Ex post Evaluation of Cohesion Policy Programmes 2007-2013 Co-financed by the ERDF/CF. Work Package 6: Environment

Revised interim report, 30 June 2015

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1 Introduction

This is the interim report for the project 'Ex post Evaluation of Cohesion Policy Programmes 2007-2013 Co-financed by the ERDF / CF, Work Package 6: Environment'. Following the agreement made with DG REGIO in connection with the approval of the inception report for the project, this report comprises the reports in respect to Tasks 1 and 2 of the project. As these tasks are very different in nature and require distinct methodologies, it was considered most relevant to produce a separate report on each task. The team is very aware that the objective of the project is to integrate the findings of the project and to produce a consolidated final report. However, at the current intermediate stage of the project, we believe that separate reporting of the results of tasks 1 and 2 provide the most suitable basis for discussing the results in the Steering Committee.

The report therefore consists of two sub-deliverables:

- Part 1: Report on Task 1
- Part 2: Report on Task 2 (this report includes a chapter on selection of projects for case study analysis in Task 4)

The report was discussed at a Steering Committee meeting on 15 April 2015 and has been revised in accordance with the comments received during the meeting as well as written comments received in a letter from the Commission after the meeting (regio.dga1.b.2(2015) and annex).

In respect to the comments provided by DG REGIO on the Task 1 report, some remarks on the main changes made in this respect compared to the first version of the interim report:

- The comments provided by DG Regio suggest using Eurostat COFOG data rather than total environmental investment data, as Member State coverage is better and moreover data are available on water supply investments (e.g. comment on p. 4 to tables 8, 9 and 17 and figure 3). This has been done, using COFOG data on gross fixed capital formation plus capital transfers, as suggested at the interim meeting (minutes of the meeting).
- There was also a suggestion to fill gaps with best estimates. We have done so where the gap is relatively small (e.g. breaks in time series such as a single year missing have been filled by extrapolation). We have also estimated the level of investments in the specific sub-sectors (waste, wastewater management and water supply) for those Member States where such detailed data were not available, by using extrapolation of the share of these investments in the remaining Member States (EU-15 and EU-13, respectively). However, we have not addressed other anomalies – for example, COFOG investment levels in Latvia are (like the environmental

expenditure levels) several times lower than those in neighbouring Baltic States.

- We have used the COFOG data on total environmental investments (plus water supply, which for COFOG is included under housing and community amenities) as a basis for comparison with Cohesion Policy allocations to specific projects, rather than the COFOG data specifically for waste management, waste water management and drinking water. This is because reporting is more complete across Member States for total environmental investments, and it avoids 'anomalous' results.

- In addition, in section 4.3 we have, as suggested, provided information about disbursement levels for seven Member States (the six addressed previously plus Romania).

- We have addressed also most other points raised in the meeting and in the Commission's letter.

- Some issues we have not addressed.

    - At the top of p. 4 of the comments provided by DG Regio, there is a request to provide information in section 2 on the extent to which Member States are complying with the directives and targets. Section 3 provides overview information on the extent to which Member States are meeting relevant targets – however, the question of meeting targets is complex and not always clear. For waste water treatment, information currently available is still incomplete. A further reference to the discussion in Section 3 has been added. We propose to revisit this question for the final report, when further information on waste water treatment may be available.

    - At the bottom of p. 4 of the comments, there is a request to investigate links to decrease in funding for waste with changes in funding to incinerators. Mr Kalinka has provided this information for Poland; we have not received a response regarding the Czech Republic.

Subsequent to submission of the revised interim report, the report was discussed with DG REGIO at a progress meeting on 4 June. At this meeting, some minor changes were agreed and it was further agreed that the report should be revised to highlight the places where new and additional data would be integrated for the final report.

Ex post Evaluation of Cohesion Policy Programmes 2007-2013 Co-financed by the ERDF/CF. Work Package 6: Environment

Revised interim report – Task 1, 30 June 2015

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List of abbreviations

AIRs	Annual Implementation Reports
BOD	Biological oxygen demand
CP	Cohesion Policy
DWD	Drinking Water Directive
EEA	European Environment Agency
MBT	Mechanical-biological treatment (for solid waste)
MS	Member State(s)
OP	Operational Programme
p.e.	Population equivalent
UWWTD	Urban Waste Water Treatment Directive
WP0	Work Package Zero of this evaluation exercise

Member State codes

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

Member State groups used in this report

EU12	The EU13 'new' Member States (see below) not including Croatia
EU13	The 'new' EU Member States, comprised of the Member States joining the EU in 2004 or later, including: Cyprus, Hungary, Czech Republic, Estonia, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia, Bulgaria, Romania and Croatia
EU15	The 'old' EU Member States comprised of: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom
EU(21)	EU28 excluding seven Member States with low or no Cohesion Policy allocations for water and investments: this is the EU(23) – see below – with the additional exclusion of Belgium and the United Kingdom.
EU(23)	EU28 not including Austria, Denmark, Luxembourg, Netherlands and Sweden (Member States with low or no Cohesion Policy allocations for both water and waste investments)
EU27	EU12 and EU15 Member States
EU28	EU13 and EU15 Member States

1 Introduction

EU environmental legislation is designed to ensure the long-term sustainability of Europe's natural resources and a healthy population. Implementation of this legislation has brought and continues to bring a wide range of benefits to quality of life across the EU. However, environmental improvements often require large capital investments. EU Cohesion Policy has played a critical role in supplying this financing to enable Member States to plan, design and construct the environmental infrastructure they need to meet EU environmental objectives and targets, particularly in the heavy-investment sectors of waste and water management.

This revised report provides the results of Task 1 of Work Package 6 (Environment) of the *Ex Post Evaluation of Cohesion Policy Programmes 2007-2013 Co-financed by the ERDF / CF*: the report reviews the trends and developments across the EU in sectors of water and waste management and assesses the contribution of EU Cohesion Policy during the period 2007-2013. This version (June 2015) addresses comments received from the European Commission and from external experts on the previous drafts (March and May 2015). The report identifies areas where updated statistics are expected in the coming months: these will be incorporated in the project final report.

1.1 Objectives of Task 1

The main objective of this work is to present the contribution of Cohesion Policy in the period 2007-2013 to meeting the requirements of the *acquis communautaire* in the fields of solid waste management and treatment, drinking water supply and waste water treatment. As per the Commission's specifications, this task can be divided in three main components:

- Providing a summary of the state and development of the European environmental legislation between 2007 and 2013;
- Providing an overview of the main trends and developments within this period including technology and finance;
- Identifying the contribution of Cohesion Policy to the above-mentioned developments.

The evaluation follows ex-post evaluations carried out for the 2000-2006 period[1] and findings that the implementation of environmental infrastructure projects has been challenging for many Member States. Paramount among these challenges have been the financial sustainability of projects and the capacity of Member States to identify, design and implement such projects in an efficient and timely manner. An important focus for this study, in Task 1 as well as other tasks, therefore is to assess the extent to which funds have been efficiently

[1] ADE et al, Ex post Evaluation of Cohesion Policy Programmes 2000-2006 co-Financed by the European Fund for Regional Development (Objectives 1 and 2) – Work Package 5b: Environment and Climate Change, 2009

absorbed by the Member States, good practices, and the factors that have stood in the way. Here the impacts of the global financial crisis in the EU during 2007-2013 are a key factor in the assessment.

A related challenge is the volume of infrastructure required in many Member States – especially the EU-12 – to meet EU environment targets and deadlines. A key question is whether the pace of improvements has been sufficient to be on track to meet EU targets and deadlines: here, a key consideration for this evaluation is the role of Cohesion Policy in supporting needed improvements.

1.2 Scope

This work covers interventions in the field of environmental infrastructure supported from the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) allocated within the financial perspective 2007-2013. More specifically, the focus is on three priority themes described with the following codes based on the Commission Regulation (EC) 1828/2006[2]:

- **Code 44: Management of household and industrial waste (waste management).** This category covers urban and industrial waste including its collection and treatment.
- **Code 45: Management and distribution of water (drinking water supply).** This category covers collection, storage, treatment and distribution of drinking water.
- **Code 46: Water treatment (wastewater treatment).** This category covers waste water collection (sewerage) and treatment.

A review of Cohesion Policy programming documents and projects funded has shown that many Member States take an integrated approach to the water sector. This means that they have combined drinking water supply and wastewater treatment needs into single projects, often referred to as 'integrated water management' or 'water cycle' projects (section 4.2 provides further details). This makes it very difficult to distinguish between funding allocated for drinking water supply and for wastewater treatment. Presentation and analysis of the data provided on funding allocated by Member States to selected projects in the priority themes 45 and 46 has therefore been combined to avoid misleading information on volumes for either sub-sector. Analysis of all other areas – legislative developments, environmental performance, technologies, and plans and achievements – is carried out separately for drinking water supply and wastewater treatment.

[2] Commission Regulation (EC) No 1828/2006 of 8 December 2006 setting out rules for the implementation of Council Regulation (EC) No 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and of Regulation (EC) No 1080/2006 of the European Parliament and of the Council on the European Regional Development Fund.

Table 1 Allocations to selected projects by Member State for waste and water themes, 2007-2013 (cumulative in 2013, million EUR)

Member State	Waste	Water	Total (waste and water)	MS share of total EU funding for waste and water
PL	1,013.8	3,653.5	4,667.3	18.9%
ES	361.3	3,121.1	3,482.4	14.1%
RO	592.8	2,776.5	3,369.4	13.6%
HU	363.7	1,887.6	2,251.3	9.1%
EL	386.9	1,112.4	1,499.3	6.1%
PT	277.6	1,171.1	1,448.7	5.9%
CZ	251.9	1,070.0	1,321.9	5.3%
SK	339.5	790.8	1,130.3	4.6%
BG	293.4	735.7	1,029.1	4.2%
IT	119.9	749.7	869.6	3.5%
LT	189.1	515.1	704.2	2.8%
LV	62.7	557.1	619.8	2.5%
SI	155.6	450.3	605.9	2.5%
EE	45.0	407.8	452.8	1.8%
FR	99.8	300.4	400.2	1.6%
DE	45.1	331.9	377.0	1.5%
HR	50.9	156.4	207.4	0.8%
MT	35.4	71.8	107.2	0,4%
CY	23.2	79.3	102.5	0.4%
UK	33.9	0.0	33.9	0.1%
IE	1.3	15.0	16.3	0.1%
FI	0.0	9.5	9.5	0%
BE	3.4	0.1	3.5	0%
NL	0.4	0.4	0.8	0%
SE	0.4	0.0	0.5	0%
AT	0.0	0.0	0.0	0%
DK	0.0	0.0	0.0	0%
LU	0.0	0.0	0.0	0%
EU28	**4,747.1**	**19,963.4**	**24,710.6**	**100%**
Share of EU28 total	19%	81%	100%	
EU15	*1,329.2*	*6,811.2*	*8,140.3*	
Share of EU15 total	*16%*	*84%*	*100%*	
EU13	*3,417.2*	*13,151.8*	*16,569.0*	
share of EU13 total	*21%*	*79%*	*100%*	

Notes: Allocations to selected projects for priority themes: Management of household and industrial waste (Priority Theme 44); Management and distribution of water (Priority Theme 45); Water treatment (wastewater treatment) (Priority Theme 46). Where allocations to specific projects exceed the allocations in the Operational Programme budgets, they are capped at the level in the OPs. Member States ordered from highest to lowest by total of water plus waste allocations.
For the final report, allocations to selected projects data will include also data for 2014; moreover, the final report will include data on actual expenditures in the period 2007-2014.
Source: DG Regional and Urban Policy, InfoView data

Time period

The evaluation covers interventions supported by the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) allocated within the financial perspective for 2007-2013. The available financial data cover Operational Programme allocations and allocation of funds to specific projects up to 2013. Data on core indicators is also available up to 2013. Consequently, 2013 is the standard cut-off year for this interim report. (For the final report the cut-off year both with regards to the Cohesion Policy spending and indicators will be set at 2014.)

Geographical coverage

The assessment focuses on Member States that benefitted from Cohesion Policy funding during the 2007-2013 period for projects in the water and waste sectors. Table 1 above shows allocations to selected priority themes by Member State.

As can be seen, three Member States – Austria, Denmark and Luxembourg – did not make any allocations to projects for water or waste: these are not included from the analysis in this report. In two Member States, Netherlands and Sweden, total allocations are less than one million Euros: these are also not included. Consequently, many tables and figures in chapters 2 to 4 refer to 23 Member States, abbreviated as EU(23). The UK did not make any allocations for water projects, and Belgium made less than one million Euros in this sector: these two Member States are not considered for the water sector. Here, tables refer to the EU(21). As Croatia joined the EU only in 2013, data for this Member State are incomplete or not available and thus not included in some tables and figures.

1.3 Methodological approach and structure of the report

The assessment has been carried out using a mix of available quantitative data and qualitative information from a range of sources including Eurostat; Member State reporting to the Commission on Cohesion Policy (data supplied by DG Regional and Urban Policy); Member State reporting to the Commission on specific EU legislation; programming documents and list of project beneficiaries prepared by the Member States and regions; and literature including reports, communications and studies published by the EEA, the European Commission and others. Quantitative data sources are listed throughout the report..

The approach to the work has been carried out in three main steps:

1) Review of the state and development of the European environmental legislation between 2007 and 2013 in the waste and water sectors;

2) Review of the main trends and developments in financing, environmental performance and technology within the waste management, drinking water supply and wastewater treatment sectors during the period 2007-2013;

3) Identifying the contribution of Cohesion Policy to trends, developments and performance in the waste management, drinking water supply and wastewater treatment sectors during 2007-2013.

State and development of EU environmental legislation

The state and development of EU legislation is analysed using a set of EU Directives selected for each of the priority themes – these are the Directives whose objectives and targets pose the main heavy investment requirements for Member States and whose provisions are most relevant for Cohesion Policy. The requirements of the Directives are summarised per Member State, indicating specific deadlines and transition periods for some Member States in accordance with the Treaties of Accession. Desk research on infringement cases related to transposition of the environmental legislation supplements this information.

Main trends and developments

Environmental financing trends are presented based on data on public sector investments from the Eurostat, collected based on the Classification of the Functions of Government (COFOG) system[3]. This data is available for nearly all Member States. The three Cohesion Policy priority themes are addressed in COFOG categories: environmental protection overall; waste management; waste water treatment and water supply. Data on gross fixed capital formation for these categories is used.

As indicated by its name, the COFOG data refers to public sector spending. In many Member States, waste management, water treatment and water supply are carried out by specialised entities; many of these are companies owned by municipalities and other government bodies, though in some Member States, private companies play an important role (this is the case, for example, for the water sector in France and the UK). In order to capture investments by these specialised entities, COFOG data on capital transfers is added to the data on gross fixed capital formation; this may not capture the role of the private sector.[4] This approach may not, however, fully or accurately capture investments made by the specialised entities (water and waste service companies), even when they are owned by the government bodies such as municipalities. Moreover, COFOG data has gaps for some years in some Member States; in addition, Eurostat reports that data are provisional for a few Member State, including Bulgaria, Greece and Hungary[5].

[3] Eurostat, Government expenditure by function COFOG, available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Government_expenditure_by_function_%E2%80%93_COFOG (accessed April 2015)

[4] Eurostat has a separate data set on environmental investments. This does not, however, include water supply; moreover, data coverage across Member States is poorer than for COFOG data. For these reasons, COFOG data were preferred.

[5] Eurostat, Government expenditure by function COFOG, available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Government_expenditure_by_function_%E2%80%93_COFOG

Environmental performance is presented for the period 2007 – 2013 using the most recent datasets currently available for the selected Member States. These include Eurostat data on the treatment of municipal solid waste management and data on population connected to drinking water and to wastewater treatment. The European Commission's implementation reports for key directives, in particular for drinking water and waste water treatment, provide further data as well as qualitative overviews regarding progress in this period.

These data are supplemented with a review of selected Operational Programmes from 2007-13 in six Member States to get a more specific idea of the situation on the ground during the period (in addition, some further information is brought in from the Programmes for 2014-2020). The six Member States were chosen on the basis of geographical distribution, with both EU15[6] and EU13[7] countries, and incorporating both larger and smaller Member States: Bulgaria, Estonia, Spain (Andalucía), Italy (Campania), Poland and Slovenia. These Member States and regions were selected from amongst those with the most significant shares of funding allocated to the priority themes on waste management, drinking water supply and wastewater treatment, with the aim to get a representative share of EU13 and EU15 countries, geographic balance, and to include both smaller and larger Member States. In each of the six, the largest Programme in terms of allocations to water and waste is considered – these are national programmes in four of the six Member States (Italy and Spain are the exceptions).

Trends and developments in the technologies used in environmental infrastructure for each of the sectors are discussed based on current literature as well as patterns that have emerged from the review of Member State programming documents, project lists, and major projects within the three priority themes.

Broad-based quantitative results are supplemented with the analysis at Member State level, drawing on the qualitative data gathered for the six selected Member States. This analysis provides an overview of the technological developments/infrastructural solutions supported by the Operational Programmes, based on the description of the main objectives regarding the three Priority Themes as well as on the basis of reviewing the lists of CP beneficiaries available on the Managing Authorities' websites.

This draft uses Eurostat and other data available as of April 2015. Further data are expected to be available by August 2015 and will be incorporated in the final draft. See Chapters 3 and 4 for further detail on data updates expected.

[6] The group of 'old' EU Member States: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom (see also the List of abbreviations).
[7] The group of 'new' EU Member States, comprised of the Member States joining the EU in 2004 or later, including: Cyprus, Hungary, Czech Republic, Estonia, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia, Bulgaria, Romania and Croatia (see also the List of abbreviations).

The contribution of Cohesion Policy

The contribution of Cohesion Policy to trends and developments in the three priority themes is analysed in a number of ways, using a range of data sources. First, Cohesion Policy funding is analysed. This is based on data from Member States' 2013 Annual Implementation Reports (AIRs) submitted to the Commission: these indicated the allocations in the Operational Programmes to priority themes as well as funding allocated to selected projects by priority theme. (As discussed above, funding for priority themes 45 (drinking water supply) and 46 (wastewater treatment) has been combined for this analysis in line with Member States' approach to programming and spending in this area.) Here it should be noted that the data on estimated allocations to selected projects for each priority theme, while available for all Member States, does not constitute actual expenditure paid or represent projects implemented[8]. The data on allocations to selected projects nevertheless represent the most recent information available for all Member States on the amounts of Cohesion Policy funding intended to be spent on each of the individual priority themes addressed in this work package.

Cohesion Policy funding is then compared to total actual government investment in each sector, using Eurostat data using the Classification of the Functions of Government (COFOG) system.[9] These data are presented as annual averages across the period 2007-2013 to allow for data gaps and the fact that the Eurostat COFOG data are available only up to 2012. It should be underlined that, due to differences in the two data sets, this comparison provides a broad indication of the relative dimension of Cohesion Policy spending across Member States rather than a precise delineation.[10]

The achievements per priority theme are summarised using primarily core-indicators as well as programme-specific indicators as reported in the WP0 of this evaluation exercise. This information, combined with data gathered in the previous step, is used to assess the contribution of the Cohesion Policy spending to the overall progress in the three selected themes. Environmental achievements are reviewed also on the basis of the six selected Member State programming documents and project lists.

[8] This is explained in more detail in the Commission Staff Working Document accompanying Cohesion Policy: Strategic report 2013 on programme implementation 2007-2013 SEC(2013)129, pp 24-25.

[9] Eurostat, Government expenditure by function COFOG, available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Government_expenditure_by_function_%E2%80%93_COFOG (accessed April 2015)

[10] One issue, described in further detail in section 4, is that Member States use different definitions to determine Cohesion Policy allocations to projects. Moreover, some Member States have allocated more than 100% of the Operational Programme allocations to a specific sector: in order to get a more realistic picture for comparison between Cohesion Policy spending and overall investments in the analysed sectors, the data on allocations to selected projects have been capped at 100% of allocations to the Operational Programmes as of 2013.

Next, a review of progress across the period is carried out to understand the extent to which Member States are on track to implement the environmental infrastructure objectives and projects planned in 2007. The analysis is based on data on overall rates of allocation to selected projects vs plans in the Operational Programmes; available data on actual Cohesion Policy expenditure; data on major reallocations across broad spending themes during 2007-2012; and qualitative information from literature. Here factors such as the financial crisis, administrative and managerial barriers and other challenges related to the design, preparation and implementation of environmental infrastructure projects are noted. This review also considers the level of expenditure in Operational Programmes of the six selected Member States, as reported in the 2013 Annual Implementation Reports of these Member States; data gathering on the level of expenditure included a seventh Member State, Romania, due to reports of slow absorption of Cohesion Policy resources there. Broad comparison of this data and information with the results of environmental results from Eurostat and other sources allows for an estimation of the potential contribution of Cohesion Policy to environmental achievements in each sector.

In the report we also investigate how the financial crisis has influenced CP spending in the three analysed priority themes. This is done by comparing the allocations to projects with the planned spending by priority theme as well as by analysing OP financial re-allocations in the selected Member States. Quantitative analysis is supplemented with desk research based mainly on the Commission reports and other reports touching upon this issue.

To get a better understanding of the specific environmental infrastructure needs in the Member States, and the types of projects funded via Cohesion Policy, Operational Programmes in six Member States/regions are analysed in detail (see the box below).

Structure of the report

The report is largely structured according to the process described above. **Section 1** provides an introduction and overview of the methodological approach used to carry out the analysis. **Section 2** presents the state and development of the EU legislation across the three selected priority themes. **Section 3** provides an overview of trends and developments in financing, environmental performance and technology in the period from 2007 to 2013 across the three priority themes. **Section 4** assesses the contribution of the Cohesion Policy spending to the overall progress according to the three selected themes, providing also an assessment of spending progress and challenges and overall conclusions.

Box 1. Operational Programmes reviewed in the six Member States

- Bulgaria: Operational Programme Environment 2007-2013 CCI No: 2007BG161PO005 (English translation); Total OP budget (including Community and national contribution): EUR 1,800 million.
- Estonia: Elukeskkonna arendamise rakenduskava, Mai 2012, Eesti Vabariik (The Operational Programme of Environmental and Transport Infrastructure Development), May 2012; Total OP budget (including community and national contribution): EUR 4,892 million.
- Italy: Regional Operational Programme Campania for the period 2007-2013, 29 October 2014 (original language), and Regional Operational Programme Campania for the period 2007-2013, 11 September 2007 (original language), Campania Region, Directorate General for International Affairs and Relations with the European Union's Regional System; Total OP budget (including Community and national contribution): EUR 4,577 million.
- Poland: Operational Programme for Infrastructure and Environment 2007-2013; Total OP budget (including Community and national contribution): EUR 37,565 million
- Slovenia: Operational programme of environmental and transport infrastructure development for the period 2007-2013, The Republic of Slovenia Government Office for Local Self-Government and Regional Policy, 26 July 2007 (unofficial translation to English); Total OP budget (including Community and national contribution): EUR 1,924 million
- Andalusia: Programa Operativo FEDER de Andalucía 2007-2013; Total OP budget (including Community and national contribution): EUR 8,555 million.

The review covered the operational programmes themselves and their beneficiaries, based on information through 2013. The following links were used to retrieve information on beneficiaries:

- Bulgaria: http://umispublic.government.bg/prProcedureProjectsInfo.aspx?proc=-2&op=7
- Estonia: http://www.struktuurifondid.ee/toetuse-saajate-otsing/?search_criteria=0&searchtype=2&toetuse_saaja=&meede=&kestvus=01.01.2007&kestvus_kuni=31.12.2013&submit=Otsi
- Italy: http://porfesr.regione.campania.it/it/progetti-e-beneficiari/elenco-beneficiari
- Poland : http://www.funduszeeuropejskie.2007-2013.gov.pl/NaborWnioskow/listabeneficjentow/Strony/Lista_beneficjentow_FE_311214.aspx
- Slovenia: http://www.eu-skladi.si/razpisi#c1=upravicenec&c0=5
- Spain (Andalusia): http://www.dgfc.sgpg.meh.es/sitios/dgfc/es-ES/ipr/fcp0713/p/por/Documents/%28377%29POFEDERAndaluca2007.2013%28231007%29.pdf

For the review of expenditures, Romania was included as well, as recent reports have raised concerns that disbursement rates are low in this Member State:

- Programul Operational Sectorial 'Mediu' 2007-2013, CCI number: 2007RO161PO004 (Sectoral Operational Programme Environment 2007-2013), Revised Official Proposal; Total OP budget (including Community and national contribution): EUR 5,309 million.
- http://www.fonduri-ue.ro/res/filepicker_users/cd25a597fd-62/Doc_prog/prog_op/4_POS_Mediu/09.07.2012/2b_POS_Mediu_en_2012_Revised.pdf

2 Legislative objectives and targets

This section addresses the first topic to be addressed in Task 1, as set out in the project specifications:

- Providing a summary of the state and development of the European environmental legislation between 2007 and 2013;

The section provides background for section 3, which considers overall trends and developments in the waste and water sector, including overview information on Member State progress towards targets. Section 4 then considers the contribution of Cohesion Policy to these trends and developments. The focus throughout is on targets potentially requiring infrastructure investments, which can be supported via Cohesion Policy; requirements related to economic instruments, such as tariffs for cost recovery, are also noted.

This section reviews first waste management and then the water sector. As explained in section 1, the priority themes for drinking water and wastewater treatment are considered together in Task 1 of this study. Moreover, the Water Framework Directive, presented in section 2.2, addresses both themes.

2.1 EU *acquis* on waste management

The European Union has an extensive body of legislation for waste management that is articulated in three major areas: first, framework legislation that sets the overall requirements for waste management (overall and for hazardous waste) and waste shipments; second, directives for waste treatment operations, i.e. landfills and incinerators; and third, a series of specific legislation governs waste streams such as batteries, end of life vehicles and mining waste.

As noted in section 1, municipal solid waste is the focus for this sector, as this has been the main area where Member States have used resources under priority theme 44. This section presents key objectives and targets for the main directives related to the management of municipal solid waste:

- Landfill Directive (99/31/EC)
- The 2008 Waste Framework Directive (2008/98/EC) and its 2006 predecessor (2006/12/EC)

This review does not cover EU legislation that establishes extended producer responsibility for specific waste streams, including waste electrical and electronic equipment, packaging waste, end of life vehicles, batteries and waste oils. Producer responsibility requires manufacturers and distributors to ensure appropriate management of these streams. As a result, these are not central areas for Cohesion Policy support and are not reviewed here; nonetheless there can be synergies with public investments for separate collection and for recycling, including those supported by Cohesion Policy. One further part of EU

waste legislation, the Sewage Sludge Directive (86/278/EEC) is noted in section 2.2 on water, as investments for sludge treatment are generally made at waste water treatment plants.

Though the focus for waste management is on the municipal solid waste, the Mining Waste Directive (2006/21/EC) is also relevant for Cohesion Policy investments in some Member States. This Directive calls on Member States to permit, monitor and make arrangements for the closure of sites for waste from extractive industries, following best available techniques.

2.1.1 The Landfill Directive (99/31/EC)

The Landfill Directive is intended to prevent or reduce as far as possible negative effects on the environment from the landfilling of waste, including impacts on surface water, groundwater, soil, air and human health.

Under the Landfill Directive, landfills fall into three categories – those for hazardous, non-hazardous and inert waste. The Directive sets technical requirements for the construction and operation of landfill sites, as well as procedures for their closure and after-care. All landfills need to receive permits, which should incorporate these requirements. As a result, investments may be needed to upgrade existing facilities. Landfills that do not meet these requirements should be closed within 10 years:

Table 2 Landfill Directive target: closure of non-compliant landfills

Target	Member States	Deadline
Closure of non-compliant landfill sites (art. 14)	All Member States	▪ 16 July 2009

Source: Directive 99/31/EC

Directive 99/31/EC also requires that all waste sent to landfills are to be treated before disposal (Art. 6(a)): this should reduce the volume. For Member States that do not do so systematically, this provision may require investment in waste treatment facilities, such as mechanical biological treatment (MBT) plants.

The Directive moreover sets targets to reduce the share of biodegradable municipal waste sent to landfills, in order to reduce methane, coupled with technical requirements for capture and treatment of landfill gas. Member States are to prepare national strategies to meet this target, which will require new investments in many countries, for example for composting capacity. Targets are set for 2006, 2009 and 2016 for 13 Member States (see the table below); 14 other Member States, which relied heavily on landfilling, have an additional four years to meet the targets.

Table 3 Landfill Directive target: reduction of biodegradable municipal solid waste to landfills

Target	Member States	Deadlines
Reduction of biodegradable municipal waste going to landfills compared to 1995	AT, BE, DE, DK, ES, FI, FR, HU, IT, LU, NL, SE, SI.	▪ 75 % in 2006 ▪ 50 % in 2009 ▪ 35 % in 2016
	BG, CY, CZ, EE, EL, IE, LV, LT, MT, PL, PT, RO, SK, UK	▪ 75 % in 2010 ▪ 50 % in 2013 ▪ 35 % in 2020

Source: Directive 99/31/EC

2.1.2 The Waste Framework Directive (2006/12/EC; replaced by 2008/98/EC)

Directive 2006/12/EC on waste codified the previous, extensively amended Directive on Waste (75/442/EEC) that established basic requirements, definitions and principles regarding waste management in the EU.

The Directive obliged Member States to ensure that waste was recovered or disposed of without endangering human health and the environment, and prohibited the abandonment, dumping or uncontrolled disposal of waste. The Directive required Member States to establish adequate networks of waste disposal installations and it set out a three-step waste management hierarchy promoting waste prevention first; waste recovery, including recycling, re-use and energy recovery second; with disposal (landfilling) as third. It also required Member States to draw up national waste management plans (WMPs). Directive 2006/12/EC came into force within 20 days of its publication (27 April 2006) and thus was in force at the start of the 2007-2014 Cohesion Policy period.

Directive 2008/98/EC repealed and replaced Directive 2006/12/EC, as well as the Hazardous Waste Directive (91/689/EEC) and the Waste Oils Directive (75/439/EEC). The WFD introduces the concepts of by-product and end-of-waste, with a view towards increased resource efficiency, as well as a requirement to prepare waste prevention programmes.

The Framework Directive also sets out the principles of "proximity and self-sufficiency": each Member State should where possible have a full range of waste management facilities, reducing the need for waste shipments in particular for disposal of waste and for recovery of mixed municipal waste. The Directive also extends the waste hierarchy set out in Directive 2006/12/EC in five steps (see the figure below).

Figure 1 Waste hierarchy established in the Waste Framework Directive

Source: European Court of Auditors, Is structural measures funding for municipal waste management infrastructure projects effective in helping Member States achieve EU waste policy objectives? Special Report No 20/2012

The Directive calls on Member States to encourage the separate collection and treatment of biodegradable waste, reinforcing the targets set under the Landfill Directive. Directive 2008/98/EC moreover sets targets for the re-use and recycling of several key waste streams in municipal solid waste (see Table 4)..

Table 4 Waste Framework Directive targets: separate collection and preparation of recyclable materials

Targets	Implementation deadlines	
Separate collection for paper, metal, plastic and glass	All MS	By 2015
Preparing 50% of paper, metal, plastic, glass and other waste materials from households for re-use and recycling	All MS	By 2020

Source: Directive 2008/98/EC

Directive 2008/98/EC entered into force on 12 December 2008, and the deadline for its transposition into national legislation of the Member States was 12 December 2010. Its objectives and targets were thus introduced during the 2007 to 2013 Cohesion Policy period, and it provided a key development of EU waste legislation.

2.1.3 Summary of key targets for the municipal solid waste management

EU legislation for solid waste management sets a range of targets and objectives for Member States. Among the most important that were in place in 2007 were the following requirements of the Landfill Directive:

- All waste should be recovered and disposed of, not abandoned or dumped
- Reduction of biodegradable municipal waste going to landfills, with phased deadlines
- Closure of landfills that do not meet standards by July 2009

- Treatment of all waste sent to landfills

Directive 2008/98/EC moreover introduced further targets during the 2007 to 2013 spending period. In particular, these included:

- Separate collection for paper, metal, plastic and glass
- Preparing 50% of paper, metal, plastic, glass and other waste materials from households for re-use and recycling

This Directive moreover further specified the waste hierarchy, established already under Directive 2006/12/EC (which in turn codified previous EU legislation). The target for biodegradable municipal waste under the Landfill Directive, together with the new targets under Directive 2008/98/EC on materials for re-use and recycling set specific targets for the implementation of the hierarchy.

A 2006 study for the European Commission estimated that 8.4 billion Euros of investments would be needed in 15 Member States to implement EU waste legislation in the period from 2007 to 2013.[11] As for water legislation, this estimate should be seen as indicative of the scale of investment needed rather than a complete or accurate projection. As the estimate was made before the 2008 Waste Framework Directive, it does not include costs to meet its recycling targets for metal, glass, plastic and paper. The study nonetheless identified the need for investments across a broad range of waste management, including waste collection, sorting, recycling and energy recovery.

2.2 EU *acquis* on water

Since the 1970s, the European Union has adopted a range of legislative and policy measures to protect water from pollution and to reduce risks to human health.

This section reviews the main targets that affect the management and distribution of drinking water (priority theme 45 for Cohesion Policy in 2007-2013) and waste water treatment (priority theme 46). These are found in:

- The Drinking Water Directive (98/83/EC, hereinafter DWD)
- The Urban Waste Water Directive (91/271/EEC, hereinafter UWWTD)

The Water Framework Directive (2000/60/EC) further expands the scope of water management and water protection and links together other EU water legislation. Its provisions can affect both drinking water and waste water treatment, as well as related directives such as the Bathing Water Directive.

[11] GHK and partners, Strategic Evaluation on Environment and Risk Prevention – Synthesis Report (report for DG Regional Policy), November 2006. The study covers: the EU12 plus Greece, Portugal and Spain. The study focused on EU requirements related to municipal solid waste.

2.2.1 The Drinking Water Directive (98/83/EC)

The new Drinking Water Directive (DWD) came into force in 1998, replacing Directive 80/778/EEC with effect from 2003. The DWD aims at protecting human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.

Member States must ensure that water intended for human consumption is free from any micro-organism and parasites and from substances that constitute a potential danger for human health and meet the minimum requirements set out in the technical annexes of this Directive. Member States are required to ensure that:

- Drinking water quality is controlled through standards based on the latest scientific evidence;
- Efficient and effective monitoring, assessment and enforcement of drinking water quality is in place;
- Any failure to meet the parametric values is investigated and corrected through remedial action as soon as possible;
- The use of a water supply is restricted or prohibited if necessary for health protection reasons, and inform the consumers promptly thereof, giving the necessary advice;
- Information on the quality of water for human consumption to consumers is provided.

The Drinking Water Directive does not explicitly call for access to safe drinking water for the EU population. This is, however, implied in its objective, to protect human health by ensuring that 'water intended for human consumption … is wholesome and clean' (Art. 1(2)). Member States may exempt from the provisions of the Directive non-commercial water sources that supply less than 10 m^3 a day or fewer than 50 persons (Art. 3(2)(b)) – these are typically individual and other water supplies in remote areas.[12] In 2014, the Commission reaffirmed that access to safe drinking water for all is implied in EU environmental legislation as well as the Charter of Fundamental Rights of the EU[13].

Member States had two years to transpose the new DWD into their national legislation and another three years to comply with the requirements of the DWD. New Member States joining the EU in 2004 and after had to comply with the Directive by the day of accession, unless specific transitional periods were laid down in their respective Accession Treaties. Consequently, the Directive's requirements were in place in the 2007-2013 period.

[12] Separately, Member States are not required to report on supplies of less than 1000 m^3 a day or serving fewer than 5000 persons (Art. 13(2)), though recent reporting has included these.
[13] European Commission, Communication from the Commission on the European Citizens' Initiative "Water and sanitation are a human right! Water is a public good, not a commodity!", COM(2014) 177 final, 19.3.2014

A summary of its targets and implementation deadlines is provided in the table below.

Table 5 Drinking Water Directive targets: water quality

Targets	Member States	Deadlines
Compliance with essential quality standards at EU level. A total of 48 microbiological, chemical and indicator parameters must be monitored and tested regularly	EU15	November 2003
	EU 12	May 2004
	BG, RO	January 2007

Source: Directive 98/83/EC

2.2.2 Urban Waste Water Treatment Directive 91/271/EEC

The Urban Waste Water Treatment Directive 91/271/EEC (UWWTD) came into force in 1991. Its obligations for Member States include the following:

- The designation of sensitive areas where surface waters are affected by eutrophication or the risk of eutrophication
- The collection and treatment of discharged waste water to specific standards depending on the sensitivity of the discharge areas and the number of inhabitants.

Pursuant to this Directive agglomerations of more than 2,000 population equivalent[14] must have collecting systems for urban waste water and secondary treatment[15] or an equivalent treatment for their urban waste water, with the exception of smaller agglomerations (2,000 - 10,000 p.e.) that discharge to coastal waters.

Member States are to designate sensitive areas where: waters are eutrophic or may become eutrophic without protective action; water is abstracted for drinking water supply; or need further treatment under other EU Directives (Annex II of the Waste Water Treatment Directive). Waste water treatment plants in agglomeration of more than 10,000 people in sensitive areas (e.g. water bodies such as natural freshwater lakes) must comply with additional requirements, which in general involve more stringent treatment, such as tertiary (chemical) treatment.

The EU 15 Member States had to ensure that collection systems are established and secondary treatment is provided for these agglomerations by the end of 2005. More stringent treatment needed to be provided before the end of 1998.

[14] 1 p.e. = 60 g B.O.D. per day
[15] Secondary treatment is defined under the Directive as a process generally involving biological treatment with a secondary settlement or other process that must respect certain requirements.

The EU 12 Member States and Croatia are subject to different intermediate and final implementation deadlines regulated under their accession treaties. These extend to 2018 for Romania and 2023 for Croatia. For many of these Member States, larger agglomerations (between 10,000 p.e. and 100,000 p.e.) must comply earlier than smaller agglomerations (> 10000). These obligations per Member States are summarized in the following table, including intermediate deadlines:

Table 6 Waste Water Treatment Directive targets by Member State

Targets	MS	Intermediate deadlines	Final deadline
Collection and treatment of waste water in all agglomerations of >2,000 population equivalents (p.e.) Secondary treatment (i.e. biological treatment) of all discharges from agglomerations of > 2,000 p.e. More stringent (tertiary) treatment for agglomerations >10,000 p.e. in sensitive areas and their catchments	EU 15	All intermediate and final deadlines prior to 2006	
	MT	Interim deadlines from May 2004 through Oct. 2006	End 2006
	LT	For secondary and more stringent treatment: End 2007 – for all aggl. > 10,000 p.e.	End 2009
	CZ	01 May 2004 – for aggl. >10,000 p.e. End 2006 – for 36 aggl.	End 2010
	EE	End 2009 - for aggl. >10,000 p.e.	End 2010
	CY	End 2008 – for 2 aggl. >15,000p.e. End 2009 – for 1 aggl. > 15,000 p.e. End 2011 – for 1 aggl. >15,000p.e.	End 2012
	BG	End 2010 – for aggl. > 10,000 p.e.	End 2014
	HU	End 2008 – for aggl. in sensitive areas >10,000 p.e. End 2010 – for aggl. in normal areas >15,000 p.e.	End 2015
	LV	End 2008 – for aggl. > 100,000 p.e. End 2011 – for aggl.10,000 <100,000 p.e.	End 2015
	PL	End 2005 – for 69% of total biodegradable load End 2010 –for 86% End 2013 – 91%	End 2015
	SI	End 2008 – in sensitive areas for aggl. > 10,000 p.e. End 2010 – in aggl. > 15,000p.e.	End 2015
	SK	End 2004 – for 83% of the total biodegradable load End 2008 – for 91% End 2010 – all aggl. > 10,000 p.e. End 2012 – for 97%	End 2015
	RO	For collection: End 2010 – 61% of the load in p.e. End 2013 – 69% of the load in p.e. End 2015 – 80% of the load in p.e. End 2013 – all aggl. > 10,000 p.e. For secondary and more stringement treatment: End 2010 – 51% of the load in p.e. End 2013 – 61% of the load in p.e. End 2015 – 77% of the load in p.e. End 2015 – all aggl.> 10,000 p.e.	End 2018
	HR	End 2018 in agglomerations > 15,000 p.e. End 2020 in agglomerations > 10,000 p.e. in sensitive areas and relevant catchments and in the 11 aggl.	End 2023

Note: This overview does not include some specific Member State requirements.
Source: Directive 91/271/EEC; DG Environment, Transitional periods and interim targets for the

implementation of UWWTD in EU-10 and EU-2, undated[16]

The table indicates that the EU15 Member States, as well as Malta, had to implement all requirements of the Directive before the beginning of the 2007-2013 period. The EU13 each have their own interim and final deadlines agreed in their Accession Treaties: five of the EU13 have to implement all requirements of the Directive by before 2013, and six have their final deadline after 2013.

The Waste Water Treatment Directive also requires Member States to ensure that industrial waste water sent to municipal sewerage and treatment plants receives pre-treatment. It calls for limits on storm water overflows[17] (Annex II) and the re-use of waste water sludge where possible (Art. 14). The re-use of sludge is further regulated by the Sewage Sludge Directive (86/278/EEC), which encourages re-use and sets requirements for its treatment. (This Directive is part of the EU waste *acquis* – it is presented here, however, as investments for sludge treatment are typically made at waste water treatment plants.)

2.2.3 Water Framework Directive (2000/60/EC)

The Water Framework Directive (Directive 2000/60/EC) sets the legal framework for the protection and restoration of clean water across Europe, with the aim of ensuring its long term sustainable use. It addresses surface waters (rivers, lakes, transitional waters and coastal waters) and groundwater.

A key provision of the Water Framework Directive is the requirement for Member States to reach good chemical and ecological status of all surface waters by 2015, along with the good chemical and quantitative status of groundwater. (The Directive also sets procedures where Member States establish exemptions to attain these objectives at later dates.) Member States must prepare River Basin Management Plans that include measures to reach and maintain good status of their water bodies. The Plans should set out work underway for other Directives, such as the UWWT Directive, and identify any more stringent measures that are needed. Consequently, Member States may establish further requirements for waste water treatment in specific river basins.

The Water Framework Directive is linked to other EU water legislation. The Directive on Environmental Quality Standards (Directive 2008/105/EC) and the Groundwater Directive (Directive 2006/118/EC) provide further specifications regarding the good status of water bodies. River Basin Management Plans should identify protected areas, including those for the abstraction of drinking water, areas designated for bathing under the Bathing Water Directive (2006/7/EC,

[16] Available at: http://ec.europa.eu/environment/water/water-urbanwaste/legislation/pdf/transitional_periods_eu10_eu2.pdf

[17] The recent ruling of the Court of Justice of the EU in case C-301/10 against the UK underlines that Member States are obliged to avoid storm water overflows except in exceptional circumstances. On the basis of this ruling, Member States may need to devote additional resources to ensure that these overflows are adequately management.

replacing Directive 76/160/EEC) and Natura 2000 sites designated under the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC).

The Directive states that 'Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs…' (Art. 9): this principle will need to addressed in setting tariffs for drinking water supply and waste water treatment. The Water Framework Directive also includes provisions related to drinking water, as it calls for the designation and protection of water bodies used for the abstraction of drinking water (Art. 7).

2.2.4 Further provisions for water management

In 2012, the Blueprint to safeguard Europe's waters addressed several emerging issues for water management. It notes the need for full implementation of existing water legislation and indicates EU Cohesion Policy funds along with EIB loans as important sources for investment to meet the provisions of the UWWT Directive. The Blueprint highlights concerns of pollution from pharmaceuticals. It addresses water resource issues, calling for more efficient water use and a reduction in leaks in water systems. It moreover promotes the reuse of treated waste water, for irrigation in particular. The Blueprint also calls for greater use of 'green infrastructure', such as wetlands and floodplains, that can retain and store water in the landscape, reducing flood and drought risks; moreover, some forms of green infrastructure can provide natural water treatment, reducing pollution levels.

The Blueprint sets strategic directions rather than binding standards or targets. Moreover, as it was published in 2012, its provisions are more important for the new Cohesion Policy period, 2014-2020, than for this evaluation. (EU marine legislation may also be important for consideration in the new period[18].) Nonetheless, it is valuable to consider whether Member States addressed the issues it raises in the 2007-2013 period.

2.2.5 Summary of key objectives and targets for drinking water supply and waste water treatment

Drinking water

The Drinking Water Directive sets the following target:

- Ensuring high quality drinking water from water sources

[18] In particular, the Marine Strategy Framework Directive (Directive 2008/56/EC) complements the Water Framework Directive by extending environmental protection into EU marine waters beyond the coastal waters. Its main goal is to achieve and maintain good environmental status of the EU's marine waters by 2020.

Moreover, EU environmental legislation (together with the EU's fundamental rights) establishes a further drinking water objective:

- Ensuring access to high-quality drinking water for all EU citizens

These targets were in place by 2007. Meeting these targets was forecast to involve significant investments for many Member States in the 2007-2013 period. A 2006 study estimated that 15 EU Member States would need to invest about 9.0 billion Euros to implement the Drinking Water Directive in the period 2007-13[19]. This estimate should be seen as indicative of the scale of investment needed rather than a complete or accurate projection.

Waste water treatment

The targets under the Waste Water Treatment Directive were all in place before 2007.

For many EU Member States, the provisions of the UWWT Directive have been identified as the environmental requirements that require the largest amount of investment to ensure compliance. The 2006 study estimated that the 15 Member States would require 17.6 billion Euros in 2007-2013, with 5.3 billion Euros required in Poland alone. Again, the estimate is only indicative; it suggests that investments in this area could be approximately twice those to meet drinking water requirements.

[19] GHK and partners, Strategic Evaluation on Environment and Risk Prevention – Synthesis Report (report for DG Regional Policy), November 2006. The study covers: the EU12 plus Greece, Portugal and Spain.

3 Main trends and developments 2007-2013

This section addresses the second topic for Task 1 set out in the project specifications:

- Providing an overview of the main trends and developments within this period including technology and finance;

The section first reviews overall trends in public sector finance for environmental protection and water supply (section 3.1). It then looks at trends in public sector finance and in the achievement of key EU legislative targets for waste management (section 3.2), focusing on municipal solid waste; and the water sector (section 3.3). For water, drinking water supply and waste water treatment are considered together: this is because many large Cohesion Policy projects address both priority themes (see section 4.2).

The analysis focuses on the Member States that have spent at least 1 million Euros on projects in the three priority themes over 2007-2013: this is 23 Member States for the waste sector and 21 Member States for the water sector (see section 1.2).

This review of main trends and developments provides a framework for comparison for the role of the Cohesion Policy in section 4. While the section covers the 2007-13 period, not all data and information sources provide a clear overview for the period as a whole. The analysis presents key indicators where available, though for many issues the information base currently provides only broad trends.

3.1 Public sector environmental investments

This section reviews overall investments in environmental protection in the EU, to provide a context for the role of Cohesion Policy. Information on investments related specifically to the waste management and water management sectors can be found in sections 3.2 and 3.3.

Total public sector investments for environment plus water supply (according to Eurostat COFOG data) for the then 27 EU Member States were EUR 29.3 billion in 2007; the level declined in the period to 2012, when total public sector investments for the 28 Member States (in this year including Croatia) were EUR 25.0 billion (see Table 7). (As noted in section 1.2, these data may not include publically owned water and waste service companies; moreover, these and other data issues may vary among Member States. An updated set of data will be used for the project final report and this may change some results.)

Among the 23 Member States that are the focus of this study, the highest levels of environmental investment are seen in large EU15 economies: France, followed by the UK, Italy and Germany. The data also show significant variations for

national levels of investment across the period. Overall, all EU13 except for Bulgaria, Malta and Latvia show an increase between the first and last year reported. Among the EU15, Italy, Spain, Ireland, Greece, Portugal and Finland show a clear decrease between first and last year reported: it is possible that these decreases are linked to the impacts of the global financial crisis.

Table 7 *Total public sector investments in environmental protection plus water supply for the 23 Member States under study, million Euros (environmental investments plus water supply investments)*

	2007	2008	2009	2010	2011	2012
FR	6,144.0	6,462.0	6,332.0	6,642.0	6,657.0	6,927.0
UK	3,689.7	3,302.9	3,533.3	3,500.6	3,223.0	3,588.8
IT	4,969.0	5,474.0	5,032.0	4,019.0	3,912.0	3,407.0
DE	3,510.0	3,510.0	3,650.0	3,650.0	4,380.0	2,830.0
ES	4,380.0	3,904.0	4,123.0	3,341.0	2,149.0	1,739.0
PL	1,339.4	1,576.5	1,593.0	1,916.9	1,956.3	1,542.3
CZ	880.6	2,357.2	792.6	985.9	1,358.4	1,334.9
RO	259.1	306.7	439.7	729.1	961.4	652.0
IE	1,277.9	1,254.6	916.0	719.7	586.1	475.3
BE	397.3	418.4	399.8	362.6	447.9	474.5
HU	436.2	442.9	256.3	419.0	564.2	464.9
SK	96.8	99.8	109.9	296.9	354.3	316.8
EL	528.0	592.0	616.0	406.0	228.0	292.0
PT	562.8	505.7	369.7	399.7	329.8	211.3
SI	173.3	221.4	279.1	201.7	207.7	202.5
LT	160.2	165.1	214.6	266.7	175.1	169.6
EE	72.1	98.2	85.2	74.0	77.3	114.1
BG	146.4	100.4	254.8	67.7	67.0	76.1
FI	137.0	124.0	119.0	96.0	70.0	65.0
LV	66.3	64.7	79.3	47.3	57.8	60.2
CY	37.5	40.1	111.1	58.0	64.2	56.8
MT	38.0	36.4	43.6	57.3	16.2	25.3
HR	:	:	:	:	:	17.2
Total	**29,301.5**	**31,057.0**	**29,350.0**	**28,257.1**	**27,842.7**	**25,042.6**
*EU15**	*25,595.7*	*25,547.6*	*25,090.8*	*23,136.6*	*21,982.8*	*20,009.9*
EU13	*3,705.8*	*5,509.4*	*4,259.2*	*5,120.4*	*5,859.9*	*5,032.7*

Notes: Based on COFOG data for environmental protection plus water supply: data for gross fixed capital formation plus capital transfers.
For some Member states (BE, BG, RO, SK, HR), data on water supply investments are not available. For these countries, an estimate has been made on the basis of an average proportion of the remaining Member States' level of investments in water supply as compared to environmental investments. For Belgium, the average proportion calculated for EU15 has been used in this approximation while for Bulgaria, Romania, Slovakia and HR, the average proportion for EU13 has been used. For Malta, data on water supply investments is available only for 2007 and this data has been used as an approximation of the level of investments in the remaining years. Single year gaps for Spain (2012) and UK (2011) have been filled with data for previous years. Data for Croatia regarding both environmental investments and water supply investments is available only for 2012.
EU15* not including the five Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details). Data ordered by 2012 investments. For the final report, an updated data set from Eurostat will be used.
Source: Eurostat, General government expenditure by function (COFOG)

The two sectors that that are the focus of this report, waste and water, together account for more than 70% of total public sector investments in the 23 Member States, for both 2007 and 2013 (see Table 8). Investments for the water sector, however, fell 10 percentage points in 2012 compared to 2007, while those for waste and other sectors increased (other sectors include pollution abatement, which will include air pollution investments, and biodiversity and landscape protection along with research and development).

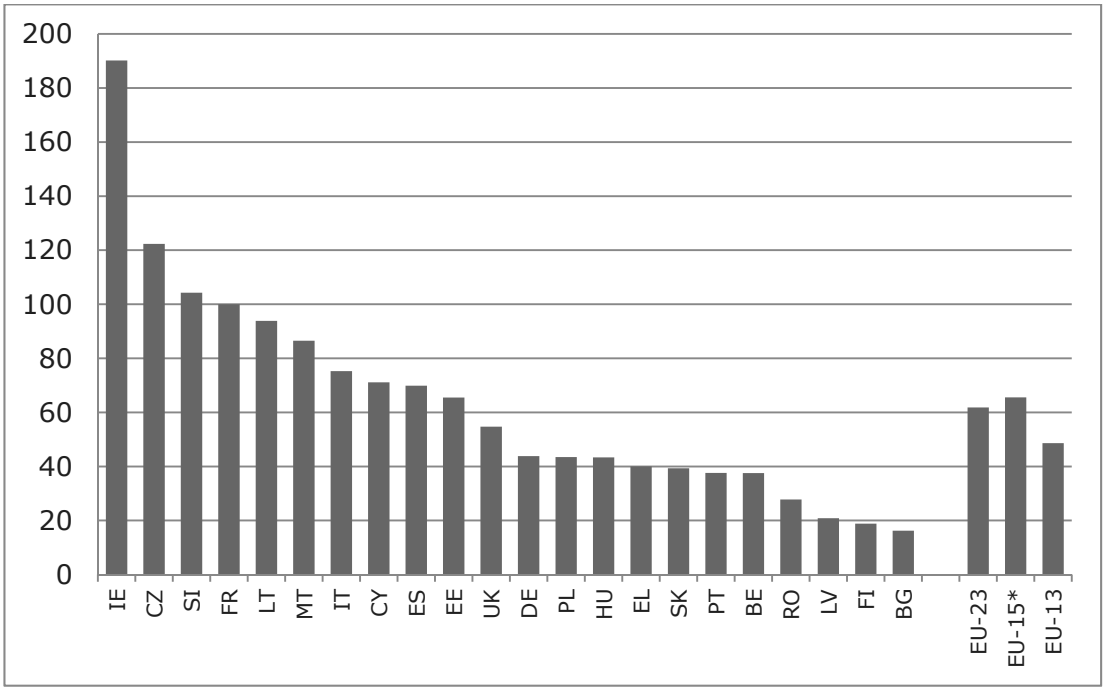
Table 8 Total public sector investments in environmental protection in 22 selected Member States, million euros

	2007		2012	
	million euros	percent of total	million euros	percent of total
Water sector	17,739.7	61%	12,680.4	51%
Waste sector	5,007.6	17%	5,617.4	22%
Other sectors	6,554.2	22%	6,744.8	27%
Total	**29,301.5**	**100%**	**25,042.6**	**100%**

See notes and sources for Table 7. (As noted there, for the final report an updated data set from Eurostat will be used.)

On a per capita basis, Ireland has the highest level of annual public sector investment, almost EUR 200. Two EU13 States have levels above EUR 100, Czech Republic and Slovenia. Four Member States have average annual per capita investments from the public sector below EUR 25: Romania, Latvia, Finland and Bulgaria (see Figure 2). As noted previously, these data describe public sector investments. They do not capture private sector investments. Moreover, specialised producers – water and waste services companies, both publically and privately owned – are leading players in carrying out investments in these sectors. While the role of these companies may be partly captured by included data on capital transfers of public sector investments, differences in levels of investment are likely to be due in part to differences in the ownership and organisational structure of these specialised producers. Data treatment may also vary across Member States.

Figure 2 *Public sector investments per capita for environmental protection and water supply, 2007-2012 average (Euro)*



See notes and sources for Table 7.

3.2 Waste management

This section reviews the level of government investment in waste management and then reviews key indicators of the trends and development in municipal solid waste management.

This section, as well as analysis in chapter 4, focuses on municipal rather than total waste:

- the first reason for this choice is that the bulk of Cohesion Policy resources for the priority theme on waste management appear to go for municipal waste management projects (this is the case for the operational programmes reviewed in six Member States, where nearly all the types of projects to be funded are municipal solid waste facilities – see section 4.1.2 below);

- more generally, government investment for waste management usually focuses on municipal solid waste management, as investments for the other key components of total waste – industrial and mining waste and construction and demolition waste – are commonly covered more directly by the private sector;

- furthermore, the volume and structure of total waste varies significantly across Member States due notably to the structure of the industrial and mining sectors[20], making comparison of levels and trends difficult.

3.2.1 Level of investment

The levels of total Member State investment in waste management provide a context for assessing the role of Cohesion Policy. Table 9 above presents public sector investments (gross capital formation plus capital transfers) based on the COFOG data reported to Eurostat. Here as for overall environmental investments, national levels vary across the period, and a clear trend across all 23 Member States is not seen.

Two large EU15 Member States, France and the UK, account for more than half of total public sector investment in waste management among the 23 Member States considered. They are followed by Germany and Italy.

On a per capita basis, however, several small EU13 Member States join them among the highest levels of investment: over 30 Euros per year in Malta (UK spending is also at this level); and over 10 Euros per year in Cyprus and Slovenia, along with France (see Figure 3). In contrast, nine of the Member States average yearly public sector gross fixed capital formation (plus transfers) for waste management below 10 Euros per capita: four EU15, Germany, Finland, Ireland and Portugal; and seven EU13 – Bulgaria, Slovakia, Latvia, Romania and Poland. Private sector investments may play an important role in some of these Member States. Moreover, as noted above, the investments made by municipal waste service companies may not be captured in a uniform way across Member States, and data for some Member States are provisional. The levels nonetheless provide a point of comparison for Cohesion Policy.

Table 9 Public sector investments in waste management, 2007 to 2012

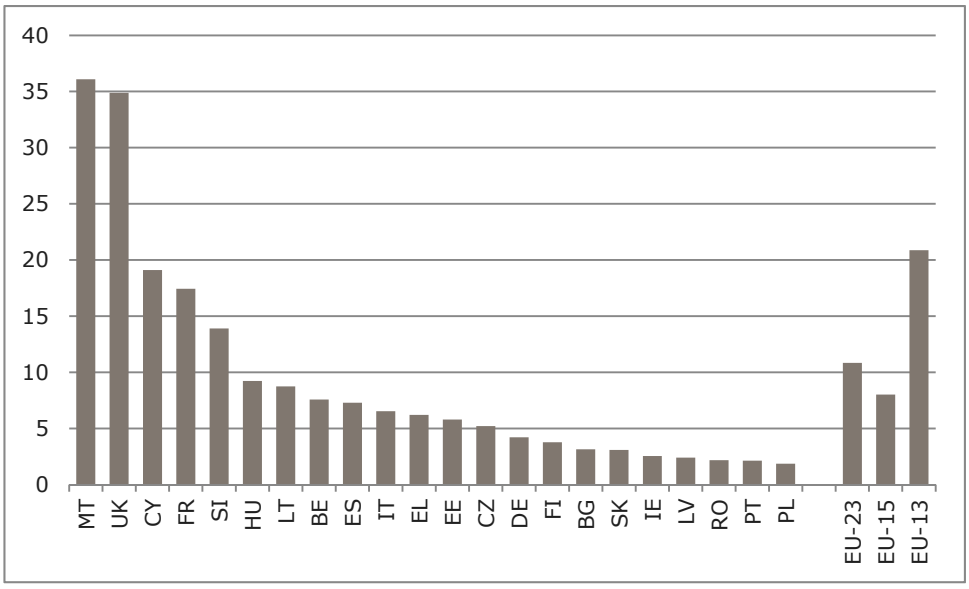
	2007	2008	2009	2010	2011	2012
UK	2,419.8	2,058.3	1,974.4	1,961.9	2,122.4	2,751.4
FR	989.0	1,043.0	1,037.0	1,183.0	1,267.0	1,311.0
DE	300.0	300.0	370.0	300.0	430.0	370.0
IT	269.0	494.0	448.0	359.0	414.0	343.0
BE	72.1	74.4	69.9	68.6	95.2	123.7
HU	61.4	135.5	65.5	109.3	95.3	82.8
EL	67.0	86.0	89.0	71.0	25.0	75.0
CZ	36.9	45.0	43.6	65.3	73.5	64.4
PL	77.4	63.5	84.3	82.1	61.0	56.7
RO	25.3	24.4	35.6	60.7	66.7	50.0
BG	12.1	20.5	31.2	18.1	25.0	31.1

[20] See for example: Eurostat, Waste Statistics, available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Waste_statistics#Total_waste_generation (accessed April 2015)

	2007	2008	2009	2010	2011	2012
SK	9.4	7.9	8.9	24.7	24.6	24.3
LT	42.9	47.2				17.1
CY	14.1	15.0	16.7	17.9	19.4	15.7
FI	27.4	25.0	23.0	18.1	13.2	15.3
IE	17.0	14.1	3.0	4.9	15.8	15.3
SI	43.5	35.4	26.8	29.8	20.9	15.0
PT	20.0	22.6	18.7	34.9	26.4	12.1
LV	6.9	7.0	10.1	2.7	5.0	11.7
MT	23.9	26.5	12.2	11.2	6.0	10.6
EE	7.5	10.3	9.8	4.5	9.1	4.9
HR						1.3
ES	465.0	425.0	353.0	375.0	215.0	
EU(23)	**5,007.6**	**4,980.7**	**4,730.7**	**4,802.7**	**5,030.4**	**5,402.4**
*EU15**	*3,227.4*	*2,845.8*	*2,676.6*	*2,705.2*	*2,683.2*	*3,165.6*
EU13	*1,780.3*	*2,134.9*	*2,054.1*	*2,097.5*	*2,347.3*	*2,236.7*

Notes: Data for several Member States were missing, and an extrapolation approach was used to estimate their waste management investments: for Belgium and Finland, an average share of waste management investment in total environmental investments for the remaining representatives of EU15 is used while for Croatia and Slovakia the average share of waste management investment in total environmental investments for the remaining EU13 is used.
EU15* not including the five Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details).
Member States ordered by 2012 investments
For the final report, an updated data set from Eurostat will be used
Source: Eurostat. General government expenditure by function (COFOG), waste management

Figure 3 *Public sector investments per capita in waste management, 2007-2012 average (Euro)*



See notes for Table 9.
Source: Eurostat. General government expenditure by function (COFOG), waste management

3.2.2 Trends in municipal solid waste treatment

Waste generation per capita

The scale of investment in solid waste treatment will depend on several factors, including existing capacity. One important factor is the amount of the municipal solid waste generated: levels reported for 2007 ranged from under 300 kg/capita in the Czech Republic to over 650 kg/capita in Malta (differences in definitions and monitoring systems may account for some of the variance).

Under EU legislation, moreover, a priority for waste management should be prevention. A majority of the Member States in focus here – 16 of the 23 – reported a decline in the municipal solid waste generated per capita between 2007 and 2012 (see Table 10). Economic trends, including difficulties arising from the financial crisis, may be one reason for these declines, though waste policies may also be a factor.

The data, however, present several limitations. As noted in the table, data for some Member States and periods are estimates. Moreover, Member States use somewhat different definitions of municipal solid waste: as a result, direct comparisons of the municipal solid waste among countries, here and elsewhere in this section, at present are 'seldom comparable', according to the European Environment Agency[21].

Table 10 Generation of the municipal solid waste per capita (kg per capita), 2007 and 2012

	2007	2012	Change 2007-2012 (%)
BE	704	663	-5.8%
BG	582	611	5.0%
CY	654	589*	-9.9%
CZ	772	587	-24.0%
DE	543	534*	-1.7%
EE	557	529	-5.0%
EL	506	506	0.0%
ES	448*	503*	12.3%
FI	567	472	-16.8%
FR	419	469	11.9%
HR	578	463	-19.9%
HU	553	460	-16.8%

[21] EEA, Managing municipal solid waste – a review of achievements in 32 European countries, EEA Report No. 2/2013. As an example, some Member States include packaging waste in their calculations of municipal solid waste; others do not. Data accuracy varies across Member States, and some have more than one, often conflicting data sets. Moreover, EEA notes that as waste management systems have become more complex, with pre-treatment steps and different approaches among waste streams, uncertainties and differences in data have grown. Eurostat has recently updated its guidelines for waste reporting, which should improve data in coming years.

	2007	2012	Change 2007-2012 (%)
IE	494	456*	-7.7%
IT	471	453*	-3.8%
LT	457	402*	-12.0%
LV	399	391	-2.0%
MT	525	362	-31.0%
PL	310*	324*	4.5%
PT	322	314	-2.5%
RO	294*	308*	4.8%
SI	391	301	-23.0%
SK	449	280	-37.6%
UK	391	271*	-30.7%
EU(23)	**517.9**	**413.4**	**-20.2%**
*EU15**	*560.6*	*523.4*	*-6.6%*
EU13	*377.2*	*336.9*	*-10.7%*

Notes: * Estimates
Member States ordered by 2012 level of waste generation
EU15* not including the five Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details).
Source: Eurostat, Environmental Data Centre on Waste, Municipal waste

While the reduction of waste generation is an EU goal, no target is set. Nonetheless, the total amount of municipal solid waste generation is a necessary factor in calculating the shares collected, composted and recycled, for which EU targets are set. Progress towards these targets is discussed in the following pages.

Collection and treatment of the municipal solid waste

Member States have an obligation to ensure the collection and treatment of all waste, including municipal solid waste. For many Member States, however, not all the municipal solid waste is collected. In Poland, for example, until early 2013 households contracted directly with waste collection and treatment companies; although this was obligatory, enforcement was often poor and an estimated 20% of households did not have waste contracts and instead dumped their waste or burned it.[22] In Bulgaria, the Operational Programme refers to low collection rates in rural areas (see Table 15 below). In total, 11 of the 23 Member States reported that less than 100% of the municipal solid waste was treated in 2007: rates varied from 75% in Romania to 99% in Lithuania (see Figure 4). Of these Member States, five saw an increase in their treatment rates for 2012. A total of eight Member States saw a decrease in the treatment rates over this period, including three (Greece, Malta and the UK) that reported a 100% rate in 2007.

[22] OECD, Environmental Performance Reviews: Poland, 2015 forthcoming

Figure 4 Share of the municipal solid waste treated, 2007 and 2012

Note: In Belgium, Cyprus, Finland, France, Germany, Portugal and Spain, 100% of the municipal solid waste was treated in both 2007 and 2012: these Member States are not shown in the figure.
Source: Eurostat, Environmental Data Centre on Waste, Municipal waste

Here, as well as for waste generation per capita, the data quality varies across Member States. For example, where not all the municipal solid waste is collected, the total amount generated is by necessity an estimate.

Implementing the waste hierarchy: landfilling, composting and recycling trends

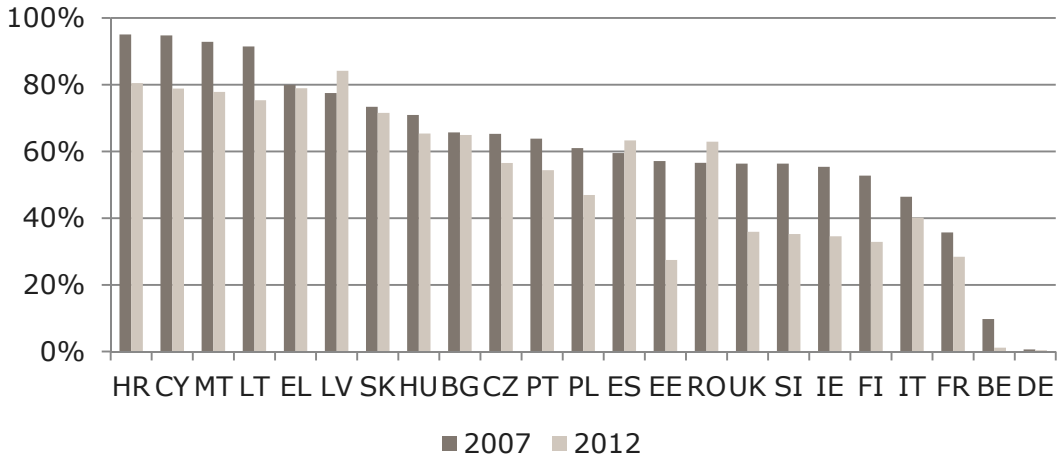
The EU waste hierarchy sets landfilling as the lowest rung, i.e. the least favourable waste management option. In 2007, however, landfilling accounted for more than 70% of the municipal solid waste treatment for seven of the 19 Member States; for three of these – Cyprus, Lithuania and Malta – it accounted for more than 90% (see Figure 5).

Between 2007 and 2012, all but three of the 19 Member States had reduced the role of landfilling. For seven Member States, the reduction was greater than 10 percentage points: Cyprus, Lithuania and Malta were among these. Three Member States, however, saw an increase in landfilling: Latvia, Romania and Spain. (Note that the shares shown in the figure are based on waste collected and treated, not total waste generated, which is estimated in Member States where not all waste is collected.)

The Waste Framework Directive calls for the use of economic instruments, among other measures, to support waste management and the waste hierarchy. A 2012 review for the European Commission found, however, that in several Member States – including Bulgaria, Greece, Hungary, Romania and Portugal – tariff structures such as landfill charges do not support a shift away from

landfilling to recycling and recovery.[23] This is a point to bear in mind in section 4: investments are a vital factor in achieving waste targets, but policy instruments are also important.

Figure 5 *Municipal solid waste disposed in landfills (as a share of all MSW treated), 2007 and 2012*



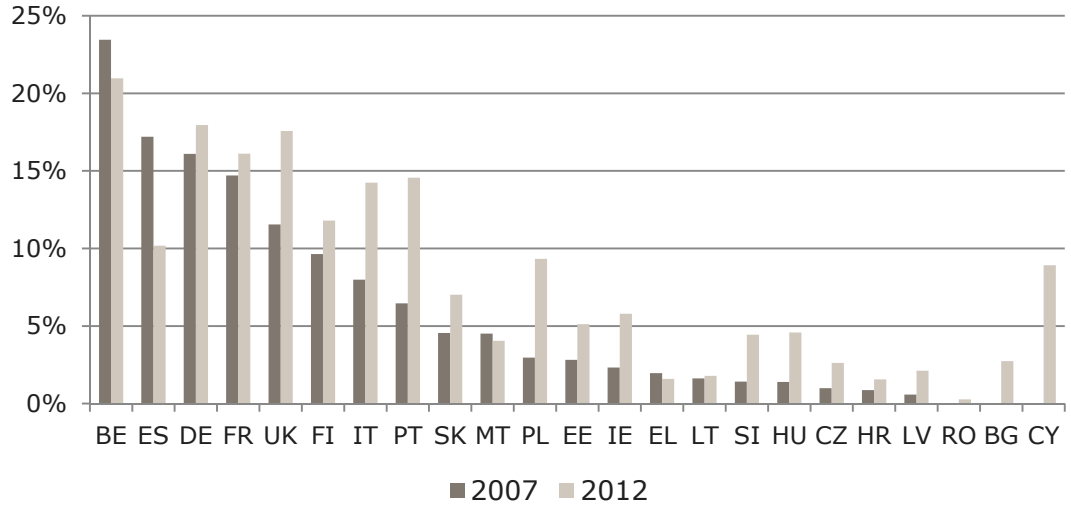
Source: Eurostat, Environmental Data Centre on Waste, Municipal waste

While a specific target for the level of landfilling is not set in EU legislation, the Landfill Directive sets targets to reduce the share of biodegradable municipal waste sent to landfills. To meet this target, Member States will need to ensure adequate composting capacity. From 2007 to 2012, composting capacity increased in 17 of the 23 Member States (see Figure 6). The starting point for most was low: for 16 of the 23 Member States, composting represented less than 5% of all the municipal solid waste treatment in 2007. The increase in composting over the period was nonetheless notable: for five Member States, the increase was greater than five percentage points, including in Cyprus, which had essentially no composting capacity in 2007. In contrast, composting fell in Belgium and Spain (the two Member States with the highest levels of composting in 2007) as well as Greece and Malta.

These improvements reflect significant investments made. In Poland, for example, about 110 mechanical biological treatment facilities and 80 composting facilities were built between 2010 and 2013.[24]

[23] BiPRO, Screening of waste management performance of EU Member States, Report prepared for the European Commission, July 2012
[24] OECD, Environmental Performance Reviews: Poland, 2015 forthcoming

Figure 6 Municipal solid waste composted (as a share of all the municipal solid waste treated), 2007 and 2012



Source: Eurostat, Environmental Data Centre on Waste, Municipal waste

The Landfill Directive's on biodegradable started in 2006, though Member States relying extensively on landfills had a derogation of four years. The European Environment Agency estimated that, among the 23 Member States considered here, all those whose deadlines started in 2006 met their first target and all but one met their second, 2009 target (see Table 11). Of the 16 Member States whose targets for biodegradable waste were derogated by four years, EEA estimates that the majority did not meet their first, 2010 target: this includes Cyprus, Czech Republic, Latvia, Lithuania, Malta, and Poland.[25]

Table 11 Achievement of the Landfill Directive targets on biodegradable municipal waste

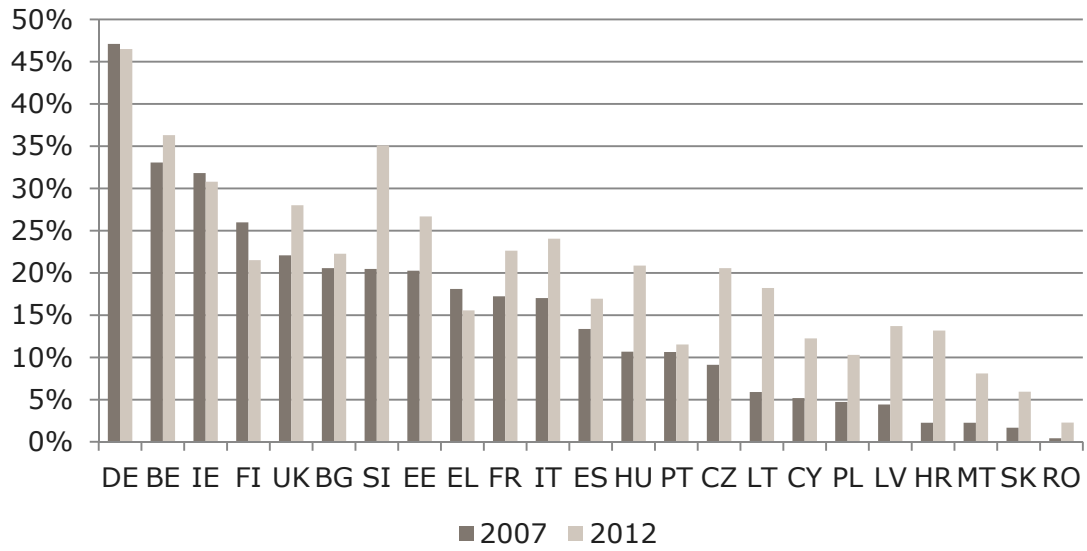
Date	Target compared to 1995 level	Member States estimated to have achieved the target	Member States estimated *not* to have achieved the target
Member States without derogation periods			
2006	75 %	BE, DE, ES, FI, FR, HU, IT	
2009	50 %	BE, DE, ES, FI, FR, HU	IT
Member States with derogation periods			
2010	75 %	BG, EE, IE, RO, SK, SI, UK	CY, CZ, EL, HR, LT, LV, MT, PL, PT
2013	50 %	*Data not yet available*	*Data not yet available*

Source: Based on Eurostat data (see Figure 6) and EEA, Managing municipal solid waste – a review of achievements in 32 European countries, EEA Report No. 2/2013

[25] EEA, Managing municipal solid waste – a review of achievements in 32 European countries, EEA Report No. 2/2013

The 2008 Waste Framework Directive sets targets for the collection and recycling or re-use of paper, metal, plastic and glass from households. While data on these waste streams are not available, these targets will require an increase in overall recycling of the municipal solid waste; moreover, recycling is a priority treatment method under the waste hierarchy.

Figure 7 Municipal solid waste recycled (as a share of all the municipal solid waste treated), 2007 and 2012



Source: Eurostat, Environmental Data Centre on Waste, Municipal waste

Between 2007 and 2012, all but two Member States (Germany and Greece) increased the share of recycling for the municipal solid waste (see Figure 7). For five Member States – Czech Republic, Hungary, Latvia, Lithuania and Slovenia – the increase was greater than 10 percentage points.

Despite the progress, EEA has warned that 'the majority of countries will need to make an extraordinary effort in order to achieve the target of 50% recycling by 2020'. [26]

[26] EEA, Managing municipal solid waste – a review of achievements in 32 European countries, EEA Report No. 2/2013

Table 12 Share of the municipal solid waste treated by incineration, 2007 and 2012 and percentage change

	2007	2012	Change in volume of waste treated by incineration, 2007-2012 (thousand tonnes)
BE	37.7%	42.1%	155
DE	36.2%	34.9%	-172
FI	11.6%	33.8%	615
FR	32.3%	32.8%	266
CZ	12.9%	20.2%	264
IT	12.4%	19.9%	2,245
PT	19.1%	19.5%	-18
UK	9.3%	16.6%	1,735
IE	0.0%	15.9%	427
EE	0.3%	12.4%	44
SK	10.8%	9.6%	-12
ES	9.9%	9.6%	-516
HU	8.3%	9.1%	-18
SI	0.0%	1.3%	10
LT	0.0%	0.6%	8
PL	0.3%	0.4%	10
MT	0.0%	0.4%	1
HR	0.0%	0.1%	2
LV	0.3%	0.0%	-3
EU(23)	**17.9%**	**21.3%**	**5,043**
EU15	*21.1%*	*24.6%*	*4,737*
EU13	*2.5%*	*3.7%*	*306*

Notes: Data ordered by 2012 incineration share. No incineration recorded in BG, CY or RO.
EU15* does not include the five Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details).
Source: Eurostat, Environmental Data Centre on Waste, Municipal waste

EU legislation regulates air emissions from waste incinerators but does not set targets for the use of incineration. Incineration accounts for over 30% of the municipal solid waste treatment in three EU15 covered in the analysis: Belgium, France and Germany. While incineration has a role to play in reducing reliance on landfills, it requires high levels of investment; moreover, as incinerators are large facilities, they need significant levels of waste and thus are most appropriate for large urban areas.[27] Some EU15 Member States, including Germany, have found themselves with excess and unused incineration capacity; a further issue is that investments need to be planned carefully to balance

[27] Peter Hodecek, VÖEB, Austria, personal communication, March 2013

capacity for waste to energy recovery with capacity for materials recycling, as key streams of municipal solid waste, such as paper and plastic, can be used for both.[28]

In 2012, four EU15 Member States sent over 30% of their municipal solid waste for incineration: Belgium, Denmark, Finland and France. From 2007 to 2012, the share of waste sent to incineration increased by more than 7 percentage points in two Member States from 2007 to 2012, the Czech Republic and Italy, and by more than 12 percentage points in Estonia (see

Table 12); by volume, Italy and the UK saw the largest increases in incineration. Overall, the share of municipal solid waste sent for incineration in the EU15 Member States considered here, almost 25%, was much higher than the level seen in the EU13, under 4%.

Closure of landfills

The Landfill Directive calls for the closure of landfills that do not meet its technical standards. There is, however, no formal Member State reporting on this issue.

A 2012 analysis carried out for the European Commission, based on national documents and reporting, estimated that all existing landfills were compliant in only 8 of the 22 Member States (see Table 13; data do not include Croatia). In 7 Member States, up to one quarter of landfills were not in compliance; and in a further 7 Member States, more than one quarter of existing landfills were not in compliance (the scores for these two sets of Member States are highlighted in red in the table). This last category is comprised of two EU15 Member States – Greece and Italy – and five EU13: Bulgaria, Cyprus, Lithuania, Romania and Slovenia.

The data available presents several limitations. While this data comes from the 2007-2012 period, the year of reference varies, and trends in the closure of out-of-compliance landfills are not provided. Moreover, the data is based on a range of Member State documents, and the extent and accuracy of reporting on the issue may vary: for example, the information for many Member States appears to focus on licensed landfills rather than illegal dumps. The results nonetheless highlight that the closure of landfills was a major issue for attention for waste management in 2007-13.

[28] OECD, Environmental Performance Reviews: Netherlands, 2015 (forthcoming)

Other sources also highlight the importance of landfill closure. In the review of operational programmes in six Member State (see Table 15 below), the issue was highlighted in four – all the EU13 Member States covered. The operational programmes in Bulgaria, Estonia and Slovenia all refer to illegal or unregulated dump sites as a key issue in 2007; while the programme in Poland indicates that many of its operating landfills did not meet EU standards and needed to be closed. Separately, an industry report in 2011 indicated Romania had plans to close about 100 landfills by 2017; a key concern raised in the report, however, is that some EU13 Member States were not setting aside sufficient resources for the future monitoring and care for landfills once closed.[29]

Table 13 Compliance of existing landfills

MS	Compliance of existing landfills
BE	100%
DE	100%
EE	100%
HU	100%
IE	100%
LV	100%
MT	100%
PT	100%
CZ	≥75%
ES	≥75%
FI	≥75%
FR	≥75%
PL	≥75%
SK	≥75%
UK	≥75%
BG	<75%
CY	<75%
EL	<75%
IT	<75%
LT	<75%
RO	<75%
SI	<75%

Note: year of reference varies across Member States.
Source: BiPRO, Screening of waste management performance of EU Member States. Report prepared for the European Commission, July 2012; based on national waste management plans, implementation reports for EU waste management legislation, and other sources. Data not available for Croatia.

[29] Peter Hodecek, Overview on key obstacles in Central and Eastern Member States, VÖEB, Austria (presentation to the FEAD Annual Conference, 30 September 2011, Helsinki, Innovative Waste Management –Greening the European economy)

EU legal actions

The three main EU Directives that regulate municipal solid waste management have been the subject of legal actions concerning Member State transposition and implementation. Poor transposition can lead to improper implementation of EU legislation. In total, 28 legal actions were taken regarding transposition of the Landfill Directive in the 23 Member States that are the focus of this study (see Table 14; for some Member States, more than one legal action was taken).

A further 28 legal actions were taken concerning implementation of the Landfill Directive. These addressed a small number of Member States: four of the EU15 and three of the EU13. About one-third of these legal actions concerned problems related to landfills that did not meet standards, including illegal landfills and uncontrolled waste tips. Other legal actions related to inadequate waste management systems. For Directive 2006/12/EC as well, several of the legal actions on implementation concerned landfills and uncontrolled waste tipping.

For the Waste Framework Directive, 20 legal actions related to issues in its transposition, and only 3 to its implementation. As noted in section 2, key targets under the Directive for the separate collection and recycling of waste streams are set for 2015 and 2020.

Actions related to implementation may cover one site or several. Moreover, the size of the sites will vary. The data nonetheless indicate that the 23 Member States had a range of issues in the proper transposition and implementation of the three directives from 2007 to 2013.

Table 14 EU Legal actions regarding key directives for municipal solid waste management, 2007 to 2013

	2007	2008	2009	2010	2011	2012	2013
Landfill Directive (1999/31/EC)							
Transposition	13	7	6	2			
Implementation	5	4	6	5	2	3	3
Waste Framework Directive (2006/12/EC)							
Implementation			1	5			
Waste Framework Directive (2008/98/EC)							
Transposition					14	6	
Implementation					2	1	

Note: data include actions under the range of infringement phases, including: Letter of formal notice; Reasoned opinion; Referral to Court; Court Judgement; Case returned to Court. Each action for a case is counted. Table shows actions taking regarding the 24 Member States identified in Table 1.
Sources: European Commission, press releases on legal actions, 2007-2013[30]; European Commission, Annual reports on monitoring of the application of EU law, 2008-2014[31]; European Commission, unpublished data file, 2015

[30] Available at: http://ec.europa.eu/environment/legal/law/press_en.htm
[31] Available at: http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/annual-reports/index_en.htm#

Waste issues identified in selected Operational Programmes

The review of selected Operational Programmes provides a further glimpse of waste problems faced in Member States (see Table 15). In 2007, all of the 6 Member States reviewed highlighted the need to improve collection of the municipal solid waste. All but Spain referred to the need for facilities for composting and recycling. Four of the six Member States identify a need to address landfills that do not meet EU standards or illegal waste dumps (a fifth Operational Programme, for the Campania region in Italy, refers to this problem in its 2014-2020 edition). Two of the six Operational Programmes referred to industrial waste issues, Bulgaria and Estonia.

The 2014-2020 Operational Programmes in a couple of these Member States provide indications of progress addressing waste issues up to 2014. In Campania, separate collection has increased and, though it remains low, so has composting. Slovenia saw progress in the construction of waste facilities. In Estonia, the cleanup of illegal dumps has started.

Table 15 Waste management issues identified in selected Operational Programmes for 2007-2013

Member State	Key issues identified
Bulgaria	• Municipal waste generation increasing in period to 2007 • Waste collection in rural areas is poor – less than 40% of population served. • Need to reduce landfilling of the municipal solid waste • Large number of uncontrolled landfills serving small populations. • 18 hazardous waste landfills; none meets EU legal standards • Need for better management of sludge from waste water treatment. • Contamination from industrial waste (mining, extraction activities)
Estonia	• High-level (70%) of total waste from the extraction and use of oil shale. • Lack of sufficient waste collection and sorting capacity • Illegal dump sites, including for hazardous waste • Poor enforcement
Italy (Campania)	• Tariffs do not cover costs for collection, treatment, recovery and disposal. • Waste generation has decreased but is still high. • Separate waste collection has improved, in particular for biodegradable waste, but levels vary among provinces • Low capacity of waste treatment facilities • Large share of municipal waste sent to and managed by other regions or countries at high cost • Landfilling is still the prevalent form of waste management. • Large quantities of waste in storage sites • Public opposition to incineration plants • Mafia infiltration in the waste cycle • High levels of hazardous waste, and low treatment capacity
Poland	• Most of municipal waste goes to landfills, many of which do not meet the technical and legal requirements: need for closure and reclamation • Low rate of separate collection of municipal waste: in 2004, only about 2%. • Low levels of composting, recycling and waste to energy
Slovenia	• Lack of larger waste management centres serving multiple municipalities • Low waste collection and treatment capacity • Unregulated dump sites, including for hazardous waste • Lack of sorting facilities for the municipal solid waste
Spain (Andalusia)	• Low level of separate collection of waste (in spite of the positive trend between 2000 and 2005, rates are still below the national average)

Sources: see Box 1 in section 0

Technology developments

The main technologies for the municipal solid waste treatment are: landfilling, recycling, composting (for biodegradable waste) and incineration. To support recycling and composting, separate collection and sorting and treatment plants are used. To promote high levels of recycling, separate collection systems need to be convenient for users – both for common waste streams such as paper and plastic as well as sites where other types of waste can be delivered. For residual waste, advanced collection systems use closed bins with weighing systems and charge residents on the basis of their amount of waste, thus providing an incentive for waste separation.

Europe has seen a growing use of integrated mechanical-biological treatment (MBT): these facilities combine mechanical sorting to remove recyclable elements such as metal, plastic and paper with biological treatment such as composting for the remainder. While these plants extract recyclable waste from 'residual' waste that is not collected separately, the quality of the waste they compost remains an issue: the level of metals, household chemicals and may leave the resulting compost unsuitable for use in agriculture, even for non-food crops. In such cases, the MBT plants only treat and reduce waste that is then sent to other waste facilities, such as landfills.[32]

For biological treatment, composting is a long-standing method that has been widely used in Europe and other parts of the world. In the past 20 years, the bio-methanisation or bio-gas systems have entered commercial use: these facilities generate methane that can be used for energy recovery.[33]

A key trend is to improve resource efficiency and recovery, along with energy recovery. A range of approaches are used, including the recovery of methane from closed landfills for energy as well as composting methods that recover biogas for energy use. An emerging approach is to "mine" existing or closed landfills for metals and other products that can be recovered: the Flanders Region of Belgium for example has proposed the introduction of landfill mining, and the European Innovation Partnership (EIP) on Raw Materials is exploring this opportunity[34]. Increasing the recovery of energy from incineration plants is also of growing attention. This involves both more advanced incineration technology – from older grate systems to fluidised bed combustion and pyrolysis – as well as providing waste streams with higher energy content. Siting incineration plants so that their heat can be recovered for either industrial processes or district heating will also increase energy recovery.

[32] ZeroWaste Europe, Mechanical Biological Treatment (MBT) & Zero Waste, 2013. Available at: http://www.zerowasteeurope.eu/2011/09/mechanical-biological-treatment-mbt-zero-waste/

[33] Kees Wielenga, FFact, Netherlands, personal communication, March 2015

[34] European Commission, European Innovation Partnership (EIP) on Raw Materials European Enhanced Landfill Mining Consortium. Available at: http://ec.europa.eu/eip/raw-materials/en/content/european-enhanced-landfill-mining-consortium (accessed March 2015)

3.2.3 Initial Conclusions on trends and developments

The data and information has showed broad progress in terms of implementing EU targets and objectives related to municipal solid waste management from 2007 to 2012. In many Member States, the municipal solid waste generated per capita has declined (though there are problems with data comparability and accuracy here). The results in terms of the share of municipal solid waste collected and treated, however, are mixed, with increases seen in several of the 23 Member States reviewed but declines in others. The share of the municipal solid waste sent to landfills nonetheless has fallen, while the share recycled or composted increased. The latter trends indicate that investments in recycling and composting capacity have been made and new facilities are in operation. In a couple of Member States, incineration has also increased.

The results also show several areas of concerns, including the need for closure of landfills (an EU requirement for 2009). A significant level of EU legal actions was taken related to both the transposition and implementation of EU legislation related to municipal solid waste, showing ongoing problems in this area. Moreover, 9 of the 23 Member States considered did not meet their initial EU targets for reducing the share of biodegradable waste sent to landfills. EEA reports and other sources warn that many Member States are not on track in terms of meeting future targets in this area as well as the 2020 targets for the collection and recycling of specific waste streams.

3.2.4 Information to be integrated in later drafts

Data on waste management in Member States for 2013 is expected to be available in the coming months, perhaps already by April 2015. By August 2015, DG Environment is expected to publish new implementation reports for the Landfill Directive and the Waste Framework Directive. Both of these sources will provide further information to update the picture of overall trends and developments in waste management. These are not expected to close some of the major gaps, such as information on progress in the closure of landfills not meeting EU standards.

3.3 Water management

This review covers overall trends and developments regarding two priority themes under Cohesion Policy for water management: drinking water supply (priority theme 45) and waste water treatment (priority theme 46). The two themes are presented together as some EU legislation, in particular the Water Framework Directive, applies to both. Moreover, an initial scoping of projects supported by Cohesion Policy has shown that Member States have put in place

many integrated projects that cover both sectors (see section 4.2), making it difficult to separate the analysis for the two priority themes.[35]

While section 3.2 on waste management covered 23 Member States, the review of water management covers 21: Belgium and the UK, which allocated less than one million Euros of their Cohesion Policy resources to specific projects for the two priority themes, are not included here.

3.3.1 Investment in drinking water supply

Across all 21 Member States considered here, public sector investments in water supply (based on Eurostat COFOG data) decline over the period from 2007 to 2012 (see **Error! Reference source not found.**). Investment levels declined in particular for the EU15 Member States considered here; they increased for the EU13. The highest levels of investment, over EUR 600 million per year, are seen in three of the 21 Member States: France, Italy and Spain. (As noted in section 1, an updated data set will be used for the project final report, and this may change some results.)

Table 16 Public sector investments in water supply for 21 Member States

	2007	2008	2009	2010	2011	2012
FR	1,652.0	1,689.0	1,595.0	1,529.0	1,500.0	1,553.0
ES	1,356.0	1,388.0	1,406.0	1,051.0	766.0	766.0
IT	1,170.0	1,256.0	976.0	830.0	699.0	622.0
PL	273.8	291.2	294.6	326.2	300.2	255.5
DE	290.0	260.0	250.0	250.0	250.0	220.0
IE	386.9	394.0	283.7	203.1	176.4	142.9
CZ	143.1	153.3	117.7	120.1	117.0	104.1
RO	45.3	38.2	82.5	115.6	135.8	99.2
SI	51.0	80.8	85.6	62.1	63.4	79.4
EE	20.8	25.7	21.7	25.4	38.7	53.4
SK	16.9	12.4	20.6	47.1	50.0	48.2
CY	23.4	25.1	94.3	39.9	44.7	40.8
EL	59.0	65.0	71.0	53.0	32.0	40.0
HU	19.5	20.3	17.2	27.9	32.2	36.8
LV	26.5	25.6	16.3	35.8	34.0	31.6
PT	131.2	58.5	56.1	42.8	28.7	18.4
FI	17.0	14.0	14.0	18.0	18.0	15.0
BG	25.6	12.5	47.8	10.7	9.5	11.6
HR	:	:	:	:	:	2.6

[35] As noted in section 1, the UK did not make allocations to specific projects in the priority themes for water; allocations to specific projects for Belgium are 0.1 million Euros. These two Member States are included in this section, but are not relevant for the analysis in section 4.2 on the role of Cohesion Policy in the water sector.

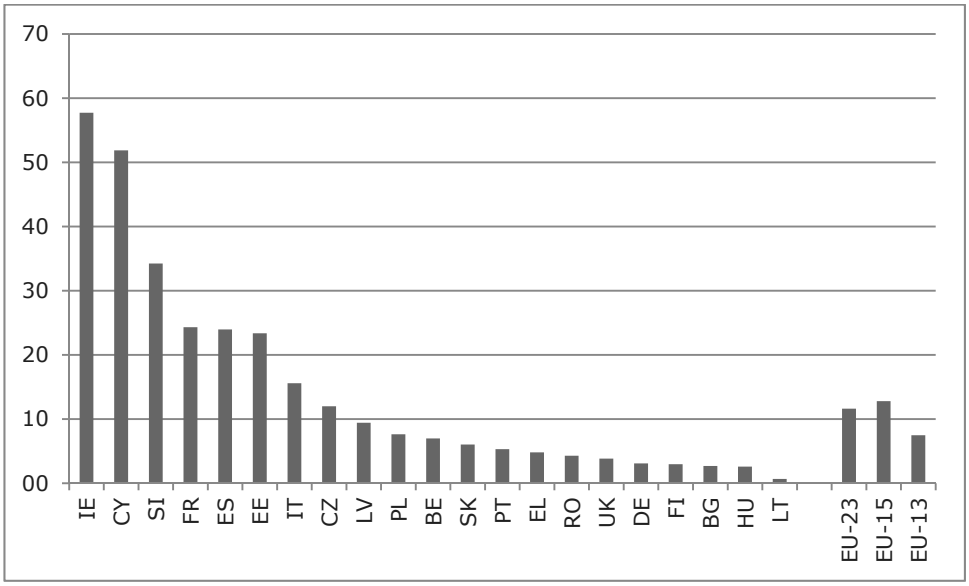
LT	1.2	1.0	0.6	0.8	2.1	2.5
MT	0.4	:	:	:	:	:
EU(21)	**5,917.0**	**6,266.2**	**5,853.3**	**5,075.6**	**4,370.6**	**4,422.7**
*EU15**	*5,269.6*	*5,580.1*	*5,054.4*	*4,264.0*	*3,543.0*	*3,657.0*
EU13	*647.4*	*686.1*	*798.9*	*811.5*	*827.6*	*765.7*

Notes: Data ordered by the volume of investments in 2012
Data for Spain in 2012 is an estimate based on 2011 level of investment
Since data for several Member States was missing, an extrapolation approach was used to estimate the drinking water investments in these countries: for Belgium, an average proportion of drinking water investment to total environmental investments for the remaining representatives of EU15 is used while for Bulgaria, Croatia, Romania and Slovakia we use an average proportion of drinking water investments to total environmental investments for the remaining EU13.
EU15* does not include the seven Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details).
For the final report, an updated data set from Eurostat will be used
Source: Eurostat, General government expenditure by function (COFOG), water supply

On a per capita basis, the highest levels of annual public investment for water supply are seen in Ireland and Cyprus (both over 50 EUR per capita per year), followed by Slovenia, France, Spain and Estonia (all over 20 EUR per capita per year). The lowest levels are seen in Bulgaria, Hungary and Latvia. As noted in section 1.3, this data has some gaps; more generally, the COFOG data are provisional for a couple of Member States.

In many towns and cities, drinking water supply is provided by government-owned water service companies; the COFOG data on public sector investment includes capital transfers but may not capture all investments made by these companies, nor would it capture investments made by any privately owned water companies.

Figure 8 Annual average public sector investment in water supply, Euros per capita, 2007-2012



Notes: data for Croatia and Malta are not included. See **Error! Reference source not found.** for further notes.
Source: Eurostat, General government expenditure by function (COFOG), water supply

3.3.2 Investment in waste water treatment

Public investments for waste water treatment (based on Eurostat COFOG data) declined from 2007 to 2012 for the 21 Member States considered here (see Table 17). As for water supply, there is a decrease for the EU15 Member States concerned; in contrast, investments for the EU13 rose. As these data cover public sector investments (gross fixed capital formation) and capital transfers, they should be directly comparable to Cohesion Policy spending; however, they do not include investments by private water companies and may not include investments financed directly at publically owned water companies. Also, as noted in section 1.3, there are some gaps in data and data for a couple of Member States are provisional; moreover, an updated data set will be used for the project final report, and this may change some results.

Table 17 Public sector investments in waste water treatment, million Euros

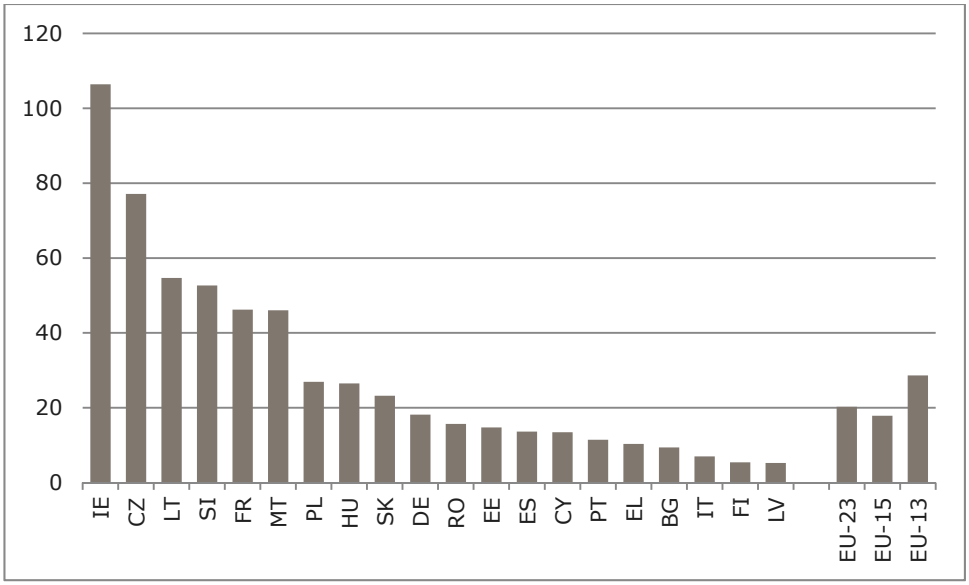
	2007	2008	2009	2010	2011	2012
FR	2,884	3,044	3,015	2,963	3,041	3,147
DE	1,820	1,740	1,510	1,310	1,350	1,190
PL	838	970	1,020	1,259	1,185	875
CZ	543	1,554	452	647	841	824
ES	1,125	602	607	856	321	321
RO	157	189	239	459	560	287
IT	537	488	498	402	297	278
IE	718	725	500	366	341	276
HU	330	287	150	254	290	268
SK	59	62	60	187	206	180
LT	106	104		188	136	136
SI	72	101	154	104	114	104
PT	159	139	133	122	98	74
EL	136	151	166	123	47	65
BG	89	62	139	43	39	43
EE	17	33	18	19	13	18
FI	45	39	34	26	16	16
MT	13	9	31	43	6	12
CY	10	11	11	14	13	11
HR						10
LV	17	19	43	5	6	5
EU(21)	**9,816**	**10,450**	**8,894**	**9,488**	**9,039**	**8,270**
*EU15**	*7,565*	*7,048*	*6,577*	*6,268*	*5,629*	*5,496*
EU13	*2,250*	*3,401*	*2,317*	*3,220*	*3,410*	*2,774*

Notes: Member States ordered by the volume of investments in 2012.
Since data for several Member States were missing, an extrapolation approach was used to estimate the share of waste water treatment investments: for Belgium and Finland an average share of waste

water treatment investments in total environmental investments for the remaining representatives of EU15 is used while for Bulgaria, Cyprus, Czech Republic, Croatia, Romania and Slovakia we use an average share of waste management investment in total environmental investments for the remaining EU13.
Data for Spain in 2012 and for UK in 2012 and 2011 are estimates based on previous year's levels of investment
EU15* does not include the seven Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details).
For the final report, an updated data set from Eurostat will be used
Source: Eurostat, General government expenditure by function (COFOG), waste water treatment

On a per capita basis (see Figure 9), several EU13 Member States are among those with the highest average public sector investments. Investments exceeded EUR 100 per capita in Ireland and EUR 70 per capita in the Czech Republic; they were over EUR 40 in Lithuania, Slovenia, France and Malta; and above EUR 20 in Poland, Hungary and Slovakia. In contrast, annual average per capita public sector investments were under EUR 10 in Bulgaria, Italy, Finland and Latvia.

Figure 9 Annual average public sector investment in waste water treatment, euros per capita, 2007-2012



Notes: See notes for Table 17. Croatia is not included.
Source: Eurostat, General government expenditure by function (COFOG), waste water treatment

3.3.3 Trends in drinking water supply

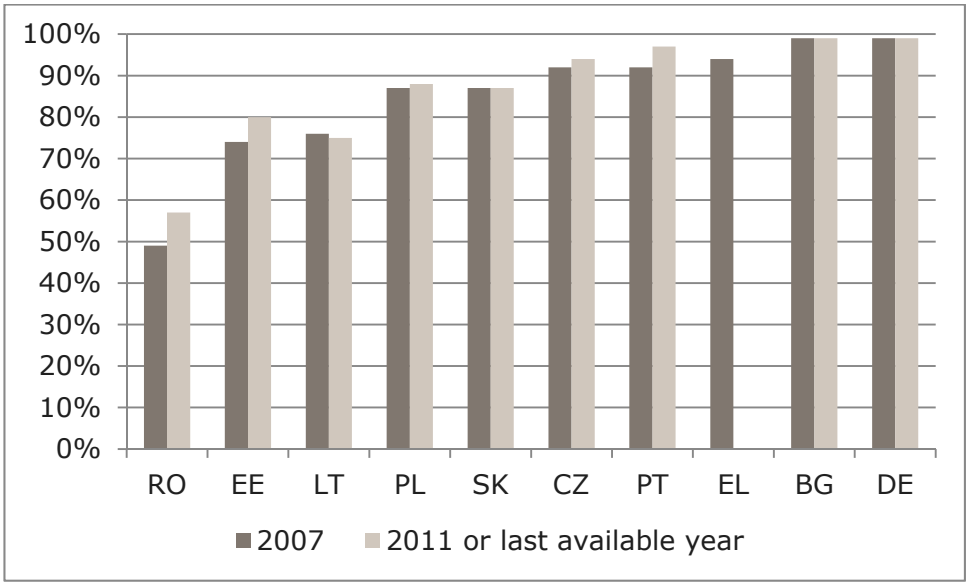
Population connected to public water supply

Access to a clean and safety water supply is a key element of the Drinking Water Directive. Member States report to Eurostat on the share of population connected to public water supply. Member States follow somewhat different methods in determining the share of their population connected. Moreover, these data are not complete. The results nonetheless provide an overview of trends for comparison with the core indicator on water supply for Cohesion Policy, as this measures the increase in population connected due to projects supported.

Among the 21 MS considered here, five reported increases in population connected to water supply, with the largest increases, 5 percentage points or higher, seen in Romania and Estonia (the MS with the lowest reported levels of connection in 2007) and in Portugal (see Figure 10). Lithuania reported a small decrease. A further five Member States reported 100% coverage in 2007 and later years and are not presented in the figure.

Data are not complete for this indicator: none are available for five MS, and for Greece, only 2007 data are available. Moreover, data are currently available only to 2011 at best. These gaps limit comparison with the Cohesion Policy core indicator for drinking water, which refers to the increase in population connected (see section 4.2.2).

Figure 10 Increase in share of population connected to public water supply, 2007 to 2011



Note: Four of the 21 Member States – Cyprus, Hungary, Malta and Spain – reported that 100% of their population was connected to water supply in 2007. These are not shown. The last available year is 2009 for Estonia and Portugal. Data are not available for Croatia, Finland, France, Ireland, Italy, Latvia or Slovenia.
Source: Eurostat, Water statistics, Public water supply

Water quality

The Drinking Water Directive distinguishes between large and small water supplies: the latter provide less than 1000 m^3 a day or serve less than 5000 persons.

For large water supplies, there appears to have been improvements in water quality between the two most recent reporting periods, 2005/7 and 2010 (see Table 18): in terms of microbiological indicators, four of the 21 Member States considered here reported that 95-99% of their samples were compliant with the

Directive in 2010; for the 2005/7 period, five of the Member States were in this lower category (data were not available for Italy in the earlier period, nor for Croatia in either period). (Due to differences in reporting methods, the values between the two periods are not fully comparable; data are not available for Croatia.)

Chemical indicators for large water supplies in general showed lower compliance. Here too, some improvements appear: only three Member States, Hungary, Italy and Lithuania, had less than 90% compliance in 2010; five MS had compliance potentially below 90% in the 2005/7 period. (The lower values in each period and for both types of indicators are highlighted in red in the table.)

Table 18 Water quality for large drinking water supplies: share of samples in compliance, 2005/7 and 2010

MS	Microbiological indicators		Chemical indicators	
	2005/7	2010	2005/7	2010
BG	99-100	95-99	95-100	95-99
CY	95-100	95-99	90-100	95-99
CZ	99-100	99-100	99-100	99-100
DE	99-100	99-100	95-100	95-99
EE	100	99-100	<90-100	95-99
EL	99-100	99-100	95-100	95-99
ES	99-100	99-100	95-100	95-99
FI	99-100	99-100	95-100	99-100
FR	99-100	99-100	95-100	95-99
HU	95-100	95-99	<90-100	<90
IE	99-100	99-100	95-100	<90
IT	:	99-100	:	95-99
LT	100	99-100	<90-100	<90
LV	100	95-99	95-100	99-100
MT	100	99-100	95-100	99-100
PL	95-100	99-100	95-100	95-99
PT	99-100	99-100	95-100	95-99
RO	99-100	99-100	<90-100	95-99
SI	95-100	99-100	99-100	95-99
SK	95-100	99-100	99-100	99-100

Note: due to differences in reporting, values from 2005/7 and those from 2010 are not fully comparable. The lower values for each period are highlighted in red. Data are not available for Croatia.
Source: European Commission, Synthesis Report on the Quality of Drinking Water in the EU examining the Member States' reports for the period 2008-2010 under Directive 98/83/EC, COM(2014) 363 final, 16.6.2014

The Commission's 2010 implementation report states that further Member State action will be needed in cases where compliance rates are below 99%. While only four of the 20 Member States considered here (data are not available for Croatia) had large water supplies with microbiological compliance rates below 99-100%, this was the case for 11 of the MS for chemical compliance rates. The reasons for non-compliance will vary; nonetheless, further investments are likely needed for compliance.

The role of small water supplies varies across Member States. These provide water to 20% or more of the population in seven of the 20 MS considered: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Poland and Slovenia (see Table 19). Small water supplies are commonly found in rural areas.

In five MS, the compliance of microbiological indicators for small water supplies was below 90% in 2010. (Comparable data are not available for the 2005/7 period.) For chemical indicators, compliance levels for small supplies are broadly similar to those for large supplies, according to the European Commission's most recent implementation report for the directive. Based on the microbiological indicator results in particular, the Commission's report states that "some Member States are struggling to manage small supplies in a safe way".[36]

Table 19 *Small drinking water supplies: share of total population served and share of samples in compliance with microbiological requirements, 2010*

MS	Share of total population (%)	Microbiological water quality
BG *	24	90-95
CY	18	90-95
CZ *	20	95-99
DE	9	95-99
EE *	32	99-100
EL	10	<90
ES *	12	95-99
FI	12	95-99
HU *	29	95-99
IE	15	95-99
IT	6	90-95
LT *	18	<90
LV	21	95-99
MT	4	99-100
PL	26	<90
PT	15	95-99

[36] Although not directly related to this evaluation of Cohesion Policy support, it is worth nothing that national reporting on drinking water quality is '…frequently not up to date and is difficult to understand…', according to the Commission's most recent implementation report.

RO	18	<90
SI	21	<90
SK	17	95-99

Note: * Exemption for water supplies of less than 10 m^3 per day or fewer than 50 persons as per Art. 3(2)(a) of the Drinking Water Directive, or similar definitions of very small supplies.
Data are not available for Croatia.
Source: European Commission, Synthesis Report on the Quality of Drinking Water in the EU examining the Member States' reports for the period 2008-2010 under Directive 98/83/EC, COM(2014) 363 final, 16.6.2014

The data available on water quality face several limitations: notably, data are only available to 2010 (and further updates are not expected before the final report), and there is not full comparability between reporting periods.

EU Legal Actions

In total, ten legal actions were taken in the period from 2007 to 2013 regarding transposition of the Drinking Water Directive in the 23 MS considered here (see Table 20). These were addressed to both EU15 and EU13 Member States. Five legal actions addressed poor implementation of the Directive: all were addressed to EU15 Member States, and issues included monitoring as well as poor drinking water quality.

Table 20 EU Legal actions regarding the Drinking Water Directive (98/83/EC)

	2007	2008	2009	2010	2011	2012	2013
Transposition		4	5	1			
Implementation	1	2	1		1		

Note: data include actions under the range of infringement phases, including: Letter of formal notice; Reasoned opinion; Referral to Court; Court Judgement; Case returned to Court. Data refer to the 22 MS that are the focus of this study (see Table 1).
Sources: European Commission, press releases on legal actions, 2007-2013[37]; European Commission, Annual reports on monitoring of the application of EU law, 2008-2014[38]; European Commission, unpublished data file, 2015

Information from selected Operational Programmes

A review of the Operational Programmes of six selected Member States (see Table 21) identifies a series of common problems: the need to increase access to water supply; losses in water supply networks; pollution of water bodies used as a source of drinking water.

In one of the six MS, Estonia, the 2014-2020 Operational Programme indicates that there has been progress compared to the previous one, with an increase in access to public water supply; however, the new Programme does not provide quantitative data on the improvements.

[37] Available at: http://ec.europa.eu/environment/legal/law/press_en.htm
[38] Available at: http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/annual-reports/index_en.htm#

Table 21 Key drinking water issues in the 2007-13 Operational Programmes of six selected Member States

Member State	Key issues identified
Bulgaria	• Good coverage of population connected to water supply systems (98.8%) but less served by treatment plants for drinking water (42.9%). • Internal losses in distribution networks (average of 59% water lost) and lack of water reservoirs are major problems.
Estonia	• Low access to quality drinking water: in 2004 77% of the total population was connected to the public water supply system • Need for the reconstruction and modernization of drinking water distribution and treatment systems.
Italy (Campania)	• Groundwater drinking water generally in good status • Water losses
Poland	• Despite significant improvement of water quality in Poland in recent years, investments still needed to fulfil the requirements of Directive 98/83/EC • The eastern and north-eastern parts of the country are the least developed
Slovenia	• Seasonal distribution problems • Groundwater pollution affecting water supply • Approx. 8% of the population lack connection to public water supply
Spain (Andalucía)	• Increasing levels of water consumption in urban areas from citizens and the tourism sector. • Overexploitation of aquifers. • Ground waters affected by saline intrusion and nitrate pollution (due to high use of fertilizers and pesticides in agriculture) • Water losses

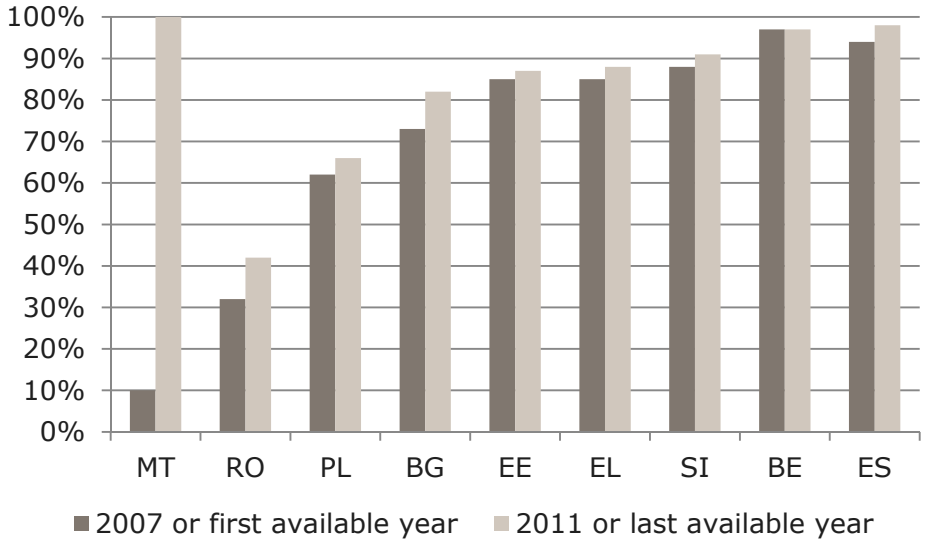
Sources: See Box 1 in section 0

3.3.4 Trends in waste water treatment

Population connected to waste water treatment

Member States report to Eurostat on the share of their population connected to waste water treatment. The reporting available provides a basis for comparison with the similar core indicator for Cohesion Policy. Based on reporting available, at least eight Member States saw an increase in the share of population connected to waste water treatment between 2007 and 2011 (see Figure 11).

Figure 11 Increases in the share of the population connected to waste water treatment, 2007 to 2011



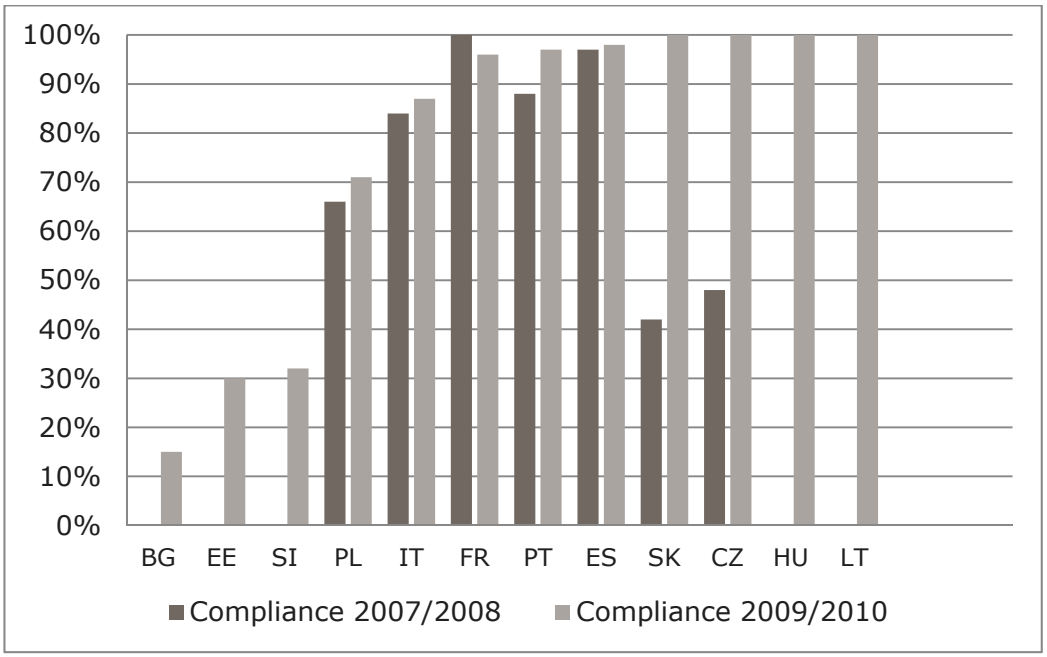
Note: Germany (not shown) reported 100% connection in 2007. Note: the first available year is 2008 for Spain, the last available year is 2010 for Germany and Spain. No data available for Croatia, Czech Republic, Cyprus, Finland, France, Hungary, Ireland, Italy, Latvia, Lithuania, Portugal and Slovakia.
Sources: Eurostat, Water statistics, Waste water treatment; Poland, national statistics: Environmental Protection Yearbook 2013, Main Statistical Office (GUS)

The data, however, has several important limitations. First, reporting is not complete. In addition, Member States may use somewhat different definitions in determining the level. Furthermore, while the data will be correlated with Member State progress in the implementation of the Waste Water Treatment Directive, the indicator is not expressed in terms of the Directive's targets.

Compliance with the Waste water Treatment Directive

In addition to their reporting to Eurostat on population connected, Member States report on their implementation of the Waste Water Treatment Directive. This involves somewhat different information: for example, data are reported in terms of agglomerations rather than population, reflecting the requirements of the Directive. The compiled results provide an overview of implementation of the Directive.

Figure 12 *Rate of compliance of MS agglomerations with Article 3 (waste water collection) of the UWWT Directive in terms of percentage of the load subject to the requirement*



Note: Cyprus, Latvia and Romania did not report data. Germany, Greece and Malta reported 100% compliance in both periods: these MS are not shown.
Source: European Commission, Technical assessment of the implementation of the Council Directive concerning Urban Waste water Treatment (91/271/EEC), 2013

In 2013, the European Commission reported that Member States had, by 2010, made significant improvements in waste water treatment – however, implementation was far from complete. Implementation of the Directive has been challenging because of the financial and planning aspects related to major infrastructure investments needed for sewerage systems and treatment facilities.[39]

The European Commission's assessment includes compliance in terms of three key requirements in the Directive:

- Waste water collection, required under Art. 3 for all agglomerations over 2000 p.e. (see section 2)
- Secondary treatment, required under Art. 4 for all such agglomerations
- More stringent treatment, required under Art. 5 for agglomerations over 2000 p.e. discharging into sensitive areas.

[39] Seventh Report on the Implementation of the Urban Waste Water Treatment Directive (91/271/EEC) (COM (2013) 574 final)

For waste water collection, the average rate of compliance (based on the amount of total waste water discharged) was 94% in 2009/2010 (up from 92% in 2005/7). Several Member States reach compliance of 100%. However, five Member States had compliance rates below 40% in 2009/2010: Bulgaria, Estonia, and Slovenia (see Figure 12); and in Cyprus and Latvia, whose collecting systems were not fully operational in 2009 (their compliance levels were assessed at 0% for that year)[40].

Figure 13 Rate of compliance of MS agglomerations with Article 4 (secondary treatment) of the UWWT Directive in terms of percentage of the load subject to the requirement

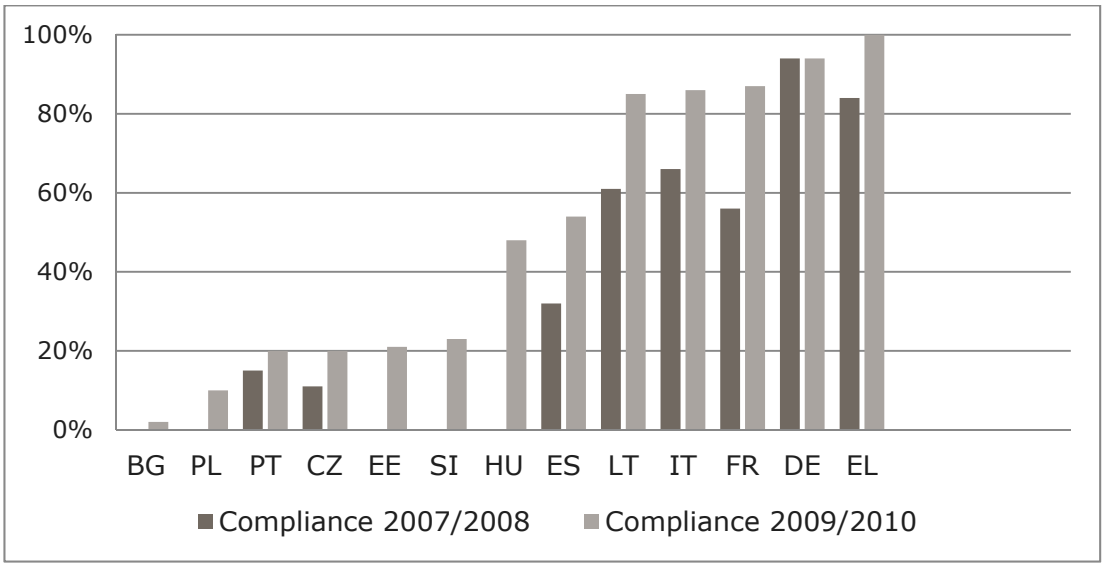
Note: Cyprus, Latvia and Romania did not report data.
Source: European Commission, Technical assessment of the implementation of the Council Directive concerning Urban Waste water Treatment (91/271/EEC), 2013

Several Member States achieved improvements in secondary treatment in this period: this is seen for eight of the MS shown in Figure 13. A further eight Member States did not report 2007/8 data, or provided data that appears incompatible with their 2009/2010 reporting. The results show major differences between the EU15, where the average compliance rate was 88% for 2009/2010, and the EU12[41], whose average compliance rate was 39%.

Compliance with requirements for more stringent treatment was problematic. Compliance levels were below 50% for all EU12 Member States reporting, and reached only 10% in Poland and 2% in Bulgaria (see Figure 14). For the EU15, average compliance rates exceeded 90%.

[40] Information based on the 7th implementation report of the Commission.
[41] Croatia was not included in this reporting cycle.

Figure 14 *Rate of compliance of MS agglomerations with Article 5 (more stringent treatment) of the UWWT Directive in terms of percentage of the load subject to the requirement*



Note: No data reported for Cyprus, Latvia or Romania. Slovakia has not declared sensitive areas.
Source: European Commission, Technical assessment of the implementation of the Council Directive concerning Urban Waste water Treatment (91/271/EEC), 2013

The data provided here are far from complete. This overview focuses on the main requirements of the UWWT Directive in terms of investment needs. Moreover, systematic data is not available across Member States on other key issues, such as storm water overflows. The data nonetheless show that Member States, in particular the EU13, had significant investments needs in order to meet the requirements of the Directive. It is hoped that further data available in summer 2015 will provide a more complete picture.

EU legal actions

Over the period 2007-2013, there were no legal actions related to the transposition of the Urban Waste water Treatment Directive (see Table 22). A total of 50 actions were taken related to the implementation of this Directive in 10 of the 23 Member States considered here: this is a key Directive with a high level of infringement actions, and several Member States are the subject of more than one action.

Table 22 *Legal actions concerning the Urban Waste water Treatment Directive and the Water Framework Directive in the 23 Member States*

	2007	2008	2009	2010	2011	2012	2013	2014
Urban Waste water Treatment Directive (91/271/EEC)								
Implementation	6	6	11	9	6	3	6	3
Water Framework Directive (2000/60/EC)								
Transposition	3	11	5	6		1	1	
Implementation	2		3	11	5	6		

Note: data include actions under the range of infringement phases, including: Letter of formal notice; Reasoned opinion; Referral to Court; Court Judgement; Case returned to Court
Sources: European Commission, press releases on legal actions, 2007-2013[42]; European Commission, Annual reports on monitoring of the application of EU law, 2008-2014[43]; European Commission, unpublished data file, 2015

For Water Framework Directive, 25 legal actions were taken regarding transposition and the same number for its implementation. Many of the actions on implementation concerned late preparation of river basin management plans; others concerned inadequate monitoring systems. It is not clear if any were directly related to drinking water supply or waste water treatment.

Results from selected Operational Programmes

Table 23 Waste water issues identified in six selected 2007-13 Operational Programmes

Member State	Key issues identified
Bulgaria	• Major need for UWWT plants, especially for smaller agglomerations. Many existing plants had only mechanical treatment capacity. • Many plants operating below capacity due to lack of sewer systems.
Estonia	• Inadequate waste water treatment systems and old sewer networks.
Italy (Campania)	• 62.1% of population severed by waste water treatment plants (higher than the national average), but more than ¼ of population lacks sewerage coverage. • Little use of separate systems for stormwater or the re-use of water resources • A high share of waste water samples not compliant with UWWTD requirements: need for improvement of existing treatment plants. • Waste water discharges pollute coastal waters
Poland	• Pollution of rivers and discharges into the Baltic Sea have a negative impact on water quality and the quality of environment of the coastal area. • This is aggravated with pollution coming from rainwater and snowmelt in urban areas, due to insufficient coverage and poor functioning of rainwater sewerage.
Slovenia	• Need to construct waste water treatment facilities in line with requirements of UWWT Directive in 159 agglomerations.
Spain (Andalucía)	• Approximately 24.9% of population lacking connection to waste water treatment facilities (Although there has been a considerable increase in the number of waste water treatment plants over the years, from 345 in 2000 to 495 in 2005). • In 2004, 88.52% of waste water collected was treated (below the national average of 92.59%)

Sources: see Box 1 in section 0

The review of six national and regional Operational Programmes for 2007-2013 showed that all highlighted the need for major investments in waste water treatment (see Table 23). Five of the six also underlined the need to improve sewer systems. The Operational Programmes for 2014-2020 in these regions refer to improvements since 2007, though only in Slovenia are these described precisely: in this MS, about half of the implementation needs are expected to have been covered in the 2007-2013 period.

[42] Available at: http://ec.europa.eu/environment/legal/law/press_en.htm
[43] Available at: http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/annual-reports/index_en.htm#

3.3.5 Technology developments for water supply and waste water treatment[44]

Drinking water treatment typically involves filtration and disinfection. For over a century, cities in Europe have used sand to filter drinking water in Europe. Recent developments include the use of *membrane* techniques – including reverse osmosis, ultrafiltration and nanofiltration – to remove contaminants and bacteria in drinking water, supplementing and in cases replacing the use of chemical disinfection methods. Over the period 2007-2013, membrane filtration has been introduced in many plants in the EU. One concern, however, is energy use, as early membrane methods had high energy demand; newer membrane methods have substantially reduced energy requirements.

Membrane filtration can be used to for the *desalination* of seawater, instead of thermal techniques. Many desalination plants have been introduced in Southern Europe over the last 10 years. High energy use is a major concern for desalination, even if membrane technologies typically require less energy than thermal methods. A further concern is the discharge of brine, which can affect coastal ecosystems.

Disinfection is traditionally done with chemicals, in particular chlorine or ozone. Over the last years, disinfection by *ultra-violet light* has become more common as it does not use chemicals.

Waste water treatment is a tried and tested process. The main steps are: primary treatment to remove solids; secondary treatment, usually with biological methods, to break down organic compounds in waste water; and tertiary treatment to remove further contaminants. Tertiary treatment can include disinfection, which allows water to be reused. Technology is evolving to improve these processes, to reduce energy consumption and also to respond to emerging policy needs. The latter include the protection of water bodies where the objectives of the Water Framework Directive require pollution reduction beyond the requirements of the Waste Water Treatment Directive. In particular in Member States affected by water scarcity and drought risks, the re-use of waters discharged from UWWT plants in agriculture is of growing interest; a further objective, set out in EU legislation, is to treat sludge removed from waste water sufficiently so for use in agriculture as a substitute for mineral fertilizers.

A range of new technologies have been introduced in Europe and North America. Among these, the use of semi-permeable membranes to remove larger solids and chemical contaminants from effluent is growing. Recently introduced developments include "ultrafiltration" that puts waste water under pressure, "nanofiltration" using nanotechnology-based filters and reverse osmosis systems. One goal of ongoing research and development is to remove "emerging" pollutants such as pharmaceuticals and suspected endocrine disruptors. For

[44] This section is based in particular on: US EPA, *Emerging Technologies for Waste water Treatment and In-Plant Wet Weather Management* (prepared by Tetra Tech Under Contract EP-C-11-009), March 2013

chemical disinfection (tertiary treatment), new methods are introducing alternatives to chlorine as the active chemical.[45] Tertiary treatment can include disinfection. UV disinfection systems have been introduced in Europe, North America and other parts of the world.

In many systems, storm waters run together with effluent in common systems, though in new systems especially the two are separated. Storm waters may receive simple treatment to remove objects (e.g. with gratings). Emerging methods include more advanced systems to remove solids and contaminants that run off from roads and other surfaces, for example with filters.

For both drinking water and waste water treatment, a key trend in technology development has been to introduce methods that reduce resource use in drinking water treatment. An emerging consideration for both is the use of '*green infrastructure*' methods, such as the restoration of natural landscape features that reduce upstream pollution, to supplement traditional 'grey' infrastructure.

3.3.6 Initial conclusions on trends and developments for water management

The review of data for *drinking water* shows that access to public supplies has increased in the period. The quality of water supplied by large systems has increased in many Member States. The trend for water quality provided by small systems is not available; however, in 2010 water quality was a concern for small systems in several Member States, including some where these systems provided 15% or more of the water supply. Overall investment trends are not available for this priority theme; however, the information available raises questions whether investment levels have been appear low in those Member States where access and water quality problems are a concern to meet EU requirements in the near term.

For waste water treatment, Member State reporting shows that at least eight Member States achieved an increased in the population connected between 2007 and 2011. Improvements were seen in some Member States in terms of compliance with the requirements of the Urban Waste Water Treatment Directive, in terms of the collection of waste water and its secondary and more stringent treatment. Nonetheless, the data available show that many Member States, both in the EU13 and the EU15, had considerable distance to cover in terms of meeting these requirements. The information gathered from six OPs shows that waste water treatment was acknowledged in 2007 as a major gap. The high level of EU legal actions in the period 2007 to 2013 underlines the ongoing needs for investment in this sector. The OPs highlight a range of specific issues to be addressed, including water losses from existing sewer system.

[45] Alternatives include: peracetic acid (CH3CO3H] and Bromo Chloro Dimethylhydantoin (1-Bromo-3-Chloro-5,5 Dimethylhydantoin)

Given the importance of investments in waste water treatment for Member States and for Cohesion Policy, it is hoped that more recent data on waste water treatment will be available for the subsequent drafts of this reports to provide more up-to-date trends (see section 3.3.7 below).

3.3.7 Information to be integrated in later drafts

Eurostat is expected to publish more recent data on population connected to waste water treatment by August 2015. In addition, in 2014 DG Environment collected information on the implementation of the Waste Water Treatment Directive. The results of the new reporting should also be available by August 2015 – this will provide update the overview of trends for waste water treatment through 2013, providing a stronger information base. New Eurostat data on population connected to water supply will be used, if available in time. More recent data on drinking water quality, however, will not be available as further Member State reporting on this directive has not taken place.

4 Contribution of Cohesion Policy to environmental achievements

This section addresses the third topic for Task 1, as set out in the specifications for the project:

- Identifying the contribution of Cohesion Policy 2007 – 2013 to the trends, developments and achievements in the areas of water and waste management in the EU. [to the trends and developments]

This section draws on two main types of financial data available for all Member States: the amounts set in the Operational Programmes for the three priority themes, first in the original 2007 Programmes and then as updated in the 2013 revisions of these Programmes; and the allocations to selected projects for the themes.

The section first provides an overview of the resources set in the Operational Programmes for the environmental theme overall, and then presents the resources determined for the three priority themes within the broader category. Separately for the waste sector (section 4.1) and the water sector (section 4.2), the funding allocated to selected projects through 2013 is compared to overall levels of public sector investment for environmental protection and water supply in the Member States. As in section 3, the focus is on the 23 Member States with more than EUR 1 million of Cohesion Policy funding for waste sector and the 21 with this level of funding for the water sector (see Section 1.2). The reviews of the waste and water sectors also examine progress on core and programme-specific indicators for Cohesion Policy[46] and provide a qualitative overview of the specific types of projects supported in six selected Member States.

The issue of absorption capacity is an important concern for Cohesion Policy spending on the environment and for water and waste in particular. Section 4.3 draws on literature as well as a review of Operational Programmes in seven Member States to consider challenges posed by the financial crisis, administrative capacity and the complexity of environmental infrastructure projects during the 2007-2013 period.

Share of funding allocated to environment, 2007-2013

According to the budget data in the 2013 AIRs, 12.5% of all Operational Programme resources for the 2007-13 period are assigned to the environment theme. The environment theme includes the priority themes dedicated to the

[46] For the 2007-2013 period, core indicators reflect the Community priorities as outlined in the Community Strategic Guidelines and programmes were required to integrate them whenever appropriate. They are mainly output indicators used to make comparisons or aggregations of data across similar programmes. Programme-specific indicators are defined directly by the Managing Authorities for each programme and should measure the extent to which programmes achieve desired results. See: European Commission, Indicative Guidelines on Evaluation Methods: Monitoring And Evaluation Indicators, Working Document No. 2, August 2006.

waste and water sectors that are the focus of this analysis, and also the following categories: air quality; mitigation and adaptation to climate change; rehabilitation of industrial sites and contaminated land; biodiversity and nature protection (and Natura 2000) and clean urban transport.

Table 24 Operational Programme allocations: environmental sector compared to total, 2007-2013 (million EUR)

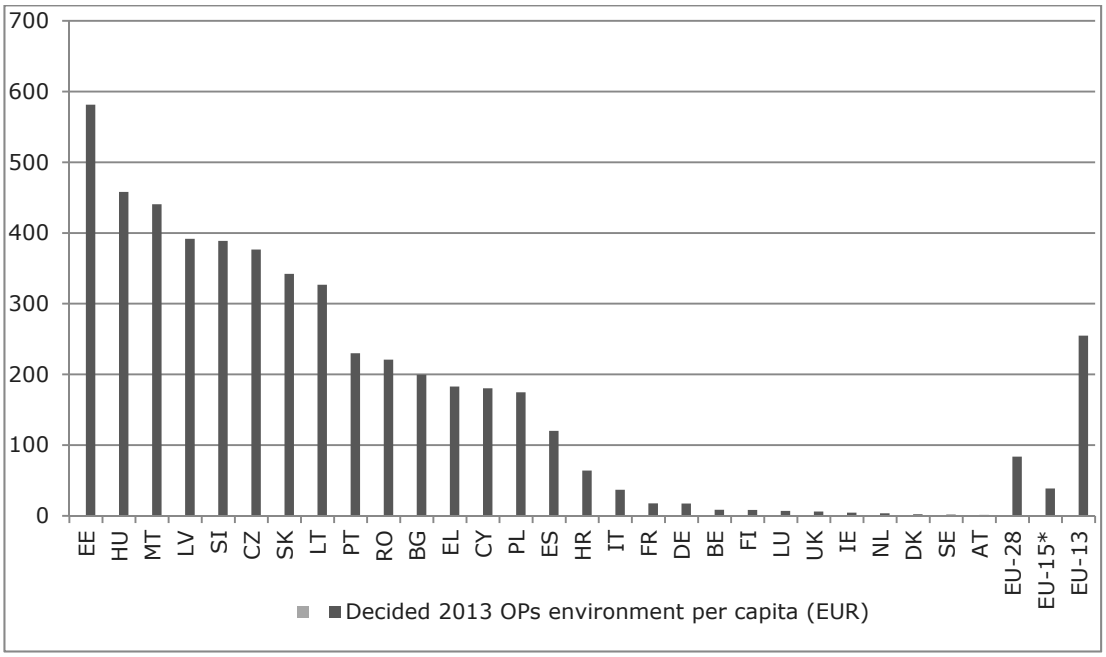
	OP 2013 resources to environment	Total OP 2013 resources (all sectors)	Share of funds allocated to environment (%)
HR	273.0	858.3	31.8%
CY	156.1	612.4	25.5%
RO	4,422.2	19,057.7	23.2%
EE	767.7	3,403.5	22.6%
MT	185.6	840.1	22.1%
BG	1,454.5	6,667.9	21.8%
SI	800.6	4,101.0	19.5%
HU	4,538.6	24,892.9	18.2%
LV	792.7	4,530.4	17.5%
ES	5,618.0	34,614.2	16.2%
SK	1,851.6	11,482.8	16.1%
CZ	3,960.5	26,128.3	15.2%
LT	971.2	6,775.5	14.3%
PT	2,410.8	21,411.6	11.3%
PL	6,729.7	67,185.5	10.0%
EL	2,023.2	20,210.3	10.0%
FR	1,148.4	13,546.3	8.5%
IT	2,198.6	27,952.6	7.9%
LU	3.8	50.5	7.5%
DE	1,394.5	25,481.1	5.5%
BE	95.6	2,060.2	4.6%
UK	384.8	9,886.2	3.9%
NL	61.6	1,660.0	3.7%
FI	45.3	1,596.0	2.8%
IE	20.5	750.7	2.7%
DK	12.3	509.6	2.4%
AT	11.7	1,191.5	1.0%
SE	15.9	1,626.1	1.0%
EU28	**42,349.0**	**339,083.2**	**12.5%**
*EU15**	*15,444.9*	*162,546.9*	*9.5%*
EU13	*26,904.1*	*176,536.4*	*15.2%*

Note: Member States ordered according to the share of funds allocated to environment.
For the final report, updated datasets including data for 2014 will be used
Source: DG Regional and Urban Policy, InfoView data

The share of Cohesion Policy funds allocated to environment is the second-highest among the 15 Cohesion Policy broad themes for which spending is tracked – it ranks behind only Innovation and Research, Technology and Development. As shown in Table 24, the shares of allocations for environment are higher in the EU13, 15.2% compared to the EU15 covered here (9.5%). It is likely that this is mainly because these countries have larger shares of Convergence regions and have greater needs for capital investment in environmental infrastructure. In five EU13 Member States – Bulgaria, Croatia, Cyprus, Estonia, Malta and Romania – allocations to environment exceed 20% of total Cohesion Policy funding allocations. The level is greater than 15% in five other EU13 - Czech Republic, Hungary Latvia, Slovenia and the Slovak Republic – as well as Spain. All the countries with an environment share below 10% are in the EU15. In EU15 Member States such as France, Germany, Italy and Spain, large environmental investments are focused on Operational Programmes in a few Cohesion Regions, and thus the national shares are lower.

On a per capita basis, the Operational Programme budgets for the environmental theme for the EU13, an average of about EUR 250, are several times higher than the average for the EU15, about EUR 40 (see Figure 15). Eight EU13 Member States – Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Slovenia, and Slovakia – have budget allocations to environment over EUR 300 per capita. These results show that Cohesion Policy is supporting a high level of level environmental investments in the EU13.

Figure 15 Cohesion Policy Operational Programmes' 2013 resources for environment per capita, per Member State, 2007-2013 (EUR)

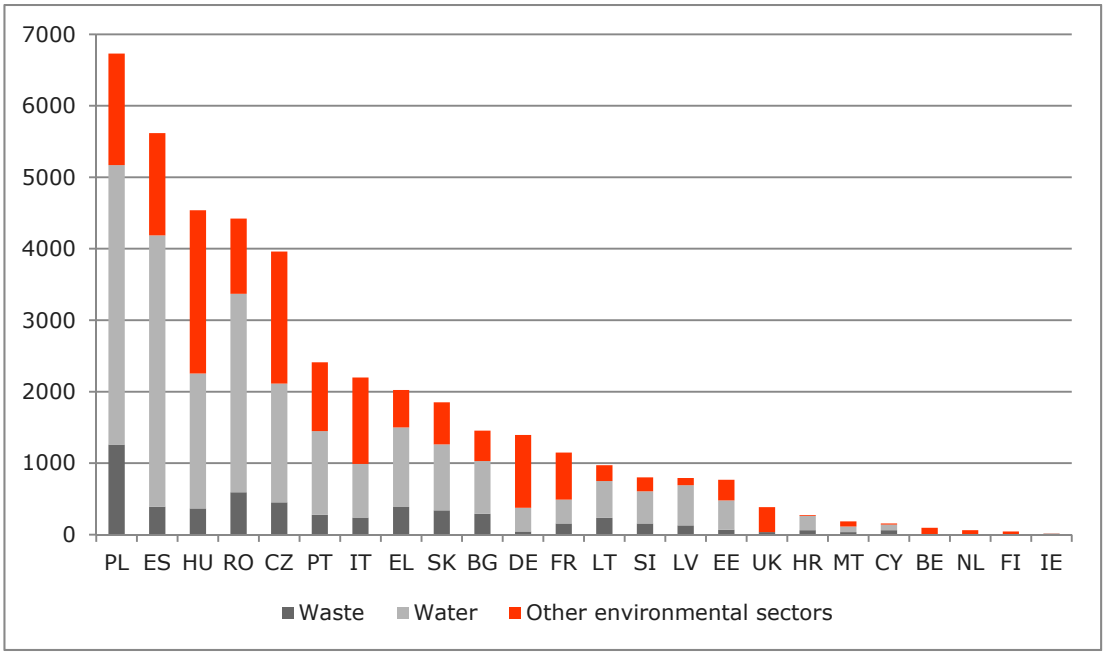


Source: DG Regional and Urban Policy, InfoView data

Funding allocated to priority themes for water and waste infrastructure

Within the field of environment, funding is allocated to specific priority themes. Operational Programmes' allocations for waste management, drinking water supply and waste water treatment include mainly large infrastructure projects and therefore account for the largest share of overall allocations to environment – around 64%. Exceptions to this are the countries with fewer Convergence regions[47] – Belgium, France, Germany and the UK. (Among EU13, the share for other projects is highest in Hungary.) When looking only at the water and waste themes, the vast majority of funds have been allocated to the water sector – around 79%, and within this most funds are used for waste water treatment. This is seen in Figure 16 below, which shows the split of allocations to waste, water and other environmental priority themes for the 23 Member States addressed here.

Figure 16 *Distribution of Cohesion Policy Operational Programmes' allocations to the environmental sector by field of intervention, per Member State, 2007-2013 (million EUR)*



Source: DG Regional and Urban Policy, InfoView data

A more detailed discussion of the Member States' allocations to the waste and water sectors and how these compare to overall environmental investment and environmental achievements is provided in the sections 4.1 and 4.2. These

[47] Convergence regions are those with GDP/capita of less than 75% of the EU average; Cohesion Policy funding overall has targeted these regions.

sections review both allocations to sectors by Operational Programmes as well as allocations to selected projects.[48]

4.1 Waste management

This sub-section reviews the contribution of Cohesion Policy to achievements in the waste management sector – priority theme 44. It first reviews financing trends to get a picture of how funding has been allocated in the waste management sector by the 20 Member States that have significantly dedicated funding to the sector.

The section then reviews these amounts against overall levels of government investment in the sector, to get a relative picture of the role of Cohesion Policy in capital investment in the various Member States. Next, the types of infrastructure interventions made possible by Cohesion Policy funds are reviewed. Here the focus is on progress reported in terms of the core and programme-specific indicators, along with a more in-depth review of the projects funding by six major Operational Programmes. Finally, an overall assessment of the contribution of Cohesion Policy to financing, technology and environmental trends in the waste management sector during the period 2007-2013 is provided, based on the presented data and information.

4.1.1 Financing trends

In total, just over EUR 5 billion has been allocated to selected projects by the Member States within the priority theme of waste management as of 2013. This represents 92% of the funding planned for the waste sector by Member States and regions in the 2013 version of the Operational Programmes.

This is shown in Table 25, which presents planned funding for waste management in the 2007 and 2013 versions of the Operational Programmes, and the amounts allocated to selected projects as of 2013 in all Member States.

Between 2007 and 2013 there was a slight downward trend in planned spending for waste management, of approximately 14% overall. This has been the trend in most Member States. In two Member States, Belgium and Portugal, the planned spending in the Operational Programmes has increased while in Hungary and Latvia it remained at the original level.

[48] The latest available data on allocations to selected projects come from AIRs 2013 and concern estimated allocations to selected projects for each priority theme. Data on actual expenditure rates or disbursement are not available by priority theme and therefore cannot be considered in this theme-specific analysis. In a Staff Working Document accompanying the communication Cohesion Policy: Strategic report 2013 on programme implementation 2007-2013, the European Commission notes that national practices regarding what is considered as the act of 'project selection' differ and are not regulated by EU definitions. Thus, direct comparisons between Member State project selection rates can be unreliable; instead, the Commission recommends comparing national project selection rates to the EU average.

Table 25 *Cohesion Policy Investments in waste management: adopted Operational Programmes and funds allocated to selected projects, per Member State, 2007-2013 (EUR million)*

Member State	Adopted OPs (2008)	Adopted OPs (2013)	Allocated to selected projects AIR 2013	% Allocated vs Adopted (2013)
EL	432.2	386.9	584.3	151%
PT	224.1	277.6	330.8	119%
RO	792.8	592.8	683.1	115%
BG	300.5	293.4	306.6	104%
SI	205.6	155.6	161.7	104%
SK	368.6	339.5	349.5	103%
DE	47.7	45.1	45.3	101%
MT	55.3	35.4	35.4	100%
HU	366.5	366.5	363.7	99%
UK	20.2	36.5	33.9	93%
ES	462.0	392.6	361.3	92%
HR	0.0	61.8	50.9	82%
PL	1,311.3	1,260.5	1,013.8	80%
LT	279.0	235.6	189.1	80%
BE	2.4	4.4	3.4	77%
EE	70.3	70.3	45.0	64%
FR	134.5	156.6	99.8	64%
IE	0.0	2.0	1.3	63%
CZ	520.3	453.2	251.9	56%
IT	338.1	239.4	119.9	50%
LV	129.5	129.5	62.7	48%
CY	125.5	61.7	23.2	38%
FI	0.0	0.0	2.1	
EU(23)	**6,186.3**	**5,596.9**	**5,118.7**	**91%**
EU15*	1,661.2	1,541.0	1,582.0	103%
EU13	4,525.1	4,055.9	3,536.6	87%

Note: Member States ordered according to the share of Allocated vs Adopted
For the final report, updated datasets including data for 2014 will be used; data on OP expenditures is expected to be available and will supplement the data on allocations to selected projects.
Source: DG Regional and Urban Policy, InfoView

The reasons for these shifts are likely to vary across Member States. In Poland, for example, a key factor has been a decrease in financing for waste incinerators: in Poland, 9 incinerators were foreseen in the 2007 Operational Programme; this was increased to 12 in 2008; however, only 6 were included in

the 2013 Operational Programme. The decrease in allocation of Operational Programme financing appears to be due to difficulties in the process for these large investments, tied for example to project preparation issues, rather than policy changes. Some of the money originally allocated to incinerators in Poland reported has been shifted instead to other waste investments, such as mechanical-biological treatment facilities, and some shifted to the water sector[49].

The rate of allocation of funds to selected projects, also shown in Table 25, varies across the Member States. Eleven Member States have allocations below the 92% average, with the lowest shares (below 50%) recorded for Cyprus and Latvia. Allocations in seven Member States are at 100% or above - for Greece the value exceeds 150%. The interviews and workshop will try to identify reasons why some Member States make allocations to specific projects higher than the levels in the adopted operational programmes. As noted above (see footnote 48), the definition of allocations to specific projects varies across Member States.

The role of Cohesion Policy resources compared to other public sector financing for the waste sector is considered in Table 26: this compares Cohesion Policy allocations to selected projects, along with EIB loans[50], with total public sector investment. As noted in section 1.3, this comparison uses data presenting different categories: allocations to projects and loan agreements with actual investments made. As noted above, allocations to projects are defined differently across Member States and thus the extent of the commitment varies; in some Member States, these allocations to projects could be reassigned to other sectors. Moreover, the data come from different sources and are in some cases incomplete: for this reason, yearly averages using available data have been calculated. In addition, the data do not include private investments..[51]

Cohesion Policy allocations to selected projects in the waste sector are above 25% of public sector investment (for all environmental protection, including water supply) in Bulgaria; these allocations are above 15% in Slovakia and over 10% in Latvia, Lithuania, Malta and Romania. Loans from the EIB are almost 20% of public sector investments in Cyprus and 12% in Finland and almost 10% in Poland. Overall, these data shows the significant role of Cohesion Policy for waste sector investments in the EU13: allocations to selected projects are 7.7% of total environmental protection plus water supply, compared to 0.6% in the EU15 Member States allocating more than EUR 1 million of Cohesion Policy resources in the sector. EIB loans are higher than Cohesion Policy allocations to selected projects in four EU15 Member States: Germany, Finland, France, Italy, Portugal; this is seen only in one EU13 Member State, Cyprus.

[49] P. Kalinka, European Commission (DG Regional and Urban Affairs), personal communication, April 2015
[50] No EBRD or World Bank loans for the waste sector were identified for the 2007-2013 period
[51] Although private companies play an important role in waste management some Member States, their role in investment in the EU13 appears limited to smaller projects, though at least one public-private partnership in Poland financed a waste incinerator.

Table 26 Comparison of Cohesion Policy allocations to selected projects and EIB and EBRD loans in the waste sector compared with total public sector investments, 2007-2013 yearly average (EUR million)

	CP allocation to selected projects [a]	EIB loans	Total public sector investments [b]	Cohesion Policy compared to total investment	EIB loans compared to total investment
	(EUR millions)			(Percent)	
BG	32.6	7.2	118.7	27.5%	6.1%
SK	37.7		212.4	17.8%	
RO	65.9	1.8	558.0	11.8%	0.3%
LV	7.0		62.6	11.1%	
LT	21.0		191.9	10.9%	
MT	3.9		36.1	10.9%	
EL	43.0		443.7	9.7%	
HU	40.4	14.6	430.6	9.4%	3.4%
SI	17.3		214.3	8.1%	
PT	30.8	39.2	396.5	7.8%	9.9%
PL	112.6		1,654.1	6.8%	
EE	5.0	4.2	86.8	5.8%	4.8%
CY	2.6	11.7	61.3	4.2%	19.1%
CZ	28.0		1,284.9	2.2%	
ES	40.1	66.1	3,272.7	1.2%	2.0%
IT	13.3	67.2	4,468.8	0.3%	1.5%
FR	11.1	14.3	6,527.3	0.2%	0.2%
DE	5.0	7.2	3,588.3	0.1%	0.2%
UK	3.8		3,473.1	0.1%	
BE	0.4		416.8	0.1%	0.0%
IE	0.1		871.6	0.0%	
FI	0.0	12.3	101.8	0.0%	12.1%
HR	5.7	0.3			
EU(23)	**527.4**	**246.1**	**28,475.2**	**1.9%**	**0.9%**
*EU15**	*147.7*	*206.3*	*23,560.6*	*0.6%*	*0.9%*
EU13	*379.7*	*39.8*	*4,914.6*	*7.7%*	*0.8%*

Notes:
[a] average of CP allocations are capped at the level of 2013 OP allocations and calculated across 9 years (2007-2015), to account for the fact that the funding can be spent until 2015.
[b] Total public sector gross fixed capital formation plus capital transfers for environmental protection and water supply
EU15* not including the five Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details).
Data on environmental investments for Croatia is not available. For the final report, updated datasets both regarding the Cohesion Policy and total investments will be used
Sources:Eurostat COFOG data on environmental investments, DG Regional and Urban Policy (InfoView), EIB

The results show that, particularly in the EU13, Cohesion Policy funds – and the public and private sources of co-financing they leverage – are a key source of investment in the waste management sector. This comparison is made, as has

been noted, on the basis of allocations to selected projects; section 4.3 discusses the key issue of whether all Member States will be able to absorb these allocated resources.

4.1.2 Environmental achievements

This section provides an overview of the types of projects funded by Cohesion Policy as well as information on their achievements, based on available indicators.

Cohesion Policy funding directly supports the key interventions that are required to achieve the objectives and targets of EU waste legislation, mainly in the management of municipal solid waste. As seen in Section 3, the available data show that Member States have made broad progress in implementing EU waste targets during 2007-2012. The share of the municipal solid waste going to landfills has fallen, and shares recycled or composted have risen, in line with the EU hierarchy for waste. Cohesion Policy has undoubtedly contributed to these achievements via support for the following types of investments:

- Regionalisation of waste management through the development of waste disposal infrastructure targeting multiple municipalities
- Closure and remediation of old, unsanitary waste dumps and non-compliant landfills serving smaller territories and hazardous waste sites
- Upgrade and modernisation of existing landfills
- Construction of facilities for separate waste collection and waste sorting
- Construction of facilities for waste treatment including composting and mechanical-biological treatment
- Construction (in some Member States) of facilities for waste-to-energy recovery, including incineration

A more detailed picture of the types of projects funded by Cohesion Policy can be seen from a review of the six selected 2007-2013 Operational Programmes, showing what the Member States intended to finance and the most recent List of Beneficiaries published by the Member States in 2014. An overview of planned interventions and projects approved for funding within these six programmes is provided in Table 28. The relationship between Cohesion Policy programmes and projects and key trends in waste management in the EU is discussed below.

Integrated waste management and landfills

There is a clear trend in the Operational Programmes towards regionalisation of waste facilities – i.e. moving from one landfill per municipality to regional-level waste management facilities. This is evident from the strategic approach described in the national-level programmes reviewed for Slovenia, Poland and Bulgaria.

Table 27 Overview of waste management projects planned and funded in six selected Member States, 2007-2013

Member State	Key planned interventions identified in OP 2007-2013	Scope of projects funded (from the Lists of Beneficiaries)
Bulgaria	• Establish system of 54 facilities (regional landfills) – including methane recovery and recycling centres • Remediate 47 remaining non-compliant landfills according to risk levels • Regional facilities for recycling construction and demolition waste	The majority of the waste projects are related landfills and integrated management of municipal waste. Nevertheless, several projects are related to composting and waste separation.
Estonia	• Closure of hazardous waste sites • Construction of waste collection and treatment facilities • Creation of new landfills compliant with environmental standards • Rehabilitation of old landfills • Improvement of sorting facilities (focus on organic waste, composting, production of bio-gas and MBT) • Improving the incineration capacity	Projects include: closure and rehabilitation of hazardous waste sites (ash-fields) and non-compliant landfills, construction of new waste sorting and treatment stations, production of compost, expansion of waste treatment/sorting facilities (also incineration), enhancing environmental inspection capacity.
Italy (Campania)	• Reorganization and expansion of network of public facilities for recovery of material from waste (recycling, composting and disposal on non-reusable fractions and treatment) • Improvement of the separate collection systems (through acquisition technological equipment and related software applications) • Realization of installations for the treatment of leachate	Treatment plant for organic waste (biogas generation) Financing for the preparation of municipal waste separate collection (to reach the 65% recycling target) Ecological station for the storage of waste components collected separately (ecological stations integrated the standard municipal collection system and the material collected will be recovered
Poland	• Support aimed at prevention and reduction of municipal waste generation as well as at waste recovery, including recycling. • Special focus on implementation of better waste disposal technologies and on the elimination of the risks arising from the storage of waste.	Projects include: construction of facilities for separate collection and mechanical-biological treatment of waste serving multiple municipalities; development of new and expansion of existing waste facilities, reclamation of landfill sites, construction of 7 facilities for thermal waste treatment
Slovenia	• Establish 200+ collection centres • Construct new regional centres for waste management • Improve processing, treatment and monitoring at existing regional centres • Construction of 1 or 2 waste-to-energy facilities (i.e. incineration) • Rehabilitation of old landfills	Projects include: Facilities for separate collection and mechanical-biological treatment of waste serving multiple municipalities; development of new and expansion of existing landfills
Spain (Andalucía)	• Develop integrated waste systems • Close uncontrolled landfills (dumps), and of end-of-life controlled landfills • Produce compost from organic waste, and promote its commercialization • Enhance the municipal solid waste management through prevention and reuse strategies, a regional network for recycling, the increase of separate collection	Projects include: Selective collection of waste; recycling of solid waste (from the construction sector in particular); construction of waste processing plants; composting of waste; sealing of landfills

Sources: See Box 1 in section 1.3.

Closely linked is the need to close and rehabilitate smaller, unregulated landfills, in favour of shifting disposal to larger centres serving multiple municipalities. The rehabilitation of old landfill sites and modernisation/expansion of the existing ones is mentioned among the priority actions in the Operational Programmes for Slovenia, Poland, Estonia, Bulgaria and Andalucía. It is typically included within larger projects titled 'integrated waste management': a review of 15 major projects[52] in the waste sector found that all of those located in the EU13 and outside major urban areas included a landfill reclamation component. Despite considerable investment in this area by Cohesion Policy funds, however, many Member States still have a long way to go in closing or upgrading non-compliant landfills (see Section 3.2.2).

Table 28 Programme-specific indicators on closure and remediation of landfills

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
EL	Environment and Sustainable Development	Sites of uncontrolled disposal of solid waste that are rehabilitated	sites	642	288	45%
FR	Guadeloupe Federation	Surface of existing landfills rehabilitated	km^2	1,334	1	0%
LT	Cohesion Action Plan	Number of closed and managed / dumps	dumps	249	242	97%
RO	Environment	Old waste landfills and dumps closed in rural areas	units	1500	189	13%
RO	Environment	Old municipal waste landfills closed in urban areas	units	150	17	11%
SK	Environment	Number of closed and regenerated landfills	units	57	46	80.7%
SK	Environment	Size of re-cultivated and regenerated area	km^2	1	0.67	67.0%

Source: WP0, based on AIRs 2013 data.

The importance of closure and remediation of unregulated landfills is the subject of programme-specific indicators for six Operational Programmes, as shown in Table 28. Lithuania and Slovakia have tracked significant progress with regard to targets set for 2013 on the number and land area of landfills to be addressed. Notably Romania lags behind, despite the fact that landfill closure has been highlighted as a significant problem there. The review of major projects shows that Cohesion Policy investments have been used for innovative approaches: for example, a project in Malta envisions the rehabilitation of a former landfill into a urban park.

Several Member States have used Cohesion Policy to construct new landfills that are compliant with the EU Landfill Directive, often as part of integrated waste

[52] Based on project documentation submitted to the Commission

management projects. The construction of new landfills is specified in the Operational Programmes for Bulgaria and Estonia, for example (see Table 27 above). This raises questions in terms of the EU waste hierarchy, which calls for a move away from landfills. These investments are believed to be part of an approach to close small landfills that do not meet standards in the Landfill Directive and replace part of their capacity with larger, regionalised landfills that are compliant.

Table 29 Programme-specific indicators on landfill construction and upgrade

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
CY	Sustainable Development and Competitiveness	Population served by sanitary landfills	%	100	27	27%
EE	Development of Living Environment	Number of regional non-hazardous waste landfills in Estonia	units	7	6	86%
LT	Cohesion Action Plan	Increase in percentage of waste landfills meeting the EU environmental protection requirements (in percent)	%	100	9.9	10%

Source: WP0, based on AIRs 2013 data.

Three Member States set programme-specific indicators specifically on the construction and upgrade of landfills, as shown in Table 29 above. While the indicators are not comparable, it can be seen that the target achievement rate was high in Estonia but relatively low for Cyprus and Lithuania.

Implementing the waste hierarchy: sorting, composting, recycling, incineration

A key strategic objective in all countries/regions reviewed is to increase the rate of selective collection and recycling. This is to be achieved through multiple types of investments; the review of major projects showed that nearly all provide for the construction more than one type of facility. For example, the waste management project for Gdansk, Poland, includes a waste storing plant, a composting facility and landfill improvements, including the extraction of methane for energy production; the project also supports separate collection of municipal waste and awareness raising activities. All six of the Member States studied in-depth had projects addressing this issue, through separate collection, sorting plants, composting plants and MBT facilities.

Eight Member States have chosen to monitor their progress in increasing capacity to recycling and reuse waste. Four established indicators for separate waste collection, a key tool in the waste hierarchy (see Table 30).

Table 30 Programme-specific indicators on separate waste collection

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
IT	Campania region	Urban waste covered by separate collection of rubbish (% of total urban waste)	%	40%	40%	100%
PT	Territorial Enhancement	Additional RUB separated in the source	tonnes	9	11	125%
SI	Development of environmental and transport infrastructure	Separately collected fractions of waste	t/year	295,000	15,615	5%
SK	Environment	Number of constructed, or modernised separated waste collection facilities	units	50	104	208%
SK	Environment	Volume of separated communal waste (total for projects)	tonnes	97,000	37,701	38.9%

Source: WP0, based on AIRs 2013 data.

Some programme-specific indicators target specific waste streams (e.g. biodegradable waste) while others look at the capacity of facilities or volumes of waste landfilled (see Table 31). Implementation progress varies considerably and due to the very different nature of the indicators, should not be used to compare Member States.

Table 31 Programme-specific indicators on sorting, treating and recycling waste

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
CZ	Environment	The proportion of waste recycled	%	75%	76%	101%
CZ	Environment	The ratio of utilized municipal waste	%	50%	42%	84%
EE	Development of Living Environment	Rate of recovery of solid waste (excl. oil shale and agricultural waste)	%	60%	0	0%
EE	Development of Living Environment	Share of biodegradable waste in total landfilled waste (%)	%	30%	0	0%
HR	Environment	Reduction of waste deposited in the landfills at county level	%	70%	0	0%
HR	Environment	Reduction of waste deposited in the landfills at national level, as a result of newly opened waste management centres	%	11%	0.00	0%
IT	Campania region	Urban waste disposed in garbage dump (kg per capita)	kg/inh	180	80	44%

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
MT	Investing in Competitiveness for a Better Quality of Life	Landfill volumes saved on an annual basis as at 2013	m^3	130,000	0	0%
PT	Territorial Enhancement	Capacity of processing of sorting unit	millions t/year	140	67.87	48%
SK	Environment	Number of constructed or modernised waste material recovery facilities	units	42	95	226.2%
SK	Environment	Volume of materially recovered waste (total for projects)	tonnes	198,590	315,051	158.6%

Source: WP0, based on AIRs 2013 data.

As reported in Section 3.2.2, despite considerable progress during 2007-2012, many Member States have not met their 2006, 2009 and 2010 targets for reduction of biodegradable waste landfilled, Furthermore many are not on track to meet 2020 targets for recycling of household waste. This issue therefore remains a major challenge for Member States, despite progress with Cohesion Policy investments during 2007-2013.

The incineration of waste ranks below recycling in the EU waste hierarchy (see section 2), but is preferred to landfilling. It remains a solution proposed in only certain Member States due to high upfront costs and other complexities. Cohesion Policy funds have played a role in increasing the share of the municipal solid waste treated by incineration in certain Member States. For example, as shown in Section 3.2.2, the share of waste incinerated in Estonia increased by 12% between 2007 and 2012 – a country which planned for investment in incineration capacity in its Cohesion Policy programme. Poland and Slovenia also planned the construction of additional incineration capacity, and one of the major projects under analysis will provide incineration capacity in the French outermost region of Guadeloupe.

Waste management projects overall

Table 32 below presents data related to the core indicator 27: number of waste projects. This indicator provides only limited information about the exact contribution of project outputs to environmental needs in the waste sector. The great variations in terms of the targets themselves across the Member States may result from differing definitions of a 'project', whereby a large project covering several municipalities can be classified either as one or as several projects. The indicator nonetheless does give a picture of the overall progress that Member States are making with regards to the implementation of projects in this sector, based on the targets they set in 2007. It can be seen that progress in terms of completion of the number of planned projects varies considerably across the Member States. Bulgaria and Romania stand out in particular with less than 10% of planned projects realised; in contrast, five

Member States – Czech Republic, Greece, Malta, Slovakia and Slovenia – achieved more than 100% of their target.

Table 32 Number of waste projects: targets and achievements, per MS, 2013

Member State	2013 Corrected Target	2013 Corrected Achievement	% Achieved vs target
MT	2	3	150.0%
CZ	256	318	124.2%
GR	78	95	121.8%
SI	6	7	116.7%
SK	235	269	114.5%
HU	60	56	93.3%
FR	234	181	77.4%
PT	87	66	75.9%
IT	671	431	64.2%
ES	973	604	62.1%
PL	318	186	58.5%
DE	228	24	10.5%
BG	24	1	4.2%
RO	37	0	0.0%
BE		1	
EE		35	
LT		29	
LV		105	
UK		17	

Note: Targets and Achievements from AIRs 2013 corrected by WP0 where necessary
For the final report, data on core indicators will be updated (2014 data should be available)
Source: core indicators WP0, based on AIRs 2013 data.

This core indicator has limitations, however. Notably, it does not provide information on the size of the projects funded; nor does it provide any indication of the type of waste management projects.

4.1.3 Initial conclusions on the role of Cohesion Policy in the waste sector

Based on the data available at this point, Cohesion Policy has potentially played a strong role in the progress towards EU targets and objectives related to municipal solid waste management in the period 2007-2013. Cohesion Policy funding has constituted a large share of overall public investment in the sector. The core and programme-specific indicators for the waste sector provide a mixed picture that is not always easy to read. On the one hand, over 2400 projects supported by Cohesion Policy for the theme on waste management had been completed from 2007 to 2013. On the other hand, reported progress through

2013 was poor in some Member States, in particular Bulgaria and Romania, and the programme-specific indicators provide a mixed picture.

In six Operational Programmes reviewed, the projects funded in the waste sector appear to reflect EU legislative requirements and targets. Although data do not allow for direct comparisons of the contribution of specific projects to improvements in environmental performance, the larger picture shows that the focus on sorting, composting, treatment of waste as well as the development of compliant waste disposal infrastructure is leading the way towards progress on the EU targets.

Concerns remain, however, about the volume of achievements made. In addition to the mixed picture seen in the core and programme-specific indicators, some countries had re-programmed a share of funding away from the waste management sector over the period from 2007 to 2013 (these resources most likely went to finance water sector infrastructure or other environmental priorities). These elements raise the concern whether Cohesion Policy investments will achieve results in the waste sector originally foreseen.

A further concern was raised by the European Court of Auditors in a review of 26 projects supported by Cohesion Policy. The projects came from both the 2000-6 and 2007-13 spending periods. This review found that the projects supported EU policy objectives, including the waste hierarchy; however, their impacts could have been stronger if they were more strongly linked to policy actions such as waste strategies and to economic incentives such as landfill fees.[53] This can influence the extent to which the projects funded represent the most cost-effective strategic solutions for the regions or local areas in question. This raises a larger question about the coherence and linkages between Cohesion Policy investments and EU and Member States policies.

Section 4.3 below reviews issues related to the absorption of Cohesion Policy resources for environmental projects, and these issues will be further considered in interviews and the upcoming workshop.

4.2 Water sector

This section analyses the Cohesion Policy contribution to the achievements in the water sector, which encompasses both drinking water supply (priority theme 45) and waste water treatment (priority theme 46). As noted in Section 1, many Member States have planned Cohesion Policy projects that include both drinking water and waste water treatment investments, making it difficult to establish a clear division line between the two. Hence, the financing trends presented in this section combine both priority themes. Project interventions and environmental

[53] European Court of Auditors, Is structural measures funding for municipal waste management infrastructure projects effective in helping Member States achieve EU waste policy objectives? Special Report No 20/2012

indicators, however, are considered separately for drinking water supply and waste water treatment sectors to the greatest extent possible.

Similar to the previous section on waste management, this section will review financing trends with regard to Cohesion Policy allocations to selected projects under the water management themes, and also review the share of financing in light of available data on public investment in the sector. It will also review the types of infrastructure interventions made possible by Cohesion Policy funds, and focus on progress to targets in core and programme-specific indicators.

Finally, an overall assessment of the contribution of Cohesion Policy to financing, technology and environmental trends in the water sector during the period 2007-2013 is provided, based on the presented data and information.

4.2.1 Financing trends

In total, just over EUR 24 billion has been allocated to specific projects by the Member States under the priority themes of drinking water management and waste water treatment (see Table 33). This represents 111% of the funding planned for the water sector by Member States and regions in the 2013 versions of the Operational Programmes.

Operational Programme allocations to the water sector decreased slightly across all Member States between 2007 and 2013. At Member State level, Greece, Portugal, Spain and Bulgaria are among the countries registering decreases in funds planned to be invested in the water sector over the period[54], while Poland, Italy and Lithuania register significant increases.[55]

Table 33 Cohesion Policy Investments in the water sector (drinking water supply and waste water treatment): adopted Operational Programmes and funds allocated to selected projects, per Member State, 2007-2013 (EUR million)

Member State	Adopted OPs (2008)	Adopted OPs (2013)	Allocated to selected projects AIR 2013	% Allocated vs Adopted (2013)
EL	1,398.2	1,112.4	2,933.7	264%
SI	382.9	450.3	722.9	161%
BG	934.9	735.7	1,161.5	158%
FI	9.5	9.5	14.3	150%
IT	574.9	749.7	1,055.5	141%

[54] In relative terms, Bulgaria, Greece and Portugal are, in this order, the countries registering higher decreases, all of around 20%, while in the case of Spain the decrease is of around 6%.

[55] The UK is not included in the selection of the Member States analysed in this section since it did not allocate any Cohesion Funding to the priority themes related to water management.

Member State	Adopted OPs (2008)	Adopted OPs (2013)	Allocated to selected projects AIR 2013	% Allocated vs Adopted (2013)
RO	2,776.5	2,776.5	3,736.3	135%
CY	8.5	79.3	100.8	127%
IE	8.0	15.0	17.7	118%
EE	407.8	407.8	465.5	114%
LT	343.6	515.1	564.4	110%
HU	1,958.6	1,887.6	1,997.3	106%
DE	375.0	331.9	338.7	102%
PT	1,439.4	1,171.1	1,189.6	102%
LV	563.0	563.0	557.1	99%
PL	3,663.8	3,908.8	3,653.5	93%
MT	46.8	78.2	71.8	92%
FR	279.4	334.0	300.4	90%
SK	890.6	923.3	790.8	86%
ES	4,019.5	3,793.7	3,121.1	82%
HR		199.1	156.4	79%
CZ	1,745.5	1,659.7	1,070.0	64%
EU(21)	**21,827.4**	**21,702.7**	**24,019.4**	**111%**
EU15	*8,104.9*	*7,518.3*	*8,971.1*	*119%*
EU13	*13,722.5*	*14,184.4*	*15,048.3*	*106%*

Note: Member States sorted according to the percent of Allocated vs Adopted
For the final report, updated datasets including data for 2014 and data on expenditures should be available.
Source: DG Regional and Urban Policy, InfoView data

Meanwhile, the rate of allocation of funds to selected projects averages at 111% of the amount planned the most recently adopted programmes. Particularly high rates are registered in Greece, Slovenia, Bulgaria and Italy. Across all of the 21 Member States with allocations over EUR 1 million to the two priority themes, the allocation to selected projects is over 60% of their 2013 Operational Programmes. The interviews and workshop will try to identify reasons that allocations to specific projects are higher than the adopted programmes, in some cases by large amounts.

Table 34 Yearly average of Cohesion Policy allocations and EIB and EBRD loans in the water sector compared with yearly average total public sector investments for environmental protection and the water sector, 2007-2013

Member State	Cohesion Policy allocations to selected projects[a]	EIB loans	EBRD loans	Total public sector investments[b]	Cohesion Policy compared to total investments	Loans compared to total invest-ments

	(EUR million)				(Percent)	
LV	61.9	20.0		62.6	98.9%	31.9%
BG	81.7	55.7	7.7	118.7	68.9%	53.4%
RO	308.5	51.3	30.3	558.0	55.3%	14.6%
EE	45.3	17.4		86.8	52.2%	20.0%
HU	209.7	71.0		430.6	48.7%	16.5%
SK	87.9	43.3		212.4	41.4%	20.4%
PT	130.1	181.6		396.5	32.8%	45.8%
LT	57.2	18.9		191.9	29.8%	9.8%
EL	123.6	36.7		443.7	27.9%	8.3%
PL	405.9	127.4		1,654.1	24.5%	7.7%
SI	50.0	21.4		214.3	23.4%	10.0%
MT	8.0	6.7		36.1	22.1%	18.5%
CY	8.8	59.7		61.3	14.4%	97.4%
ES	346.8	441.0		3,272.7	10.6%	13.5%
CZ	118.9	87.4		1,284.9	9.3%	6.8%
IT	83.3	281.6		4,468.8	1.9%	6.3%
FI	1.1	0.0		101.8	1.0%	0.0%
DE	36.9	335.9		3,588.3	1.0%	9.4%
FR	33.4	73.3		6,527.3	0.5%	1.1%
IE	1.7	16.7		871.6	0.2%	1.9%
HR	17.4	13.3	4.3			
EU(21)	**2,218.1**	**2,179.1**	**42.3**	**28,475.2**	**7.8%**	**7.8%**
EU15	*756.8*	*1,585.6*	*0.0*	*23,560.6*	*3.2%*	*6.7%*
EU13	*1,461.3*	*593.5*	*42.3*	*4,914.6*	*29.7%*	*12.9%*

Notes:
[a] average of CP allocations are capped at the level of 2013 OP allocations and calculated across 9 years (2007-2015), to account for the fact that the funding can be spent until 2015.
[b] Total public sector gross fixed capital formation plus capital transfers for environmental protection and water supply
Average of CP allocations are capped at the level of 2013 OP allocations and calculated across 9 years (2007-2015), to account for the fact that the funding can be spent until 2015.
EU15* not including the five Member States with less than one million Euros in Cohesion Policy allocations for the two sectors (see section 1.2 for details).
Data on public sector environmental investments for Croatia is not available.
For the final report, updated datasets for both Cohesion Policy and total investments should be available.
Sources:Eurostat COFOG data on environmental investments, DG Regional and Urban Policy (InfoView data), EIB, EBRD

A comparison of Cohesion Policy funding, along with EBRD and EIB loans, as a share of overall public investment funding in the water sector, highlights the important role of these sources (see Table 34 above). As noted in sections 1.3 and 4.1.1, this comparison uses data presenting different categories: allocations to projects (whose definition varies across Member States) and loan agreements are compared with actual public investments made. The data come from different sources and are in some cases incomplete. In addition, private investments in public water supply are not included, though these are not believed to play a major role in most Member States.

In five EU13 Member States – Bulgaria, Estonia, Hungary, Latvia and Slovakia – Cohesion Policy allocations to selected projects are above 40% of total public sector investments for environmental protection and water supply. In Latvia, the share is almost 100%. Among the EU15, only two – Greece and Portugal – have levels above 20%. In comparison with the waste sector, where international loan financing played a smaller role, loans from the EIB are seen in all the 21 Member States considered; EIB loans (plus the far smaller EBRD loans) are roughly equal in volume to the Cohesion Policy allocations to projects.

Major differences are seen between the EU15 and the EU13. In the former, Cohesion Policy allocations to selected projects represent only 3.2% of total public sector investments, while EIB and EBRD[56] loans are more twice that level, 6.7%. In contrast, in the EU13, Cohesion Policy allocations to selected projects are almost 30% of total public sector investments and loans are much smaller, below 13%.

Both Cohesion Policy funds and loans play a much higher role in the water sector than the waste sector. The uptake of Cohesion Policy allocations to projects is thus crucial for the sector; this is discussed further in section 4.3.

4.2.2 Environmental achievements – drinking water supply

This section will show, based on indicators as well as information from selected Operational Programmes and projects, that Cohesion Policy funding for the drinking water sector supports a range of improvements in the infrastructure required to provide a reliable supply of clean and safe drinking water in all areas. The investments are directly targeted at the water quality targets of the Drinking Water Directive, and also address issues such as connection of rural populations and the supply of water in varying climatic conditions. Monitoring and information systems for consumers are also included in investment.

In general, Cohesion Policy funds allocated to drinking water supply projects over the period have been mainly devoted to:

- Extension of drinking water supply networks
- Improvement and modernisation of networks in order to prevent water losses and improve water use efficiency
- Improvement of treatment capacities for drinking water supply
- Establishment of systems to monitor the quality of drinking water

[56] Data on EBRD loans in the water sector for Bulgaria, Croatia and Romania have been retrieved from the website of EBRD: http://www.ebrd.com/work-with-us/project-finance/project-summary-documents.html. These data are presented as annual averages to enable comparison with data from other sources.

Table 35 Overview of drinking water supply projects planned and funded, 2007-2013

Member State	Key planned interventions identified in OP 2007-2013	Scope of projects funded (List of Beneficiaries)
Bulgaria	• Foster the integrated management of water – combined with waste water treatment	• The majority of projects cover the entire water cycle – from distribution of drinking water to collection and treatment of waste water.
Estonia	• Construction and modernisation of infrastructure for drinking water supply (pipelines and treatment plants)	• The majority of projects are related to the extension and upgrading of drinking water supply systems.
Italy (Campania)	• Completion of drinking water supply network • Rationalisation of the use of existing networks, among others by establishing systems to monitor water losses	• Extension and improvement of water supply networks • Development of integrated water projects (water supply and waste water networks) • Establishment of monitoring and remote control systems of water networks
Poland	• Construction of infrastructure for drinking water supply (pipelines and treatment plants)	• Water and waste water management in river basins (combined water management projects)
Slovenia	• Construction of infrastructure for drinking water supply (pipelines and treatment plants) • Construction of multi-purpose water retention basins	• Extension of drinking water supply • Construction and upgrade of water retention systems • Hydraulic improvements to prevent water loss • Investments to improve the capacity for monitoring and assessing the condition of water resources
Spain (Andalucía)	• Extension and improvement of water supply networks • Upgrading of water treatment facilities • Construction of desalination plants and pumping stations, as well as a dam, in order to address water scarcity problems • Modernisation of irrigation systems, in order to reduce water losses and enhance efficient water use • Establishment of systems to increase the reuse of water • Improvement of water management systems in order to optimise the use of existing infrastructure	• Extension and improvement of water supply networks • Construction of desalination plants and pumping stations, water reservoirs, as well as a dam • Modernisation of irrigation systems • Establishment of rainwater utilization systems • Establishment of stations to control the quality of drinking water

Sources: See Box 1 in Section 1.3.

A more detailed picture of the types of projects funded by Cohesion Policy can be seen from a review of the six selected 2007-2013 Operational Programmes, showing what the Member States intended to finance and the most recent List of Beneficiaries published by the Member States in 2014 (see Table 35). In this field, country- or region-specific conditions clearly determine the scope of projects funded. For instance, in Andalucía (Spain), a region with problems of water scarcity in which agriculture constitutes one of the key economic sectors, an important share of funds allocated to water supply have been devoted to the construction of desalinization plants and pumping stations, water reservoirs and a dam; to the establishment of rainwater utilization systems as well as to the modernization of irrigation systems. In Slovenia, projects focus on the construction of water retention basins, as seasonal supply issues are a problem.

According to the OP, these basin investments will enable the country to reduce its dependence on water imported from Croatia.

For Bulgaria and Poland in particular, drinking water supply and waste water treatment are integrated in a single section in the Operational Programme and combined in integrated projects addressing water management. In both the programmes and the project titles, the focus is on the waste water component of the project, leaving limited information about water supply.

The core indicator measured by all Operational Programmes for drinking water supply is 'additional population served by water projects'. Member State results according to 2013 reporting are presented in Table 36 below, where data are available.

Table 36 Cohesion Policy core indicator: Additional population served by drinking water supply projects: targets and achievements, per Member State, cumulative 2007-2013

MS	Cohesion Policy 2013 Target (pop. to be served)	Cohesion Policy Achievements 2007 to 2013		National population not served by drinking water supply in 2007		Cohesion Policy achievements (2007-13) as a share of 2007 population not served
		Population served	Share of target	Share of total pop.	No.	
CZ	310,000	340,321	110.0%	8.0%	820,339	41%
IE	27,327	27,000	99.0%	15.0%	651,018	4%
FR	552,000	482,403	87.0%			
PT	363,600	310,620	85.0%	8.0%	842,607	37%
PL	268,630	207,028	77.0%	13.0%	4,956,312	4%
SI	370,000	193,128	52.0%			
EL	1,957,776	988,701	51.0%			
SK	9,500	4,150	44.0%	13.0%	698,513	1%
EE	30,000	9,158	31.0%	26.0%	349,159	3%
LV	1,810,000	398,245	22.0%			
ES	8,957,911	1,253,406	14.0%			
HR	20,000	0	0.0%			
IT	1,002,386	0	0.0%			
TOTAL	**15,679,130**	**4,214,160**	**27.0%**			
EU15	12,109,417	3,246,308	26.8%			
EU13EU13	3,569,713	967,852	27.1%			

Note: Targets and Achievements from the AIRs 2013 and corrected by WP0 team where necessary. Member States ordered by Achieved vs target. No data for Belgium, Bulgaria, Cyprus, Germany, Finland, Hungary, Lithuania, Malta, Romania. Greece is not included as Cohesion Policy and Eurostat data do not appear to be compatible.
For the final report, data on core indicators should be available through 2014 and will be updated
Source: WP0 core indicators, based on AIRs 2013 data. Eurostat, Water statistics, Public water supply

For the Member States that reported (13 in total), the cumulative achievement levels from 2007 through 2013 is low, only 27% of the total target achieved. Seven Member States, however, reported achieving more than 50% of their

target: Czech Republic (100%), followed by Ireland, France, Portugal, Poland Slovenia and Greece. Two Member States, Croatia and Italy, reported their achievement levels through 2013 as zero.

When compared to the population not served by drinking water in 2007 (as reported to Eurostat), the Cohesion Policy investments have made an important impact in two Member States, Czech Republic (41% of the gap addressed) and Portugal (37%). Comparable data are available for only four other Member States: Estonia, Ireland, Poland and Slovakia. In all four, Cohesion Policy achievements through 2013 appear to have addressed less than 5% of the population not served. In the case of Poland, this appears linked to the large size of the gap in population served, and the total increase due to Cohesion Policy in this country is over 200,000.

Table 37 below presents a comparison between the achievements of the Cohesion Policy investments and the overall achievements in the Member States in the field of drinking water supply, as measured by the number of additional population served by drinking water supply projects. Here, based on evidence gathered in Section 3, data are available for only five Member States, and at present only up to 2011. The table below shows that in at least two of the five Member States, Czech Republic and Portugal, Cohesion Policy has played a significant role in the expansion of drinking water supply.

Table 37 Cohesion Policy achievements on additional population served by drinking water supply compared to total national improvements

MS	Cohesion Policy achievements 2007 to 2013	Total national improvement 2007 to 2011	Cohesion Policy achievements compared to total national improvement
CZ	340,321	359,170	95%
PT	310,620	547,203	57%
PL	207,028	753,226	27%
SK	4,150	24,584	17%
EE	9,158	76,186	12%
TOTAL	**4,214,160**	**1,760,369**	

Note: Achievements from the AIRs 2013 and corrected by WP0 where necessary.
Source: WP0 core indicators, based on AIRs 2013 data, Eurostat data env_wat_pop, Milieu calculations
Member States ordered according to CP achievements compared to total national improvement

In addition to core indicators, some countries report achievements using programme-specific indicators. The reported indicators related to the investments in the drinking water sector are presented in Table 38 below[57].

[57] Among the six selected countries under analysis, only Bulgaria, Estonia and Italy (Campania) report on programme-specific indicators in the field of drinking water supply.

Table 38 Programme-specific indicators for drinking water supply sector in the selected Operational Programmes

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
EE	Development of Living Environment	Population supplied with adequate drinking water in result of reconstruction of water supply systems and treatment facilities (public water supply systems with over 2,000)	persons	100,000	55,301	55%
EE	Development of Living Environment	Number of residents for whom connection points to the public water supply have been created	persons	42,000	16,570	39%
EL	Environment and Sustainable Development	Population served by water supply networks that are improved in terms of their monitoring and leak control	persons	2,175,839	17,984	1%
IE	Southern and Eastern OP	No. of rural water source protection projects supported	projects	12	0	0%
IE	Southern and Eastern OP	Biological Oxygen Demand (BOD) Reduction in protected sources	%	0.75	0	0%
IT	Campania	Supplied water (%)	%	70%	60%	86%
IT	Campania	Total length of upgraded water supply networks	km	76	45	59%
MT	Investing in Competitive-ness for a Better Quality of Life	Increased rain water harvesting and re-use potential in catchment areas	m^3	300,000	50,000	17%
PT	Operational Programme of Territorial Enhancement	Constructed dams in primary water supply network (EFMA)	units	8	3	38%
PT	Operational Programme of Territorial Enhancement	Covered population served by public water supply system	persons	1,600,000	1,226,083	77%
PT	Operational Programme of Territorial Enhancement	Extension of built primary water supply network (EFMA)	km	155	132.81	86%
PT	Operational Programme of Territorial Enhancement	Intervened water supply system (high and low systems)	km	2,350	1,852	79%
SK	Environment	Length of newly built-up drinking water supply network (without connections)	km	410	173	42.2%

Source: WP 0, based on AIRs 2013 data.

The indicators focus mostly on the (additional) population served by adequate drinking water supply but they may also refer to the length of constructed or upgraded water pipelines or to the amount of supplied water. The achievements are diversified and range from 1% in Greece through about 40-50% in Estonia and Slovakia and over 70% reported for the indicators selected in the Operational Programme of Territorial Enhancement in Portugal.

As noted in section 2, one approach to improving drinking water quality is to protect water sources. Only one Member State has established indicators in this area, Ireland (though reported achievement levels are zero). This implies, along with the evidence from the selected Operational Programmes and projects reviewed, that upstream watershed protection has not been an important focus for investments under priority theme 45. Malta has a programme-specific indicator on rainwater harvesting, an action that may not be linked directly to drinking water but could reduce demand on public water supply systems.

4.2.3 Environmental achievements – waste water treatment

Waste water treatment occupies by far the largest share of Cohesion Policy funds within the environment theme in nearly all of the Member States considered in detail. In line with this, the infrastructural needs in many Member States were quite high at the start of the funding period – and in many cases remain high despite significant progress during the period.

The projects funded through Cohesion Policy across the Member States are largely similar – the majority of funding supports the capital costs of constructing sewer networks and waste water treatment plants in agglomerations over 2,000 PE. Most of the Member States with the greatest needs have prioritised support from the Cohesion Fund for agglomerations over 10,000 PE; smaller settlements are funded through the ERDF under regional level Operational Programmes or will be funded at a later stage. In some Member States (e.g. Bulgaria and Poland) projects are combined with upgrades and extensions to water supply systems; in others they remain separate.

With regards to the Cohesion Policy funds allocated to waste water treatment projects, the analysis of the largest Operational Programmes devoted to the environment in the six selected Member States reveals that in most cases funds have been devoted to the construction and modernisation of waste water treatment plants and sewerage networks (i.e. waste water collection and treatment). In regions such as Campania (Italy) and Andalusia (Spain), funds have been also allocated to the reuse of waste water and the upgrading of treatment systems. Table 39 below presents more details. The relationship between Cohesion Policy programmes and projects and key trends in waste water treatment in the EU is discussed below.

Table 39 Overview of waste water treatment projects planned and funded, 2007-2013

Member State	Key planned interventions identified in OP 2007-2013	Scope of projects funded (from the Lists of Beneficiaries)
Bulgaria	• Construction of waste water collection and treatment facilities, with priority given to agglomerations of over 10,000 PE. • Investment on equipment for detection and measurement of leakages • Provision of support for the	• The majority of projects cover the entire water cycle – from distribution of drinking water to collection and treatment of waste water.

Member State	Key planned interventions identified in OP 2007-2013	Scope of projects funded (from the Lists of Beneficiaries)
	preparation of RBMPs	
Estonia	• Construction and modernization of sewage networks and waste water treatment plants	• The majority of projects are related to the extension and upgrading of waste water infrastructure
Italy (Campania)	• Construction and upgrading of sewage network and waste water treatment facilities • Establishment of systems to increase the reuse of waste water • Construction of underwater pipelines integrated with WWT plants in order to support the auto-depurative process of coastal water	• The main projects are related to the upgrading of sewage network and waste water treatment plants, while others relate to the construction of new infrastructure, and the adjustment and restructuring of the existing sewerage network • Establishment of systems for water reuse and conservation • Establishment of systems to regulate the collection of storm water runoff
Poland	• Construction and modernization of sewage network and waste water treatment facilities, with priority given to agglomerations of over 15,000 p.e.	• Projects related to the construction, expansion and modernization of sewerage networks and waste water treatment plants.
Slovenia	• Construction of sewage network and waste water treatment facilities	• Projects related to the construction of sewage network and waste water treatment facilities
Spain (Andalucía)	• Improvement of sewage networks • Upgrading of existing WWT plants • Establishment of systems to increase the reuse of waste water	• Projects related to the improvement of sewage networks and the upgrading of existing WWT plants • Establishment of systems to increase the reuse of waste water

Sources: See Box 1 in section 1.3.

An analysis of 40 major projects in the water sector[58] also reveals that many projects designated as drinking water (priority theme 45) incorporate sewerage and waste water treatment investments. This is seen in particular in the EU13: examples include projects in Huneadora (Jiu Valley) in Romania and Bodva Region in Slovakia, each includes new facilities across several agglomerations. These and other projects provide both new drinking water pipes as well as new sewers.

Table 40 Cohesion Policy core indicator: Additional population served by waste water projects: targets and achievements, per Member State, cumulative 2007 to 2013

	2013 Target (inhabitants)	2007 to 2013 Achievement (inhabitants)	Achieved versus target (%)
LV	1,257,459	1,273,150	101%
DE	248,100	186,418	75%
CZ	741,000	459,266	62%
IT	2,499,737	1,419,452	57%
PT	2,045,100	1,131,876	55%
SI	210,000	114,936	55%

[58] Based on project documentation submitted to the Commission

	2013 Target (inhabitants)	2007 to 2013 Achievement (inhabitants)	Achieved versus target (%)
EE	30,000	11,064	37%
PL	1,262,150	393,967	31%
EL	1,174,222	358,292	31%
FR	341,441	93,969	28%
LT	270,000	63,214	23%
BG	1,500,000	281,189	19%
HU	1,300,000	200,000	15%
ES	11,294,596	1,636,514	14%
SK	335,991	13,883	4%
HR	44,550	0	0%
IE	4,200	0	0%

Note: Targets and Achievements from the AIRs 2013 and corrected by WP0 where necessary.
For the final report, data on core indicators should be available through 2014 and will be updated
Source: WP0, based on AIRs 2013 data.

Extending waste water treatment: additional population served

The core indicator 'additional population served by waste water projects' provides information on the extent to which Cohesion Policy projects have enabled improvements in this area. It should be noted that this indicator relates to all waste water projects, thus distinction between construction or modernisation of waste water treatment plants and construction or renovation of sewers is not possible.

Reporting by Member States on this core indicator is presented in Table 40 above[59]. As for drinking water supply, the achievement levels in waste water treatment are rather low. Most Member States report having achieved less than 50% of their initial target, including: Slovakia, Bulgaria, Hungary, Spain, Lithuania and Greece. The countries registering relatively achievement rates above 50% are Latvia, Germany and the Czech Republic.

This core indicator can be compared with Eurostat data on the number of additional population served by waste water projects for Member States as a whole. Unfortunately, data are available for only a few countries (see Table 41) Moreover, it should be noted that Eurostat data currently are available only to 2011 at the latest (which can help explain why the shares for Greece and Slovenia are over 100%). In the five Member States where data are available, they indicate that Cohesion Policy investments have played an important role in the expansion of waste water treatment.

[59] Data on core indicators are only available for some of the Member States under analysis

Table 41 Cohesion Policy core indicator: Additional population served by waste water projects: reported achievements and Eurostat data, 2013

MS	2007 - 2013 Achievements according to the CP indicator (inhabitants)	2007 - 2011 national improvement according to Eurostat (inhabitants)	Cohesion Policy achievements compared to total improvement (%)
EL	358,292	283,380	126%
SI	114,936	101,465	113%
EE	11,064	15,265	72%
ES	1,636,514	2,268,914	72%
BG	281,189	520,182	54%
SK	13,883		

Note: Achievements from the AIRs 2013 and corrected by WP0 where necessary.
MS ordered according to the share of Cohesion Policy achievements over total achievement
For the final report, data on core indicators will be updated
Source: WP0 core indicators based on AIRs 2013 data, Eurostat data, Milieu calculations

Three Operational Programmes also included programme-specific indicators that measure population connected to waste water treatment systems (see Table 42); in some cases these indicators refer to combined water supply and waste water connections. These vary between the measurement of areas provided with service (similar to the agglomeration approach of the EU water Directives) and actual population figures.

Table 42 Programme-specific indicators on construction and modernisation of sewer systems

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
LT	Cohesion Action Plan	Number of residential areas where a water supply and/ or wastewater system was renovated/ constructed	number of areas	220	242	110%
LT	Cohesion Action Plan	Increase in percentage of residents who use centralized wastewater collection and management services (in percent)	%	8%	1.90%	24%
RO	Environment	Population connected to basic water services in a regional system (%)	%	70%	60%	86%
RO	Environment	Centres provided with new/rehabilitated water facilities in a regional management system	units	300	171	57%
SI	Development of environmental and transport infrastructure	Number of communally equipped agglomerations	units	40	7	18%

Source: WP0, based on AIRs 2013 data.

These indicators show mixed and not always consistent results: for example in Lithuania the indicator related to the number of residential areas covered with new or renovated water services shows a high level of achievement, which is not

reflected, however, by the similar indicator reported for this Member State in relation to the increase of the share of the residents using such services. Such possible discrepancies may bear further review in national evaluations (they may also be linked to problems with the quality of reporting and/or with the validity and consistency of setting the Operational Programme targets).

Construction and modernisation of sewer systems

Article 3 of the Urban Waste Water Treatment Directive requires Member States to ensure the collection of waste water from all agglomerations over 2,000 PE.

Table 43 Programme-specific indicators on construction and modernisation of sewer systems

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
DE	EFRE 2007 - 2013 Mecklenburg-Vorpommern	New and modernised sewage systems (km)	km	120	117	98%
EE	Development of Living Environment	Number of residents for whom connection points have been created	persons	55,000	20,443	37%
IT	Campania	Total length of upgraded waste water system	km	240	205	85%
PL	Infrastructure and Environment	Length of new and modernised wastewater network	km	9,000	720.45	8%
PT	Operational Programme of Territorial Enhancement	Constructed or upgraded collecting wastewater drainage	km	4800	4,242.24	88%
PT	Operational Programme of Territorial Enhancement	Covered population served by public urban sewerage network	persons	3,500,000	1,974,672	56%
SK	Environment	Length of newly built-up sewer networks (without sewer connections)	km	1,264	728	57.6%

Source: WP0, based on AIRs 2013 data.

The connection of population to waste water treatment systems in the EU is generally quite high (over 90% as described in Section 3), but this varies considerably across the Member States; five Member States from the EU13EU13 countries had waste water collection rates below 40% in 2009/10. The needs in this area still remain high in many of the countries that are allocated Cohesion Policy funding to water management.

Table 43 above presents the reported programme specific indicators related to the construction and modernisation of sewers. The indicators refer typically to the length of constructed or modernised sewer networks. The achievements show quite good advancement with exception of Poland, which in 2013 reported only 8% of the target achieved.

Waste water treatment plants

Member States are required to provide treatment for all collected waste water before it is discharged; the type of treatment depends upon the level of sensitivity of the receiving water body. Member States have reported overall improvements in the percentage of agglomerations covered by waste water treatment, as presented in Section 3. However, compliance rates remain relatively low considering that the Directive deadlines have already passed for most Member States. This is further confirmed by the relatively high number of legal actions related to implementation of the Urban Wastewater Treatment Directive (a total of 50 actions in 10 Member States).

Programme-specific indicators related to waste water treatment plants are shown in Table 44. Most of the indicators concern the number of constructed waste water treatment plants; some Member States report the number of population or agglomerations covered with waste water treatment services.

The indicators show a highly diversified picture regarding the level of implementation of the targets in this area. Greece and Poland report low achievements (below 10%), Bulgaria, Romania, Slovakia and Germany report achievements higher than 15% but lower than 60%, and the remaining Member States report high achievements (over 80%). However these targets are all very different and achievement rates cannot be directly compared.

Table 44 Programme-specific indicators related to waste water treatment plants

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
BG	Environment	New and rehabilitated Wastewater Treatment Plants	units	45	7	15.6%
CZ	Environment	Number of reconstructed and new water treatment plants	units	5	9	180%
DE	EFRE 2007 - 2013 Mecklenburg-Vorpommern	Modernisation and extension of sewage plants	units	8	3	38%
EE	Development of Living Environment	Properly functioning wastewater treatment plants (agglomerations of more than 2,000 p.e.)	units	49	0.00	0%
EL	Environment and Sustainable Development	Third priority settlements covering the requirements of Directive 91/271 (served by operating WWTP)	settlements	176	14	8%
EL	Environment and Sustainable Development	Equivalent population of third priority settlements (Directive 91/271) that is served by operating WWTPs	persons	691,599	53,390	8%
EL	Environment and Sustainable Development	Population served by the WWTP (capacity of WWTP)	p.e.	472500	0.00	0%
HU	Central Transdanubia	Number of inhabitants with access to waste water treatment facilities meeting the EU criteria within the supported projects in settlements with less than	persons	11,000	9,585	87%

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
		2000 PE (persons)				
IT	Campania	Population served by waste water plants with primary and secondary treatments	%	80%	90%	113%
PL	Infrastructure and Environment	Agglomeration population benefiting from waste-water treatment plants in the city	%	90%	92%	102%
PL	Infrastructure and Environment	Number of new/expanded/modernised wastewater treatment plants	units	150	8	5%
PT	Operational Programme of Territorial Enhancement	Constructed or upgraded wastewater treatment plants	units	440	359	82%
RO	Environment	New/ rehabilitated wastewater treatment plants (number)	units	200	55	28%
RO	Environment	Wastewater treated (of the total wastewater volume) -%	%	60%	35%	58%
SK	Environment	Number of newly built-up and reconstructed waste water treatment plants (WWTP)	units	110	30	27.3%

Source: WP0, based on AIRs 2013 data.

Other aspects related to waste water treatment

As discussion in Section 3.3.5, there has been a technological trend towards better management of storm waters. At least 8 of the 40 major projects reviewed include investments to better manage stormwater, for example through the construction of reservoirs to hold stormwater (in Cheb, Czech Republic) and separate sewerage for stormwater runoff (in Żory, Poland). A project in Bečva, Czech Republic, will improve infiltration of stormwater into the ground so it does not flow into the sewer system.

A few large waste water projects involve the use of recent technologies for treatment of waters for reuse. For example, in Moita and Seixal, Portugal, a new waste water treatment plant will use UV disinfection of discharge waters. In Grand Prado, La Réunion, France, a new waste water treatment plant will employ ultrafiltration of discharge waters for their reuse and treat sludge so it can be used in agriculture. The Kokkinochoria treatment plant in Cyprus will link treated discharge water to an irrigation system for use in agriculture.

EU legislation and policy promotes the recovery of waste water treatment sludge for either agriculture and energy (see section 2). The review of major projects shows that this has been an element of Cohesion Policy investment for waste water treatment: improvements to sludge processing are included in at least 16 of the 40 projects reviewed.

Table 45 Programme- specific indicators: other indicators related to waste water treatment

MS	OP	Programme-specific indicator	unit	2013 Target	2013 Achievement	% Target achieved
PL	Infrastructure and Environment	Reducing the amount of industrial waste water requiring treatment	hm^3	675	950.50	141%
PL	Infrastructure and Environment	Reducing the amount of industrial waste water requiring treatment - including purified	hm^3	660	834.40	126%

Source: WP0, based on AIRs 2013 data.

The Waste Water Treatment Directive also sets requirements on waste water from industrial facilities. One Member State, Poland, has established indicators related to this area (see EU legislation and policy promotes the recovery of waste water treatment sludge for either agriculture and energy (see section 2). The review of major projects shows that this has been an element of Cohesion Policy investment for waste water treatment: improvements to sludge processing are included in at least 16 of the 40 projects reviewed.

4.2.4 Initial conclusions on the role of Cohesion Policy for drinking water supply and waste water treatment

Drinking water supply and in particular waste water treatment rank as two of the largest priority themes across all of Cohesion Policy, in terms of funding allocated to selected projects in 2013. Funds allocated to selected projects exceed what has been planned for these themes for the EU as a whole and these allocations appear to be significantly higher in particular in those Member States where there remain considerably needs to meet EU compliance requirements.

Reporting on core indicators through 2013 is unfortunately incomplete, and does not yet provide a comprehensive picture of the extent to which projects selected will be implemented, enabling concrete environmental improvements. While a trend toward improvement can clearly be seen based on Member State reporting for the two key Directives (Drinking Water and Waste Water Treatment) questions remain whether the speed of infrastructure improvements has been sufficient to meet targets. This is a concern in particular for waste water treatment, given the fact that most Member States have either missed their targets or are not on track to meet them in 2015.

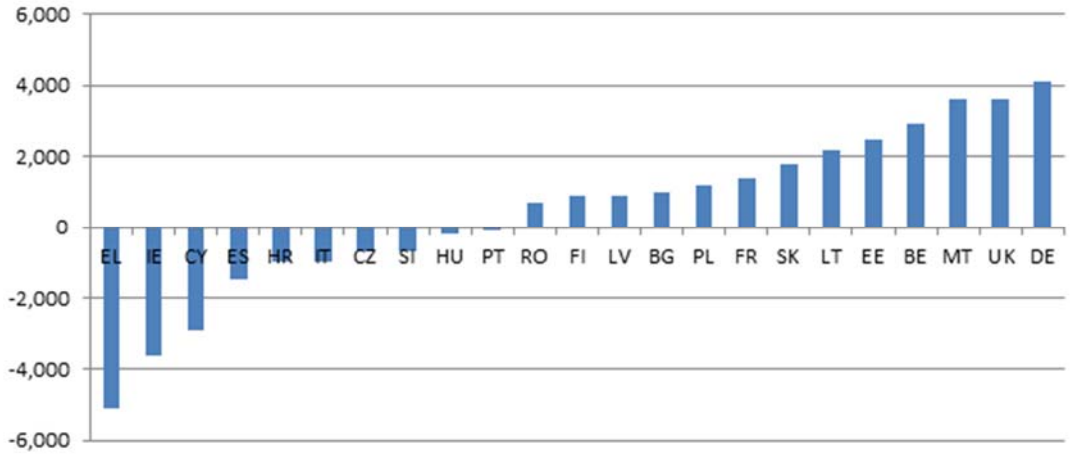
In this context, issues related to implementation of programmes and projects including the impact of the financial crisis and the challenge of absorption capacity are crucial: these questions are discussed in the following section.

4.3 Allocations to achievements: implementation issues

Across the EU, there has generally been marked progress in protection and sustainable use of resources in the waste and water management sectors. Less waste is going to uncontrolled landfills; more is being collected, treated and disposed of sustainably. Recycling rates are on the rise. The quantity and quality of drinking water supplies have improved, and most countries are close to 100% connection rates. The rate of population served with waste water collection and treatment to a high standard is also on the rise. Nevertheless, many Member States, especially those in the EU13 group and Southern Europe, are not on track to meet their legislative targets in these sectors, and in some cases legal action has been brought against Member States by the EU.

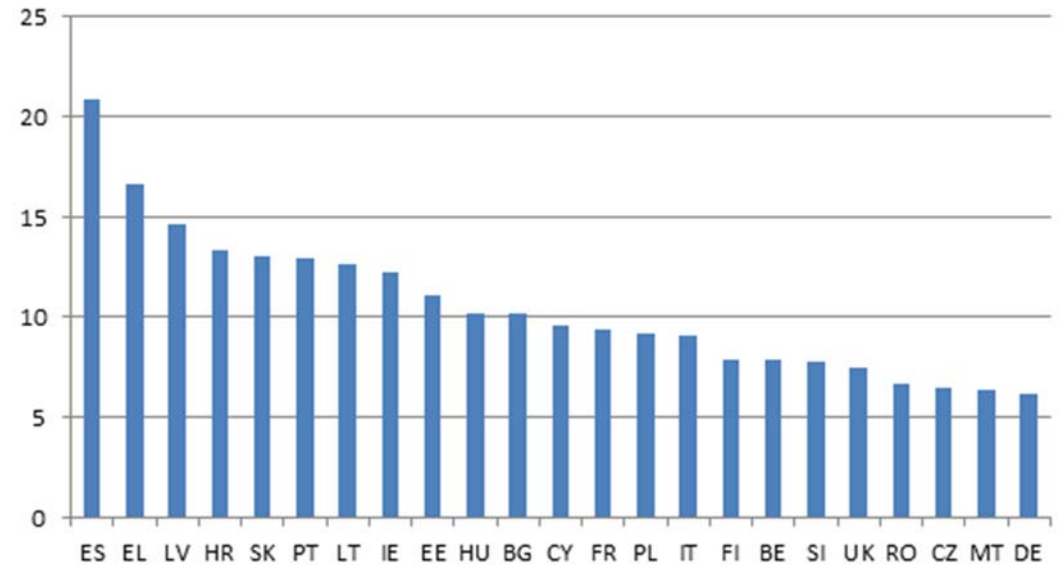
The overview of programmes and projects funding during 2007-2013 in the previous sections shows that the funds are clearly targeting implementation of the relevant EU legislation. For the most part they are planned according to national and regional level sectoral and development plans, aimed at ensuring overall strategic coherence within Member States and respect of priority legal obligations. To better understand the extent to which Cohesion Policy funds have the potential to make significant contributions to enabling Member States to meet the requirements of EU legislation, it is necessary to review some of the key factors that have impacted the Member States as they plan and spend Cohesion Policy funding in the environment sector.

Figure 17 Growth of GDP per capita, 2008-2014, euros per capita



Source: Eurostat

Figure 18 Average unemployment rate, 2008-2014



Source: Eurostat

Implementation of environmental infrastructure projects during the period 2007-2013 has posed many challenges, particularly in the EU-12 but also in Greece, Italy, Portugal and Spain where the needs for waste and water infrastructure have remained high. An important factor has been the global financial crisis, which had a severe impact on the EU from 2009 and posed many implementation constraints for environmental infrastructure projects. Another is the complexity of planning and implementing environmental infrastructure projects, linked to administrative capacities of the beneficiaries and concerns surrounding public procurement procedures, financial sustainability of projects, legal and policy complications and other issues. The impact of implementation challenges stemming from these factors can be seen in two sets of data: the relatively low rates of actual expenditure reported by the Member States (compared with high rates of allocation to selected projects); and reallocations of funding away from the environment theme overall and within the specific priorities.

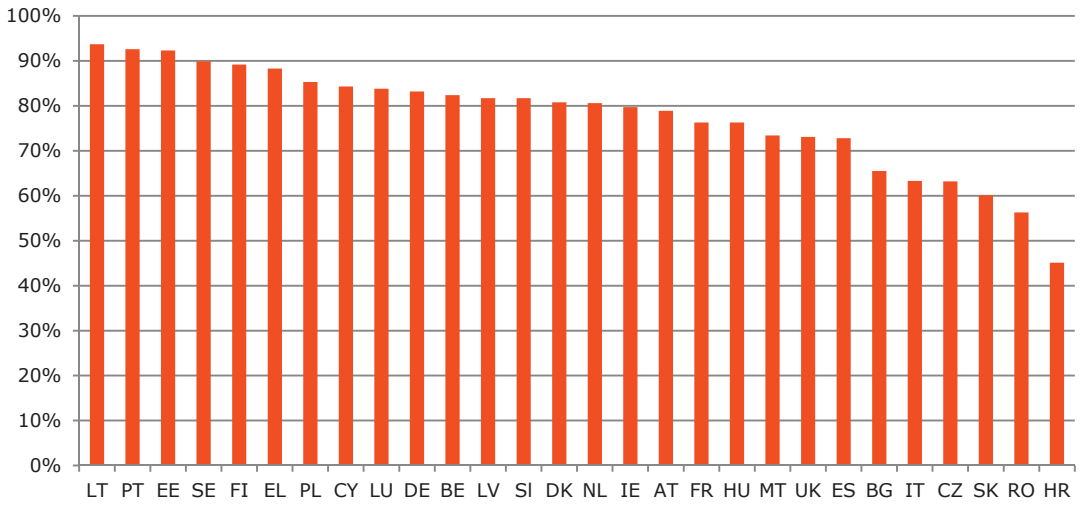
Figures 17 and 18 (above) provide basic data on the change in GDP growth and unemployment rates between the start of the financial crisis in 2008 and 2014. From these it can be seen that many of the countries for which environmental infrastructure represents a significant share of Cohesion Policy funding were also those that were most severely impacted by the crisis. However, these are not always the Member States that have shown expected reactions to the impact of the crisis, namely low absorption capacity or high re-allocation rates. These are discussed below[60].

[60] Unless otherwise noted, the examples of challenges related to implementation of environmental and other large infrastructure projects as part of Cohesion Policy 2007-

Absorption capacity: from allocation to expenditure

The most recent data available on Cohesion Policy spending specifically in the waste and water sectors indicate the volume of funding that has been allocated to specific selected projects in the Member States. These data show that most Member States have allocated considerable amounts of funding to selected projects as of 2013, compared to their most recent spending plans as stated in the final versions of the Operational Programmes adopted in 2013 (see Table 25 above on waste management and Table 33 above on the water sector). Across the 23 Member States, 92% of planned funds have been allocated to selected projects in the waste sector, and 111% for the water sector. In some Member States, the figures are very high, e.g. Bulgaria (water 158%); Greece (waste 151% and water 264%); Italy (water 141%); Romania (water 135%); and Slovenia (water 161%).

Figure 19 Absorption of Cohesion Policy funds per MS, 2014 (%)



Source: DG Regional and Urban Policy, InfoView data

At the same time, mid-term evaluations, as well as the Commission's 2013 strategic communication on Cohesion Policy have indicated that several Member States are at risk of failure to mobilise the available EU funds within the time available for implementation of the projects. According to the Commission, expenditure rates as of the end of 2012 were especially slow in Bulgaria, Czech

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2013 programmes are based on information in the national reports of the network of independent evaluation experts on progress in implementing the programmes co-financed by the ERDF and CF in 2007-2013. These included interviews with numerous Managing Authorities and other stakeholders. They are available at http://ec.europa.eu/regional_policy/index.cfm/en/information/publications/evaluations/2013/expert-evaluation-network-2012-delivering-policy-analysis-on-the-performance-of-cohesion-policy-2007-2013-synthesis-of-national-reports-2012.

Republic, Hungary, Italy, Malta, Slovakia and Romania[61]. The 2014 figures published on the Commission's InfoRegio site show a similar situation; Bulgaria (65.5%), Italy (63.3%), Czech Republic (63.2%), Slovakia (60.1%), Romania (56.3%) and Croatia (45.1%) also have absorption capacity rates below 70% as shown in Figure 19.

A review of the AIRs for Operational Programmes in seven Member States indicates that the absorption of Cohesion Policy resources has been even slower for waste and water projects. This review (see Table 46) covered the six Member States identified in section 1.3, plus Romania, where this issue has been a concern, as shown by the low level of overall absorption seen in Figure 19 above.

Table 46 Absorption rates for waste and water projects in seven Member States, 2013

	waste		water		OP Total	
Member State	EUR (million)	Absorp-tion	EUR (million)	Absorp-tion	EUR (million)	Absorp-tion
BG	65.4	18%	385.2	30%	492.2	27%
EE	445.0*	71%	445.0*	71%	1114.0	75%
IT (Campania)	83.2*	19%	83.2*	19%	4576.5	38%
PL	263.0	26%	1533.0	49%	16500.0	58%
SI	43.5	24%	130.1	28%	698.6	38%
ES (Andalusia)	3.1	16%	505.7	39%	5051.4	59%
RO	883.8	28%	192.7	17%	1271.5	24%

Notes:
* Waste and water sectors not available separately (see Member State notes for further details).
BG: OP Environment. Total certified eligible expenditure paid out by the beneficiaries; data reflect total public funding, including national contribution.
EE: OP Environmental and Transport Infrastructure Development. Total certified eligible expenditure paid out by the beneficiaries; data refer to EU grant only. Data for priority axis covering waste, water and air pollution.
IT: Regional OP Campania. Data for payments. Data for waste and water both refer to Axis I.1, which covers the two sectors.
PL: OP Infrastructure and Environment. Certificates and statements of expenditure; data refer to EU grant only.
SI: OP Environmental and Transport Infrastructure Development. Total certified eligible expenditure paid out by the beneficiaries; data reflect total public funding, including the national contribution.
ES: ERDF OP for Andalusia. Total certified eligible expenditure paid out by the beneficiaries; data reflect total public funding, including the regional contribution.
RO: OP Environment. Total certified eligible expenditure paid out by the beneficiaries; data reflect total public funding, including the national contribution.
For the final report, a more detailed approach to absorption capacity will be presented on the basis of WP13 data on Cohesion Policy expenditures across all Member States.
Sources: see Box 1 in section 1.3

This review shows (see Table 46) that disbursements for water and waste investments through 2013 were above 50% of the amounts adopted in the

[61] Cohesion Policy: Strategic report 2013 on programme implementation 2007-2013, European Commission COM(2013) 210 final, p 10.

Operational Programmes in only one case, Estonia's Operational Programme for Environmental and Transport Infrastructure Development. Disbursements for water projects stood at 49% in Poland and 39% in Andalusia, Spain. In all other cases, disbursements through 2013 for water and waste were at or below 30%.

Five of the seven Operational Programmes include environment as well as other sectors. Estonia, Poland and Slovenia include transport; and for Andalusia (Spain) and Campania (Italy), the regional-level programmes cover a broad range of other sectors. For all five of these Operational Programmes, disbursements for environment are lower than the Operational Programme average, indicating that spending for environmental projects lags behind other areas. Except for Estonia (with only a four percentage point gap), the differences are at least nine percentage points.

Five of the seven Operational Programmes report disbursement information separately for the water and waste sectors (for Estonia and Italy, in contrast, data are reported for a single priority axis that includes both). In four of these five programmes, the levels of disbursement are higher for water projects than for waste projects; only in Romania are disbursements higher for waste projects.

Few comments on potential absorption problems were found in the AIRs. In the case of the Campania Regional Operational Programme, for example, the 2013 AIR paints a largely positive picture: it states that many projects have been started and it highlights the approval in 2013 of a couple of large environmental projects. Romania's Operational Programme for the Environment, however, provided the following information:

- For the water sector, there has been a lack of knowhow and organizational skills on the part of beneficiaries related to the implementation of projects – and, in some cases, lack of co-financing.

- For the waste sector, most of the challenges are related to lack of competent staff for project implementation. A further problem has been legal issues related to land for waste facilities, including landfills.

The high levels of project selection rates in countries with relatively low levels of environmental expenditure reported (e.g. Bulgaria, Greece, Italy, Romania) nonetheless would imply that implementation of the selected projects with funding from the 2007-2013 period may be at risk, which would in turn impact the achievement of environmental targets and objectives for Cohesion Policy 2007-2013. [62]

Absorption capacity challenges stem from many factors. Overall, the bulk of the funding for environmental infrastructure is allocated to the EU-12, countries that during 2007-2013 had relatively limited experience in the administrative,

[62] National reports of the network of independent evaluation experts on progress in implementing the programmes co-financed by the ERDF and CF in 2007-2013.

financial, technical and other aspects of spending large amounts of EU public investment funds within the framework of the Cohesion Policy regulations. Lower administrative capacity in these countries, coupled with the impact of the financial crisis on institutional budgets for human resources in many countries, has led to problems with timely processing of investment projects, including temporary suspension of selected projects. This is noted in particular in Bulgaria and Romania, which joined the EU in 2007, although they are not the only countries with low expenditure rates.

The beneficiaries of waste and water sector infrastructure projects are typically local governments, many of which experienced significant negative impacts on their revenues due to the financial crisis. They have therefore struggled to meet co-financing contributions set by national authorities as requirements for receiving financing from Cohesion Policy funds. This is often compounded by the financial performance of the investment projects themselves. Water and waste infrastructure projects are revenue-generating investments, meaning that capital costs should be at least in part covered by the revenue streams generated by the user charges associated with the service provided by the infrastructure. When project revenues are not sufficient to cover the capital costs of the infrastructure, even with grant assistance from EU and national funds, projects are at risk and may either not be approved for funding or be suspended during start-up.

Issues related to public procurement procedures have also had a significant impact at the project implementation stage; this factor is mentioned in many evaluation reports, as well as in interviews carried out with Managing Authorities as part of mid-term evaluations. Problems with transparency in public procurement procedures resulted in delays due to frequent appeals by unsuccessful bidders. This in turn has led to an increase in scrutiny of the procedures, which has resulted in the application of very strict, quantitative criteria for selection of companies to carry out the implementation of infrastructure projects. This has in some cases limited the ability to select the best all-around qualified contractor for the job. There is motivation for contractors to reduce their price offers in order to secure contracts, leading to failure to be able to implement the work for the contracted price. In Slovenia it was reported that the three largest construction companies in the country had gone bankrupt as of 2011, resulting in suspension of many Cohesion Policy funded projects. It is likely that this was also impacted by the financial crisis; cash flow problems stemming from credit crunches experienced across all Member States by public and private sector actors have undoubtedly caused delays and suspensions of work for environmental infrastructure projects.

Finally, in many countries, development of the necessary infrastructure to meet EU legislative targets has gone hand-in-hand with broader sectoral reform aimed at more strategic and efficient use of infrastructure. This has usually meant adopting a more 'regionalised' approach, whereby smaller municipalities and villages band together to share facilities such as landfills and waste water

treatment plants. In most cases this has required putting in place legal and policy instruments (e.g. strategic plans); these can be delayed for political, administrative or other reasons. In other cases problems have occurred in getting municipalities to cooperate effectively. Another problem has been clarification of ownership issues between the private sector and national/local governments, including the quality of existing cadastral maps. Land acquisition has also been cited as a cause for delays.

Re-allocation and re-programming of funds

The onset of the financial crisis in the EU in 2008 posed significant challenges for Cohesion Policy in the environment sector. On the one hand, there was the risk that Member States would not be able to absorb funding due to constraints on the availability of national, regional and local budgets to co-finance large infrastructure investments as well as increased limitations on administrative capacity within public authorities. On the other hand, Cohesion Policy could provide significant amounts of public investment funding that could support economies in distress and enable the construction of urgently required infrastructure.

Due to the flexibility of Cohesion Policy, Member States had the opportunity to re-allocate and re-programme funds in reaction within and across priority axes, Operational Programmes and funding instruments to enable them to meet national and regional needs that emerged during the crisis or due to other factors. The EU also responded with other legislative and non-legislative measures designed to increase flexibility and accelerate spending; some of these have had particular impact on environmental infrastructure projects.

Overall, Member States reprogrammed a total of EUR 36 billion – or 11% of the funds from one broad theme to another by the end of 2012. The net tendency has been a decrease in funding for environment[63], with increases in innovation and R&D, generic business support, sustainable energy and roads[64]. During 2007-2012 the balance of thematic re-programming for the environment theme was a reduction of funding by EUR 1.4 billion[65], which is around 0.4% of the total allocation[66]. Generally, this net thematic re-allocation can be seen as a reaction to the financial crisis: Member States frequently shifted funding away from measures that were impacted by lower demand (e.g. business support measures when business activity was down) or co-financing implications (e.g. measures

[63] Includes the three priority themes that are the focus of this study, and also air quality; mitigation and adaptation to climate change; rehabilitation of industrial sites and contaminated land; promotion of biodiversity and nature protection; and clean urban transport.
[64] Cohesion Policy: Strategic report 2013 on programme implementation 2007-2013, European Commission Staff Working Document SEC(2013)129, p33.
[65] Ibid, p54
[66] Synthesis of National Reports 2012, Expert evaluation network, January 2013, p 70.

which required considerable amounts of local government co-financing, such as waste and water sector infrastructure)[67].

Table 47 Differences in Operational Programme allocations to waste and water infrastructure, 2007 to 2013, by Member State and sector (million EUR)

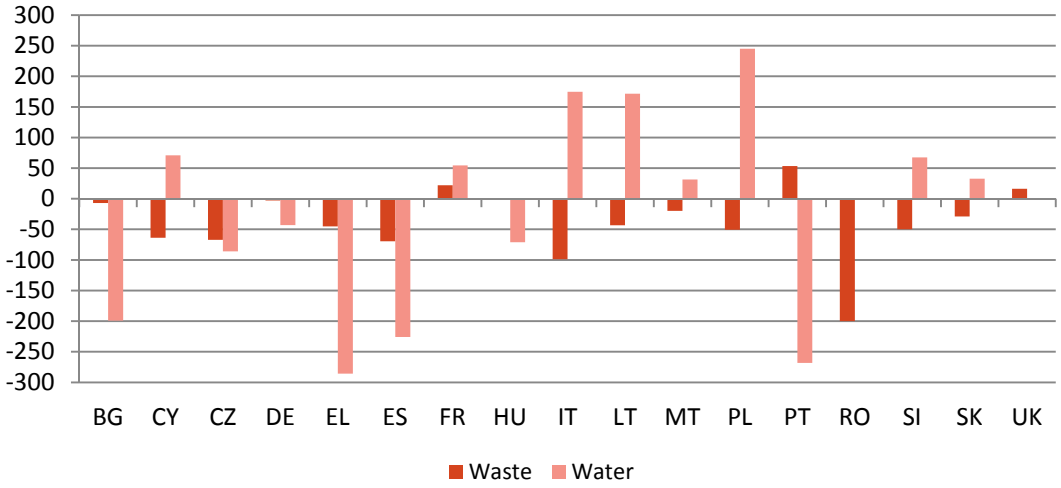
Member State	Waste	Water	Total (waste and water)	Total (all OP allocations)
PL	-50.7	245.1	194.3	1,663.5
LT	-43.4	171.5	128.0	0.0
FR	22.1	54.5	76.6	-2.9
IT	-98.7	174.8	76.1	-35.2
SI	-50.0	67.4	17.4	0.0
UK	16.3	0.0	16.3	-28.7
MT	-19.8	31.4	11.6	0.0
IE	2.0	7.0	9.0	0.0
CY	-63.8	70.8	7.1	0.0
SK	-29.1	32.7	3.6	137.7
BE	2.0	0.0	2.0	-3.3
EE	0.0	0.0	0.0	0.0
FI	0.0	0.0	0.0	0.0
LV	0.0	0.0	0.0	-32.5
DE	-2.7	-43.0	-45.7	-7.6
HU	0.0	-71.1	-71.1	-11.2
CZ	-67.1	-85.8	-152.9	-72.9
RO	-200.0	0.0	-200.0	-155.4
BG	-7.1	-199.2	-206.3	0.0
PT	53.5	-268.3	-214.8	-341.0
ES	-69.4	-225.8	-295.2	-4.5
EL	-45.3	-285.8	-331.1	0.0
TOTAL EU(22)	**-651.2**	**-323.8**	**-974.9**	**1,106.0**
*TOTAL EU15**	*-74.9*	*-300.8*	*-375.7*	*-423.2*
TOTAL EU12	*-531.0*	*262.8*	*-268.2*	*1,529.2*

Note: The figures presented in the table are calculated by subtracting the 2007 Operational Programmes allocations from the 2013 Operational Programmes allocations. Negative figures show that Operational Programmes allocations to the specific sectors have decreased over the programming period, while the opposite is true for positive figures. The last column ('all sectors') presents the overall changes in Operational Programmes allocations.
Croatia is not included
Source: DG Regional and Urban Policy

[67] Ibid, p 15.

This general analysis covers shifts between categories of expenditure which require formal approval. Considerable additional shifting of funds occurred at the Operational Programme level, which has had an impact on the overall allocations of funding to waste and water infrastructure. This can be seen by the differences in the amounts planned in the 2007 and 2013 versions of the Operational Programmes for 2007-2013 for waste and water infrastructure in each Member State. Table 47 above and Figure 20 below depict these positive and negative amounts, as well as the overall balance of re-allocation of funds in the country (all sectors) to get an idea of the relative magnitude of the shifts in the waste and water sectors.

Figure 20 Differences between Operational Programmes allocations in 2007 and 2013 in environmental infrastructure, per sector, per Member State (million EUR)



Note: Countries with minor or no Operational Programme reallocations in the field of environment between 2007 and 2013 (BE, EE, FI, IE, LV) have not been included in the graph.
Source: DG Regional and Urban Policy

Here it can be seen that there are quite some differences across the Member States. In most cases, shifts in funding were made to avoid the risk of de-commitment due to lack of capacity to develop and implement eligible projects. For example, the decrease in funds planned for the waste sector in many Member States is likely related to difficulties in putting together the regional approach to integrated waste management, which requires the complex task of getting municipalities to agree to cooperate on strategic issues and also financial commitments. Evaluations undertaken by the Expert evaluation network for DG Regional and Urban Policy[68] note that most Member States increased funding for energy efficiency as it was decided in 2009 to extend eligible expenditure to energy efficiency in housing in all Member States[69]. This considerably broadened

[68] Synthesis of National Reports 2012, Expert evaluation network, January 2013, p17.
[69] Regulation (EC) No 397/2009 of the European Parliament and of the Council amending Regulation (EC) No 1080/2006 on the European Regional Development Fund as regards

the scope of beneficiaries, thus increasing opportunities for project demand. (The summary of the evaluations does not, however, provide details on the extent of the shift in terms of amounts of funding or number of projects.)

Another response to the crisis which has impacted environmental infrastructure projects in particular was the decision by the EU to increase the share of Cohesion Policy co-financing (without increasing the overall amount of funding provided). The result has been to the burden on Member States and beneficiaries to contribute financing, with the aim of increasing overall absorption capacity - although at the same time decreasing the overall number and value of projects funded through the EU contribution. In practice this option was taken up mainly by EU15 countries, as the countries in the EU12 convergence regions were already effectively realising the maximum allowed EU co-financing rates. Average increases in co-financing rates were quite high particularly in Southern European countries: 12 percentage points in Portugal; 8 percentage points in Spain and 6 points in Greece[70].

Measures were also taken to ease the implementation of major projects, defined as those where costs exceed EUR 50 million. A 2010 amending regulation[71] increased the threshold for environmental projects from EUR 25 million to EUR 50 million, meaning that fewer environmental infrastructure projects required mandatory cost-benefit analysis and special Commission approval to go forward. Other regulations increased the amount of advance payments available for Operational Programmes from the funds, to ease up cash flow problems for beneficiaries. Additional funds were also extended to the JASPERS facility, which provides project preparation support for large infrastructure projects in the EU-12.

In sum, there is no clear correlation between Member States that were most impacted by the crisis in terms of GDP contraction or unemployment levels and re-allocations of Cohesion Policy funding. Interestingly, Greece, the country arguably most impacted by the crisis, showed limited overall reallocation of funding between broad themes. A wide range of factors have impacted both absorption capacity and funding allocations in the Member States, such that it is difficult to attribute any of the outcomes to a particular cause. The key point for concern remains whether Member States will manage to implement the selected environmental infrastructure projects for 2007-2013 by the N+2 deadline or whether some will need to be shifted into the following programming period, assuming this is possible.

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the eligibility of energy efficiency and renewable energy investments in housing, May 2009.

[70] Synthesis of National Reports 2012, Expert evaluation network, January 2013, p 12.

[71] Article 1(1), Regulation (EU) 539/2010 of the European Parliament and the Council, amending Council Regulation 1083/2006

In conclusion, it is interesting to note that whilst many evaluations were carried out within the Member States during the funding period, including some of Operational Programmes dedicated to environment, these have mostly focused on processes rather than thematic content or contribution to strategic objectives. Part of the reason is likely that the actual outputs that contribute to strategic environmental objectives (e.g. completed infrastructure projects) do not materialise until the very final stages of the funding period. Formal monitoring of strategic environmental outcomes is also limited for most Operational Programmes. Nevertheless, a well-structured thematic evaluation could make use of various information gathering approaches (e.g. interviews with authorities and beneficiaries) to develop meaningful thematic conclusion at the mid-term that could improve overall results and could be encouraged by both the Commission and Member State authorities.

4.4 Information to be integrated in the next draft

The analysis in sections 3 and 4 will be revised based on updated data. Among the expected changes, more recent Eurostat data on total public investments (available from the COFOG database) will be used. For Cohesion Policy, data on expenditures should be available from WP13, and core indicator data through 2014 should also be available. Moreover, the analysis in section 4.3 in particular can be enriched with results from Tasks 2 through 5 of this project. In particular, the interviews and workshop will be used to try to gather information on why environmental projects, and in particular those for water and waste, lag behind those in other sectors, and if possible also reasons why some Member States at the same time have made high allocations to specific projects for water and waste themes.

5 Conclusions

This section brings together key results from the previous sections to provide an overview of the role of Cohesion Policy in terms of supporting Member States to meet key EU objectives and targets the waste management and water sectors.

5.1 Review of key results in the waste sector

The review of trends and developments shows progress overall in the waste sector. The share of the municipal solid waste sent to landfills has fallen, while the share recycled or composted increased. Nonetheless, seven EU13 Member States, as well as Greece and Portugal, appear to not have met their initial EU targets for reducing the share of biodegradable waste sent to landfills (see Table 48). EEA reports and other sources warn that many Member States are not on track in terms of meeting future targets in this area as well as the 2020 targets for the collection and recycling of specific waste streams.

Cohesion Policy has supported the progress towards EU targets and objectives related to municipal solid waste management in the period 2007-2013. For seven Member States, allocations to selected projects in the waste sector are above 10% of all public sector investment for environmental protection and water (see Table 48). Even in Member States where the share is lower, the total amount is significant: EUR 112.6 per capita in Poland, EUR 65.9 in Romania and over EUR 40 in Greece, Hungary and Spain. The review of Operational Programmes in six selected Member States showed that their priorities for spending broadly addressed key needs for the implementation of EU waste legislation, such as increasing recycling capacity.

The core indicators show that Cohesion Policy has brought a series of improvements: for example, 2428 projects were completed through 2013. A key concern, however, is that Member States will not be able to use fully their allocations to selected projects, as expenditure levels through 2013 for waste projects were below 30% in six of seven Operational Programmes reviewed. This issue, and the reasons for the slow implementation of Cohesion Policy spending, will be an area for investigation in the remaining tasks of the project.

Table 48 *Waste management sector - summary*

Member State	CP allocations to selected projects EUR /capita	CP allocations to selected projects compared to total public sector investment	CP core indicator: projects completed	Landfill Directive: reduction of biodegradable waste to landfill		Change in recycling rate, 2007-2012 (Percentage points)
				75% target	50% target	
BG	32.6	27.5%	1	✓*	N/A*	+2%
SK	37.7	17.8%	269	✓*	N/A*	+4%
RO	65.9	11.8%		✓*	N/A*	+2%
LV	7.0	11.1%	105	X*	N/A	+9%
LT	21.0	10.9%	29	X*	N/A*	+12%
MT	3.9	10.9%	3	X*	N/A*	+6%
EL	43.0	9.7%	95	X*	N/A*	-3%
HU	40.4	9.4%	56	✓	✓	+10%
SI	17.3	8.1%	7	✓*	N/A*	+15%
PT	30.8	7.8%	66	X*	N/A	+1%
PL	112.6	6.8%	186	X*	N/A*	+6%
EE	5.0	5.8%	35	✓*	N/A*	+6%
CY	2.6	4.2%		X*	N/A*	+7%
CZ	28.0	2.2%	318	X*	N/A*	+11%
ES	40.1	1.2%	604	✓	✓	+4%
IT	13.3	0.3%	431	✓	X	+7%
FR	11.1	0.2%	181	✓	✓	+5%
BE	0.4	0.1%	1	✓	✓	+3%
DE	5.0	0.1%	24	✓	✓	
UK	3.8	0.1%	17	✓	✓	+6%
FI	0.0	0.0%		✓	✓	-4%
IE	0.1	0.0%		✓*	N/A*	-1%
HR	5.7			X*	N/A*	+11%

Notes:
Biodegradable waste deadlines: reduction to 75% of 1995 level by 2006; 50% by 2009; an asterisk * indicates Member States with a four-year derogation to 2010 and 2013, respectively.
For the final report, updated datasets both regarding the Cohesion Policy and total investments will be used
Sources: see Table 11, Figure 7 and Table 26.

5.2 Review of key results in the water sector

The water sector accounted for over 50% of public sector investment the period from 2007 to 2013, and also a much higher share of Cohesion Policy resources than the waste sector in the 23 Member States reviewed here.

In this period, access to public drinking water supplies increased. The quality of water supplied by large systems has increased in many Member States, though water quality was a concern for small systems in several Member States. For waste water treatment, at least eight Member States achieved an increase in the population connected between 2007 and 2011. Improvements were seen in some Member States in terms of compliance with the requirements of the Urban Waste Water Treatment Directive, including for secondary and more stringent treatment. More recent data should be available for the final report. Nonetheless, the currently available data show that many Member States, both in the EU13 and the EU15, had considerable distance to cover in terms of meeting these requirements.

As shown in section **Error! Reference source not found.** above and in Table 49 below, Cohesion Policy allocations to selected projects in the water sector are quite high in some Member States, in terms of the share of total public sector investment in environmental protection and water supply and in the level per capita. Cohesion Policy has clearly contributed to improvements in drinking water supply and waste water treatment, though the range of achievement varies greatly across Member States.

For this sector as for waste management, the challenge of absorption capacity is a key concern.

Table 49 *Summary of data and scoring of Cohesion Policy Contribution related to the water management sector*

MS	CP allocations to selected projects (EUR/capita)	CP allocations to selected projects compared to total public sector investment	Core indicator: Additional population served by drinking water supply achievement vs 2013 target (%)	Core indicator: Additional population served by waste water projects achievement vs 2013 target (%)	Change in share of waste water with secondary treatment (Percentage points)
LV	275.3	98.9%	22%	101%	
BG	159.4	68.9%	-	19%	+8%
RO	186.6	55.3%	-	-	
EE	352.6	52.2%	31%	37%	
HU	201.6	48.7%	-	15%	
SK	146.1	41.4%	44%	4%	
PT	113.4	32.8%	85%	55%	+11%
LT	189.9	29.8%	-	23%	+11%
EL	265.2	27.9%	51%	31%	+3%
PL	94.8	24.5%	77%	31%	
SI	351.1	23.4%	52%	55%	
MT	170.3	22.1%	-	-	
CY	116.4	14.4%	-	-	
ES	66.8	10.6%	14%	-	3%
CZ	101.7	9.3%	110%	62%	
IT	17.7	1.9%	0%	57%	+6%
DE	4.2	1.0%	-	75%	
FI	2.6	1.0%	-	14%	
FR	4.6	0.5%	87%	28%	+20%
IE	3.8	0.2%	99%	0%	
HR	36.7		0%	0%	

Notes:
For the final report, updated datasets both regarding the Cohesion Policy and total investments will be used.
Sources: See Tables 34, 36 and 40.

5.3 Overview of findings

Environment is the second-highest among the 15 Cohesion Policy broad themes for which spending is tracked, ranking behind only Innovation and Research, Technology and Development. Within the environment theme, Cohesion Policy investments are highest in the water sector, where infrastructure funding needs are urgent and, as shown by studies before the 2007-2013, quite large: the Urban Waste Water Treatment Directive has been identified as the most intensive of EU environmental legislation in terms of investment needs[72].EU13

This review has shown that Operational Programme allocations to priority theme 44, waste management, have declined between 2007 and 2013. Operational Programme allocations to the water sector, priority themes 45 and 46, have increased. For both waste management and water, a high allocation to selected projects is seen in most Member States.

For both waste management and water, EU targets are demanding. While the data reviewed indicate that Cohesion Policy investments have played an important role in many Member States in terms of meeting these targets, there remain concerns that key targets – such as those for biodegradable waste and waste recycling, and for sewerage and waste water treatment – will not be met.

[72] GHK and partners, Strategic Evaluation on Environment and Risk Prevention – Synthesis Report (report for DG Regional Policy), November 2006.

Ex post Evaluation of Cohesion Policy Programmes 2007-2013 Co-financed by the ERDF/CF. Work Package 6: Environment

Revised interim report – Task 2, 30 June 2015

CONTENTS

APPENDICES

1 Introduction

This is the report on the results of implementing Task 2 in the project 'Ex post evaluation of cohesion policy programmes 2007-2013 co-financed by the ERDF / CF, Work Package 6: Environment'.

Task 2 concerns the assessment of the quality of demand analysis and financial analysis of 20 selected major projects under priority themes 44 (management of household and industrial waste), 45 (management and distribution of water (drinking water)) and 46 (water treatment (wastewater)). The 20 projects to be analysed were selected and approved by DG REGIO in a selection procedure, which took place during the inception phase of the project. During this process, it was found that most projects in the water sector could not be confined specifically to either priority theme 45 or 46. For this reason, the projects in these two categories are analysed together under the heading 'water projects'. The 20 projects are presented below in section 1.4.

1.1 Purpose of task 2 and links to other tasks in the project

The purpose of Task 2 as stated in the tender specifications is to assess the quality of demand analysis and financial analysis and, on this basis, to identify common patterns as well as individual and systematic methodological errors across the 20 projects.

Task 2 is closely linked to other tasks in the project. The most important links are briefly described below.

- Task 3: Of the 20 selected projects, eleven are operational (i.e. were finalised by December 2014 according to the information received from DG REGIO). In Task 3, a comparison of ex-ante and ex-post data will be carried out providing for conclusions on the reliability of ex-ante assumptions as well as the financial sustainability of these eleven projects. The ex-ante assumptions identified as part of Task 2 thus form an important foundation for conducting Task 3.

- Task 4: Ten of the 20 projects selected and analysed under Task 2 will be subject to a more detailed case study in Task 4. Task 4 will obtain a more detailed and contextual understanding of the projects exploring reasons behind identified methodological errors, impacts of these and other factors on the financial sustainability of the projects as well as implementation difficulties in the projects and the impact of financial aspects on implementation of the projects. Task 2 thus provides a foundation for setting forth project-specific issues and questions to be further explored during the case studies (for the relevant projects). In accordance with tender specifications, this report provides our suggestions for projects to be selected as pilot case studies – please see chapter 4.

- Task 5: This task will produce a 'catalogue of challenges', which will describe the most common problems encountered in financial analysis and solutions for avoiding them. Clearly, Task 2 provides a key input to this catalogue as it identifies quality issues and methodological errors in financial analysis, which is a key source for describing the 'most common problems'.

1.2 Methodology

The methodology followed for Task 2 was determined and agreed in the inception phase and is documented in the inception report of the project. Detailed guidelines for the review of waste projects and water projects, respectively, were developed and have been used as basis for the work in Task 2. The guidelines explained how to analyse and make judgement on the soundness and quality of the demand analysis and the financial analysis.

Each of the 20 projects was reviewed according to the specified guidelines. The basis for the review was the project documentation provided by DG REGIO comprising the application form as well as various supporting documents submitted by the projects at the time of application. Box 1-1 below provides an overview of such supporting documents. It should be noted that these supporting documents have been available to a variable degree for the 20 projects. In some cases, this does provide limitations on the degree to which it is possible to make judgement on the demand and financial analysis. These limitations are explained in the report chapters 2 and 3.

Box 1-1 Supporting documents

Feasibility study: This report includes information to demonstrate the financial feasibility of the project hereunder its financial sustainability. Report submission is optional. In addition, and applying to all 'operational' (and 'non-operational) projects selected, the application form contains a summary of the feasibility study in its section C.

Full CBA report: This report is the full cost-benefit analysis (CBA) document that mandatorily is to be provided as Annex II to the major project application (whereas Section E of the application form requires a summary CBA only). The application form requires both a financial and an economic CBA.

Excel model: The model may be optionally submitted in support of the financial and/or the economic CBA report. In the experience of the Consultant, the model is sometimes submitted as being the full cost-benefit analysis document.

In line with the objective of Task 2 as described above, our analysis focused on drawing out the findings of the reviews of the 20 projects with respect to two main aspects:

- Quality issues: This we understand quite broadly to concern identified areas, where the demand analysis or financial analysis display weaknesses and where the methodology followed does not follow current good practice and thus may be regarded as unsound or questionable. These issues may not necessarily represent '*methodological errors*' as there is not always a clear 'right' or 'wrong' approach to take in relation to the financial analysis.

- Methodological errors: These are areas where clear mistakes have been made compared to a clearly established and commonly accepted benchmark, and where these mistakes potentially have a significant impact on the financial analysis – and thus on the financial sustainability of the project.

In the analysis, we aimed to identify common patterns in respect to both of these main aspects. However, as is seen in chapters 2, 3 and 5, the analysis showed common patterns primarily in relation to quality issues and less so in relation to methodological errors.

Due to the different nature of the projects in the waste sector and the water/wastewater sector, we found it relevant to first identify common patterns within each sector and secondly, to compare the findings from the two sectors. This is reflected in the structure of the report as seen below. Further, as the waste projects comprise five projects and the water/wastewater projects include 15 projects, the presentation in Chapter 2 (waste) and Chapter 3 (water/wastewater) differ in regard to the level of project-specific details included in the text. Appendix A includes tables summarising the main observations per project in the water/wastewater sector.

The tender specifications called for the identification of common patterns in relation to quality of demand and financial analysis – also looking at common patterns for each Member State. Given the limited amount of projects analysed, we do not consider it appropriate to draw conclusions on common patterns per Member State. The common patterns identified are summarised in chapter 4.

1.3 Structure of the report

The report provides separate findings on waste projects and water/wastewater projects and chapters 2 and 3, respectively. Chapter 4 provides our suggestions for projects to be selected for pilot case studies in Task 4. Chapter 5 sums up the main conclusions in respect to quality of demand analysis and financial analysis as well as methodological errors identified.

1.4 Projects analysed

Table 1-1 below provides an overview of the 20 selected projects. Chapters 2 and 3 contain a short introduction to the relevant projects. The data on the projects shown in the table is based on a list of major projects provided by DG

REGIO. It should be noted that all projects marked as completed by end of 2014 are regarded as 'operational' projects in the context of this study.

Table 1-1 Overview 20 projects analysed

No	Country	Title	Completion date	Investment budget (m EUR)	CF funding (m EUR)	JASPERS involvement
Waste management projects						
1	Portugal	Treatment Project. Valorization and final disposal of urban solid waste of the inter-municipal system of the Litoral Centro	End 2014	276	178	No
2	Bulgaria	Integrated System of Municipal Waste Treatment Facilities for Sofia Municipality – Phase II	-	107	84	Yes
3	Hungary	Development of solid waste management system in the operation area of the Association of Municipalities for Solid Waste Management of Győr Region	-	38	22	Yes
4	Poland	Modernization of municipal waste management in Gdansk	End 2014	86	51	No
5	Romania	Integrated Waste Management System in Cluj County	End 2015	47	39	Yes
Water and wastewater projects						
1	Czech Republic	Improving water quality in rivers Jihlava and Svratka above tanks of Nové Mlýny	End 2014	29	18	Yes
2	Estonia	Renovation of Water Supply Systems in Kohtla-Järve Area	End 2014	55	31	No
3	Latvia	Development of water management in Riga, stage 4	End 2015	39	21	Yes
4	Poland	Comprehensive organization of water - sewage management in Żory	End 2014	80	43	Yes

No	Country	Title	Completion date	Investment budget (m EUR)	CF funding (m EUR)	JASPERS involvement
5	Poland	Water and wastewater management in Nova Sol and neighbouring municipalities	End 2014	47	36	No
6	Romania	Extension and rehabilitation of water and wastewater infrastructure in Jiu Valley Area, Hunedoara County	End 2015	48	34	No
7	Greece	Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas	-	88	75	No
8	Portugal	SIMARSUL – Sanitation sub-systems of Barreiro/Moita and Seixal	End 2014	61	22	No
9	Spain	Sanitation of Vigo	-	112	112	No
10	Czech Republic	Renovation and constr. of sewerage system in Brno	End 2014	91	38	Yes
11	Hungary	Nagykanizsa and surrounding areas - sewage coll. and WWTP development	-	41	29	Yes
12	Lithuania	Sludge Treatment Facility at Vilnius WWTP	End 2014	92	58	Yes
13	Malta	Malta South Sewage Treatment Infrastructure	End 2014	70	59	Yes
14	Poland	Construction of sewage and storm water collection systems and municipal WWTP in Tarnow mountains - phase 1	End 2014	40	24	No
15	Slovakia	Sewage collection system and upgrade of Liptovská Tepla WWTP	End 2015	27	15	Yes

2 Analysis of solid waste projects

This chapter presents the findings from the ex-ante financial review of the five municipal solid waste (MSW) management projects that were selected.

The five projects vary considerably in terms of scope and project boundary. For an understanding then of any common patterns and errors of methodology, the first section of this chapter covers these project dimensions. Since the extent of financial analysis review is determined by the information contained in the application and the supporting documents, the project summary addresses also the issue of information availability. In the summaries each project will be referred to by an acronym derivable from its project title as defined in the section heading of each summary. Thereafter, each project is identified through its geographic location (country).

The following sections cover the findings from the demand analysis and the financial analysis with section/sub-section headings corresponding to the areas for review defined in the assignment TOR. The final section provides the main findings.

2.1 Presentation of projects reviewed

2.1.1 Portugal: Litoral Centro SWT[1] Project (2008PT161PR004)

The project concerns the upgrading of an existing solid waste management system through the construction of two plants for mechanical-biological waste treatment and a transfer station. The system involves 18 municipalities and is operated on a concession basis. The project boundary is confined to the concession holder and the municipalities. The financial analysis of the application does not extend to tariff affordability issues with the population. Within this boundary, the application information was considered adequate for the ex-ante financial analysis review.

2.1.2 Bulgaria: Sofia ISMWT[2] Phase II Project (2011BG161PR007)

The Sofia ISMWT Phase II Project covers the construction of a waste sorting/treatment facility only. The project boundary in financial terms includes households and other MSW producers. In Sofia, waste tariffs are not charged, instead the cost of waste management is paid for through a waste fee set in proportion to property value. The application information available was extensive and fully adequate for the purpose of the review. Phase I of the project included the construction of a composting plant and of a landfill.

[1] Solid Waste Treatment

[2] Integrated System of Municipal Waste Treatment

2.1.3 Hungary: Györ Region SWM[3] Project (2008HU161PR008)

The project covers provision of all MSW management services in the region from collection to landfill disposal. The project boundary includes the households ans other MSW producers of the region, which is partly urban, partly rural with about 50% of the population in each. The application information for the review is that required submitted, i.e. the summary financial analysis of the application form and the cost-benefit analysis (CBA) report. Also available was the JASPERS completion note. The information was lacking in detail for a proper carrying out of the financial analysis review.

2.1.4 Poland: Gdansk MWM[4] Project (2007PL161PR002)

The Gdansk MWM Project covers the construction of new waste sorting plant, a new composting plant, installation of a crusher (for building waste), waste storage facilities, and the upgrade of an existing landfill to include landfill gas and leachate collection. The project boundary covers the delivery of waste to the facility from the Coty of Gdansk and surrounding municipalities. The application addresses the waste streams to the treatment/disposal facility only. These are MSW, building waste, bulky waste, and asbestos containing waste (for temporary storage). The financial analysis review was based on the application form, the CBA report, an Excel model with few formulae and an update (only) of a more comprehensive feasibility study. For these reasons in a number of cases, it was not possible to identify and assess specific assumptions made for the financial analysis.

2.1.5 Romania: Cluj County IWMS[5] Project (2009RO161PR036)

The project concerns the establishment of a fully integrated solid waste management system and the closure of existing dumpsites for the whole of Cluj County with 2/3 of residents in urban areas and 1/3 in rural areas. The project boundary is further defined by covering collection of municipal type waste from all waste producers i.e. including also collection from large businesses not normally a municipal responsibility. System components included are the provision of waste containers, the construction of waste transfer stations, and the establishment of a central waste management facility with a sorting plant, a mechanical-biological waste treatment plant and a landfill. The supporting documentation submitted with the application was very comprehensive and sufficient for the assessment.

[3] Solid Waste Management

[4] Municipal Waste Management

[5] Integrated Waste Management System

2.2 Judgment on demand analysis

For the waste projects, the analysis of demand is expected to address the amounts of waste generated for the purpose of waste management, i.e. collection, transport, treatment, and/or final disposal.

2.2.1 Waste generation

Current waste generation

The demand for waste management services depends directly on the amounts (by weight) of waste generated. Preferably, the demand estimation should reflect the particular characteristics of the project area and have its starting point in the current waste generation per person and of the business entities covered by the MSW management system.

The three projects that cover waste treatment/disposal only (Litoral Centro MWT Project in Portugal, the Sofia ISWMT Project in Bulgaria, and the Gdansk MWM Project in Poland) do not consider the amounts of waste produced by individual waste generators. Taken into account only is the total waste amounts currently delivered for waste treatment/landfill. Since these amounts are known (measured), this is a valid approach for estimating current waste generation.

The situation is different for the two other waste projects, which establish integrated waste management systems (Györ Region SWM Project in Hungary and Cluj County IWMS Project in Romania). In Hungary, the assumed total waste amounts generated are just stated; information on the estimation of current amounts appears to be in the feasibility study, which was not available for review.

In Romania, current waste generation per person (by weight) is estimated only on the basis of information from waste collection companies of *volumes* of waste collected. These volumes are very much estimates as the exact volume will depend on degree of filling and compacting of waste in the containers. This leaves much uncertainty about current waste generation amounts against which waste projections are prepared. Therefore capacity needs for waste collection equipment, for waste treatment and for waste disposal are uncertain as well. The uncertainty could have been reduced by using information on actual waste generation amounts of other counties in Romania (or in other countries in the region) where integrated, modern systems had already been set up.

The estimates for the Romanian project correctly take into account that waste generation in urban areas is much higher than in rural areas (1/3 of the population). Waste surveys performed for other projects invariably show such difference which should be reflected in the baseline waste generation estimation. Among the five projects this is a relevant consideration also in the Hungarian project, which, however, fails to integrate this difference in assumption in the waste forecasting (half of the population in areas). The Romanian project sets

per capita waste generation in urban areas at 2½ times the level in urban areas. This difference is in line with the results of the waste surveys.

In the Romanian project as well the estimates of the current levels of street waste and garden waste to be taken to the waste treatment facilities are much higher than seen elsewhere for similar projects. No justification is given for assuming these high levels given (which also represent very large increases as compared to previous years). This likely overestimation leads to an overestimation of future amounts of these types of waste as well as of overall capacity needs. This apparent error in assumption with respect to waste generation could have been eliminated in this area as well if the experience of the operation of such similar projects had been drawn upon in project preparation.

Waste generation forecasts

The approaches to preparing forecasts for total waste generation also differ across the five projects. This covers the basis for the forecasts as well as the assumed growth rates. In Portugal, Poland and Hungary the basis for the forecasts is the total waste amounts estimated for the catchment area. In Bulgaria and in Romania the basis for the projections is the per capita waste generation amounts. The latter approach is the more appropriate one as it allows to take into account the impact of specific behavioural assumptions for all households or for selected groups of households. Allowed also in this approach is the explicit consideration of the impact of population developments on total waste generation.

Assumptions with respect to waste growth rates range from applying 'passive' assumptions of national/regional waste management plans of quite high waste growth rates in line with income increases (the Hungarian and Romanian projects) to modest but constant increase rates (Poland) and to 'active assumptions' for growth rates in Portugal and in Bulgaria. These two projects integrate the experience from waste generation in the past and in countries at the income levels forecast attained in the projects with a decoupling of waste generation from income levels. This active approach provides for much larger confidence in the realism of growth forecasts.

This experience of decoupling also means that in Hungary and in particular in Romania, the resulting waste amounts that are projected appear high. Statistics from Eurostat show that the decoupling of waste and income has been observed across the EU over the past 15 years or so. The result for the two projects may then well be that capacity needs are overestimated.

2.2.2 Waste composition

The demand for municipal waste management services also depends on the composition of the waste by its different fractions e.g. the share of waste that may be recycled or treated. This is a relevant aspect for the dimensioning of the

capacity needs for the waste sorting (separation of recyclable waste) and the waste treatment components of the projects.

Waste characterization studies consistently establish differences in the types of waste coming from households and from non-households. Household waste has a much larger share of organic waste than non-household waste. This is counterbalanced by more mixed and recyclable (paper) waste from the non-households of the municipal waste collection system. These entities are typically schools, organizations and small businesses. Furthermore, waste from households in rural areas has been found to contain more organic waste than waste from households in urban areas. The differences are also a logical result from the fact that food preparation is done mainly by households and that households in rural areas to a higher degree are self-supplying in foodstuffs (fruit and vegetables), which generates more organic waste from their preparation as opposed to buying prepared foodstuffs

Preferably, as well, assumptions with respect to waste composition should derive from studies carried out in the project area or in similar areas. This approach has been adopted for the projects in Portugal, Bulgaria and Poland. In Hungary and Romania, national planning data appears to have been used. Not known is whether these data derive from waste sampling or are assumptions only.

These planning data do not distinguish between either household/non household waste composition or urban/rural waste composition although it would have been a very relevant consideration for both projects. The composition for the Romanian project is that for household waste only. This appears to be the case also for the project in Hungary but cannot be verified. When so, the amounts of organic waste are overestimated and those of recyclable and mixed waste underestimated with repercussions on the capacity estimations for the sorting and waste treatment facilities.

The failure to consider this difference is a particular problem for the Romanian project where non-household waste comprises a very large share of the total municipal waste collected, some 45-50% of household waste. This reflects that the management of all waste similar to household waste is considered a municipal responsibility. Normally, as reflected also in the Eurostat definition of municipal waste, the share is much smaller, some 15-20% only[6].

The Bulgarian, Portuguese and Polish projects, covering exclusively or mainly urban areas, do not make a distinction between household and non-household waste composition either. The waste characterization study underlying the assumption of waste composition has covered all waste to be treated. The waste composition assumed is then the 'average' for household and non-household

[6] Eurostat defines municipal waste as "waste collected by or on behalf of municipal authorities. The bulk of the waste stream originates from households, though similar wastes from sources such as commerce, offices, public institutions and selected municipal services are also included." (source: Eurostat: 'Statistics in focus' 31/2011 p.11)

waste and therefore appropriate in the context of establishing capacity needs for sorting and waste treatment.

2.2.3 Demographics

For all projects the assumptions with respect to the population level of the project area are based on the most recent census data with updates to the year of project preparation well justified from other population statistics.

The waste forecasts of the project financial analysis should incorporate that population developments will affect the amounts of waste generated. Furthermore, as the trend of the last several years of migration from rural to urban areas may be expected to continue, this demographic change should be integrated in forecast assumptions to the extent relevant.

Consideration of population developments is best possible if the basis for the waste projections is the per capita waste generation. Cf. discussion in section 2.2.1 this was the approach for the Bulgarian and the Romanian projects. The Bulgarian project very adequately considers the population trend in Sofia only with its comparatively high population increases.

The Romanian project uses the national level forecasts and therefore fails to take into account the rural-urban migration. In turn, this leads to an underestimation of waste amounts given that the project – in line with waste characterization studies assumes much higher waste generation per person in urban areas.

Any failure to take adequately into account relevant demographic developments in the project area is of course a methodological error. However, the impact of the error on capacity needs and on tariffing should not be overestimated as regards total population change. Any deviations will only impact on the change rate for future waste generation. Much more important is to get the population level and the per capita waste generation amounts right.

2.2.4 Consumer behaviour

The behaviour of waste generators will affect the amounts of waste produced, the types of waste produced, and the extent to which waste is sorted at the source with a view to recycling or treatment of the waste. In turn this helps determine capacity needs for sorting and treatment.

The behaviour of waste producers may be impacted by a variety of factors. These include the price for waste collection (tariff) affecting waste amounts, the income levels of waste producers affecting waste composition, and the conduct of waste awareness campaigns for waste minimization and/or for increasing the efficiency of waste sorting at the source (separation of waste into different bins, use of recycling yards). The conduct of such campaigns is provided for in Article 4 of the Waste Framework Directive, which states that Member States are to

take measures to promote waste prevention, re-use, recycling, and other waste recovery.

None of the projects formally incorporates price and income responsiveness (elasticities) in projections. This is fully reasonable, as empirical evidence is not established.

With respect to price responsiveness, and for the projects in which tariffs are analysed, these tariffs are set in regard to the number of emptyings of a container whether at an individual household or at communal sites. Measures are not included for the weighing of waste at the point of collection and the emptying of a container is the only indicator of household waste generation for the purpose of tariff setting. Therefore, price (tariff) increases will not normally provide an incentive to reduce waste generation and need for waste management services. An exception could be e.g. if households could choose between weekly and bi-monthly collection depending on the amount of waste they generate.

As explained previously, waste generation amounts in the Romanian and the Hungarian project are assumed to increase in direct proportion to income growth. As also explained, this assumption is not sound as it deviates from the empirical evidence of a decoupling of waste growth from income growth. In the Polish project the background to constant waste growth rates cannot be established. Finally, the Portuguese and the Bulgarian projects appropriately assume a decoupling.

Empirical evidence does point to *waste composition* changing with income changes. With increased affluence consumers will to a higher degree buy prepared and pre-packaged foods. This means a lower share of organic waste counterbalanced by more mixed waste and more recyclable (packaging) waste. All projects include waste sorting and waste treatment components; such that changes in waste composition should be incorporated in the waste forecasting to the extent income growth is expected. The reason for this is, as previously discussed, that the composition of the incoming waste helps determine sorting and treatment needs.

The reviewed projects for the most part reflect these expected changes in waste composition over time. This is incorporated in the Bulgarian, Hungarian and the Romanian projects. The Portuguese project assumes an unchanged waste composition whereas no information in this regard is available for the Polish project.

Waste awareness campaigns are included in all projects but the Bulgarian one. In Sofia, the conduct of these campaigns is outside the project scope being the responsibility of the private sector waste collection companies. The effect of the campaigns is built into the assumptions with respect to the amounts of

recyclable waste received for sorting or direct sales of the Portuguese, Hungarian, and Polish projects with increased sorting efficiency over time.

The Romanian project, on the other hand, assumes source sorting to be highly efficient already in the first operating year. Based on the experience from other countries this is unrealistic; consumer awareness of the importance of sorting will be improving only over some time. Consequently, the amounts and revenues from recyclable waste are overstated. The Hungarian project also builds on an assumption of very high sorting efficiency but this develops over some years only. However, as far as can be understood, the proposed technical solution in this project is for waste generators to bring recyclable waste to recycling yards; this means assuming a very high willingness of the population not only to sort the waste at source but also to bring it to the yards.

2.2.5 Affordability

'Affordability' addresses the waste tariff affordability of households. Conventionally, affordability is to be calculated as the ratio of the monthly (annual) household bill to the monthly (annual) disposable (after tax) income for households in the project area.

The Member State may have determined maximum affordability ratios (affordability thresholds) to comply with either for the population as a whole or for specific population groups. As income levels differ between rural and urban areas, separate thresholds may be defined for these two areas. Otherwise, a 'conventional' maximum of 1½-2% of average disposable household income is often taken to be the threshold value[7].

Neither the Portuguese nor the Bulgarian project addresses tariff affordability as defined above. In the former, the consideration of project impact on households is outside the project scope; in the latter no waste tariffs are imposed and waste management services are paid for by property owners through a fee set in proportion to property values. To note is that the waste fee is not expected to increase with the project. The reason for this is that Sofia Municipality with the project will realize important operating cost savings as waste for landfill no longer needs to be transported to other municipalities for disposal. In this indirect manner project acceptance as far as the price of the service is concerned should be ensured

In the three other projects, the definition of affordability follows the standard approach of looking at the household waste bill and at household income.

[7] Cf. e.g. European Investment Bank (EIB): "The Economic Appraisal of Investment Projects at the EIB" (2013) p. 212 mentioning that the DG REGIO threshold for assessing 'major project' applications in terms of eligibility of EU grant support. is 1.5% and also the one followed by the EIB for judging the affordability of solid waste management services.

The Polish and the Romanian projects apply affordability thresholds defined at the national level for the average population respectively for the lowest income decile of the population. In the Polish project, the threshold is stated not to be effective; however, the underlying assumptions for this statement cannot be verified.

The affordability threshold is effective in the Romanian project. In this project, the threshold definition has been extended to apply to the whole population without any reason given and contrary to the national guidelines. This means that the wealthier 90% of the population pays the same tariff as the poorest 10% irrespective of their ability to afford higher tariffs. In practical terms, this extension is a necessity as private companies are to collect tariffs. Charging lower tariffs for the poorer part of the population requires these companies to be informed of their income levels, which does not appear feasible. The problem lies then with the lack of practicality of the national threshold definition when waste and tariff collection are both outsourced.

The Hungarian project does not address the issue of affordability threshold and tariff affordability. Noted is that in the urban areas the affordability ratio will be unchanged as real income increases are stated to fully offset increases in operating costs; a surprising finding given the scope of the integrated project proposed including the purchase of new collection equipment and the establishment of new sorting and waste treatment facilities. In the rural areas, the affordability ratio on the other hand is stated to increase significantly due to low current tariffs.

2.2.6 Tariffing

In the setting of tariffs, the full cost recovery principle and the polluter pays principle are to be applied as per Article 14 of the Waste Framework Directive.

Full cost recovery means that tariff and other operating revenues, e.g. from sales of recyclable/treated waste are to cover all operating costs including allowances (depreciation amounts) for asset renewals over time including the construction of new landfill cells. The polluter pays principle implies that tariffs for each customer group are to be set in accordance with the costs of waste collection and transport (if part of the project) and the costs of treatment and final disposal of the collected waste.

Member States may also take social impacts into account in tariff setting (Article 4 of Directive). This allows for an element of cross-subsidisation in tariff setting.

Full cost recovery

In the Polish project limited information is available for assessing whether the affordable tariffs set do indeed cover the full operating costs for waste treatment as well as for waste collection. As discussed later in this chapter, the principle does not appear to have been fully adhered to

Among the four remaining projects only the Portuguese one has been found to ensure the strict application of the full cost recovery principle: This follows from the institutional set-up: the concession holder is an independent company that will charge the full costs of its services to the municipalities granting the concession. Cost recovery of tariffs is required by law so at least in principle the payment of these full costs will be passed on to the waste generators.

In the Romanian project, the affordable tariffs set do not ensure full cost recovery as only the direct operating costs are included in the cost base. The failure of tariffs to cover full costs means that subsidy payments from the participating municipalities will be required. In this project, the Inter-municipal Development Association as overall project responsible sets tariffs. Affordability is the overriding concern, which is the reason that household tariffs have been found not even to cover all of the direct operating costs. The tariffs for economic agents was found to cover only the full direct operating costs only and that even only in discounted terms over the project life such that in any individual year tariffs may not cover the actually held operating costs.

In the Hungarian project, information is lacking on the definition of operating costs. The information available points to tariffs including at least part of costs of future system investments but this cannot be verified. Furthermore, as shown in the discussion of operating costs, the waste treatment/disposal facility maintenance costs are set at levels that must be judged below the level required for operational sustainability. Viewed at least from that perspective the principle of full cost recovery is not respected.

The Bulgarian project has adequately identified the full operating costs of the various treatment and disposal facilities. The operator of the facilities, foreseen to be a municipal company, is not the entity determining the waste fee to be charged. Sofia Municipality sets this fee, which, according to law, is to cover the full cash costs of operations.

An issue addressed in the Commission services appraisal of the Sofia application was how to allow for the accumulation of cash at this municipal service company in order to cover future investment needs in terms of asset replacement and new landfill construction. In an answer to the Commission, the beneficiary, Sofia Municipality, agreed to the accumulation of cash with the company. At the same time, the Act of Establishment of this company states the accumulation to be limited in amount such that reserves for future investments cannot be accumulated[8]. Instead, it appears that a separate municipal budget allocation has to be made for future investments. Furthermore, the budget supplied for the waste fee compensation payment foresees recurrent maintenance costs that are *lower* than otherwise established in the application (more specifically maintenance costs for the operation of the mechanical-biological treatment

[8] File name: "Act of Establishment of SWME_30.11" (SWME is Solid Waste Management Enterprise)

(MBT) plant). When so, the project cannot be sustainably operated[9]. This aspect is detailed in the section that follows in operating costs.

Polluter pays principle

The five projects represent different approaches to applying the polluter pays principle; for two projects with a failure to apply the principle.

In the Portuguese project the polluter pays principle is stated to be applied in tariff setting by law.

In the Polish project, the polluter pays principle discussed relates only to the fee within the project boundary, the gate fee for receiving waste at the treatment/landfill facility. The information available shows that gate fees differ according to the degree of environmental harmfulness of the waste received (other forms of waste than municipal solid waste is received). This is only a part application of the polluter pays principle as differences in waste management costs should also be incorporated in the gate fee setting.

The Hungarian project proposes a complex system of tariff setting differentiating between geographic areas and between service levels. The tariff policy attempts to apply the polluter pays principle in a very ambitious manner, which may not be very operational. This includes tariffs and service levels that differ in the summer and in the winter months.

In the Romanian project, the polluter pays principle is not applied as neither tariffs for households nor for economic agents cover the full operating costs. No cross-subsidisation is built into the tariff schedule as the tariffs for the economic agents only cover the estimated direct operating costs of waste management services to this customer group.

Finally, in the Bulgarian project, the polluter pays principle is not applied as tariffs are not charged for waste management services. Extensive cross-subsidisation is involved in the waste fee setting as 70% of the fees are collected from commercial property owners, which generate only 20% of the waste handled. Sofia Municipality appears to have committed to introducing a tariff charging system by 2022 with elimination of cross-subsidisation and application of the polluter pays principle.

Phasing-in of tariffs

The investments of the five waste projects are of a scope such that quite sizeable tariff increases should be necessary for the full operating costs to be covered. Gradual phasing-in of household tariffs to their cost recovery levels is an often used, and recommended, tool for ensuring the acceptability of the

[9] File name: " Calculation of Compensation_SWME_30.11" (Note prepared by Sofia Municipality on the calculation of compensation to the municipal enterprise

higher tariffs. Phasing-in prevents too abrupt tariff increases at the time of project operation start.

Phasing-in is not an issue in the Portuguese and the Bulgarian projects; in the former as the level of household tariffs is outside the project boundary; in the latter as waste tariffs are not charged. Due to cost savings from reduced landfill disposal outside Sofia, the waste fee need not be increased provided the degree of cross-subsidisation remains at its current high level.

Only the Polish project foresees a phasing-in of the gate fee for household and other municipal waste to its cost recovery level.

The Romanian and the Hungarian projects do not address the issue. In the former, with tariffs set at their perceived affordability levels, household tariffs will hardly increase with the project. The Hungarian project disregards phasing-in entirely although tariffs in rural areas are stated to increase considerably even at their well below cost recovery levels.

2.3 Judgment on financial analysis

The 'financial analysis' assessment of this section covers the part of the overall project financial analysis that addresses financial flows other than those deriving from the tariffs set for the project. In the projects' implementation phase this means covering implementation schedule, investment costs and financing plan. In the operating phase of the projects, assumptions with respect to operation and maintenance costs, tariff collection rate, and revenues from the sales of recyclable and treated waste will be examined. Also assessed is the scope and relevance of the risk and sensitivity analysis performed for the overall financial analysis.

2.3.1 Project implementation phase

The assessment of the project implementation phase relates to the concept of financial sustainability as broadly interpreted, namely with the taking into account of the risk of delay impeding 'timely' financial performance. Such delay may derive from insufficient time for implementation, in particular construction, but also from any needed land purchase, from under-budgeting/cost overruns, which cannot be easily financed, and from problems relating to obtaining overall finance for project investments.

Implementation plan

The applications reviewed show that all five projects were to have been in operation at the beginning of 2015. Only two have commenced operation; web searches show operation start for the Portuguese project in December 2012 (a delay of 22 months) and for the Polish project in June 2012 (a delay of 30 months). The other projects were in the respective applications expected to commence operations in April 2010 (Hungarian project), December 2012

(Romanian project) and December 2014 (Bulgarian project). A web search has shown the Bulgarian project to be delayed by at least 1 year. This comparatively short delay may be attributed to the fact that, part of the preparatory work had been carried out already in the phase I of this project. So far, the Hungarian project is delayed by 5 years, and the Romanian one delayed by more than 2 years.

The sizeable delays incurred are unsurprising. A common feature for all is that the time reserved for construction of the treatment and/or landfill facilities has been too short. Construction periods of between 1½ and 2 years have been assumed. Experience shows such period to be insufficient with a period of at least 2½ years more realistic for the carrying out of works.

For all five projects, environmental impact assessment (EIA) procedures had been completed and any needed land for the project had been secured at the time of the filing of the applications. Hence, the project delays are not attributable to these parts of project implementation.

The too short overall implementation period found appears mainly to relate to unrealistic expectations with respect to the construction period length. This conclusion applies also to those projects where the main contracts had been tendered or even awarded at the time of application submission (Portugal, Bulgaria, Hungary, Poland). The Romanian project foresees the implementation phase from design to operation start lasting 3¼ years. Experience from recently implemented projects of the same type shows implementation periods of some 4½ years to be required as a minimum.

Delays arising from the fact that commitments to project investment co-finance were not in place at the time of application submission are addressed later in this section in the discussion of financing plan. Such delays will be project specific reflecting the financing structure arrangements of the individual project.

Investment cost budget

Overall financial sustainability may be impacted by the construction of 'too much' (or too little capacity) as compared to needs and by under-budgeting or lack of reserves to cover cost overruns.

In all projects where information is available for an assessment, the proposed technological solutions appear overall adequate and selected following an options analysis. At the level of specific technology solutions 3 of 4 projects with MBT plants opt for mechanical-biological treatment plants with production of Refuse Derived Fuel (RDF), which fuel would be expected sold in the market to replace use of fossil fuel. In the Portuguese project, however, the RDF will be disposed in a landfill until the time when the government has adopted a policy on refuse derived fuel. It is not explained why a simpler and cheaper mechanical-biological treatment technology without refuse derived fuel production has not been opted for - as done in the Romanian project. Similarly applies to the Hungarian project,

where RDF is produced but not sold; the application does not even address if RDF may potentially be sold at all.

In Bulgaria, the selection of an MBT plant technology with refuse derived fuel production is a risky one with respect to the project's operational and financial viability relying on the sales of the refuse derived fuel in the market. Resulting from the Commission Inter-Service Consultation process, the refuse derived fuel is required sold at the market price, which may be negative or positive depending on the demand for this fuel.

Two projects include landfill cell construction (Romania, Hungary). In the Hungarian project, the assumed cell operating life of 10 years is double of that called for to ensure technical-operational sustainability. From this perspective as well financial sustainability is at risk; degradation of the expensive landfill lining system is an issue with such long operating life and parts of the landfill not being used till late in that period.

Capacity needs *overall* are consistent with the demand deriving from the waste forecasts. Two of the four projects with different types of waste sorting/treatment facilities included have been found to lack balance in the capacity dimensioning of the facilities. These are the two projects where the level of current waste generation has been estimated applying a problematic methodology:

As noted already, in the Romanian project total waste generation forecasts appear overestimated, the demand for sorting underestimated, and the demand for mechanical-biological waste treatment overestimated. In the Hungarian project as well overall capacity needs appear likely too high; furthermore, the capacity of the composting plant of the project appears rather too high. Production of compost to use as fertilizer requires a high degree of 'purity' of the incoming waste (15-20% of the waste collected), which will be difficult to fulfil. Separately collected garden and park waste is particularly suitable for composting. Conversely, mechanical-biological treatment plant capacity appears too low unless it can be offset by increasing the number of shifts in plant operation. This cannot be judged from the information available. The application even points to a need for doubling mechanical-biological treatment plant capacity as early as after 5 years of operation; assuming such short a plant life is a financially unsound solution.

With respect to the proposed investment cost budgets, as noted previously, all projects but the Romanian were at an advanced stage of preparation when the application was submitted with the main contracts even awarded for three of the projects. As a result, the estimated investment costs for the main components have been found in line with expectations. In terms of technical preparation, the Romanian project was also at an advanced stage with part of the detailed design apparently completed at the time of application submission. The assumed unit costs for treatment/landfill facilities were found reasonable when taking into

account that an assessment is difficult for the landfill where site specific features may explain a comparatively high unit cost.

The inclusion of contingency reserves to meet unexpected cost increases, including inflationary ones, is appropriate in order to finance cost overruns as compared to the initial budget. All projects reviewed points to a risk of delay from insufficiency of such reserves; however, this risk varies widely across projects.

Contingencies for *price* increases are needed if the project investment budget is in constant (same year) prices. This is the case for the Portuguese, Romanian and the Hungarian projects. The two former include adequate provisions for inflationary price increases. In the Hungarian project, a clear risk exists that the cost budget may not cover inflation hereunder any price indexation foreseen in the main contract awarded.

The level of *technical* contingencies in the Bulgarian project is set at its maximum of 10% in the application form budget. This may not be sufficient as the cost budget is based on an 'optimized' mechanical-biological treatment plant design described in the feasibility study report. The project design tendered initially (and later cancelled), was not this optimized design. That of the retender is not known; a web search points to plant costs in the tender awarded being higher than allowed for with the contingency reserve. In the Hungarian and the Romanian projects, the technical contingency reserve was only 2-3% of base costs, which is imprudent given the type of facilities to be constructed. Neither the Portuguese nor the Polish projects included any technical contingencies in the cost budget of the application form. This is inappropriate unless the cost budgets for the individual project components included such reserves; this cannot be assessed from the information available.

Financing plan

In the broader definition of financial sustainability, lack of finance may delay or even prevent project implementation.

Among the five projects, funding for the co-financing of project investments at the time of filing the application had been secured only for the Bulgarian project.

The Portuguese, Polish and the Hungarian projects all relied on the obtaining of external loans where loan agreements could only be entered when the EU grant had been approved. For the Portuguese project, the application offers adequate mitigating measures by stressing the financial strength of the foreseen borrower (the concessionaire). For the Polish project, the financing plan for the project is only superficially addressed and no full assessment can be made. The sources of borrowing appeared to be the National/Regional Environmental Funds, which provides adequate comfort for the loans to be available.

In the Hungarian project as well, the current service provider (a City of Györ owned company) was foreseen to extend a loan to the beneficiary for investment

co-finance. The application information pointed to this company not being very financially strong and also that a formal operating agreement was still under discussion for this company also to operate the new waste treatment/disposal facilities. The need for appointment of another operator could also delay project implementation. In the project, only the City of Györ was to provide an own funds contribution; the other participating 110 'settlements' in the rural areas were not foreseen to supply co-finance. This is unusual and lack of project acceptability, including the large tariff increases projected for the rural areas could help explain why the project so far has incurred an extraordinary long delay of 5 years.

Most problematic among the 5 projects appears to be the Romanian one where no loans were foreseen obtained. Funding commitments were lacking from all of the 80 participating municipalities and communes but one (City of Cluj).

In the Hungarian and the Romanian projects, the issue of available co-finance may very well be a contributory factor for the (considerable) delay in project implementation. The Polish project was also delayed for financing reasons as the EU grant payment apparently was made later than required for payment of the contractor. The delay was minimised through the beneficiary obtaining a short-term bridge loan.

2.3.2 Project operating phase

In the projects' operating phase, the key issue in financial sustainability terms is whether the cash generated from the collection of tariff revenues/gate fees and from the sales of recyclable and treated waste is sufficient to cover the 'full' operating costs. This concept of operating costs comprise not only the direct, cash costs but also at least part of the cash outlays later required for the replacement of project assets and, if relevant, for the construction of new landfill cells. This issue was addressed from an overall perspective in the section on the application of the full cost recovery principle.

The Bulgarian waste project is a special case in this context. The municipal enterprise to operate the project is not in control of the waste fee revenues and cannot control either the revenues from the sales of recyclable/treated waste. If the revenues from these sales turn out below budget, then a risk is that the total operating revenues, from waste fees and from sales of recyclable/treated waste are insufficient to cover cash outlays.

As part of the Inter-Service Consultations, an agreement was reached between Sofia Municipality and the Commission that the revenue risk from the sales of recyclable/treated waste would be placed with the municipality. In this way, the waste fee compensation to the operator would be defined on a gross basis to cover all operating costs, not on a net basis with deduction of revenues from waste sales. It is unclear whether Sofia Municipality will increase the compensation amount if the revenues from recyclable/treated waste sales are

negative. This cannot be excluded as the refuse derived fuel produced may have to be sold at a cost to the municipal enterprise cf. discussion later in this section.

Operating costs

The issue of operating cost base with respect to tariff setting is not relevant for the Portuguese project. Tariff setting is outside the project boundary and the participating municipalities must pay the full costs to the concession holder.

A common feature for the four other projects reviewed is that the operating costs used in the determination of tariffs/gate fees do not appear to include the full operating costs. This puts the long-term financial sustainability at risk.

In the case of the Romanian project, and as already mentioned, not even all direct operating costs are included. The financial model assumes that the cost of asset replacements and new landfill cell construction can be financed almost entirely by borrowings. The project includes two sets of operating costs, one with the direct cash costs only and one that includes depreciation costs and appropriations for a new landfill cell. The former is used for tariff setting, the latter (some 2-3 times higher) for the cost-benefit analysis.

As also previously discussed, the Bulgarian project includes cash costs only and apparently not even all MBT plant maintenance costs for the setting of the annual waste fee. Sustainability requires Sofia Municipality to provide separate budget allocations for any future asset replacements.

The Hungarian project does appear to include some allowances for future reinvestments but insufficient details are available. However, the replacement of collection vehicles does not appear included among reinvestment. This is certainly inappropriate and it will adversely affect service quality. At the same time, the level of maintenance costs for the waste treatment/landfill facilities (sorting plant, mechanical-biological treatment plant, landfill) looks much lower than is warranted for sustainable operation. The application information available does not even address the issue of how to set maintenance costs.

The Polish project does not include specifics of the cost base for gate fee setting either. The review found that the income statement for the facility operator showed losses in almost all years of operation. As cash inflows from gate fees are shown sufficient to cover cash operating costs, the losses must be attributable to the non-cash item in the income statement of depreciation allowances. Furthermore, the budget for maintenance costs cannot be validated as the calculation method, defined as a percentage of the total of fuel costs and processed waste amount, is a very unusual one. Standard practice is to define maintenance costs as a percentage of investment costs.

A feature for at least 2 of the 4 projects that include the construction and operation of an MBT plant is that the recurrent maintenance costs to ensure the sustainable operation of the plant are underestimated (the only exception is the Bulgarian project). Mechanical-biological treatment plants are characterised by

relatively low investment costs and high maintenance costs. The Bulgarian project has set maintenance costs at 10% of investment costs, which is high but reasonable. The Portuguese project assumes 5% of investment costs. The Hungarian project does not have a separate allowance for MBT plant maintenance but lumps the cost together with other fixed costs such as insurance. The maintenance cost share for the Romanian project is 6%; the lower share may in part be attributed to the simpler technology of the proposed MBT plant. No justification for the level is supplied, however.

The unit costs and unit consumption values otherwise assumed in the establishment of operating cost budgets have been found reasonable for the four projects where a sufficient level of detail is available. A clear exception to this is the Hungarian project where no information is provided and where quite possibly unit costs and unit consumption levels are defined from some pre-defined national standards rather than being specific to the project.

Tariff revenues

The tariff revenues actually received for cover of operating costs will depend not only on tariff levels but also on the ability and willingness of waste producers to pay their waste bills, i.e. the tariff collection rate. The tariff increases that should result from project implementation may affect this ability and willingness.

In the Portuguese and the Bulgarian projects, once again, this is not an issue due to the definition of the project boundary respectively that tariffs are not charged.

The Polish project assumes a 100% collection rate. This is well justified as the gate fee is paid by the waste collection companies. The Romanian project assumes collection rates of 98-99% in the project's operating period. This assumption is very odd: derivable from the application is that this rate level represents a significant improvement as compared to the situation before the project. In the application, the current low level of the collection rate is stated to be an issue to address in the tender of waste collection contracts[10]. Against this background, future tariff revenues of the Romanian project will be overstated being yet another reason for the lack of financial sustainability of this project.

Finally, judged from the information available, the Hungarian project has not even considered the issue of tariff collection; this a problematic omission as the project will lead to considerably higher tariffs in the rural areas where incomes and therefore payment ability is the lowest.

Off-take markets for recyclable and treated waste

The analysis of the potential for the sales of recyclable and treated waste have been devoted relatively limited attention in the projects.

[10] File name: "Institutional Report CLUJ County_final" p. 58.

In the Portuguese project, sales volumes of recyclable waste appear related to government set targets rather than to an analysis of actual sales potential, which may well be lower. Selling prices are the administratively set prices prevailing at the time of project preparation.

Sales volumes in the Romanian project are uncertain and assume, as previously discussed, a high degree of efficiency in the source segregation of waste (between recyclable and other waste). Selling prices are reasonably stated at the levels prevailing in Romania. At least in the early operating years, revenues from recyclable waste sales are overstated. Furthermore, the application assumes that some of the 'Compost Like Output' from the MBT plant may be sold as compost. This is a pure assumption with no justification of how it will be ensured that the output will be of compost quality (requiring good quality bio-waste input in a separate process) and whether there is market for compost at all.

The Hungarian project builds on clearly unrealistic assumptions with respect to sorting efficiency and how much of the recyclable waste that is of a quality that can be sold in the market. The share of revenues from recyclable sales is projected to increase during the operating period from an already somewhat high 10% in the first operating year to 25%. These percentages compare with a very low recycling share before the project. With this overestimation, the need for tariff increases is correspondingly underestimated. The application also fails to demonstrate the potential for sales of compost assumed in the financial forecasts. This includes whether the compost may be sold at a (positive) price. Under the given assumptions the project is not financially sustainable.

The Polish project application does not include an analysis of the off-take markets for either recyclable waste or compost. The financial forecasts build on assumptions of sales at current market prices and that all sorted recyclable waste is of a quality that can be sold in the market.

The market for the sales of refuse derived fuel is considered only in the Bulgarian project, which is the only one where refuse derived fuel is assumed sold. The analysis is a Commission requirement for consideration of the project for EU co-financing. The mechanical-biological treatment plant investment was initially part of phase I of the Sofia ISWMT project. The Commission requested the investment taken out in order for the refuse derived fuel market to be better analysed for justification of the mechanical-biological treatment technology choice with refuse derived fuel production. The application assumes the RDF sold at a zero net cost (including transport to the off-taker). This may appear conservative, but is not so as often refuse derived fuel is sold at a negative price; i.e. the refuse derived fuel producer has to pay for inducing the off-taker to buy the fuel. Refuse derived fuel is a fuel that is not clean, requiring additional investments at the off-taker, and with uncertain calorific value. As previously explained, the project approved by the Commission has eliminated the revenue risk from sales of recyclable/treated waste from the project. A possible uncertainty element is, as already mentioned, whether this applies also in the

case refuse derived fuel has to be sold at a negative price or, if not sold, disposed at the landfill also at a cost.

Cash flows and financial sustainability

The cash flow statements received fulfil the formal requirement of incorporating cash items only. For most, however, not all relevant cash items are included, more particularly the cash required from needed working capital increases with the project, which only the Romanian project took into consideration.

As the demonstration of financial sustainability is a requirement for Commission approval of the application, then of course all projects demonstrate such sustainability. However, this demonstration is no better than the assumptions behind the forecast cash flows. Financial sustainability should ensure also the operational sustainability of the project in its operating period.

In the Portuguese project, this concept of financial sustainability is ensured by virtue of the institutional set up within the project boundary; the concessionaire is financially independent from the grantor, the 18 municipalities. Whether these municipalities may be able to cover the concession payments through waste tariffs is outside the project boundary. A key assumption is though the municipalities are capable of paying the concessionaire for its services.

The financial sustainability of the Bulgarian project appears ensured in a similar manner, more specifically to the extent that the owner of the operating company, Sofia Municipality, is willing to pay for the full costs of project operation.

The Romanian project appears particularly vulnerable in financial sustainability terms. Not only do the direct operating costs that is the cost base appear underestimated. Tariffs are also set at a level whereby they do not even cover these costs. Revenues from sales of recyclable/treated waste are assumed to make up for the shortfall and to provide the limited cash that is generated in the project. Furthermore, the demonstration of financial sustainability assumes that net cash is generated already in the project implementation period; including such cash is methodologically incorrect.

The same methodological problem is found in the Hungarian project; cash is assumed generated from the project although it has not entered into operation. Furthermore, the financial sustainability of this project relies heavily on the overoptimistic assumptions with respect to revenues from the sales of recyclable waste. Although in most years tariff revenues are higher than operating costs it is above all the cash generation from the sales of this form of waste that is to cover the costs of asset renewals and the construction of a new landfill cell.

The Polish project includes all relevant cash items including loan repayment and some provisions for asset renewals.

2.3.3 Risk and sensitivity analysis

In general, the risk and sensitivity analyses focus on the impact on project profitability. This is in accordance with Commission requirements and also reasonable to the extent that any financial sustainability impact may be mitigated by higher tariffs.

An exception is the Bulgarian project, which additionally and rightly assesses the (high) sensitivity of the project's financial sustainability to alternative assumptions for key variables, notable the RDF selling price. As part of the Inter-Service Consultation process, this risk and the risk of the sales of recyclable waste has been transferred to Sofia Municipality. Apart from this revenue source, a risk and sensitivity analysis is not of relevance for the project as the operator is compensated for service provision by Sofia Municipality. A similar compensation mechanism exists in the Portuguese project.

The Polish project included a qualitative discussion of sustainability impact including that a 10% decline in waste deliveries, with an unchanged gate fee, would lead to non-financial sustainability. As the operator has room for increasing the gate fee charged waste collection companies, financial and operational sustainability may be preserved.

The Hungarian and the Romanian project applications do not address the risk to financial sustainability. In the Hungarian project, the scope for tariff increases cannot be realistically assessed since operating costs have been found too low.

In the Romanian project, the participating municipalities and communes have defined a tariff development plan for maintaining 'affordable' household tariffs, which are set below the level of direct operating costs. Preservation of financial sustainability requires the ability and willingness of the municipalities and communes to subsidize waste management operations. The private waste collectors foreseen appointed will require not only their direct cash costs covered but also allowances for the depreciation of their collection vehicles and an adequate profit margin in order to carry out service provision at all.

2.4 Key findings for waste projects

The differences in project boundary and project definition limit the scope for identifying common patterns in the five waste management projects. A few patterns do emerge as well as some differences in methodological approaches that impact the soundness of the various projects.

2.4.1 Judgment on demand analysis

Waste generation: The two project that stand out with respect to overestimating future waste generation and therefore capacity needs are exactly those two, where current waste generation is not known and which have failed to peruse

the best available information for estimating current waste amounts and for projecting future waste amounts.

These are the Hungarian and the Romanian projects. The Hungarian project appears to have relied on national planning assumptions. The Romanian project relied on simple estimates of volumes or amounts of current waste without any particular justification and on national/regional planning assumptions for future waste generation. Both projects would have benefited from consideration of actual waste amounts in similar regions and from consideration of how overall waste generation has developed in similar regions. The failure to do so has not only increased the uncertainty about future waste amounts but also led to what appears as capacity overestimation. By way of comparison, the Bulgarian project has much relied on this 'information transfer' by drawing on the experience of similar but economically more prosperous cities.

Decoupling of waste growth and income growth: In waste forecasting it is essential to take into account the decoupling observed in the EU over the last many years of waste growth and income growth per person. Whereas per capita income has been growing since the mid-1990s, per capita waste generation has been largely stable for the EU as a whole. The Hungarian and the Romanian projects, and to some extent the Polish one, has no such decoupling.

Waste composition: The Hungarian and Romanian projects both rely on the perusal of 'passive' national/regional level assumptions with respect to the composition of MSW that are not particular to the project area. They also do not distinguish between the composition of waste between urban and rural areas. This increases the uncertainty about capacity needs for waste sorting, for waste treated and for landfill of waste. The uncertainty could have been reduced through the carrying out of waste characterization studies in the project area (as in the three other projects) or drawing on the findings from studies in similar regions.

The expected changes in waste composition with income growth has been incorporated in three of the four projects for which information is available.

Differences in waste composition between household and non-household MSW have not been taken into account in two projects (Hungarian and Romanian ones). As the differences are major, this impacts the capacity need estimations for sorting and waste treatment facilities.

Demographic changes: Three of five projects (Portugal, Poland, Hungary) fail to take overall population developments into account as waste forecasts are prepared for total amounts only, not on a per capita basis. This is an issue as changes in the population will affect the amounts of waste generated. A fourth project (Romania) fails to incorporate the demographic changes to be expected with the population moving from rural to urban areas. As per capita waste generation in urban areas is much higher, the failure to address this change in

the forecasts will have a more than insignificant impact on the amounts and types of household waste generated.

Tariff affordability: Affordability of household tariffs is an issue to consider in three of the five projects. No firm conclusion can be drawn on whether affordability is ensured in all three projects. In the Romanian one, the household tariff on average in the project area should be well affordable as the tariff is at the affordability threshold levels for the poorest 10% of the population. The tariff is set against the average income for this decile and does not take into account that the income levels in rural areas, also shown in the application, are somewhat lower than in urban areas. Using the strict Romanian national standards affordability could then become an issue in rural areas. This is the case also in the Hungarian project, which does not address affordability at all for this population group (half of the project area population). The information available for review in the Polish project does not allow an assessment of whether tariff affordability is ensured (the project only covers waste sorting/landfill).

Full cost recovery principle: Respect of the cost recovery principle appears ensured at the planning stage only for the Portuguese project this being a legal requirement. Two factors appear behind the failure to apply this principle. First, that tariff/waste fee setting does not include depreciation and appropriations for future landfill cell construction and second, maintenance costs for equipment and machinery that are set below the levels required for operational sustainability in the full operating life of the projects.

Polluter pays principle: The principle is adhered to at the planning stage only in the Portuguese project again being a legal requirement. The Hungarian project attempts to apply the principle in a very ambitious manner that may well not be able to adopt in practice. The waste fee set in Bulgaria involves extensive cross-subsidisation of owners of residential properties. The Romanian project has no cross-subsidisation as the tariff for economic agents is set to cover the direct operating costs only.

2.4.2 Judgment on financial analysis

Implementation schedule: All projects reviewed show clear optimism basis with to the foreseen length of the implementation period including the period for construction of waste sorting, treatment and disposal facilities. As a result, operational start for all has been delayed by as much as 5 years at the present time.

'Typically' seen reasons for delay in major projects in the waste management sector have often been the late obtaining of the environmental permit and/or problems in acquiring the land needed for the project. However, these delay reasons do not apply for any of the projects with permits obtained and land secured.

Technological solutions: At the overall level, the information available points to appropriateness of the solutions suggested. The suggested collection system in the Hungarian project is very ambitious but option analysis details are not available. Possibly the solution is one foreseen at the level of national planning and passively adopted for the project. If so, this is an inappropriate approach.

Three of four projects including MBT plants have chosen a technology with production of RDF. Only one project (Bulgarian) argues in the information available for review for the choice of this more expensive solution in the form of plans for selling the RDF. This follows from a requirement of the Commission to perform such analysis. The other two projects do not sell, at least in the first years, the fuel. An RDF production component could have been added at a later stage. The extra costs of including RDF production lack justification.

One of the two projects with construction of landfill (the Hungarian one) has a cell life of double that normally considered the maximum. The application does not provide any justification. Such long cell life is usually considered irreconcilable with regard to operational sustainability.

Capacity needs: Because of the way waste projections have been prepared it appears likely that the overall capacity for waste sorting, treatment and disposal has been overestimated in the Hungarian and the Romanian projects. In addition, the demand for waste sorting appears underestimated and the demand for waste treatment overestimated. The uncertainty about capacity needs is in part attributable to both projects being integrated ones, covering the full waste management cycle. However, as argued previously, the uncertainty could have been reduced if the experience from the similar projects had been drawn upon rather than some national/regional level assumptions developed for the purpose of overall waste management planning.

Investment cost budget: All projects have been found at a stage of technical preparation, including the tender/award of the main contracts, such that the overall cost budgets have been found reasonable. The Hungarian project could be an exception as cost estimates may have been prepared on the basis of national planning data but this cannot be verified from the information available.

The need for contingency reserves has been found underestimated for the Hungarian and the Romanian projects. For project specific reasons, the reserves for the Bulgarian project could also be too low; they are however set at the maximum 10% allowed by the Commission for the investment cost budget of the application.

Financing plan: At the time of application submission financing arrangements were in place only for the Bulgarian project. Possibly, the lack of finalization could help explain the delays in implementation for the other four projects. For example, the information for the Romanian project shows a formal co-financing commitment apparently lacking from 79 of the 80 municipalities participating in

the project. This hypothesis can only be verified for the projects where a case study will be carried out (Task 4 of the assignment).

Operating costs: The level of maintenance costs for equipment appears an issue in the four projects where this part of operating costs can be assessed. With the exception of the Bulgarian project, and when compared with the level required for operational sustainability, the budgets foreseen appear low notably for the two projects including mechanical-biological treatment plants with refuse derived fuel production. This in a way be considered a form of optimism bias to help ensure that household waste tariffs in the projects where relevant do not increase by too much as compared what is considered acceptable.

Tariff revenues: For the two projects where the level of the tariff collection rate is an issue for project financial sustainability, the level is either considered unrealistically high (Romanian project) or disregarded entirely (Hungarian project).

Off-take markets for recyclable and treated waste: In general, the analysis of the revenue potential from the sales of recyclable and treated waste is not devoted much attention. An exception is the refuse derived fuel market analysis of the Bulgarian project, which, however, was performed only as it was a Commission requirement. The lack of analysis is of concern as the sales of such waste may constitute an important part of overall operating revenues and therefore be important as well in the setting of the tariffs that will demonstrate financial sustainability. The lack of analysis is a particular concern for the Hungarian project, which assumes ¼ of revenues to originate from the sales of recyclable and treated waste. Compared to similar, already implemented projects, this share must be considered unrealistic.

Furthermore, in both projects that comprise waste collection (Romanian and Hungarian ones) too optimistic assumptions have been set with respect to the efficiency of source segregation of recyclable waste and with respect to the share of recyclable waste separated at the projects' sorting plants that is of a quality such that it can be sold in the market. Both projects are lacking in justification for the setting of such assumptions. Judged from the information available, the common reason appears to be that the efficiency of waste sorting has not been considered an issue for separate analysis.

2.4.3 Methodological errors requiring recalculation

Task 3 of the assignment covers a verification of the relevant assumptions of the financial analysis for those projects that are operational. In the waste sector, the Portuguese and Polish projects have entered into operation. The assignment TOR calls for a recalculation of the financial analysis for these two projects in the cases where methodological errors have been identified. Based on the available information, no errors as such were identified for either project.

In the case of the Polish project, the information base for making this judgment was rather limited e.g. with the Excel financial model containing data values only as opposed to showing the formulae, and thereby the assumptions behind the financial calculations. Neither project has explicitly considered the impact of demographic changes on future waste amounts. The Portuguese project argues that it does so indirectly in the setting of waste growth rate assumptions. Both projects have chosen a methodological approach in this area that cannot be considered sound but a choice that may also have been affected by the comparatively narrow project boundary excluding waste collection.

3 Analysis of water and wastewater projects

This chapter provides the results of the review of the financial analysis for the 15 water and wastewater projects. The chapter starts with a brief description of each project and then provides the review of demand analysis in section 3.2 and financial analysis in section 3.3. Finally, section 3.4 provides the main findings. Due to the fact that the chapter covers 15 projects, as opposed to the chapter on waste projects, which only covered 5 projects, there is more limited mention of individual projects in this chapter. For this reason, Appendix A includes a summary table with the most important observations per project.

3.1 Presentation of projects reviewed

The projects vary in scope and project boundary and this first section briefly describes the main aspects as this provides a basis for understanding the scope of the financial analysis. Since the extent of the financial analysis review is determined by the information contained in the application document and available supporting documents, the project summaries below also address the issue of information availability.

3.1.1 Czech Republic: Improving water quality in rivers Jihlava and Svratka above tanks of Nové Mlýny (2009CZ161PR005)

The project *"Improving water quality in rivers Jihlava and Svratka above tanks of Nové Mlýny"* covers sewage disposal and water supply investments. The main components within sewerage are the construction of a new wastewater drainage and combined sewer system, modernisation of the existing combined sewer system, and a modernisation of the existing wastewater treatment plant (WWTP) and increase the treatment capacity. In addition, the project will connect 2,064 new residents to the sewer system. Within water supply, the network will be modernised.

The project boundary is confined to the existing service area for water supply and sewerage although new residents will be connected to the sewerage system. The information available was sufficient for the preparation of the ex-ante financial analysis review, but the inaccessibility of a financial model spreadsheet restricted the scope of the possible verifications.

3.1.2 Estonia: Renovation of Water Supply Systems in Kohtla-Järve Area (2009EE161PR003)

The project "*Renovation of Water Supply Systems in Kohtla-Järve Area*" covers investments in water supply systems. The main components are an upgrading of the water treatment facilities and rehabilitation of the water pipelines and other infrastructure in three towns. This will increase the quality of water services and reduce water losses. No new connections are foreseen. The project boundary is

confined to the existing service area for water supply. The information supplied provides for a 'reasonable base' for judging the ex-ante financial sustainability of the project.

3.1.3 Latvia: Development of water management in Riga, stage 4 (2012LV161PR001)

The project *"Development of water management in Riga, stage 4"* covers the sewerage and water supply investments. The project will connect additional 4,200 inhabitants to the water supply system and connect additional 6,000 inhabitants to the sewerage system. The project boundary is confined to the existing service area for water supply and sewerage although new inhabitants will be connected to the both the water system and the sewerage system. The information supplied provides for a 'reasonable base' for judging the ex-ante financial sustainability of the project.

3.1.4 Poland: Comprehensive organization of water - sewage mgt. in Żory (2009PL161PR004)

The project *"Comprehensive organization of water - sewage mgt. in Żory"* covers sewerage and water supply investments. Within sewerage the project will increase the number of people connected to the sewerage system, modernise the stormwater system and rehabilitate the wastewater treatment plant and increase the treatment capacity. The water treatment plant will be constructed and the water works will be modernised. The project boundary is confined to the existing service area for water supply and sewerage although new inhabitants will be connected to the sewerage system. The project information was sufficient to conduct a review and serves as a reasonable basis for the *ex-ante* evaluation of the financial sustainability of the project.

3.1.5 Poland: Water and wastewater management of the town Nova Sol and the adjacent municipalities (2007PL161PR005)

The project "*Water and wastewater management of the town Nova Sol and the adjacent municipalities"* focus in the drinking water sector on reconstructing the water treatment plant in Nova Sol and to add 470 new residents to the water supply system. Within the sewerage sector the project will reconstruct the wastewater treatment plant in Nova Sol and to extend the sewerage system with 99 km pipes whereby 9,600 new residents will be connected to the sewerage system. The project boundary is confined to the existing service area for water supply and sewerage with new inhabitants to be connected to both the water system and the sewerage system. The material provided a reasonable base for judging the ex-ante financial sustainability of the project.

3.1.6 Romania: Extension and rehabilitation of water and wastewater infrastructure in Jiu Valley Area, Hunedoara County (2009RO161PR012)

The project *"Extension and rehabilitation of water and wastewater infrastructure in Jiu Valley Area, Hunedoara County"* covers sewerage and water supply investments. The project will, within water supply rehabilitate the existing water treatment plants in Valea de Pesti and Jiet and inprove the water distribution system. In the sewerage sector the wastewater treatment plant in Danutoni will be improved and the sewerage system will be rehabilitated. The project boundary is confined to the existing service area for water supply and sewerage. The Application Form is supported by an extensive Feasibility Study with numerous Annexes and a detailed Excel model. The information was sufficient for this review.

3.1.7 Greece: Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas (2013GR161PR007)

The project *"Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas"* covers sewerage investments. The main components of the project are establishing sewage collection networks and sewerage transportation pipelines, the establishment of a wastewater treatment plant in Koropi-Peania, and finally establishing a disposal pipelines for treated sewage. The project boundary is confined to the existing service area for sewerage. The project information supplied provides a reasonable base for judging the ex-ante financial sustainability of the project.

3.1.8 Portugal: SIMARSUL – Sanitation sub-systems of Barreiro/Moita and Seixal (2009PT162PR001)

The project *"SIMARSUL – Sanitation sub-systems of Barreiro/Moita and Seixal"* covers sewerage investments. The main components are to establish wastewater treatment plants to service the municipalities of Barreiro and Moita as well as service the municipality of Seixal. In addition the project covers establishment of a drainage/pumping system for including new piping works the Barreiro and Moita municipalities as well as for for Seixal municipality. The project boundary confines to the existing service area for the sewerage system. In the absence of the "feasibility study" and a financial model in Excel, the reviewed documentation provides only a preliminary base for ascertaining the ex-ante financial sustainability of the project.

3.1.9 Spain: Sanitation of Vigo (2009ES161PR008)

The project *"Sanitation of Vigo"* covers sewerage investments. The main components are the modernisation and expansion of the wastewater treatment plant as well as the construction of the pipe to discharge treated water into the river. The project boundary is confined to the existing sewerage system.

The information provided in the screened application form and appended documentation is not sufficient to support a careful assessment of the ex-ante financial sustainability of the project. The reviewers are not sure whether such information exists in the preliminary studies mentioned in the application form. A "feasibility study" (e*studio de viabilidad*) and a "study of alternatives and preliminary engineering" (e*studio de alternativas y anteproyecto*) are mentioned many times in the documentation.

3.1.10 Czech Rep.: Renovation and constr. of sewerage system in Brno (2009CZ161PR009)

The project *"Renovation and constr. of sewerage system in Brno"* covers sewerage investments. The main project components are to modernise the main sewers and completion of establishing main sewers, sewer system modernisation in city districts and the completion of the sewer system in city districts. The amount of information submitted with the application form is very extensive. The information supplied provides for a 'reasonable base' for judging the ex-ante financial sustainability of the project.

3.1.11 Hungary: Nagykanizsa and surrounding areas - sewage coll. and WWTP development (2008HU161PR011)

The project *"Nagykanizsa and surrounding areas - sewage coll. and WWTP development"* covers investments in the sewerage system. The main project components are to build sewer network in certain areas of Nagykanizsa, and in 12 settlements. In addition, it will upgrade the wastewater treatment plant and the sludge treatment. The project boundary is not clear. The available information is not regarded as sufficient for judging whether the ex ante financial sustainability assessment has been sufficient since the CBA report contains chapters and tables that are not sufficiently detailed.

3.1.12 Lithuania: Sludge Treatment Facility at Vilnius WWTP (2009LT161PR001)

The project *"Sludge Treatment Facility at Vilnius WWTP"* will establish a new sludge treatment facility at Vilnius wastewater treatment plant. Without the project the sludge would be landfilled. The project boundary are confined to the sludge from the Vilnius wastewater treatment plant, which service area are not affected by the project. The information available was sufficient for the preparation of the ex-ante financial review, but the lack of a financial model spreadsheet restricted the scope of the possible verifications.

3.1.13 Malta: Malta South Sewage Treatment Infrastructure (2007MT161PR001)

The project covers sewerage investments. The main components are: (1) Construction of a wastewater treatment plant (WWTP) plant to EU standards; (2) Construction of a wastewater pumping station at Rinella; (3) Upgrade of an existing wastewater pumping station; (4) Construction of a new wastewater gallery for transport of untreated sewage from Rinella to the plant; (5) Construction of a submarine outfall for discharge of the treated wastewater into the sea and to serve as storm water outflow.

3.1.14 Poland: Construction of sewage and storm water collection systems and municipal WWTP in Tarnow mountains - phase 1 (2007PL161PR003)

The project *"Construction of sewage and storm water collection systems and municipal WWTP in Tarnow mountains - phase 1"* covers sewerage investments. The main project components are to modernise three wastewater treatment plants and to increase the sewerage connection from 85% to 99%. The project boundary is confined to the existing service area for sewerage with new inhabitants to be connected to the sewerage system. The review had access to printouts of the financial model only, and not to the spreadsheet model, which made analysis complicated and it was not possible to analysis all issues. The feasibility study is quite old (dated beginning of 2007) and refers to the old guidelines. Not all issues are clearly described in the feasibility study report.

3.1.15 Slovakia: Sewage collection system and upgrade of Liptovská Tepla WWTP (2010SK161PR002)

The project *"Sewage collection system and upgrade of Liptovská Tepla WWTP"* covers sewerage investments. The projects entails an extension of the existing wastewater sewage network to make 5,730 new connections, and to increase the capacity of the existing wastewater treatment plant WWTP Liptovská Teplá. The project boundary is confined to the existing service area for sewerage including new residents to be connected to the sewerage system. The project information supplied provides a reasonable base for judging the ex-ante financial sustainability of the project.

3.2 Judgement on demand analysis

It is a general observation (relevant for considering demand and financial analysis) that an incremental approach, as opposed to a company approach, has been adapted in the Application Forms for the 15 projects. This is in accordance with prescriptions in guidelines and includes comparisons of scenarios with and without the project, and presentation of the additional costs and revenues generated by the investment. This approach provides information on the financial sustainability of the project, but does not provide any information on

the financial sustainability of the water company after the project has been implemented.

3.2.1 Water consumption

The review of the 15 projects shows that baseline water/wastewater consumption is estimated based on either billed observations of actual water consumption or wastewater discharged recorded by the water company or on historical data/statistics available in the relevant departments at the municipal level. In case of projects aimed at extending an already existing network, the analysis of consumption is made for the entire network (before and after implementation).

For the projects "*Extension and rehabilitation of water and wastewater infrastructure in hunedoara county" (*Romania), "*Malta south sewage treatment infrastructure"* (Malta), "*Upgrade of sewage collection system and WWTP of Liptovská Tepla"* (Slovakia) and "*Improvement of sewage disposal infrastructure for the town of Tarnowskie Góry"* (Poland) there is no evidence of measurement of wastewater discharges. These are calculated by applying a return factor to water consumption.[11] In the Romanian, Slovak, Check Republic, Latvian and Polish cases, however, this factor is assumed equal to 1.0, i.e. the same consumption is assumed for both water and wastewater. This affects the operational costs together with water infiltration but do not have any impact as such on the financial sustainability as revenues for wastewater services are based on measured water consumption.

In two cases (Greece and Spain) the baseline demand, or the underlying assumptions, are not provided in the supplied documents. In the project "*Sludge treatment facility at Vilnius waste water treatment plant" (Lithuania)* the issue is not relevant because project demand is based on current and expected sludge generation at the concerned wastewater treatment plants and does not address the underlying demand for water.

The level of detail and disaggregation of the baseline consumption depends on the specific objective and scope of the project. Accordingly, a distinction between household and non-household consumption is provided only for those projects embracing multiple water purposes. Further breakdown of non-household consumption by user typology (e.g. commercial, public administration, industry, etc.) is however provided only in three cases.[12]

[11] Return factor ranges from 0.7 to 1.0.

[12] Namely, "*Malta south sewage treatment infrastructure"* (Malta) and "*Water quality improvement in the Jihlava and Svratka rivers above the Nové Mlýny reservoir*" (Czech Republic) and "*Group sewerage ružomberok and wwtp liptovská teplá, liptovské sliače"* (Slovakia).

No information is usually available regarding the method of measuring water consumption and wastewater discharges, i.e. whether metering is used at the network or individual household's level. However, typically meters are assumed to be in place to measure water consumption. It is not mentioned in any of the applications that metering constitutes a problem.

3.2.2 Demographics

The soundness of service demand projections depends on the validity of the demographic forecasts. These forecasts have their starting point in the baseline population of the project service area. Ideally, the population base should be established on the basis of recent census data with adequate justification for update to base year, and if appropriate adjusted to the local conditions. Ideally, the forecast population growth should link to the project area. If relevant, separate projections should be made for urban and rural areas as growth rates may be expected to differ with lower/no growth in rural areas.

For all reviewed projects, future water/wastewater consumption is estimated based on baseline population data and demographic forecasts in the project service area. In 8 out of 15 projects, the source of data is made explicit by the project promoter. The Central Statistics Office is the most used source for population forecast. City Development Plans are also quoted as reference source. Statistics from the Central Statistics Office are typically based on local or municipal statistical reports. Obviously, these are not necessarily compatible with the service area of the water company. The project promoter does not qualify the Central Statistical Office population projection, but refer to them as the reference source.

In most cases, however, the population base refers to the year when the original feasibility study was prepared. Similar considerations apply to the other Polish project "*Improvement of sewage disposal infrastructure for the town of Tarnowskie Góry".* Population decrease is seen in the Latvian project *"Development of the water management in Riga, 4th stage".* This is a rather dramatic decrease in population which could impact the financial sustainability as the tariff will have to increase. However, high real income growth assumptions have been made, which secures that the affordability threshold is not exceeded.

Vice-versa, overoptimistic assumptions of demographic growth have been used for the appraisal of the projects "*Collection, transport, treatment and disposal of sewage in Koropiou and Peanias areas*" (Greece), "*Sanitation sub-systems of Barreiro/Moita and Seixal*" (Portugal) and "*Sewage Infrastructure of Vigo" (Spain)*. Population overestimation may result in project oversizing, especially

when significant part of demand is given by future new connections. This, in turn, has also implication on future revenue generation capacity[13].

In case of projects aimed at extending an already existing network, future water consumption is analysed at the level of the network as a whole (and not of the single segment to be constructed). The net demand generated by the project is then computed as the difference between water consumption in the scenarios with and without the project. This is the standard approach taken in the incremental analysis.

3.2.3 Consumer behaviour

In the analysis of 'consumer behaviour' the review has addressed the justifications for the assumed development in per capita water demand for households (usually l/day) and in total water demand from non-households over the reference period. The benchmark against which the demand analysis was assessed is that the forecasts should provide justifications for both and be particular to the project service area. The assessment also considers income and price elasticity for the future demand calculations.

In eight out of 15 projects, considerations about the responsiveness of consumption to increase of both price and disposable income have been correctly made to adjust the unit consumption estimates. Different elasticities are used across the projects, ranging from -0.05 to -0.30 for the price elasticity, and from 0.05 to 0.72 for the income elasticity. An income elasticity of 0.72 as reported in the case of the project on Malta are a very high figure as compared to the rest of European income elasticity estimates. A high elasticity basically implies that water consumption increases quite significantly with positive income forecast, which may overstate the revenues of the project. The rest of the applied elasticities are within the expected levels, and are thus found justified. The remaining projects do not use elasticities or implicitly assume they are zero. This can be an acceptable assumption only for price elasticity if unit water consumption levels are low, which is the case in all projects. Unit water consumption levels are applied with reasonable and expected levels in the range between 80 and 120 litres per capita per day (lpcd).

In most cases, the assumptions underlying the use of the elasticities are not explained by the project promoter. Nevertheless, these seem generally reasonable and pursuant to the adoption of a precautionary principle, with the notable exception of the projects "*Improvement of water supply and sewage collection infrastructure for the town of Zory*" and "*Water and Wastewater*

[13] Two solutions exist to this problem. Either the Feasibility Study needs to be updated with new census data available when submitting the Application Form or the Feasibility Study documents that the chosen technological solution and the important parameter assumptions are robust or resilient to uncertainties, including forecast uncertainties, but we rarely see Feasibility Studies prepared in this way.

management of the Town Nowa Sól and the Adjacent Municipalities" (Poland) and "*Malta south sewage treatment infrastructure*" (Malta). In the Polish projects, very low elasticity is used for income, which leads to the strong assumption that the already very low volumes of water currently consumed by users will not grow in the future. Vice-versa, in the Maltese project, high elasticity to income is used without any supporting evidence or justifications.

3.2.4 Affordability

'Affordability' addresses the combined water and wastewater tariff affordability of households. Conventionally, affordability is to be calculated as the ratio of the monthly (annual) household bill to the monthly (annual) disposable (after tax) income for households in the project area. The Member State may have determined affordability ratios (thresholds) to be complied with – either for the population as a whole or for specific population groups. Otherwise, a 'conventional' maximum of 3½-4% of average disposable household income in the project area may be taken as reference point. For the project area, and if relevant, a distinction may and should be made between urban and rural areas as income levels differ.

Considerations about affordability of the service are made in the appraisal of most projects. However, in the projects in Malta, Spain, Portugal and Greece, the issue is not considered.

First, affordability thresholds, expressed as a ratio between combined water and wastewater monthly bill and average disposable household income, are adopted from national guidelines. Table 3-1 shows thresholds used in the reviewed projects.

Table 3-1 Affordability thresholds used in reviewed projects

Country	Affordability ratio
Hungary	3.5%
Poland	3%
Romania	4%
Czech Republic	2%
Estonia	4%
Slovakia	2%
Lithuania	4%

Source: Application forms for reviewed projects

It is observed that the project promoters are using different thresholds for calculating the affordability, varying between 2% to 4%. The lower the threshold the less financing is generated from the tariffs, whereby the calculation of the EU grant will produce a higher grant. This implicitly implies that the project promoters using the lowest affordability threshold will obtain a higher EU grant and thus be more financially sustainable than with a higher threshold.

Secondly, affordability calculations are carried out by the project promoters to check if, with the introduction of the new tariff, the affordability threshold is exceeded, or not, over the reference period of the analysis. As to the methodological aspects, calculations are always carried out in constant prices, while assumptions of household income real growth are based on data for real increase in salaries available from national statistical sources of information. In the long term, incomes are usually expected to increase faster than tariffs in real terms.

Overall, affordability calculations are prepared in compliance with national and international standards. However, a water bill of 1% of the average disposable household income may imply 3% or more for the lowest quintile and even more for the lowest decile. No documentation as to the impact for the lowest quintile or decile is presented in the application forms.

A major concern, however, arises in relation to the scope of the analysis. In fact, in most projects, the affordability analysis is done at the level of average household income and not at the level of the most vulnerable population groups, e.g. based on the first income decile of population. This a major weakness and limitation of the analyses presented in the project dossiers.

Evidence from the financial analysis review shows that, thanks to expected economic growth, the affordability thresholds are not exceeded. The only exception relates to the Hungarian and Polish projects, where, the combined tariff for water and wastewater will exceed the 3.5% and 3% limits, respectively, during the first years of project operation. In those years, the approach taken by the project promoters is to lower tariffs so as to meet the affordability threshold. Local governments, in turn, are expected to pay for the remaining portion of the price. While this approach is sound and aligned with common practice across EU countries, the main problem is that no information is provided about the institutional arrangements that will be effectively adopted to put in place the price subsidy mechanism. Hence, some elements of uncertainty hinder the assessment of quality of the financial appraisal included in the application forms.

3.2.5 Tariffing

In the setting of tariffs, the cost recovery principle and the polluter pays principle are to be observed as per Article 9 of the Water Framework Directive. This article requires cost recovery, but there is no legal requirement for this to be full.

Full cost recovery means that tariff and other operating revenues are to cover all operating costs including allowances (depreciation amounts) for asset renewals over time. The polluter pays principle implies that tariffs for each customer group are to be set in accordance with the costs of water use and/or for the collection and treatment of discharged wastewater.

The same article establishes that Member States in their cost recovery may have regard to the social, environmental and economic effects of the recovery. This allows an element of cross-subsidisation in tariff setting.

Full cost recovery

In tariff setting, the full-cost recovery principle is applied heterogeneously by the project promoters. Different "intensities" of cost recovery are reported, as a result of different "interpretations" of the principle.

While operating and maintenance costs are treated homogenously across the projects (i.e. they are always fully reflected in the tariff), differences occur as far as other cost items, such as depreciation of capital asset, replacement of short-life equipment, financial costs and reinvestments, are concerned.

For instance, in relation to the first item, deprecation costs, two distinct approaches are visible. The first approach consists of accounting the entire cost of asset depreciation in the expected tariff. This has been applied in the majority of the cases. The second approach consists of accounting only the share of the investment not covered by (EU and other national/regional) grants in the tariffs. This has been applied in the Spanish and Portuguese projects. Both approaches are plausible and have a rationale, while responding to different logics. The former aims at maximising the revenue generation potential of the project. This will ensure financial resources to replace warn out assets in the future. However, it may results in sharp tariff increase with consequent issues of affordability and social acceptance. The latter approach gives instead priority to political and social issues than profitability of the water company. Hence, the water company will have to take loans in the future to finance the replacement of the EU/National grant assets.

As far as the renewal of asset or rehabilitation is concerned, the replacement costs have been accounted for when setting the tariff for 13 projects, in line with the provisions of the full-cost recovery principle. In this way, assets renewal is self-financed with the project revenues. Just in two cases (Greece and Lithuania), tariffs have been set without considering the replacement costs. The aim was to ensure the affordability of the service and to increase the tariff collection rate (which, especially in the Greek case, was very low). Hence, even if not methodologically correct, the project promoter might have seen it as a measure necessary to achieve the project objectives, given the prevailing economic conditions of the affected area. In turn, this approach put additional burden on the company's budget since it implies that assets renewal will be

financed in the future with the beneficiary's equity and/or loan (which, in turn, generates additional financing costs).

When relevant, financial costs (i.e. interest payment) are usually, and properly, recovered in tariff, as if they were operating costs. Only for the project "*Water and Wastewater management of the Town Nowa Sól and the Adjacent Municipalities*" (Poland), the review shows that they have been wrongly omitted from tariff setting.

Finally, the review of the project "*Sludge treatment facility at Vilnius waste water treatment plant*" (Lithuania) suggests that forthcoming reinvestments already planned on the infrastructure network will also be included in the tariff. However, these have not been calculated yet, which introduces some elements of uncertainty about the future project cash flows.

Polluter pays principle

The application of the polluter pays principle requires that the tariff structure also includes environmental and resource costs to encourage the introduction of charging systems when the costs of pollution and preventive measures are borne by those who cause the pollution.

In operational terms, the application of the principle to the wastewater sector implies larger tariffs to non-domestic and industrial customers, as well as the introduction of a penalty system when established limit values for certain pollutants, both concentrations and loads, are exceeded. The aim is to encourage industrial customers to pre-treat their wastewater according to established standards. Alternatively, the polluting companies should pay for the extra cost of treating the wastewater.

In all the projects reviewed, it is claimed that the polluter pays principle has been respected because tariffs were set in compliance with the national standards. It has implicitly been assumed that wastewater from non-households, which potentially contains higher concentrations of COD/BOD (chemical and biological oxygen demand) than standard household's wastewater are pre-treating their wastewater to household standards. No projects have referred to situations whereby they estimate the extra costs incurred by treating more polluted wastewater from industries are covered by extra invoicing to the concerned industries. If industries are discharging extra polluted wastewater without paying the extra costs, the polluter pays principle is not respected in full. In the available documents, however, there is no clear evidence about any tariff differentiation by customer or development of fining tools. Thus, albeit any formal statement, the application of the polluter pays principle cannot be ascertained as it has not been documented. The only project where the issue is specifically addressed, and supported by evidence, is the "*Extension and rehabilitation of water and wastewater infrastructure in Hunedoara county*" (Romania).

Tariff phasing-in

The application of the full-cost recovery and polluter pays principles implies, in all projects, an increase of the existing tariff level. In many cases, such increase is expected to be very sharp, as for example in the case of the Estonian project "*Renovation of the water supply systems in Kohtla-Järve area",* where the resulting tariff is doubled.

In this context, it is common practice to make a proposal for tariff phasing-in, i.e. the gradual adjustment of tariff up to reach full cost recovery. To do so, an appropriate pace and timing for such adjustment should be considered by the project promoter, as soon as the affordability analysis allows.

Tariff phasing-in has been however adopted explicitly in 5 projects only, in Estonia, Romania, Czech Republic, Greece and Malta. Referring again to the Estonian case, tariffs are expected to be gradually increased, following the development of the costs in two phasing-in stages. The first being the increase in the general tariff level due to higher operational costs as well as interest and depreciation costs; the second being the harmonisation of tariffs in the three municipalities/service areas concerned.

In the remaining cases, tariff phasing-in was not applied (or there is no evidence in the application). That is, tariffs will be increased once the project becomes operational.

3.3 Judgement on financial analysis

The 'financial analysis' assessment of this section covers the part of the overall project financial analysis that addresses financial flows other than those deriving from the tariffs set for the project. This means covering in the projects' implementation phase the implementation schedule, investment costs and financing plan. In the operating phase assumptions with respect to operation and maintenance costs, tariff collection rate, and revenues from the sales of recyclable and treated waste is examined. Also assessed is whether the quality of the risk and sensitivity analysis performed for the overall financial analysis.

3.3.1 Project implementation phase

The assessment of the project implementation phase relates to the concept of financial sustainability as broadly interpreted, namely with the taking into account of the risk of delay impeding 'timely' financial performance. Such delay may derive from insufficient time for implementation, in particular construction, but also from any needed land purchase, from under-budgeting/cost overruns which cannot be easily financed, and from problems relating to obtaining overall finance for project investments.

Institutional arrangements

For all the projects reviewed, the institutional arrangements proposed for project implementation and operation generally follow common practice in the concerned countries and are assessed as compatible with ERDF/CF financing. However, construction periods in general seem acceptable, if the project progresses as expected, which is normally not the case. Slack or delay periods are not included in the projects' time- and activity schedules as presented in the application forms.

The beneficiary (or, in other words, the water company) will be responsible to supervise construction, and then to operate and maintain the infrastructure for service provisions. In most cases, the company is already in charge of the operation and maintenance of existing assets.

In the specific case of the project "*Water quality improvement in the Jihlava and Svratka rivers above the Nové Mlýny reservoir*" (Czech Republic), it is acknowledged that the existing technical and institutional capacity of the water company, as well as experience with preparation and management of large scale investment projects, is low. Therefore, a specialised Project Implementation Unit, temporarily hiring external experts from the international labour market, will be set up to facilitate the investment process.

Land acquisition, environmental impact assessments and permits have already been obtained at the time when the application forms were submitted, so that any delay in project implementation cannot be referred to them.

Implementation period

The implementation period ranges from a minimum of 1.5 years, for the "*Upgrade of sewage collection system and WWTP of Liptovská Tepla*" (Slovakia) to a maximum of 6 years, for the "*Renovation of the water supply systems in Kohtla-Järve area*" (Estonia). Of course, the length of the implementation period depends on the object of the project and its technical specifications.

The applications reviewed show that 14 projects were to have been in operation at the beginning of 2015, except for the Greek project, which should be operational by the end of 2015. Nine projects have commenced operation as of end 2014. The operational status of the Spanish project and the Hungarian project is uncertain. This shows a substantial delay as construction should have been completed end of 2013 and end of 2012, respectively. Three projects are expected to commence operations by the end of 2015. This is the case for the Latvian, Romanian and the Slovakian projects. Construction was scheduled to be completed by mid-2013, mid-2014 and primo 2014 respectively and these projects hence also experienced some delays. The nine projects which are operational as of end 2014 may also have experienced some delay, but no information is available on the possible delays for those nine projects.

The delays incurred are as such not surprising. A common feature for all projects is that the time reserved for construction has been too optimistic.

Overall, given the size and complexity of the projects concerned, the construction time frames illustrated in the application forms are assessed as optimistic as experience also shows.

Methodological assumptions

The assumptions undertaken across projects to carry out the financial analysis are generally consistent with the provisions of the main guidance documents, namely the EC Working Document N.4 and the 2008 Guide to Cost Benefit Analysis of Investment Projects. In particular:

- The analysis is carried out from the point of view of the infrastructure owner.

- The cash flow method is adopted so that only cash inflows and outflows are considered in the analysis, i.e. depreciation and other accounting items which do not correspond to actual flows are disregarded. This is true for all projects with the exception of "*Renovation of the water supply systems in Kohtla-Järve area*" (Estonia) and "*Construction of sewage and storm water collection systems and municipal WWTP Tarnow mountains*" (Poland) where depreciation allowances are included within the operating costs.

- Project cash-flow forecasts are provided for a given reference period appropriate to the project's economically useful life.

- The analysis is carried out in constant prices, i.e. with prices fixed at a base-year. Nominal prices are used only in the project "*Sewage Infrastructure of Vigo*" (Spain), where input and output are inflated by 2% annually. Both approaches are methodologically correct, provided that consistent use of prices is made across the calculations.

- Real cost developments are correctly applied to wages in most projects, following statistical projections of real wage growth in the service area.[14]

Investment cost budget

Financial sustainability may be impacted by the construction of too large water and wastewater treatment capacities, or if networks are overdesigned. This depends on a number of factors including national design guidelines, engineering assumptions with regard to water demand, infiltration etc. The majority of the projects in the water sector are concerned with rehabilitation of the existing network, extension of the networks to cater for new connections or rehabilitation

[14] In addition, in 7 cases, real price escalation is also applied to energy costs. Since there is high uncertainty over price evolution in the long term, the application of changes of relative prices to both labor and energy should, however, be the result of proper analysis to avoid cost overestimation. Supporting evidence should be therefore provided in the project appraisal, which is not the case for most reviewed projects.

of the water and wastewater treatment plants. Only two of the projects i.e. "*Improving water quality in rivers Jihlava and Svratka above tanks of Nové Mlýny" (Czech Republic)* and *"Sewage collection system and upgrade of Liptovská Tepla WWTP"* (Slovakia) are upgrading the capacity of the wastewater treatment plant.

In all cases, the chosen technical solution is considered sound and appropriate to achieve the project objectives with respect to project implementation and sustainable operation. The majority of the investments are well-known and deal with rehabilitation of the existing sewerage network or expansion of the existing networks to connect new customers. These projects are all based on the red FIDIC book approach, which is suitable when the technology is well-known and applied already[15]. For the projects involving new water and wastewater treatment plants (or rehabilitation of existing plants), the yellow FIDIC book approach has been applied. This should provide for identification of appropriate technology and cost efficient tender prices as the contractor is more likely to have knowledge of suitable technologies.

The investment cost budget, based on detailed engineering specifications, is assessed adequate to realise the proposed investments for all projects, where all relevant components of implementation (e.g. including also items such as project access, technical contingencies, supervision, consultancy services, publicity, etc.) are considered in the cost estimates. When project design was completed several years before construction, as in case of the Greek project "*Collection, transport, treatment and disposal of sewage in Koropiou and Peanias areas"*, the relative costs have been considered sunk and therefore (correctly) excluded from the investment budget.

Also, when data availability allowed for, construction cost levels are assessed in line with standard costs of similar facilities in the concerned country.

In summary, the investment budget and the tender process are in line with a cost effective approach. Projects are primarily concerned with rehabilitation and modernisation. The risk to financial sustainability from oversizing of capacity is therefore less sensitive than in case of projects concerned with construction of new water and wastewater treatment capacities. Overall needs for treatment are consistent with the demand derived from water and wastewater forecast.

[15] The red and yellow FIDIC books are recognised standard forms of contracts between employers and contractors on international construction projects established by the International Federation of Consulting Engineers (FIDIC). The red book is used in a project designed by the employer whereas the yellow book is used when the design is done by the contractor.

3.3.2 Project operating phase

In the projects' operating phase the key issue in financial sustainability terms is whether the cash generated from the collection of tariff revenues is sufficient to cover the 'full' operating costs i.e. not only the direct, cash operating costs but also at least part of the cash outlays required for the replacement of project assets.

Operation and maintenance costs

The operating costs are estimated based on assumptions of the technical specifications, in case of new facilities, and on (adjusted) projections of historical data, in case of rehabilitation of already existing infrastructure[16].

The level of maintenance costs is usually assumed as a percentage of the construction cost, in accordance with common practice in most countries.

Overall, operating and maintenance costs are considered reasonable against the expected level of service provision and the technological solution adopted. Only in the case of the project "*Sewage Infrastructure of Vigo*" (Spain), the calculated unit operating cost (equal to EUR 0.046 per m^3) seems quite low when compared to international benchmarks.

Replacements costs, i.e. costs of investment but occurring during the reference period to replace short-life machinery and/or equipment, have correctly been computed and included in the cash-flows in the financial analysis, as illustrated by the project promoters. Notable exceptions relate to the appraisal of the projects "*Collection, transport, treatment and disposal of sewage in Koropiou and Peanias areas*" (Greece) and "*Water and Wastewater management of the Town Nowa Sól and the Adjacent Municipalities*" (Poland), where these costs have been omitted. The quality, and veracity, of the analysis result therefore hampered, including concerns on the future sustainability of the operations[17].

Also, in the project "*Sanitation sub-systems of Barreiro/Moita and Seixal*" (Portugal), a main methodological deficiency occurs because replacement costs have been (incorrectly) annualised and inserted as annual expenditure over the years of the analysis. This procedure distorts the financial projections about both the timing and the annual volume of expenditures.

Finally, when relevant, costs of financing (i.e. interest payments) have been correctly included within the outflows for all projects, with the exception of "*Water and Wastewater management of the Town Nowa Sól and the Adjacent Municipalities*" (Poland).

[16] Where the project aims at fixing malfunctions of existing assets, cost savings may occur, as is the case of the Estonian project when reduction in unaccounted for water and reduced staffing (due to reduced pipe breaks) will imply cost savings.

[17] In addition, the Polish project does not include the costs of financing in the cash-flows

Operating revenues

Overall, operating revenues are estimated correctly across the projects. These are calculated on the basis of water/wastewater consumption and the forecasted tariff. When relevant, average unit tariffs are used per type of user (domestic vs non-domestic, household vs. non-households).

However, in 13 out of 15 projects, the financial forecasts do not include assumptions with respect to tariff collection rates, which will be potentially at risk when increased tariffs enter into force. From a methodological point of view, assumed changes in tariff collection rate are reflected in the cash flow statement through corresponding working capital changes in the Romanian case, while they are imputed as a cost item in the Estonian one. Tariff increases are not substantial, as in the Estonian project, which indicates that operating revenues can be collected without serious concern about the affordability.

Sustainability

A financial sustainability analysis is carried out for all projects based on cumulated net cash flow projections for the project. In those projects where large capital reinvestments make the cash flow negative in some specific years, two alternative methods are used by the beneficiary to make the investment sustainable. One is to assume that the beneficiary will contribute with additional equity to ensure that (undiscounted) cumulative cash in hand at the end of the year remains always positive. The other is to assume that temporary shortfall will be covered by loans. Hence, the analysis always results in a conclusion that the project is financially sustainable. In this regard, however, two observations shall be made.

First, when projects fall within an already existing infrastructure, such as capacity extension, the financial sustainability should be better checked in the overall scenario "with the project" more than that of the single extended segment. The focus in the application is the grant calculation and the project financial sustainability. This is also the recommendation in the CBA guidelines. However, a company approach, which is not taken, will ensure that not only the project but also the operator will not run out of cash, or possibly experience negative cash flows, and is particularly relevant in the case of infrastructure that has previously suffered from severe underfunding. This cannot be, however, considered as a main deficiency because of ambiguity of the guidelines available at the time of project applications about this topic.

Second, and more in general, it must be stressed that a financial analysis at project level can only measure the effect of a project on the infrastructure owner. That is, a financially instable or weak project can be always managed by a financially strong owner, which can absorb temporary losses in one of its assets. Vice-versa, even good projects might be disrupted by the bankruptcy of its owner. This is why financial sustainability is best analysed at the company level, and not at the project level. In this regard, the use of ex post evaluations is particularly useful. Alternatively, it would be more appropriate to include a

company financial sustainability analysis with the project implemented. This may be covered in the feasibility study, but the analysis of the 15 projects indicates that it is rarely the case.

3.3.3 Risk analysis

All projects have been subject to sensitivity analysis, carried out with reference to economic (and possibly financial) indicators, as requested by the Major Projects Application Form. The analyses have been carried out by varying one variable at a time and determining the effect of that change on project performance. The main criterion applied to test the variables and select those that are critical is ±1% variation. In several cases, however, additional variations, e.g. ±5%, ±10%, ±25% have also been used, which is a good practice to take consideration of possible non-linear elasticity of the variables. The risk or sensitivity analysis performed has been done with the objective of testing the EU grant rate to variations in various input parameters, and not for testing the financial sustainability of the project or the project owner. In most projects, investment cost, operation and maintenance costs and revenues are the variables that resulted critical to the financial performance.

The review of the projects sample shows that sensitivity analysis is generally carried out in line with the recommendations of the EC working Document N.4 and the CBA Guide. The major, frequent, deficiency is that too aggregate variables are taken into consideration so that variables inter-relations and dependency are not sufficiently analysed[18].

In ten projects, a quantitative risk analysis, based on Monte Carlo simulations, has been also carried out with the aim of determining the mean (expected) value of the performance indicators. The methodology used is, again, in line with the guidance documents.

For the way they are designed, however, both sensitivity and risk analyses do not lend themselves to assess the risks related to financial sustainability of the project operations. In fact, given some changes in the assumptions, they focus on the financial and economic performance of the project, as measured by the rate of return and the net present value.

That said, a general lack of attention to sustainability aspects can be observed as well. This is because those more qualitative adverse events potentially affecting sustainability (such as delays in implementation, low technical capacity of the beneficiary, difficulties to access the credit market, social issues, etc.) are never treated in the relevant section of the Application Form. Nor are measures discussed on how to mitigate the risks associated to changes in the key

[18] For example “revenue” is a compound variable, but ”per capita water consumption” or “tariff” or both may be critical.

parameters analysed in the risk and sensitivity analysis, which also affect sustainability. Hence, the absence - in all projects - of a specific analysis of the risks to sustainability.

3.4 Key findings for water projects

3.4.1 Judgment on demand analysis

Water demand: The review of the 15 projects shows that baseline water/wastewater consumption is estimated based on either billed observations of actual water consumption or wastewater discharged recorded by the water company or on historical data/statistics available in the relevant departments at the municipal level. In case of projects aimed at extending an already existing network, the analysis of consumption is made for the entire network (before and after implementation). This provides for relatively safe demand forecasts as the uncertainties are minor estimating the future unit demand. These are based on elasticity assumptions as well as population forecast. Some of the elasticities can be questioned such as the income elasticity on Malta, which is rather high compared to the other projects. In seven projects, considerations about the responsiveness of consumption to increase of both price and disposable income have not been made to adjust consumption estimates. In the remaining cases, elasticity factors are used, but the underlying assumption are not explicit.

Demographic changes: Future water/wastewater consumption is estimated based on baseline population data and demographic forecasts in the project service area. In 8 out of 15 projects, the source of data is made explicit by the project promoter. The Central Statistics Office is the most used source for population forecast. City Development Plans are also quoted as reference source. Statistics from the Central Statistics Office are typically based on local or municipal statistical reports. Obviously, these are not necessarily compatible with the service area of the water company. The project promoter does not qualify the Central Statistical Office population projection, but refer to them as the reference source.

When the timespan between original feasibility study and the Application Form is large, it might imply that forecasts are established on the basis of outdated census data. When many years occur from original feasibility study and financial appraisal included in the Application Form, some assumptions that are key for operation sustainability, *in primis* population forecasts, resulted outdated. Hence, these forecasts are often over- (or under-) estimated across the projects. For example, if more recent projections (available at the time of the Application Form) were used, population growth in the area addressed by the project "*Improvement of water supply and sewage collection infrastructure for the town of Zory*" (Poland) would be significantly higher. Given the specifications of the project, this has little influence on its financial sustainability, but put some concerns on the designed capacity of the infrastructure.

Tariff affordability: Affordability calculations are prepared in compliance with national and international standards. A major concern, however, arises in relation to the scope of the analysis. The major limitation of the affordability analysis, as presented in the project dossiers, is that it is done at the level of average household income and not at the level of the most vulnerable population groups (e.g. based on the first income decile of population). This a major weakness and limitation of the analyses presented in the project dossiers. Evidence from the financial analysis review shows that, due to expected economic growth, the affordability thresholds are not exceeded. The only exception relates to the Hungarian and Polish projects, where, the combined tariff for water and wastewater will exceed the 3.5% and 3% limits, respectively, during the first years of project operation.

Full cost recovery principle: The full cost recovery principle is applied in all projects although with different intensities (e.g. two projects do not account for depreciation of EU/National grant funded in the tariffs). In two cases Greece and Lithuania, however, tariffs have been set without considering the replacement costs. Also, for the project "Water and Wastewater management of the Town Nowa Sól and the Adjacent Municipalities" (Poland), interest payments have been wrongly omitted from tariff setting.

Polluter pays principle: In all the projects reviewed, it is claimed that the polluter pays principle are respected and tariffs set in compliance with the national standards. It has implicitly been assumed that wastewater from non-households, which potentially contains higher concentrations of COD/BOD (chemical and biological oxygen demand) than standard household's wastewater are pre-treating their wastewater to household standards. No projects have referred to situations whereby they estimate extra costs incurred by treating more polluted wastewater from industries. In the available documents, there is no clear evidence about any tariffs differentiation by customer or development of fining tools. Thus, albeit any formal statement, the application of the polluter pays principle cannot be ascertained as it has not been documented. The only project where the issue is specifically addressed, and supported by evidence, is the "Extension and rehabilitation of water and wastewater infrastructure in Hunedoara county" (Romania).

3.4.2 Judgment on financial analysis

Implementation schedule: All projects reviewed show clear optimism basis with to the foreseen length of the implementation period including the period for construction of water and wastewater facilities. As a result, operational start for many projects has been delayed. Basically it takes much longer to prepare the tenders correct as well as the construction period takes significantly longer than anticipated.

Technological solutions: At the overall level, the information available points to appropriateness of the solutions suggested. It is well-known technologies and

appropriate to solve the problems identified. These are not a course of project implementation delay.

Capacity needs: Capacity needs are not really an issue in the water sector for the 15 projects reviewed. Only a few cases are related to expansion of the treatment capacity and the expansion seem justified to cater for the demand.

Investment cost budget: All projects have been found at a stage of technical preparation, including the tender/award of the main contracts, such that the overall cost budgets have been found reasonable. The projects are basically all based on either Red or Yellow FIDIC books.

Operating costs: The level of operation and maintenance costs does not appear to be an issue because they are based on existing operational costs. However Replacements costs have been excluded from the cash-flows so that overall costs during the operating phase have been underestimated in two cases (Collection, transport, treatment and disposal of sewage in Koropiou and Peanias areas" (Greece) and "Water and Wastewater management of the Town Nowa Sól and the Adjacent Municipalities" (Poland)).

Tariff revenues: Tariff revenues are calculated basically according to conventional standards. In one case (Poland), costs of financing (i.e. interest payments) have not been included within the outflows so that overall costs during the operating phase have been underestimated. In one case (Estonia), depreciation allowances have been wrongly included in the cash flows. In this way, the Funding gap results higher and, in turn, the EU grant.

Tariff phasing-in has been adopted explicitly in 5 projects only. In the remaining cases, it was not applied, or there is no evidence in the application, that is, tariffs will be increased once the project becomes operational.

Company sustainability: A general lack of attention to company sustainability aspects can be observed. Focus is on grant calculation and documentation of the incremental project, with the accompanying cash flow calculations for the project. More qualitative adverse events potentially affecting company sustainability (such as delays in implementation, low technical capacity of the beneficiary, difficulties to access the credit market, social issues, etc.) are never treated in the relevant section of the Application Form. The existing assets and the associated revenues as well as operation and maintenance costs – i.e. not project related revenues and costs are not included. Nor are measures discussed on how to mitigate the risks associated to changes in the key parameters analysed in the risk and sensitivity analysis, which also affect company sustainability.

3.4.3 Methodological errors requiring recalculation

Task 3 of the assignment covers a verification of the relevant assumptions of the financial analysis for those projects that are operational. In the water sector, the Estonian, Czech Republic , Lithuanian, Polish, Portuguese and Maltese projects have entered into operation. The assignment TOR calls for a recalculation of the financial analysis for these projects in the cases where methodological errors have been identified. Based on the available information, no significant errors as such were identified for the projects.

4 Proposal for pilot case studies

Task 4 of the assignment comprises the carrying out of case studies for 10 of the 20 projects covered in the ex-ante financial analysis review of Task 2 as summarised in Chapters 2 and 3 of this report.

During the inception phase, agreement was reached that the 10 projects should cover mainly operational major projects (defined to be those projects that had been completed by end 2014). Table 4-1 lists the operational projects, which number 11 in total.

Table 4-1 Operational projects

Country	CCI	Title
Waste management projects		
Portugal	2008PT161PR004	Treatment Project. Valorisation and final disposal of urban solid waste of the inter-municipal system of the Litoral Centro
Poland	2007PL161PR002	Modernization of municipal waste management in Gdansk
Water and wastewater projects		
Czech Republic	2009CZ161PR005	Improving water quality in rivers Jihlava and Svratka above tanks of Nové Mlýny
Estonia	2009EE161PR003	Renovation of water supply systems in Kohtla-Järve area
Poland	2009PL161PR004	Comprehensive organization of water - sewage management in Żory
Poland	2007PL161PR005	Water and wastewater management in Nova Sol and neighbouring municipalities
Portugal	2009PT162PR001	SIMARSUL – Sanitation sub-systems of Barreiro/Moita and Seixal
Czech Republic	2009CZ161PR009	Renovation and constr. of sewerage system in Brno
Lithuania	2009LT161PR001	Sludge Treatment Facility at Vilnius WWTP
Malta	2007MT161PR001	Malta South Sewage Treatment Infrastructure
Poland	2007PL161PR003	Construction of sewage and storm water collection systems and municipal WWTP in Tarnow Mountains - phase 1

Noted from the table is a high degree of country concentration as all four Polish projects reviewed are on the list. In order to achieve a geographical balance and since major water projects for Poland and the Czech Republic, respectively, do

not differ much in methodological approach, only one project from each country is proposed to be included. This provides for the inclusion of two non-operational projects instead. The following two non-operational projects are proposed as case studies:

- Romania: Integrated Waste Management System in Cluj County
- Greece: Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas

The consultants suggest that, out of the 11 operational projects, the three not to be included as case projects should be within the water and wastewater sector to ensure a better sector balance. For country balance, two Polish projects and one Czech project have been left out. Among the three Polish water projects, the two operations with smaller total investment and smaller Cohesion Policy contribution (2007PL161PR005 and 2007PL161PR003) have not been included. Also, among the two water and wastewater projects in the Czech Republic, the project with the larger share of funding has been chosen (2009CZ161PR009).

The resulting list of ten case studies is shown in the table below.

Table 4-2 Overview of 10 case study projects

Country	CCI	Title	Completion
Portugal	2008PT161PR004	Treatment Project. Valorization and final disposal of urban solid waste of the inter-municipal system of the Litoral Centro	End 2014
Poland	2007PL161PR002	Modernization of municipal waste management in Gdansk	End 2014
Romania	2009RO161PR036	Integrated Waste Management System in Cluj County	End 2015
Estonia	2009EE161PR003	Renovation of Water Supply Systems in Kohtla-Järve Area	End 2014
Poland	2009PL161PR004	Comprehensive organization of water - sewage management in Żory	End 2014
Greece	2013GR161PR007	Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas	-
Portugal	2009PT162PR001	SIMARSUL – Sanitation sub-systems of Barreiro/Moita and Seixal	End 2014
Czech Republic	2009CZ161PR009	Renovation and construction of sewerage system in Brno	End 2014
Lithuania	2009LT161PR001	Sludge Treatment Facility at Vilnius WWTP	End 2014

Country	CCI	Title	Completion
Malta	2007MT161PR001	Malta South Sewage Treatment Infrastructure	End 2014

The first phase of the case study work is the carrying out of two pilot case studies. These pilots are to be selected among a shortlist of minimum four projects. Based on this short list DG REGIO will select the two pilot case studies.

The shortlist proposed has been drawn up against the objective of the conduct of pilot case studies, which optimises the case study tools for application to the remainder eight case studies. This means that the shortlist for the two pilots should cover as broadly as possible the scope of the projects. For this reason, the list includes projects in both main sectors of the assignment and only projects that are operational.

In the waste sector, and in order for DG REGIO at all to have a choice in selection of the pilot case study for the sector, the shortlist consists of the two projects reviewed that are operational, i.e. the Litoral Centro SWT Project in Portugal and the Gdansk MWM Project.

In the water and wastewater sector, there is a larger pool of projects for consideration. The pilot case study shortlist we propose to be the following three projects:

- Malta South Sewage Treatment Infrastructure (because the review of this project identified several methodological errors and issues in relation to the financial analysis and it is relevant to explore these further. Furthermore, our key financial expert will be able to participate in this pilot as documents and communication is in English)

- Estonia: Renovation of water supply systems in Kohtla-Järve area. Again project documentation is in English and our preliminary contact with the project holder also suggests a good possibility for involving our key financial expert due to good English speaking skills.

- Czech Republic: Renovation and constr. of sewerage system in Brno. This project is interesting because it is an example of a relatively well prepared project and it thus offers opportunity for insights into good practise. However, a disadvantage is that contact with the relevant stakeholders has not yet been firmly established. However, from previous experience in working together with the utility company, we would expect cooperation to be good, once established.

For sector balance, we suggest that the two pilot case studies comprise one in each sector.

5 Main conclusions

Task 2 has comprised a review of the financial analysis of 20 selected projects, of which five were waste projects and 15 were water and wastewater projects. The review aimed to judge the quality of the demand analysis and the financial analysis undertaken as part of the preparation of the projects and as documented in the application form and the supporting documents available for the review. As part of judging the quality, the review also identified methodological errors and problems.

Overall, the review identified only few concrete methodological errors whereas the soundness and general quality of the financial analysis was questioned in quite a number of areas.

5.1 Main quality issues identified across sectors

Looking across the findings of review of the projects in the two sectors as documented in chapters 2 and 3, six main issues stand out.

Implementation plan and time overruns

There is a general tendency in project preparation towards optimism bias in the implementation plan. This means that a number of projects have experienced time overruns. In some cases, the review points to overoptimistic assumptions concerning financing arrangements planning and in other cases, optimism bias is also seen in relation to the physical establishment of the infrastructure. In respect to financing, it is not unlikely that the financial crisis can have played a role, however, other explanatory factors undoubtedly also contribute. These are elements to be further explored during the case studies in Task 4.

Capacity – are projects over-dimensioned or wrongly dimensioned?

There are examples of projects, which seem to be over-dimensioned or are at risk of being over or under-dimensioned due to unrealistic demand assumptions or demand assumptions, which are not very specific to the project area. This issue can be further explored in Task 3, which compares the ex-ante assumptions with actual values, and in Task 4, where we will seek to obtain a better understanding of the link between project development and relevant management plans and strategies as well as other factors influencing demand projections.

Affordability

The financial analysis conducted in the projects in both sectors generally conform with the national and international standards. In the financial analysis conducted for the water projects, the issue of affordability was not presented as significant as the real income growth assumptions in general were higher than the real tariff increase. Hence, the affordability ratio for the average household declined over the years. The issue was also partly addressed in the tariff policy.

However, the analyses of most projects (including waste projects) was carried out for the 'average income' population. This means that the affordability for the poorest and most vulnerable population groups was not considered (which in some of the projects take up a considerable share of the population served). When so, the ability to pay tariffs, and thereby also the projects' continued financial sustainability, may become an issue.

Full cost recovery principle

Judged from the information available, the extent of the application of this principle varies between the two sectors. In the waste projects, the principle was not fully applied, if at all. This could reflect reasons of affordability since in this project type, the non-cash part of the full costs in terms of allowances for future reinvestments are much more important than in water/wastewaters projects. The reason is the shorter economic life-time of waste project assets. The failure to set aside these reserves puts the longer-term financial and operational sustainability of the waste projects at risk.

Furthermore, waste project assets in the form of equipment require a higher level of maintenance that do water/wastewater assets. In the waste sector projects, required maintenance costs for short-term financial and operational sustainability were found underestimated to a higher degree than in the water/wastewater sector.

In the water sector it was seen that in some cases depreciation of the EU and national grant financed assets were not accounted for in the tariff. This reduced the tariff increase and thus improved the affordability calculation.

Replacement of assets have not in all cases been taken into account in the cash flow analysis, which will affect the financial sustainability. I.e. if there is no cash available to replace a worn-out asset, unless loan financed, the operational sustainability could come at risk.

Cross-sector, it appears that the cost base for setting tariffs was defined in consideration of affordability and acceptability by the population rather than taking into account the need to sustain operations through full cost recovery.

Polluter pays principle

It is a general observation that there is often a lack of documentation and evidence about tariff differentiation, which makes it difficult to ascertain whether the polluter pays principle has been respected. Based on the available information, it is concluded that the principle is respected to varying degrees in the projects analysed.

Sustainability issues

In the water projects it was found that the project applications' focus is not on company sustainability aspects. Focus is on grant calculation and documentation of the incremental project, with the accompanying cash flow calculations for the

project. The existing water company assets and the associated revenues as well as operation and maintenance costs – i.e. not project related revenues and costs are not included. A company approach will, in addition to the project IRR, NPV and grant calculations ensure that not only the project but also the operator will not run out of cash, or possibly experience negative cash flows. This is particularly relevant in case of infrastructure that has previously suffered from severe underfunding of capital investments and operations.

Overall, more quality issues have been identified for the waste projects than for the water and wastewater projects. There may be several plausible causes for this, which could be further explored during the case studies in Task 4. Most importantly waste projects are more complex as waste (as compared to water) is not homogenous but rather consists of many different fractions, which need to be considered in estimating future demand. This gives rise to different waste streams and different technologies making the analysis of options and investments more complex. Further, adding to uncertainty in the waste sector is that markets for bi-products and recyclables need to be taken into account in the financial analysis.

5.2 Methodological errors

In respect to methodological errors in the operational projects, no such errors were found in relation to the operational projects included in the review.

5.3 Perspectives for Task 4

Following the conclusions presented above, one may ask whether:

- the identified quality issues and methodological errors could have been (or should have been) captured in the various stages in the project approval process (nationally as well as those relevant for the Cohesion Policy Programmes)

- the current available guidelines and tools for assistance in project preparation are sufficient to help project implementing bodies address the financial analysis

These questions are beyond the scope of task 2, but we suggest that they be further explored in the ten case studies to be conducted under task 4. It will be relevant to discuss the project preparation process with interviewees as well as gaining their views on sufficiency of current guidelines, tools and procedures in order to ensure quality in financial analyses. This can also provide useful inputs to Task 5 – catalogue of challenges.

Appendix A Summary table on observations for each project in the water and wastewater sector

No.	Country	Title	Price elasticity taken into account in water consumption estimates	Source of data for population forecasts explicit	Tariff affordability analysis in compliance with standards	Tariff affordability taking into account different income groups	Full cost recoverey principle applied	Polluter pays principle applied	Optimism bias in implementation schedule	Appropriate technological solutions	Investment cost budgets reasonable	Sufficient budget for Operating costs	Tariff revenues according to standards	Tariff phasing in applied
1	Czech Republic	Improving water quality in rivers Jihlava and Svratka above tanks of Nové Mlýny	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
2	Estonia	Renovation of Water Supply Systems in Kohtla-Järve Area	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Latvia	Development of water management in Riga, stage 4	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Poland	Comprehensive organization of water - sewage management in Żory	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No
5	Poland	Water and wastewater mngt. in Nova Sol and neighboring municipalities	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes
6	Romania	Extension and rehabilitation of water and wastewater infrastructure in Jiu Valley Area, Hunedoara County	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Greece	Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas	No	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes
8	Portugal	SIMARSUL – Sanitation sub-systems of Barreiro/Moita and Seixal	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
9	Spain	Sanitation of Vigo	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
10	Czech Republic	Renovation and constr. of sewerage system in Brno	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Hungary	Nagykanizsa and surrounding areas - sewage coll. and WWTP development	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
12	Lithuania	Sludge Treatment Facility at Vilnius WWTP	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
13	Malta	Malta South Sewage Treatment Infrastructure	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes
14	Poland	Construction of sewage and storm water collection systems and municipal WWTP in Tarnow mountains - phase 1	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
15	Slovakia	Sewage collection system and upgrade of Liptovská Tepla WWTP	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes