been no projects in Greece or Ireland, only one in the UK.

Where there are demonstrable problems in achieving European waste policy, an active upstream role would be particularly valuable, in institutional strengthening for example and in the initial phases of project preparation. Here, the EIB can bring considerable added value by nurturing a 'pathfinder' project in an immature market, with inexperienced promoters and contextual uncertainties. Benefits may be felt widely, more so if adequate follow-up ensues by the transfer of experience to other markets where there is a policy gap, such as the Accession Countries. Such situations perhaps offer the Bank the greatest opportunity to add value.

Since EIB normally has a full guarantee, there is a risk of enticement into a *Make-or-Break Finance* role with unsustainable projects, as the loan will be repaid anyway. However, in such a case there is negative value added, facilities that will close prematurely and a demonstrable failure to progress Community policy. This was true for one of the Italian projects,<sup>14</sup> and partly true for two of the Portuguese projects. The EIB has an obligation to ensure added value through up-stream and appraisal work, regardless of the loan guarantees being in place or not. With the *Make-or-Break Finance* model, the Bank is well positioned to impose special loan conditions to manage risk and ensure viability.

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<sup>14</sup> The Italian project that failed may have been 'fund-led' as the Bank's loan was made available to the final beneficiary as a grant, in the context of a State programme. This is a well-known phenomenon whereby projects are identified and initiated *in reaction* to the availability of a funding source. A 'window of opportunity' is created within which projects are sometimes developed in haste, in order to take advantage of the funds. Commonly, such projects are ill-prepared, and subsequent failure likely. In this case the project was not developed fully at the time of financing, and in particular, the institutional arrangements on which it depended were not in place. The Bank must ensure projects are properly prepared.

### 4.3 MEASURING ADDED VALUE

Measuring the value added by EIB through its involvement in projects would be worthwhile, but not easy. A number of areas where there might be scope for assessing relative contributions are nevertheless apparent. These are as follows:

- the timing of the Bank's involvement in projects;
- ratios between *Top-Up-Finance* and *Make-Or-Break Finance*, as discussed above;
- the Bank's penetration of new markets, as opposed to repeat business, and the incidence of new promoters and intermediaries;
- quantities of (biodegradable) waste diverted from landfill;
- support for new technologies or application of a value multiplier to those at different levels in the waste hierarchy;
- the percentage of projects where intermediary banks have a role; and
- loan benefits offered by EIB with respect to competition.

We believe that further exploration of these areas would provide a useful measure or measures for lending to the solid waste management sector.

## 5 PROJECT CYCLE

### 5.1 PROJECT IDENTIFICATION

#### *Initial Prospecting*

In the Member States, solid waste management projects are identified primarily through the strong relationships the Bank has developed with intermediary banks and promoters. Although the range and nature of these contacts is flexible, and varies between countries, the Bank generally maintains a thorough understanding of the sector, and is made aware of the significant majority of emerging projects through these informal channels. A similar approach is followed outside the EU, although the Bank has occasionally taken a more active role in promoting the development of *Make-Or-Break Finance* projects, especially with regard to up-stream preparation.

Commonly, the sector has access to few major sources of project finance compared with other types of projects, and a long-term dialogue is established both with counterparts in the banking sector and with experienced and reliable promoters, often diversified groups with cross-sectoral interests. In certain cases, prior contact with the Bank allows promoters to benefit from EIB's reputation in talks with municipalities.

This informal approach clearly has strengths, notably in its flexibility, and should remain the Bank's primary route for identifying waste management projects, particularly of the *Top-Up Finance* model. Here, supporting promoters with a demonstrated track record will tend to lead to good projects. However, generally this approach exploits established channels and actors, but does not normally lead to a pro-active response to policy imperatives. As a result, there is some danger that new market entrants may fail to develop links with EIB, that the Bank may be distanced from promoters of new waste technologies and without products that complement the advancing edge of European waste policy, as discussed in *Section 3*.

There is a strong justification for the Bank adopting a more pro-active approach and employing its expertise in up-stream work preparing the ground for *Make-Or-Break* style projects. As discussed above, this is perhaps where the Bank has the potential to add the greatest value.

#### *Project Selection*

The reasons given by the Bank as motives for project selection were wide-ranging, but nevertheless fall into two principal categories. These reflect banking imperatives and EU and EIB environmental objectives. Some projects were either seen as 'ripe' for an EIB loan, with one or more of a number of significant attractions such as a reputable and widely supported promoter, construction and/or operating permits already secured or a suitable site with no public objections. These largely fit the model of *Top-Up-Finance* projects described above. Alternatively, projects contributed to environmental, energy or regional development objectives, often complying more closely with the *Make-Or-Break Finance* model.

The early, informal screening of projects as they are brought to the Bank's attention allows good projects to be progressed, whilst those with a poor chance of success can be identified and rejected outright. A decision as to the detail required in appraisal could be made at this point (see *Figure 4.1*). Reportedly, some 110 projects have gone through this informal screening procedure in order to provide the 62 waste management projects in the portfolio. It is at times difficult to obtain detailed information on the reasons of rejecting some projects, as sometimes this was through informal dialogue. The main reasons given for rejecting projects are technical and economic considerations.

Even if the project is rejected, or the promoter chooses not to adapt their proposals, it is evident that the Bank still adds value through its expertise, and rejection is managed so that other sources of funding are not compromised. Since good projects are generally quickly appraised and it is time-consuming to establish the flaws of poor projects at appraisal, screening is an efficient use of the Bank's resources. Clearly it is a vital precursor to any streamlined appraisal of *Top-Up Finance* projects.

For *Make-Or-Break* projects with potential, the Bank can enter a dialogue with promoters with regard to the essential requirements for funding. The Bank can help strengthen projects at this stage such that unacceptable aspects of the project can be mitigated. It is clear that some projects have been made viable through the Bank's informal feedback at this stage, and significant gains in environmental protection secured. In general, the Bank appears to have a greater influence outside the Member States, largely because promoters are weaker and/or there is an insufficiently developed policy and regulatory framework.

## 5.2 APPRAISAL

Traditionally, the Bank does not take project risk, and its loans are normally subject to adequate guarantees from other Banks, large companies or States. Clearly, the Bank can only meet its objectives by supporting sustainable projects. An *ex ante* appraisal is required to ensure that each project is economically, financially, technically and environmentally viable, and thus able to repay the loan in full. On a limited scale, the Bank has developed direct co-operation with the Commission in this area, with an opinion on Cohesion projects provided on request, and less systematic input to CEEC programmes (Phare, Ispra, etc.).

### *Role of EIB Technical and Economic Expertise*

The Bank has a deep understanding of practices and technology across Europe gained from project appraisal, and the small number of market/sector studies undertaken. Few other banks have this understanding of the sector, and co-financing commercial banks, municipalities and other stakeholders clearly appreciate the 'quality mark' of the EIB's involvement and appraisal (as demonstrated in 4 of the evaluated projects). With one of the Portuguese projects, the Bank was able to use its expertise to help the promoter prepare a successful Cohesion Fund grant application.

The appraisal process allows the Bank to add value by bringing its technical and economic expertise to bear on enhancing project viability, particularly in the *Make-Or-Break* situation. The Bank requested the promoter to make changes to the project specification in about half of the sample of 28 projects examined, in some cases making these conditional to the loan. The changes were varied, but can be grouped into three key areas, as follows:

- environmental, including EIA, background monitoring, changes to emissions control technologies and pre-sorting to avoid landfill of organic waste;
- contractual, relating primarily to the guaranteed supply of wastes and disposal of residues, but also to permits, technical guarantees, construction, training and the sale of recovered energy; and
- financial, in respect of financial planning, cash flow guarantees, tariff adjustments and competitive tendering.

Nevertheless, the provision of technical and financial expertise to the projects reviewed was, in general, regarded as useful, rather than vital, particularly for *Top-Up Finance* projects. However, major issues were raised in several other cases, particularly where the Bank operated in a *Make-Or-Break Finance* role (e.g. forecasts of product quantities in one project). The Bank had a significant impact on the development of the technical/financial concept of the project in only one of the case studies. For a Spanish incinerator, all key technical, economic, environmental and management issues were raised at appraisal. Such issues were pointed out to promoters, and acted upon, in several other cases, but often the Bank's influence was constrained largely because of its late intervention.

It is striking that the Bank does not communicate more with promoters on risks and issues identified at appraisal, or provides them with a summary of the appraisal findings. A broader dialogue would reap benefits for both sides. Currently, communication between EIB and promoters varies, depending on at what stage the Bank becomes engaged in the project. Whilst the Bank can become involved at an advanced phase, early and sustained communication is likely to benefit the project, ensure the EIB's information requirements are being met and lead to a more sustainable project. Clearly, this dialogue requires resources, but more communication on, for example, the reasons behind loan conditions would be extremely beneficial.

Although there are undoubted environmental benefits accruing from the Bank's emphasis on flue gas treatment standards for incineration, the in-depth studies indicate that it may be overlooking some other environmental impacts that affect sustainability, in particular disamenity impacts such as odour, vehicle movements, visual impact and noise. All aspects of the environmental aspects of projects should be considered at appraisal if the risks associated are to be mitigated and projects' sustainability enhanced.

### *Technology and Market Understanding*

A number of sector papers and notes from PJ have provided background information on waste policy, on the status and characteristics of waste management technologies and on the needs and constraints of the market in individual Member States. This information is essential to provide a contextual guide for effective action by Operational Departments in support of waste policy. Therefore we recommend that a programme for the prioritised development and review of background papers is developed and that this vital information is used to guide the development of the Bank's overall plan for securing solid waste management projects and individual Operational Department strategies.

Personal aide-memoires on parameter values and rules of thumb on technical and financial criteria are used in screening and appraising projects. There would be benefit in sharing these informally, or presenting simple discussion documents or screening tools in order to cement the Bank's expertise in the face of regular changes to team composition and to encourage consistency. For example, our consultations suggest a common approach on the assessment of the technical and financial lifetime of incinerators, addressing the question of how reserves are provided for upgrading and unplanned maintenance, would greatly assist consensus in EIB.

Simple guides to other aspects of project context would be valuable for similar reasons. These include information on the calorific value of wastes, growth in waste arisings, generation statistics and forecasts of the impact of changing legislation on waste streams. More formalised recording of parameter values, including ranges and uncertainty would facilitate sensitivity analysis in appraisal, and permit the quantitative assessment of risk.

### **5.3 PROJECT FOLLOW-UP**

Project monitoring and ex-post evaluation allows EIB to establish how projects performed and whether its appraisal sufficiently identifies risks that might compromise success. Project completion reports are necessary for transparency and to establish whether the Bank is successful other than in terms of total loan volume. They provide feedback on whether projects were delivered as proposed, their effectiveness and efficiency, environmental impact and benefits etc., and can track promoters' details, experience and credit-worthiness. Unfortunately, Project Completion Reports were frequently lacking in detail, incomplete and sometimes pending.

The PCR is even more important outside the Member States, where the Bank is more clearly performing in a development agency role, and where there is a greater need for scrutiny as EU budget funds may be involved.

We recommend that PCRs be given a higher priority. There should be minimum criteria for their preparation and formal acceptance, and receipt of PCRs should be linked to the achievement of COP targets. There should be simple guidelines for their completion and the Bank should ensure that resources are sufficient for them to be completed without compromising other functions.

Clearly, one problem with PCRs is that they are completed at the time of commissioning. This is rarely the appropriate time at which to assess the success or otherwise of the project, other than in terms of budgeted and actual project investment costs. Better would be *a review* after some years of operating experience, which would give far better feedback on the effectiveness and efficiency of the projects financed. Factors such as contracts, calorific value, prices, markets, quality, sales etc. are only realised after a period of operating experience. Follow-up at this stage would make a valuable contribution to the maintenance and development of the Bank's understanding of technologies and markets, adding value to the identification and selection of projects and to project appraisal.

We recommend that consideration be given to a formal structured approach to project monitoring beyond completion, particularly for *Make-Or-Break Finance* projects. For these projects, the Bank should carry out a full review after 18 months of operation, focusing on any issues requiring further action. Continued dialogue with promoters through a structured follow-up to loans post-completion will also facilitate the identification of new opportunities with promoters, both within and outside the solid waste management sector.

Figure 1

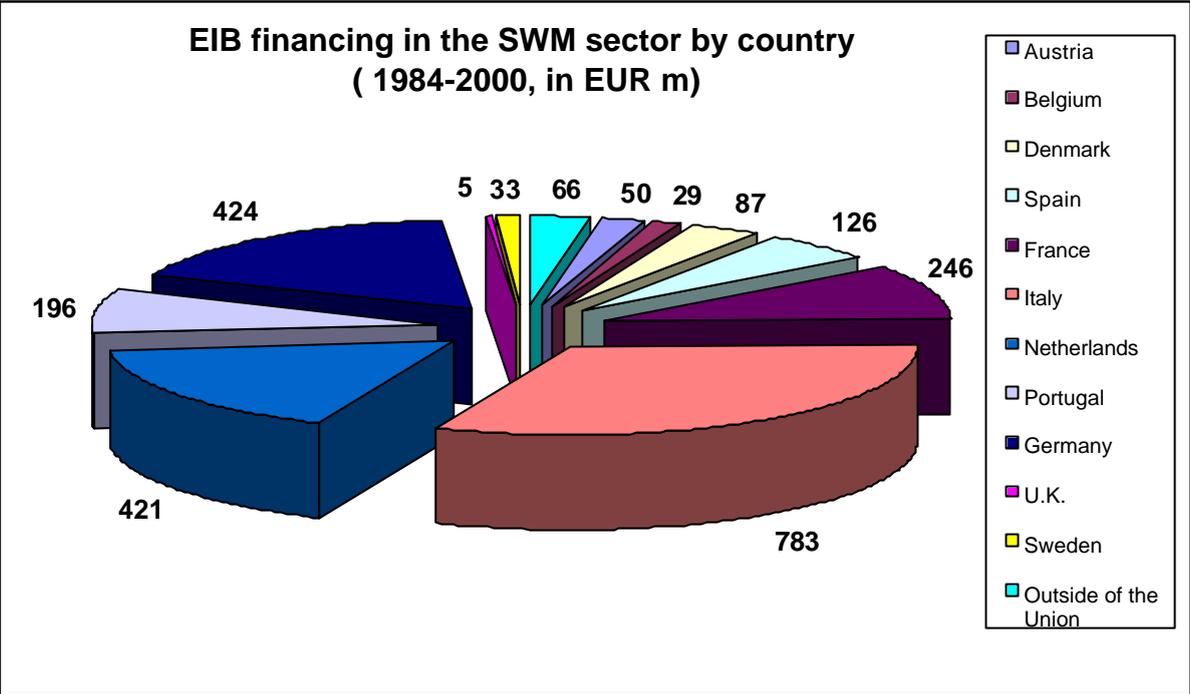


Figure 2

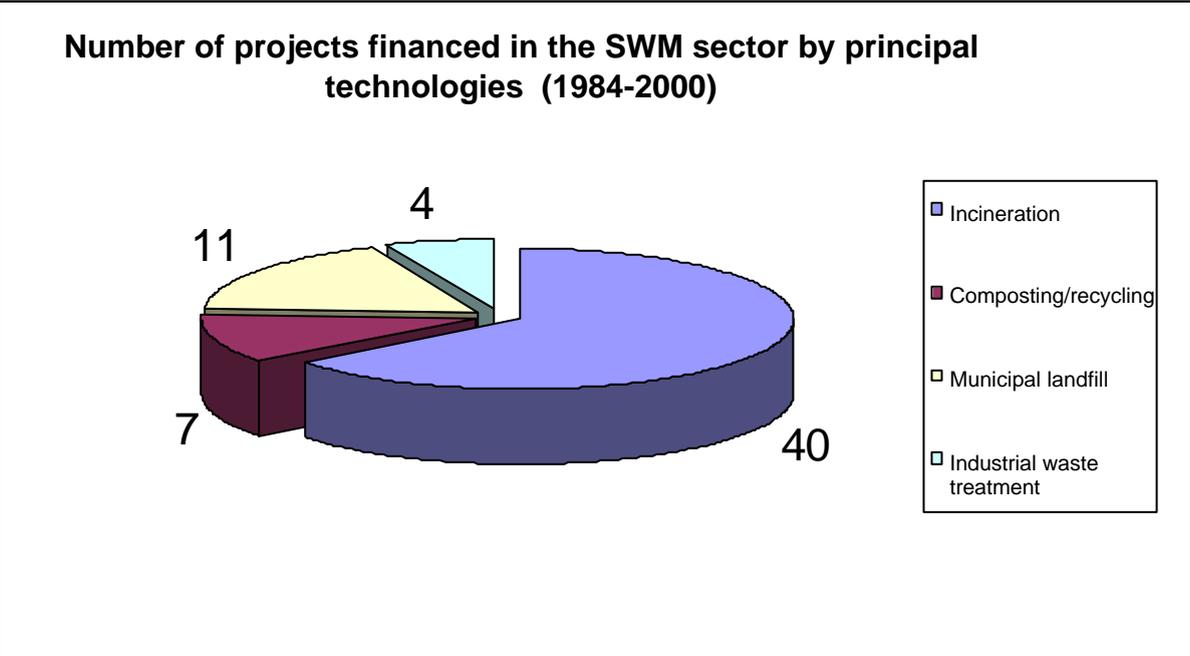


Figure 3

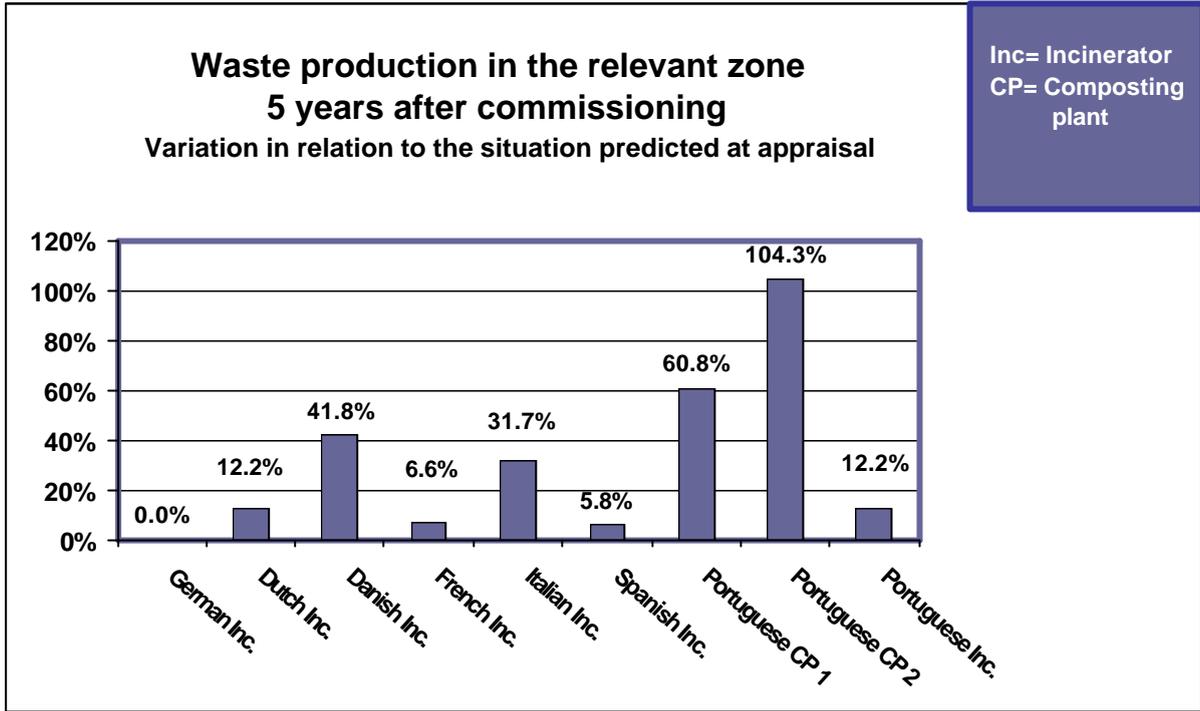


Figure 4

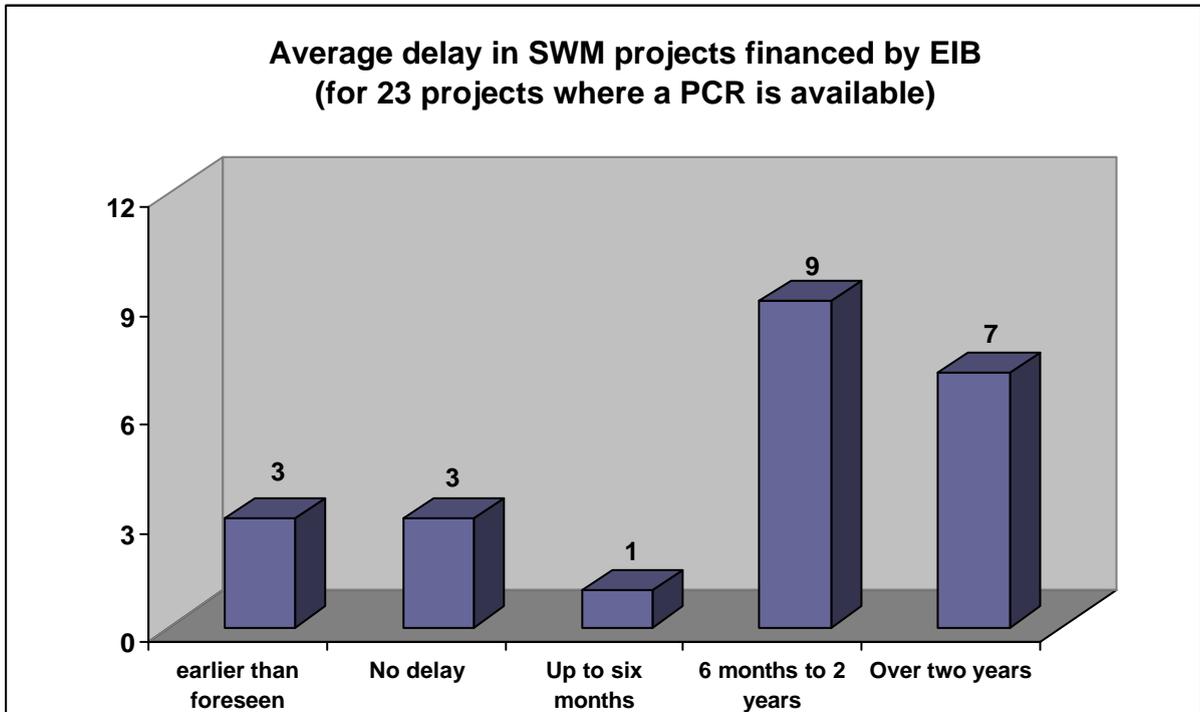


Figure 5

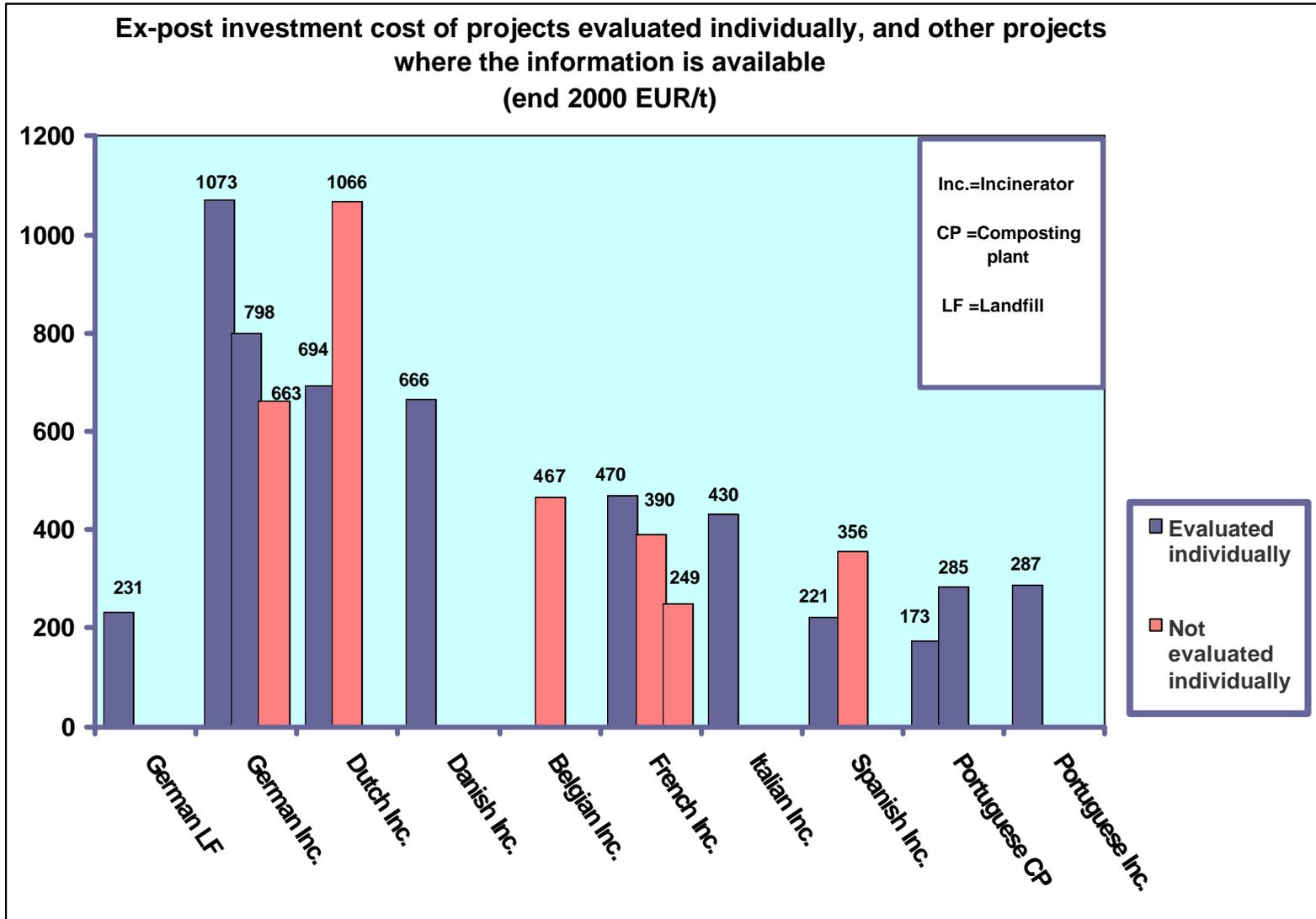


Figure 6

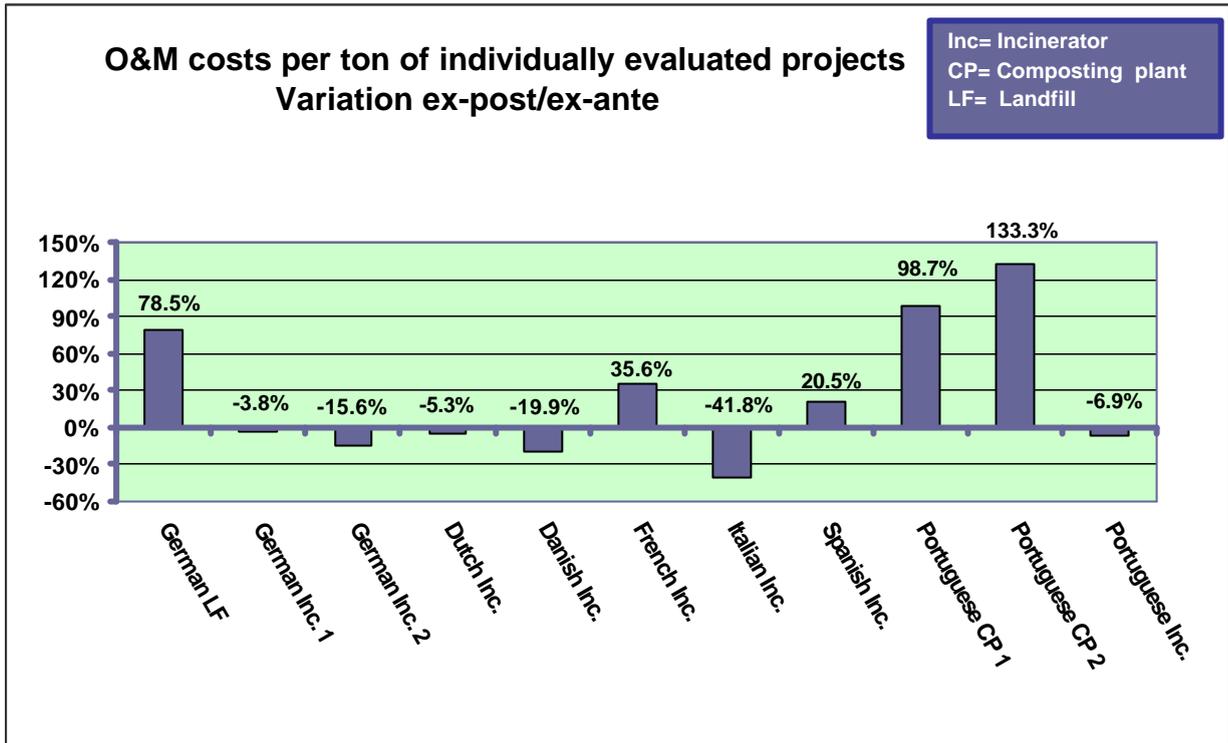


Figure 7

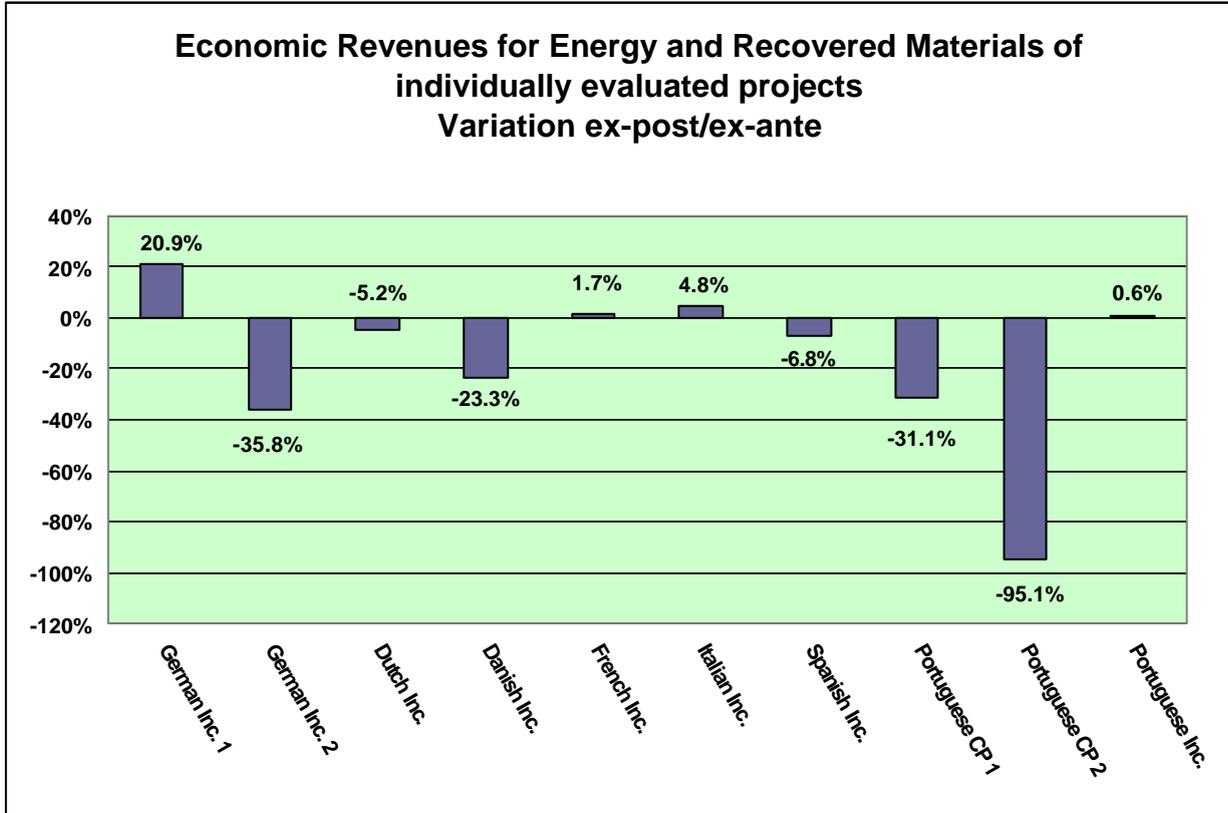
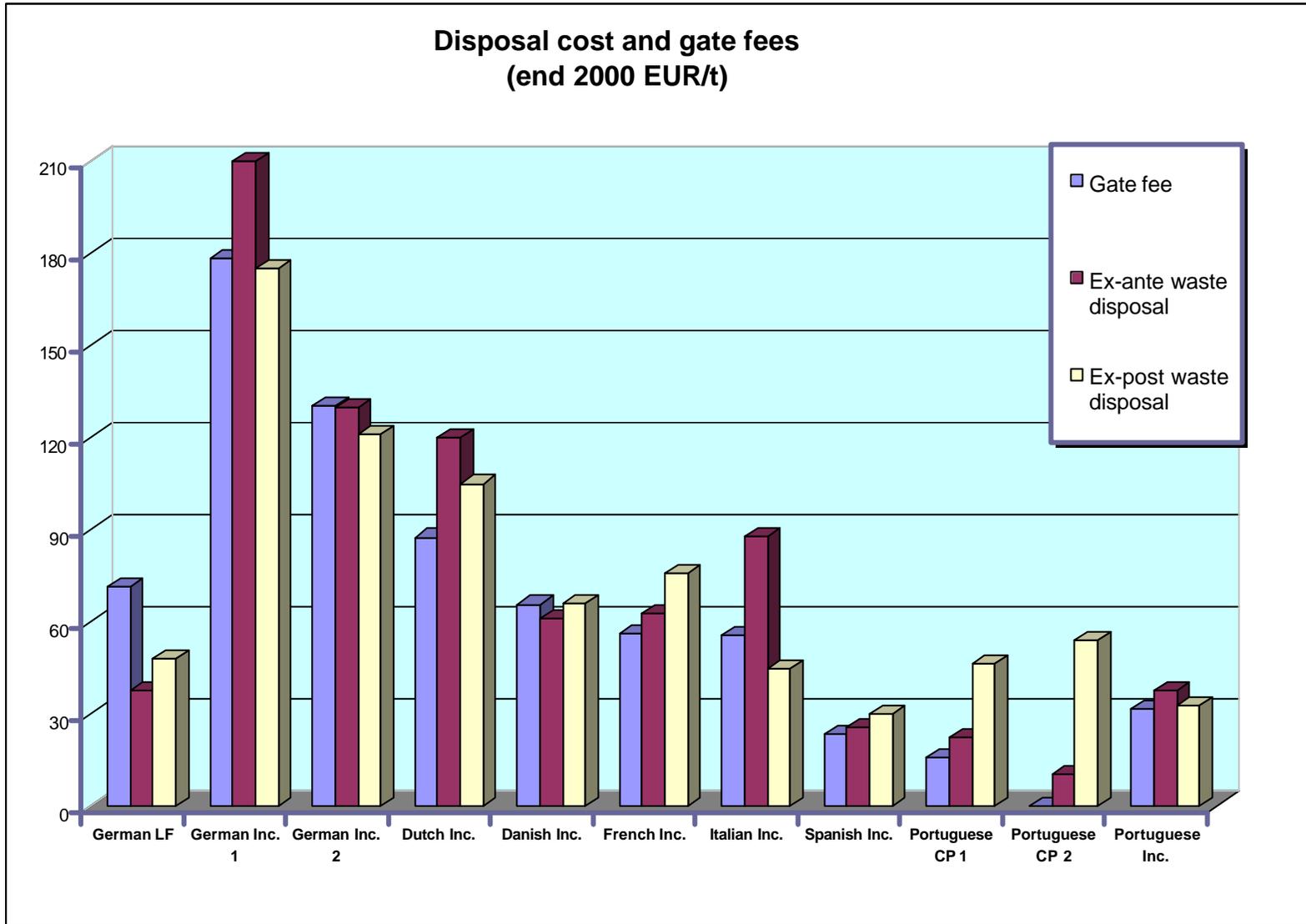


Figure 8



## THE EUROPEAN INVESTMENT BANK

The European Investment Bank (EIB) is owned by the fifteen European Union (EU) Member States and has its headquarters in Luxembourg. It supports EU policies on a self-financing basis, raising its resources on the world's capital markets for onlending to sound capital investment projects that promote the balanced development of the European Union.

Set up in 1958 by the Treaty of Rome, the EIB has its own administrative structure and decision-making and control bodies (Board of Governors - usually the Finance Ministers of the Member Countries - Board of Directors, Management Committee and Audit Committee).

As a major international borrower, which has always been awarded the highest "AAA" credit rating by the world's leading rating agencies, the EIB raises large volumes of funds on fine terms. It onlends the proceeds of its borrowings on a non-profit basis.

The volume of the EIB's operations has grown steadily and the Bank is today one of the largest financing institutions of its kind in the world. While the bulk of its loans are within the European Union, the Bank has also been called upon to participate in the implementation of the Union's development aid and cooperation policies through financing for the benefit of some 120 non-EU countries. It therefore supports:

- economic growth in the African, Caribbean and Pacific States and the Overseas Countries and Territories, as well as in the Republic of South Africa;
- a stronger Euro - Mediterranean partnership;
- preparations for the accession of the Central and Eastern European Countries and Cyprus;
- industrial cooperation, including the transfer of technical know-how, with Asia and Latin America.

The EIB began carrying out ex-post evaluations in 1988, mainly for its operations in non-EU Member Countries. In 1995, the Bank established an Evaluation Unit to cover operations both inside and outside the Union. Ex-post evaluations take a thematic approach and are intended for publication. To-date the bank has published:

1. Performance of a Sample of Nine Sewage Treatment Plants in European Union Member Countries (1996 - available in English, French and German)
2. Evaluation of 10 Operations in the Telecommunications Sector in EU Member States (1998 - available in English, French and German)
3. Contribution of Large Rail and Road Infrastructure to Regional Development (1998 - available in English, French and German)
4. Evaluation of Industrial Projects Financed by the European Investment Bank under the Objective of Regional Development (1998 - available in English, French and German)
5. An Evaluation Study of 17 Water Projects located around the Mediterranean (1999 - available in English, French, German, Italian and Spanish).
6. The impact of EIB Borrowing Operations on the Integration of New Capital Markets. (1999 – available in English, French and German).
7. EIB Contribution to Regional Development A synthesis report on the regional development impact of EIB funding on 17 projects in Portugal and Italy (2001 – available in English (original version), French, German, Italian and Portuguese (translations from the original version)).
8. Evaluation of the risk capital operations carried out by the EIB in four ACP countries 1989-1999 (2001 - available in English (original version), French and German (translations from the original version)).
9. EIB financing of energy projects in the European Union and Central and Eastern Europe (2001- available in English (original version), French and German (translations from the original version))
10. EIB Financing of Solid Waste Management Projects (2002 – available in English (original version), French and German (translations from the original version)).

These reports are available from:

Mrs. Barbara Simonelli, Information Desk  
Fax: (+352) 4379-3188  
e-mail: b.simonelli@eib.org