

A new methodology for evaluating the contribution of Cohesion Fund Interventions in waste management to achieving the environmental acquis (2000-2006)

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Abstract

When evaluating the contribution of EU funds across member states in achieving the *acquis communautaire*, traditional target based assessments are not appropriate when comparing nations at different starting points and with different needs as a result. This paper presents a method for evaluating the contribution of Funds in helping countries to meet European Directives in the field of solid waste collection and treatment, by calculating the extent to which the projects financed by the funds helped each country in reducing their needs in this field. The analysis demonstrated that the Cohesion fund and ISPA provided a significant contribution to countries' needs and compliance with the environmental *acquis*. New assets, or extensions or upgrades of infrastructure in solid waste management were delivered as a result, but the extent that these have been successful greatly depends on the initial assessment of a country's needs. Sustainability offers a great opportunity in undertaking such task, as a more integrated and holistic assessment of those needs is central to identifying the right solutions, making effective decisions and providing appropriate services. As we move towards new policies at a European level, delivering environmental infrastructure becomes more complex, and requires more co-ordinated, effective and efficient assessment of each country's needs.

Keywords: Cohesion Fund; EU; Solid waste; ISPA; infrastructure; holistic, catchment management; environmental *acquis*

1. Introduction

The European Union is one of the most prosperous economic zones in the world, but economic and social disparities between its Member States and among its regions are significant. Cohesion Policy seeks to strengthen the economic, social and territorial cohesion of the Union. An important first landmark was the publication of the Commission Communication on Cohesion Policy and the Environment in 1995. Cohesion policy has been a visible expression of solidarity across the European Union and represents a very substantial part of the budget of the European Union. Citizens expect to know what has been achieved with public money and evaluations have a role to play in making sure that investments have been effective (European Commission, 2014).

For the period 2000-2006, EUR 213 billion was earmarked for the Cohesion Policy for the 15 Member States. In addition, about EUR 22 billion in structural interventions for the new Member States in the period 2004-06, was allocated within the Union's adjusted financial perspectives. Most of the funding is being spent through multiannual development programmes via the Structural Funds, managed jointly by Commission services, the Member States and regional authorities. These programmes ran until 30.06.2009 (European Commission, 2003b).

In total, seventeen countries were eligible for either Cohesion or ISPA funding during this period, although not all of the pre-accession countries were funded for the whole period. As of the end of 1999, four countries: Greece, Spain, Ireland and Portugal met the condition for Cohesion funding of being a Member State with a per capita gross national product of less than 90% of the Community average and with a programme leading to the fulfilment of conditions of economic convergence as described in Article 104c of the Treaty. In total, €m 15,307.54 of estimated funds were allocated to projects from 2000-2006.

Environmental regulations, very broadly, regulate the interaction of humanity and the rest of the biophysical or natural environment, with the purpose of reducing the impacts of human activity, both on the natural environment and on humanity itself. They normally cover two major aspects: (1) pollution control and remediation (emissions), and (2) resource conservation and management (environmental quality). They cover a broad spectrum of biological, chemical and operational fields (see Table 3).

The main Waste related EU directives are:

- Waste Framework Directive (2006/12/EC) and the revised Waste Framework Directive (2008/98/EC): A key objective is to ensure that waste is disposed of by methods that endanger neither human health nor the environment, and to this end recycling is also promoted.
- The Landfill Directive (99/31/EC): The objective of the Directive is to prevent or reduce as far as possible negative effects on the environment from the landfilling of waste, in particular effects on surface water, groundwater, soil, air and human health.

This paper presents a new methodology for the assessment of the contribution of the Fund to achieving the *acquis communautaire* in the field of environment at an EU country level and its findings for Cohesion Policy Interventions in solid waste collection, treatment and disposal, for the period 2000-2006. Our work aimed to inform decision-making and policy formulation in the future through the provision of empirically-driven feedback. It was funded by the Commission as part of the Ex Post Evaluation of the Cohesion Fund (including former ISPA).

2. Methodology

The methodology developed provides a systematic assessment of the value of the contribution of Cohesion Policy, put in the context of each country's needs in terms of meeting European legislation. This focuses on evaluating the extent to which the projects financed by the funds helped the seventeen beneficiary countries to meet European Directives in the field of solid waste collection and treatment.

Countries' needs were defined as the extent to which, Member States, failed to meet European environmental legislation in the solid waste sector, and our methodology (Figure 1) calculated the extent to which projects funded reduced the needs of each country in order to comply with European environmental legislation in the this sector.

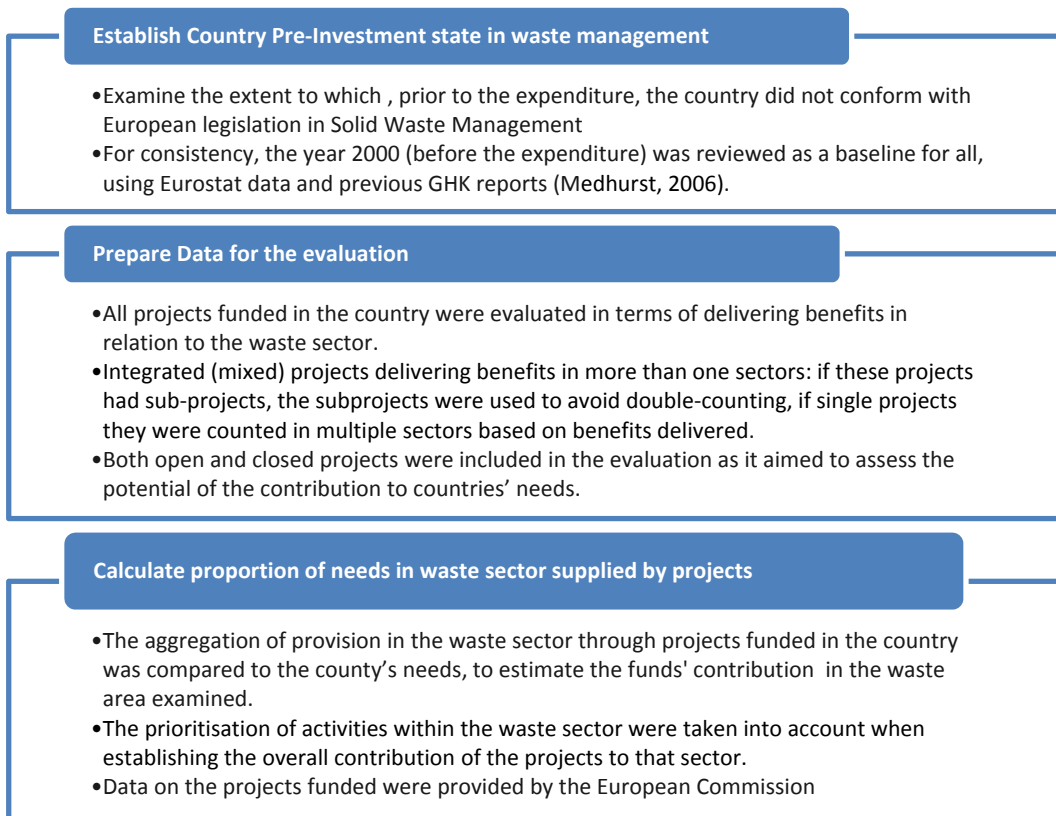


Figure 1: Methodology for calculating the contribution of funds to a country's needs in solid waste management.

To examine the extent to which the country, prior to the expenditure, the Member State beneficiaries failed to comply or the pre-accession states would have been unable to comply with European legislation, data from year 2000 (before the expenditure – used a baseline for consistency) were reviewed.

Data from the year 2000 were collected in terms of required infrastructure, (or extrapolated from a date as close as possible, depending on data availability). A country's need for the year 2000 was defined as the difference between the total demand for a particular provision required for achieving the *acquis communautaire* (e.g. waste collection) and that which was already provided at the time.

For calculating the contribution of the Cohesion Fund and ISPA to a country's needs, the aggregation of projects delivering provisions in the waste sectors was used to estimate a country's total provision in the sector. Although projects funded under the Cohesion fund covered many sectors, and many were not entirely independent, overall legislation for waste is different and was used to identify the projects that had an impact in the waste sector (Table 1).

Table 1: EU Environmental Legislation for waste

EU Legislation (Primary)	EU Legislation (Important)	EU Legislation (Relevant)
Directive on waste & waste disposal	<ul style="list-style-type: none"> - Strategy on the prevention and recycling of waste - Waste incineration - Shipments of waste - Waste from consumer goods - Hazardous waste 	<ul style="list-style-type: none"> - Integrated pollution prevention and control: IPPC Directive - Waste Management statistics - Competitiveness of the recycling industries

Where available, data on physical outputs, outcomes and benefits were used as indicators (where an environmental indicator is a parameter, or a value derived from measurable parameters, that provides information about the state of the environment, and has a significance extending beyond that usually directly associated with the value) for the evaluation (Table 2). The prioritisation of activities within the sector was taken into account when establishing the overall contribution of the projects to the sector. Each activity was assigned a ranking and a weight based on its relative importance in meeting the environmental acquis communautaire in order to assess the activity's contribution to the sector. The rankings for the activities were taken from the GHK national reports (Medhurst, 2006) and the weights were calculated based on data provided by these reports. For the countries that the GHK reports were not available, suitable alternatives were used.

Table 2: Outputs, results and impacts as indicators for the three sectors

<p>Physical Outputs</p> <p>OUTPUTS</p>	<p>Outcomes</p> <p>RESULTS</p>	<p>Benefits</p> <p>IMPACTS</p>
<ul style="list-style-type: none"> • Compost produced (tonnes) • Waste Storage (m³ or tonnes) • Landfill capacity created (m³) • Recycling capacity created (tonnes) • Waste capacity (m³ or tonnes) • Waste treatment (m³) per outcomes/results (sorting, MBT capacity etc) 	<p>Additional population served (new, extension)</p>	<p>Waste saved from landfill (tonnes)</p> <p>Number of landfills closed /remediated</p>

All project data provided by the EC were carefully examined, and based on availability, the most representative indicators were used. Lack of consistency in European statistics was a limiting factor when establishing the national needs. Although extensive additional research could have reduced uncertainties associated with data quality and quantity, it was decided that such work would be outside the remit of this work. All data on the projects funded were provided by the European Commission. The primary data source for all other data used for the evaluation was the Eurostat database and the GHK Strategic Evaluation on Environment and Risk Prevention Under Structural and Cohesion Funds for the period 2007-2013 country reports (Medhurst, 2006).

For the contribution to the EU (Figure 2), three criteria were used: **relevance** (how much was the contribution in relation to what was needed), **benefits** (how effective was the contribution in having an impact on people) and **sustainability**.

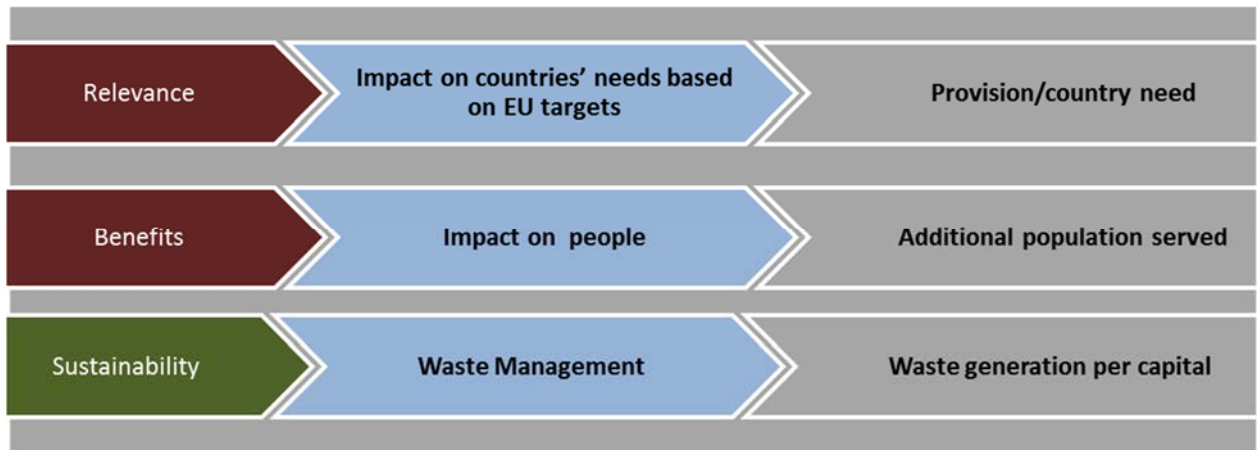


Figure 2: Criteria and indicators for the analysis of the contribution to EU

For each country, the contribution in each sector to the EU environmental acquis was calculated by the ratio of the provision to the country's needs and the impact on people using available project data on benefits and additional population served. The sustainability analysis aimed to demonstrate that the contribution of the Cohesion Fund depends significantly on the efficiency of waste management systems in each country. Changes in these systems can have important implication for the effective use of the Cohesion fund in the future.

3. Results

Capacity provided by the projects and calculated contribution per country is presented in table 3.

Table 3: Capacity by project and contribution per country (Source: Ranking data - GHK 2006)

	Indicators	Ranking	2000 needed capacity		Provided by the projects	Contribution of funded projects
Bulgaria	Disposal – Landfill Remediation/ Closure	2	No. of non-compliant landfills to be closed or remediated	700	14	0.02
	Disposal – new landfills	1	Annual landfill Capacity needed (t)	3,271,000	549,666	0.168
	Sorting	3	Weight (t)	238,219	33,500	0.118
	Collection	2	Population not served by Waste collection facilities	1,638,175	17,645	0.107
	Biowaste recovery	2	Waste needing diversion (t)	301,523	17,500	0.58
Croatia	Disposal – Landfill Remediation/ Closure	1	Non-compliant Landfills needing closure/remediation (%)	47	0.8	0.017
	Disposal – new landfills	2	Population without MSW collection and disposal at Compliant Landfill (%)	20	6	0.30
	Collection	5	Population not served by waste collection facilities (%)	20	0.12	0.006
	Recovery	3	Bio-waste not recovered (%)	24	0.3	0.013
	Sorting	4	Population not served by sorting system (%)	90	0.3	0.003
Cyprus	Waste collection	3	Need for collection of separate waste streams (tonnes/year)	-	0	0
	Waste sorting	2	Waste landfilled in 2000 (tonnes/year)	423,000	160,000	0.38
	Recovery	2	Waste needing recovery based on 2020 targets (tonnes/year)	158,558	73,019	0.46
	Disposal-New Sites	1	Waste needing landfill based on 2020 targets (tonnes/year)	311,032	88,000	0.28
	Disposal – Site remediation	1	Number of disposal sites needing remediation	113	0	0
Czech	Upgrade disposal	2	Population needing upgrade	2,132,964	279,812	0.131

	Waste Sorting	1	Waste not sorted	1,591,786	208,818	0.131
Estonia	Disposal	2	Non-compliant Landfill closures needed	37	2	0.05
	Disposal	2	Compliant Landfill creation needed	13	2	0.15
	Recycling	1	Recycled Waste collection facilities needed	13	1	0.08
Greece	Waste collection – Transfer stations	1	Generated waste not collected (tonnes)	667,050	300,700	0.451
	Waste Sorting	1	Waste needing sorting (tonnes)	4,056,197	424,730	0.105
	Recovery	2	Waste needing recovery (tonnes)	1,763,974	344,730	0.195
	Disposal- New	1	Waste needing disposal (tonnes)	2,630,400	371,194	0.141
	Closure/Remediation of Uncontrolled disposal sites	1	Number of landfill closures	2,626	40	0.015
Hungary	Disposal (new compliant landfill)	1	Waste disposed in non-compliant landfills (minus recovery targets) (tonnes/y)	2,033,317	528,400	0.260
	Landfill closure/remediation	2	Non-compliant Landfill closures Needed (no.)	510	228	0.447
	Sorting	3	Recyclables needing sorting (tonnes/y)	635,000	255,700	0.403
	Recycling	2	Recycling needed (tonnes/y)	635,000	69,250	0.109
	Biowaste recovery	2	Biowaste fraction of MSW needing recovery (tonnes/y)	871,650	392,330	0.450
Ireland	Recovery	1	Waste landfilled (tonnes/yr)	2,093,000	835,000	0.399
Latvia	Landfill Construction	1	Number of new regional landfills needed	101	7	0.7
Lithuania	Landfill closure	2	Number non-compliant needing closure	700	423	0.60
	Sanitary landfill creation	1	Number landfills needed	10	5	0.50
	Diversion of biodegradable waste	2	35% of 1995 landfilled biodegradable tonnage (tonnes)	623,038	335,000	0.54
	Waste Sorting and recycling	3	EU MSW recycling target % of MSW	50%	14%	0.28
Malta	Waste collection	2	Need for collection of separate waste streams (tonnes/year)	-	0	0
	Waste sorting	2	Waste landfilled in 2000 (tonnes/year)	130,877	36,000	0.28
	Recovery	1	Waste needing recovery (tonnes/year)	35,800	35,000	0.98
	Disposal	3	Waste needing landfill based on 2020 targets (tonnes/year)	-	0	0

	Remediation of disposal site	1	Number of disposal sites needing remediation	-	0	0
	Other: illegal waste disposal prevention	1	Waste Illegally disposed (tonnes/year)	-	0	0
Poland	Collection	2	People not served by waste collection	17,394,101	1,805,934	0.10
	Sorting	3	Need for recycling (t/year)	2,860,110	135,500	0.05
	Recovery of biowaste	2	Bio-waste to be diverted from landfill (t/year)	2,547,517	69,600	0.03
	Disposal- New Landfills	1	Need for Compliant Capacity (tonnes/year)	11,845,350	183,826	0.02
Portugal	Waste collection	4	No. people not connected to waste collection system(PE)	40,181	0	0
	Waste sorting	3	No. people generating landfilled waste in total waste(PE)	7,308,327	394,422	0.05
	Recovery	1	No. people generating landfilled waste in total waste (PE)	7,308,327	5,570,947	0.76
	Disposal	2	No. people generating landfilled waste in treated waste(PE)	7,279,523	950,000	0.13
Romania	Waste Collection	2	Waste needing Collection (tonnes)	2,047,205	0	0.00
	Waste sorting	3	Waste needing sorting (tonnes)	1,232,048	82,000	0.07
	Recovery/Recycling	4	Waste needing recycling/Recovery(tonnes)	4,120,988	65,600	0.02
	Disposal-New	1	Waste needing disposal (tonnes)	6,280,437	43,718	0.01
Slovenia	Waste collection	2	Population not served by waste collection (no)	139,306	34,826	0.25
	Waste sorting	3	Waste needing sorting (tonnes/yr)	192,700	5,000	0.03
	Recovery	4	Waste needing recovery (tonnes/yr)	380,758	77,500	0.20
	Disposal	1	Need for new landfill capacity (tonnes/year)	208,297	90,285	0.43
Spain	Waste collection	5	Generated waste not collected (tonnes)	6,408,000	2,489,803	0.39
	Waste sorting	2	Waste needing sorting (tonnes)	9,738,500	1,872,773	0.19
	Recovery	1	Waste needing recovery (tonnes)	9,738,500	1,872,773	0.19
	Disposal (landfill) - New	4	Waste needing disposal (tonnes)	4,677,000	617,030	0.13
	Disposal (landfill)- closure	3	Number of landfill closures	850	763	0.90

The analysis demonstrated that the Cohesion fund and ISPA provided a significant contribution to countries' needs and compliance with the environmental acquis. New assets, or extensions or upgrades of infrastructure in solid waste management were delivered as a result: Waste infrastructures either as waste disposal facilities such as landfills or incinerators, or as other measures and targets concerning waste prevention, recycling, recovery, disposal (as well as for progressive closing-down and/or rehabilitation of old waste dumps) was delivered.

The impacts on the EU were calculated by combining the contribution to a country's needs and the population ratio of the country to the whole population of the EU (a country's contribution to EU = contribution ratio to a country's needs x the country's population / EU population) for each sector (Figure 3).

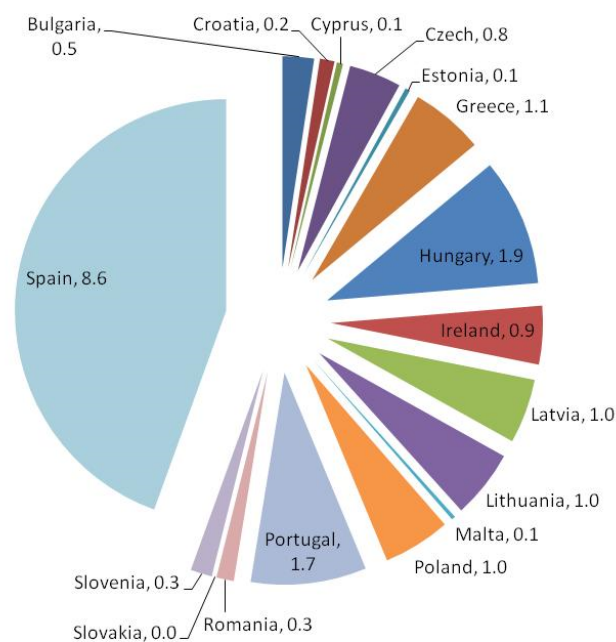


Figure 3: Impact to the 17 beneficiary countries (%) in the solid waste sector

4. Discussion

This impact evaluation is particularly interesting when compared to the level of funding provided per country. The distribution of the contribution to the EU is almost identical to the distribution of the total cost of projects across the countries, a very positive outcome for the Fund. However, it should be kept in mind that the contribution as a percentage of a country's needs cannot be compared (in terms of effectiveness or countries' performance) with regards to the investments required, as the needs are very different across the EU countries. Our analysis is **not about effectiveness**, but understanding the role of different needs, the potential of infrastructure to reduce them and the ability of funds to deliver increased contribution.

The impact to the environment of the projects funded is not easily quantified. The relation between the performance of the infrastructure delivered through the funded projects, the characteristics of the local environment and the existence of other sources of pollution is extremely complex. Although almost all of the projects should deliver environmental benefits, this complexity makes it difficult to assess their significance, extent and timescales involved.

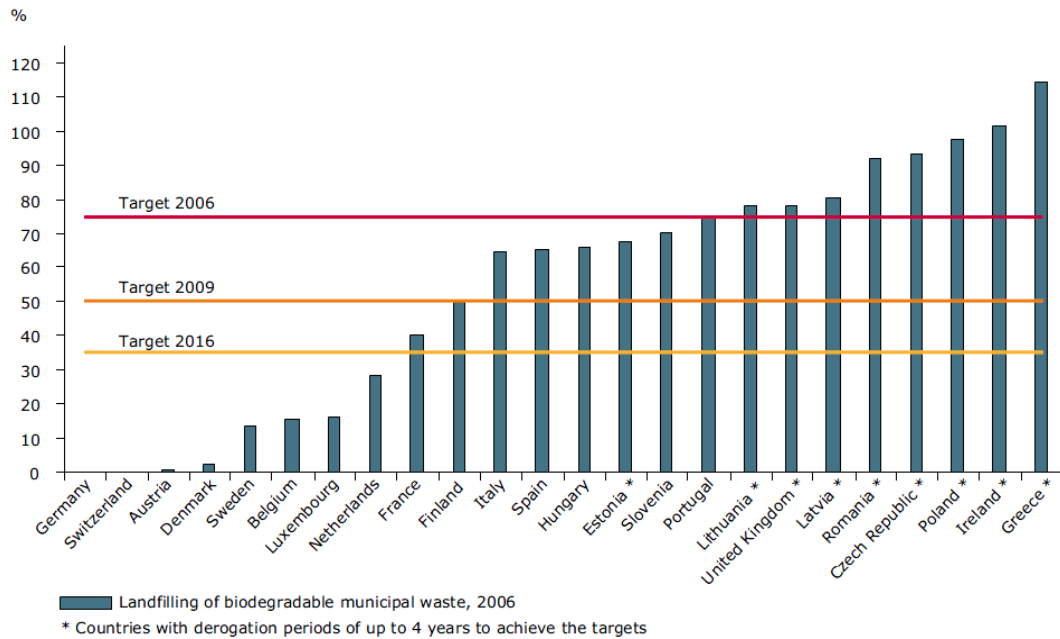
Environmental improvements driven by regulatory frameworks were the reason behind most interventions for solid waste management for all EU countries that period. This is a good example to **demonstrate the need for a 'needs based' approach to the evaluation**, the assessment of the extent to which projects financed by the funds helped the countries to meet European Directives.

In the solid waste management, broadly speaking, cohesion policy interventions were mostly directed:

- to heavy infrastructures (incineration, landfill conforming with the standards of the landfill directive, rehabilitation of existing landfills) and recycling plants in order to compensate for their lack of treatment facilities, or

- to new infrastructures for recycling or sorting of waste as more advanced integrated systems for collection, recycling and recovery were needed, once the above basic infrastructure required by legislation was already in place.

Although a target based evaluation would have been appropriate if all countries had the same needs, as they have the same targets (EU legislation- see example in Figure 4), the value of the contribution would not reflect all the benefits delivered. For example, sub-standard landfills and dumpsites, and also closed but not remediated landfills, posed a significant environmental threat, that was addressed by the first type of interventions above. More than 3,300 landfills in EU Member States were closed between 2004 and 2006. Such landfills were constructed without proper measures to reduce their potentially negative environmental impacts and have had to be closed or upgraded in order to comply with the minimum requirements of the EU Landfill Directive. Actually not enough was done in this sector, as the European Commission has identified systemic failures in the implementation of the Landfill Directive, with 13 non-conformity cases and 11 bad application cases in 2009 as well as a large number of complaints related to illegal landfills and the failure of many Member States to improve the situation (European Commission, 2010).



Notes: 1) Landfill rates above 100 % can result from a growth in the generation of biodegradable municipal waste as the targets are related to the absolute amounts generated in 1995.
 2) Percentages for Greece, Italy, Luxemburg and Portugal are based on total biodegradable waste landfilled.

Source: Compiled by ETC/SCP based on data reported to the European Commission by EU Member States, as summarised in Ecologic and IEEP, 2009; personal communication from the European Commission, the Danish EPA and the Polish Ministry of the Environment in 2010; BAFU, 2008; UN-CSD18-Estonia, 2010; EC, 1999.

Figure 4: EU targets for the landfilling of biodegradable municipal waste, 2006

Finally, the **sustainability analysis** aimed to demonstrate that the contribution of the Cohesion Fund in the three sectors also depends significantly on the efficiency of waste management systems in each country. Changes in these systems can have important implications for the effective use of the Cohesion Fund in the future. As the contribution of the funds depends on a country’s needs, it is more sustainable to aim to reduce those needs by other means before directing investments to do so. Solid waste generation data across the EU countries (Table 4) demonstrate that with the contribution of the funds depending on countries needs there is great scope in aiming to reduce those needs by solid waste reduction.

Table 4: Solid waste generation data related to the effectiveness of the funds

Country	Waste generation per capita (kg/person/yr)	CF (waste) (million euro)	CF (waste) (%)
Bulgaria	516	72.7	1.8
Croatia	N/A	10.7	0.3
Cyprus	680	49.9	1.2
Czech Rep.	334	66.4	1.6
Estonia	440	41.6	1.0
Greece	408	449.4	11.2
Hungary	445	329.7	8.2
Ireland	603	8.1	0.2
Latvia	270	91.8	2.3
Lithuania	363	155.7	3.9
Malta	547	32.2	0.8
Poland	316	145.3	3.6
Portugal	472	520.1	12.9
Romania	355	144.9	3.6
Slovakia	254	15.4	0.4
Slovenia	513	83.6	2.1
Spain	662	1804.9	44.9
EU17	449	4022.3	100.0

The highest waste generation (680 kg per person per yr) of Cyprus is 2.68 times the lowest waste generation in Slovakia. Depending on the waste reduction policies, the effectiveness of the Cohesion

Fund varies up to 2.68 times. Therefore, in sustainability terms, there is considerable potential to reduce countries' needs through parameters such as reduced waste generation per capita, before further investments are directed towards those needs. For example, if in the future any calculations of countries' needs were to take into account differences in waste generation and their potential for reductions, countries might be encouraged to improve efficiencies, by providing more realistic estimations of their actual needs.

There is also a need for better integration across different sectors, with an increased emphasis in closing loops. Closed loop systems are able to make use of currently available, proven technologies and can have economic advantages over other approaches. One of the key challenges is addressing these issues holistically and not within the boundaries of different sectors. This can be particularly evident when applied to the materials cycle (Figure 5), where sometimes technological barriers and market mechanisms can be obstacles to delivering change, with opportunities lying in the creating resources out of wastes.

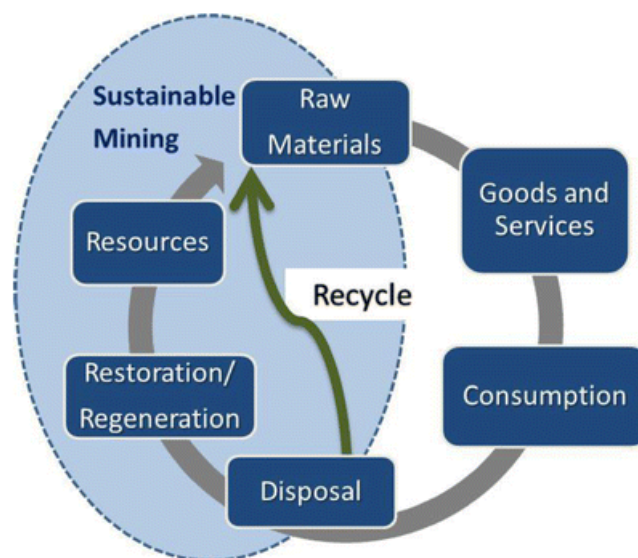


Figure 5: Closing the loop in the context of sustainable resources management (Voulvoulis et al., 2013)

Through research and innovation, technical barriers and institutional obstacles can be overcome, an area that was not really addressed through the projects funded, which focused mainly on delivering conventional and proven infrastructure to address the countries' needs in waste management.

However, in terms of the future of the funds, this need should not be a barrier. The application of new concepts does not have to be at full scale from the beginning: the most successful case studies have been those that have grown and gradually evolved over a period of time, giving scope for innovation and optimisation. This reduces risks compared with large-scale roll-out of integrated systems and supply chains from inception. It may be that solutions to the obstacles would become apparent as the system develops, enabling subsequent scale-up of all operations. With the right policy environment, closed loop systems could provide a framework for more economical and low carbon interventions for resources management in the EU.

5. Conclusion

The analysis presented in this paper demonstrated that the Cohesion Fund and ISPA provided a significant contribution to countries' needs in terms of compliance with the environmental acquis. This contribution was mainly the delivery of **infrastructure**. Waste infrastructures were delivered, either as waste disposal facilities such as landfills or incinerators, or as other measures and targets concerning waste prevention, recycling, recovery, disposal (as well as for progressive closing-down and/or rehabilitation of old waste dumps). As some countries had to deliver infrastructures necessary, to be efficient and meet EU legislation, there is still a great need for the solid waste sector to be integrated through regional or national strategies, while respecting relevant EU policy and legislation. Actually, the Structural and Cohesion Funds have undoubtedly stimulated the elaboration of waste management plans in conformity with EU legislation.

On the other hand, the extent that the projects funded have been successful greatly depends on the initial assessment of a country's needs. Sustainability offers a great opportunity in undertaking such task, as a more integrated and holistic assessment of those needs is central to identifying the right solutions, making effective decisions and providing appropriate services. As we move towards new policies at a European level, delivering environmental infrastructure becomes more complex, and requires more co-ordinated, effective and efficient assessment of each country's needs.

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