



Environment

Report on eight case studies Work Package 6

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2007-2013, focusing on the European Regional
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Ex post evaluation of Cohesion Policy Programmes 2007-2013 Co-Financed by the ERDF/CF. Work Package 6: Environment

Report on eight case studies

[November – 2015]





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List of abbreviations/glossary

BOD	Biological oxygen demand
BWD	Bathing Water Directive (2006/7/EC)
CBA	Cost benefit analysis
CF	Cohesion Fund
COD	Chemical oxygen demand
EEA	European Environment Agency
EIA	Environmental impact assessment
ERDF	European Regional Development Fund
EU	European Union
EUR	Euro
GDP	Gross domestic product
IPPC	Integrated pollution prevention and control
p.e.	1 p.e. (population equivalent) means the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60 g of oxygen per day
UWWD	Urban Wastewater Directive (91/271/EEC as amended)
WEEE	Waste from electrical and electronic equipment
WFD	Water Framework Directive (2000/60/EC)
WWTP	Wastewater treatment plant



Member states

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



1 Introduction

This is a report on eight case studies conducted for the project Ex post Evaluation of Cohesion Policy Programmes 2007-2013 Co-Financed by the ERDF / CF. Work Package 6: Environment. The report was first submitted in August 2015. After receiving comments, the report was subsequently revised and this is the revised and final version.

1.1 The evaluation study

The study aims to analyse the progress and achievements of Cohesion Policy in selected areas of environment related infrastructure: drinking water, wastewater treatment, and solid waste management. Special emphasis is given to the financial sustainability of investments, which is examined through a desk study on financial data of 20 major projects and ten case studies. The project includes seven tasks:

- Task 1: Summary of achievements. This task provides an analysis of the achievements of Cohesion Policy to meeting the requirements of the *aquis communautaire* in the fields of drinking water supply, wastewater treatment, and solid waste management and treatment. Essentially, the results of this task was documented in the first interim report. This will be updated with data becoming available later in 2015.
- Task 2: Review financial analysis. This task reviewed the financial analysis of 20 selected projects. The results of the task were documented in the first interim report.
- Task 3: Verifying assumptions: This task focused on comparing planned and actual values for 11 operational projects. The results were documented in the second interim report.
- Task 4: Case studies. This task includes case studies of ten projects, of which two studies were pilots and documented in the second interim report. The remaining eight case studies are documented in this report.
- Task 5: Catalogue of challenges. This task will provide a note on the most common problems encountered in financial analysis and solutions to avoid them. The catalogue is due to be submitted on 18 September 2015.
- Task 6: Seminar. This task will gather relevant stakeholders from the Member States, IFIs and the Commission to discuss and deepen the analysis of emerging findings. The seminar is scheduled for 8 October 2015. A discussion paper highlighting main findings and questions to the seminar participants will be prepared and advance of the seminar.
- Task 7: Final report. This task will summarise the evaluation in a report. The draft final version of this report is due on 10 November 2015.



1.2 Overview of case studies

The case projects include two projects in the waste sector and six projects in the water and wastewater sector. As per the tender specifications there was a preference for projects which had become operational, however, in view of the very few projects in that category and in order to have greater representativeness across Member States, a few non-operational projects were also included among the case studies (Romania, Estonia and Greece).

Table 1-1 Overview of case projects

Project title (short)	Stage *	Investment cost		Period		Assistance from JASPERS
		Planned (million EUR)	Realised (million EUR)	Start (planned/realised)	End (planned/realised)	
Waste management projects						
Urban waste management (ERSUC), Litoral Centro, Portugal	O	88.3	115.3	Feb 2009	Feb 2011/ Sept 2012	No
Integrated waste management, Cluj Romania	I	76.5	n.a.	Mar 2011/ Jan 2012	Jan 2013/ n.a.	Yes
Water and wastewater projects						
Renovation of water supply system in Kohtla-Järve, Estonia	I	45.9	44.7**	Apr 2009/ May 2009	Nov 2015/n.a.	No
Water and sewage management, Zory, Poland	O	43.7	64.4	Mar 2007	Dec 2011/ Jul 2015	Yes
Sewage management in Koropiou and Paianias, Greece	I	123.9	n.a.	Dec 2010/ Jul 2013	Dec 2016/n.a.	No
Sanitation system of Barrerio/Moita and Seixal (SIMARSUL), Portugal	O	51.5	51.2	Mar 2007	Dec 2011/ Apr 2012	No
Sewerage system in Brno, Czech Republic	O	91.0	81.1	July 2011/ Mar 2012	Dec 2013/ Feb 2014	Yes
Malta South Sewerage Treatment Infrastructure	O	68.4	68.0	Dec 2008	Oct 2010	Yes

*O=operational, I=under implementation, **expected but not confirmed as project is not operational

1.3 This report

This report provides the reports of the eight case studies, which have been conducted according to the template and guidance as revised in accordance with comments received on the two pilot case studies (second interim report).



The data sources for the case studies include publicly available documents as well as information obtained in writing from the Managing Authority, during field visits to project facilities and meetings with representatives of the Managing Authorities, the beneficiaries, and Implementing Bodies.

The authors would like to thank the relevant authorities for their time and co-operation, without which this case study report could not have been prepared. There has been a process to validate the contents of the case study report with the relevant stakeholders. In some case studies, this process is complete and in others it is still ongoing. If necessary, the evaluation team will revert to the necessary stakeholders to validate any additions made to the report in view of comments received from DG REGIO.

The structure of this report is such that each case study is documented in a separate chapter. The list of persons interviewed for the case studies is given in Appendix A. Each chapter has the same structure:

1. Executive summary, providing a brief overview of main project characteristics and the findings presented
2. Project description, providing a factual description of the project
3. Relevance of the project, providing the findings of the analysis of project relevance
4. Project performance, providing the findings of the analysis of project effectiveness
5. Technical and financial sustainability, providing the findings on project sustainability
6. Good practises and possible policy implications



2 Project for the treatment, valorisation and final disposal of urban solid waste of the inter-municipal system of the "Litoral Centro" region (ERSUC), Portugal

2.1 Executive summary

PROJECT FOR THE TREATMENT, VALORISATION AND FINAL DISPOSAL OF URBAN SOLID WASTE OF THE INTER-MUNICIPAL SYSTEM OF THE "LITORAL CENTRO" REGION

Location (country and region/city)	Portugal: Litoral Centro
Total investment costs (planned)	EUR 88.3 million (115.3)
Total CF/ERDF contribution (planned)	EUR 61.4 million (80.3)
Start (planned)	February 2009 (February 2009)
End (planned)	September 2012 (February 2011)
Beneficiary	ERSUC
Implementing body	ERSUC
Assistance from JASPERS	No

The project concerns the upgrading of a multi-municipal urban solid waste management system to comply with national and EU regulations concerning packaging waste (Directive 94/62/EC and 2004/12/EC) and waste handling and disposal processes (the landfill directive 1999/31/EC). The main components of the project are:

- construction of two mechanical and biological treatment units in the municipalities of 'Aveiro' and 'Coimbra' with a capacity of 2 x 190,000 t/year of unseparated urban waste¹ and 123,000 t/year of organic waste to be processed by anaerobic digestion,
- a transfer station in the municipality of 'Figueira da Foz' and
- four trucks.

The foreseen objectives for the capacity of the plants were attained. The project was completed in 43 months, a considerable delay of 19 months (or 80%) behind schedule.

¹ Unseparated waste refers predominantly to household refuse without any distinction of materials; it may also include refuse from small shops, restaurants, offices and other small facilities. It is opposed to separate urban waste resulting from source separation of refuse materials into homogeneous factions (e.g.: paper & board, glass, plastic and metal packing materials, etc.)



The actual investment costs were 24% lower than budgeted. Such reduction was due to an overestimation of costs when the budgeting exercise was carried out in 2006.

The new facilities are in operation for more than 2 years without any major hindrance or malfunction. Since coming into operation, the facilities have been improved in the functioning of some departments. ERSUC management estimates these improvements to be responsible for an increase of EUR 1.2 million in the company turnover. These positive outcomes were partially offset by the increase of maintenance costs, which are higher than expected. On the whole, the operational and maintenance performance of the new facilities are considered fairly good (see section 2.5.2).

No cash-flow problems were reported in relation to funding the capital investment costs. Actually, investment outlay was slower than expected due to construction delays, thus not impinging any special pressure on long-term funding needs.

Financial sustainability of project operation is ensured by the concession contract, which guarantees that tariffs should cover all costs incurred by the concessionaire. This is the "cost plus" or "cost reimbursement" type of contract, where a contractor is paid for all of its allowed expenses (after subtracting the income generated by recycling and recovery activities) plus additional payment to accommodate a profit.

This project is a fairly good example of a faulty planning process that was counter balanced by a good execution.

The planning process included several flaws: (a) Poor feasibility studies and risk analyses; (b) Unrealistic forecast of the construction time-schedule; (c) Insufficient consideration given to engineering measures to deal with negative events, such as extreme weather conditions; (d) Lack of market/affordability research; (e) Over budgeting of capital investment costs due to lack of experience; Inconsistencies in various submission documents.

On the upside part of the execution there is: (a) Capital costs were kept within the initial budget of the turn-key construction contract (obviously lower than the inflated original budget); (b) The new facilities were built in conformity with the original objectives in terms of scope and capacities; (c) The new facilities have been in operation for more than 2 years without any major problem; (d) The "cost plus" tariff approach has proved successful in passing on to the city councils a large proportion of benefits engendered by increased sales of recyclable materials and energy.

2.2 Project description

2.2.1 Key facts about the project

In mainland Portugal urban solid waste is typically:

- collected by local city councils², either directly by municipal sanitation services or through contracts with private firms;

² There are more than 300 municipalities in Portugal



- (a) **Two mechanical biological treatment units** in the municipalities of 'Aveiro' and 'Coimbra'. Each mechanical and biological treatment unit has a capacity of 190,000 tonnes/year to process unseparated urban waste and 123,000 tonnes/year of organic waste (this to be treated by anaerobic digestion, with electricity generation). This way all unseparated waste generated in the territory and collected by the 36 city councils will be processed by these two units, which will also handle separate waste coming from specialised collection circuits;
- (b) **1 transfer station** in the municipality of 'Figueira da Foz' and **four trucks** (to transport recyclable and non-recyclable waste to the Coimbra mechanical and biological treatment units);

as well as the **acquisition of land** necessary for the mechanical and biological treatment units and the transfer station.

The construction project was managed by ERSUC that is also operating the new facilities.

Table 2-1 Investment budget (planned / realised)

Project components	Planned	Realised	Variation
	M EUR	M EUR	%
Project preparation incl. design ⁵	2.9	0.0	- 100
Land purchase and site preparation	6.6	8.1	+ 23
Construction + Equipment	97.0	78.0	- 20
Price adjustment	5.9	0.0	- 100
Supervision	2.9	0.9	- 100
Total investment costs	115.3	87.5	- 24

Source: Reference 1 and Reference 2, Appendix B

2.2.2 Project history and key milestones

The "Litoral Centro" multi-municipal system was created by a government order of September 1996⁶, followed one year after by the incorporation of ERSUC and the granting of the concession contract for managing the urban solid waste of the area. The 31 city councils that initially created the system were extended to 36 municipalities in the next two years, configuration that is still existing today.

ERSUC started progressively its operations in September 1998. These operations were based on three landfills, two sorting plants, several transfer stations (where unseparated urban solid waste is delivered by city councils) and allied equipment, including drop-off centres scattered over the territory for early separation of recyclable materials. In addition to the routine operations, ERSUC also carried out the sealing-off of about 40 uncontrolled waste dumps in accordance with the concession contract.

⁵ In the revised version these costs were included in the "Construction + Equipment" item.

⁶ Decree-law 166/96 of 5 September 1996.



In 2005, a major revision of the ERSUC business plan was performed in close collaboration with its shareholders, EGF and the city councils. The revised plan aimed at decreasing the tonnage of urban solid waste sent to landfills by adopting recycling and other uses of the collected waste. The plan, which was approved by the government in September 2006, included the construction of new facilities for the preparation of recyclable materials (glass, packaging, board and paper, etc.) and new waste-to-energy solutions.

After preliminary feasibility and location studies conducted with the support of the municipal shareholders throughout 2006-2008, ERSUC submitted the investment project to the approval of the Portuguese authorities (POVT⁷).

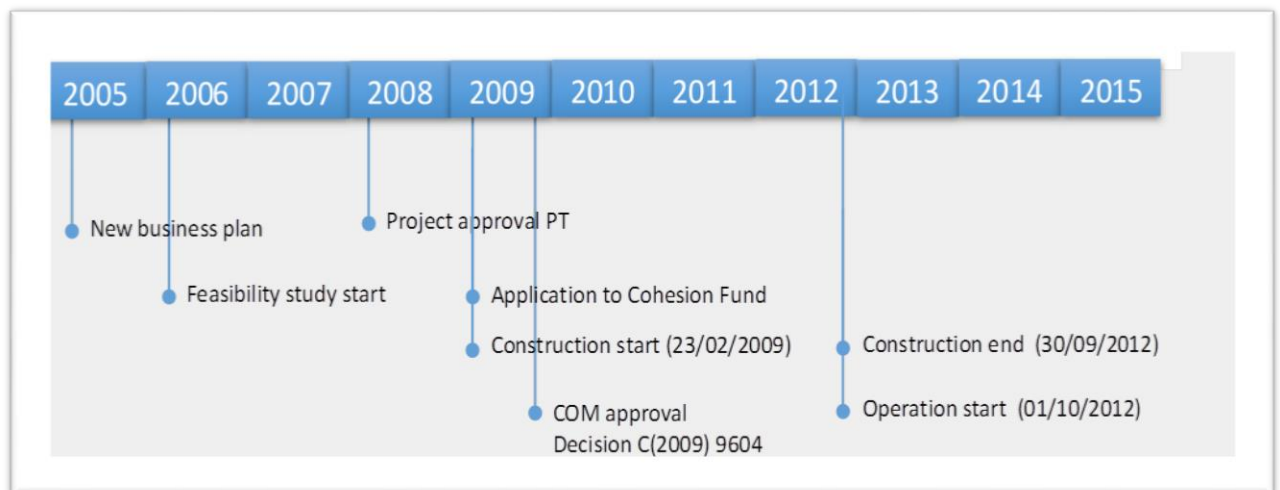
After approval by the POVT managing office, the project application to co-funding by the Cohesion Fund was submitted to the Commission on 27 January 2009. The project was approved by the COM Decision C(2009) 9604 of 30/11/2009. Three re-programming decisions were subsequently approved by the Commission, entailing changes in material and financial aspects. The table below shows the performance of the implementation plan with the figure further down illustrating the timeline.

Table 2-2 Implementation plan (planned / realised)

	Application	Realised	Variation
Construction start date	23/02/2009	23/02/2009	0
Construction end date	22/02/2011	30/09/2012	+ 19.3 months
Operation start date	23/02/2011	01/10/2012	+ 19.3 months

Source: Reference 1 and Reference 2, Appendix B

Figure 2-2 Project timeline



Source: Reference 1 and Reference 2, Appendix B, POVT, ERSUC

⁷ POVT – Programa Operacional Valorização do Território, the PT operational programme 'Territorial Enhancement'



2.2.3 Main objectives and outputs

The project purpose concerns the upgrading of a multi-municipal urban solid waste management system to comply with national and EU regulations concerning packaging waste (Directive 94/62/EC and 2004/12/EC) and waste handling and disposal processes (the "Landfill Directive" 1999/31/EC).

The main investment objectives concerning capacities did not change over the three different project submissions to the Cohesion Fund. The realised capacities are in line with the design figures⁸.

Table 2-3 Project capacities (planned / realised)

	Unit	Application	Realised	Variation
Transfer station (t/year)	t/year	41,000	41,000	0
Treatment plant (t/yr.)	t/year	380,000	380,000	0

Source: Reference 1 and Reference 2, Appendix B

2.2.4 Key stakeholders

The major stakeholders are the inhabitants and businesses of the concession territory, which are represented by the 36 city councils as shareholders of the concessionaire, ERSUC. Stakes of the municipalities vary from 0.20% held by 'Castanheira de Pera' (population 3,191 in 2011) to 6.93% held by 'Coimbra' (population 143,396). Besides 'Coimbra', stakes of over 3% are held by 'Aveiro' with 3.13% (population 78,450) and 'Oliveira de Azemeis' with 3.09% (population 68,611).

The project was overseen by the managing authority, the management office of POVT.

2.3 Relevance of the project

2.3.1 Coherence with policy objectives

The rationale of the project is to increase as much as possible the share of urban waste targeted to recycling and recovery and thus minimising the fraction to be disposed into landfills. This aim was in accordance with the national policy concerning urban solid waste handling (PERSU II)⁹, which came into force at the time the project

⁸ There a 17-minutes video showing the main features of the new twin treatment plants (MBTP) at <https://www.youtube.com/watch?v=v7kbnV0TIMg> (Portuguese)

⁹ This national policy was set out in the second version of the Strategy Plan for Solid Urban Waste (*PERSU II Plano Estratégico para os Resíduos Sólidos Urbanos*), approved by the Portuguese government in 28 December 2006. This is a second version of a national plan (dating from 1997) that contains national and EU policies introduced since 1996 ensuring that the Union objectives with respect to avoiding the deposition into landfills of organic and recyclable waste. The plan was prepared by a government appointed committee that included a representative of EGF, the major shareholder of ERSUC (Doc. 13, Appendix A).



feasibility and location studies were underway, as well as with the Waste Framework Directive (Directive 2008/98/EC).

Project objectives are connected to the "Operational Programme 'Territorial Enhancement", through priority 3: "Prevention, Management and Monitoring of Natural and Technological Risks (Cohesion Fund)"¹⁰.

2.3.2 Consistency with needs in the territory

The demand forecast was based on the projections of the tonnage of waste set out in PERSU II and seems satisfactorily in agreement with service demand so far (an oversized capacity of about 5% is acceptable). The capacity utilisation of the mechanical and biological treatment units stabilised in the range of 92/94% (Table 2-4).

Table 2-4 Urban solid waste processed by ERSUC (tonnes/year)

	2008	2012	2013	2014
Total waste to facility (planned)	398,563	411,968	412,066	411,563
Total waste to facility (actual)	421,482	388,499	377,337	388,403
Waste for sorting	32,345	30,436	28,502	29,775
Waste for landfill	388,780	237,997		
Waste for temporary storing	357	101	90	70
Waste for treatment	0	119,965	348,745	358,558
Treatment capacity utilisation (%)	-	32	92	94
Total population (no.)	975,834	957,237	945,572	938,367

Source: Reference 15, Appendix B

The capacity appears to be consistent with the needs of the territory as demand is not likely to increase in the next years. Based on a national survey of existing solid urban waste multi-municipal systems (2014), government projections assume stabilisation or decreasing trends.

The technical solutions used in the mechanical and biological treatment units are based on the best available technologies and the project scope did not change during construction, except for minor adjustments.

ERSUC, the operator, has adequate resources to manage all the systems in place.

¹⁰ The first application was submitted under priority 8: "National Infrastructures for processing Urban Solid Waste (ERDF)" of the same operational programme.



2.4 Project performance

2.4.1 Fulfilment of objectives

Project capacity objectives were attained. Although demand increase is not foreseen during the project economic life, the facilities have the flexibility to accommodate a moderate capacity expansion, as well as seasonal demand peaks (e.g.: in holiday periods) and the intensification of processing (e.g.: following stoppage periods for extensive maintenance work).

2.4.2 Implementation effectiveness

In the initial submission, the construction of the facilities was to be rolled out between February 2009 and February 2011. In the last re-programming submission (dated March 2012), the **time schedule** was extended to December 2012. The project was completed before that, in September 2012.

The new mechanical and biological treatment units were already in operation in 2012 with a capacity utilisation of 32%. ERSUC annual report for 2013 confirms that the fiscal year 2013 was the first one to have the new facilities in full operation for the whole period.

The project was completed 19 months behind schedule for a total foreseen duration of 24 months. This is a considerable delay of more than 80%.

There are two main reasons that explain this delay:

- Very severe weather conditions in two winters with heavy rainfall episodes causing floods and affecting terrain physical structure and stability. These conditions entailed considerable delays on civil construction works. There is large meteorological data in the region, which may be used to predict the likelihood of severe weather conditions and adjust the time schedule and devise contingency solutions. So, these occurrences were foreseeable at the planning date and arrangements to preclude, mitigate or incorporate their impact on the time schedule could have been worked out.
- Construction was awarded under a competitive tender to a consortium through a turn-key contract. One of the members of the consortium entered into bankruptcy in the beginning of the construction period¹¹. The bankruptcy process led to defaults in payments to a sub-contractor that was supplying the main equipment. This situation required lengthy negotiations for the replacement of the consortium member. Although foreseen in the contract, delays are inescapable when cost

¹¹ The company HLC, one of the 3 members of the consortium, after a judicial court case and amid suspicions of corruption, was declared insolvent in November 2010.



control is a main concern¹². In this case, costs were completely contained (thus, delays were inevitable).

Financing conditions did not play any role in the time overrun of the construction operations.

As already noted, actual **investment costs** were reduced by 24% when compared with the cost foreseen in the initial feasibility and submission documents. Besides an increase in the cost of land (with an overall impact of 1.3%) and some small adjustments (constant prices, classification of cost items), the main factor of this cost change was the value of the turn-key contract for construction works and equipment supply, which revealed a reduction of 20%.

This change is an exclusive outcome of the overestimation of costs when the budgeting exercise was carried out in 2006. At the time, there was not much experience in building mechanical and biological treatment units in Portugal. The team that prepared the budget performed a programme of technical visits to mechanical and biological treatment facilities throughout Europe (Austria, France, Germany, Netherlands, and others), which included an investigation of construction costs. The pro forma costs based on the survey are now recognised as quite inflated.

2.5 Technical and financial feasibility

2.5.1 Technical operation

The new facilities have been in operation for more than 2 years without any major hindrance or malfunction. After smoothing the organisational and operational impacts of the new facilities, ERSUC started to optimise the functioning of the segments of the facilities that were apt to improvements: tuning the mechanical processing department provided an increase of the recovery rate of recyclable materials from unseparated waste; changes in the biological processing department increased the quality and stability of the biogas, with a favourable impact on electricity generation. ERSUC management estimates these gradual improvements to be responsible for a rise of EUR 1.2 million of the company turnover¹³. These positive outcomes were partially offset by the increase of maintenance costs, which are higher than expected.

2.5.2 Operating budget

The reported increase of 3.3% in operating costs was less than proportional to the increase of the actual tonnage of processed waste when compared with the budgeted amount (Table 2-5). Maintenance costs have fixed and variable components. Variable components are roughly proportional to the tonnage of waste processed. In this case,

¹² It is needed extra time to negotiate competently to avoid quick fix solutions that usually imply huge costs and/or quality downgrade.

¹³ Reference 16, Appendix A, p. 1



tonnage actually processed was about 5.8% higher than the planned tonnage, but the actual costs were only 3.3% over the plan. Accordingly, overall, there is a fairly good performance of the facilities as regards the operating and maintenance costs.

Table 2-5 Operating costs (planned / realised)

Operating costs 2014 (EUR thousand/year)	Projection	Actual	Variation
Treatment plants	n.a.	1,114.9	n.a.
Transfer station	n.a.	16,181.1	n.a.
Total	16,745.7	17,296.0	+ 550.3 (3.3%)

Total waste to facilities (Tonnes/year)	367,038	388,403	+21,365 (+5.8%)
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Source: Reference 1 and Reference 2, Appendix B

2.5.3 Financial sustainability

No cash-flow problems were reported in relation to funding the capital investment costs. Actually, investment outlay was slower than expected due to construction delays, thus not impinging any special pressure on funding needs.

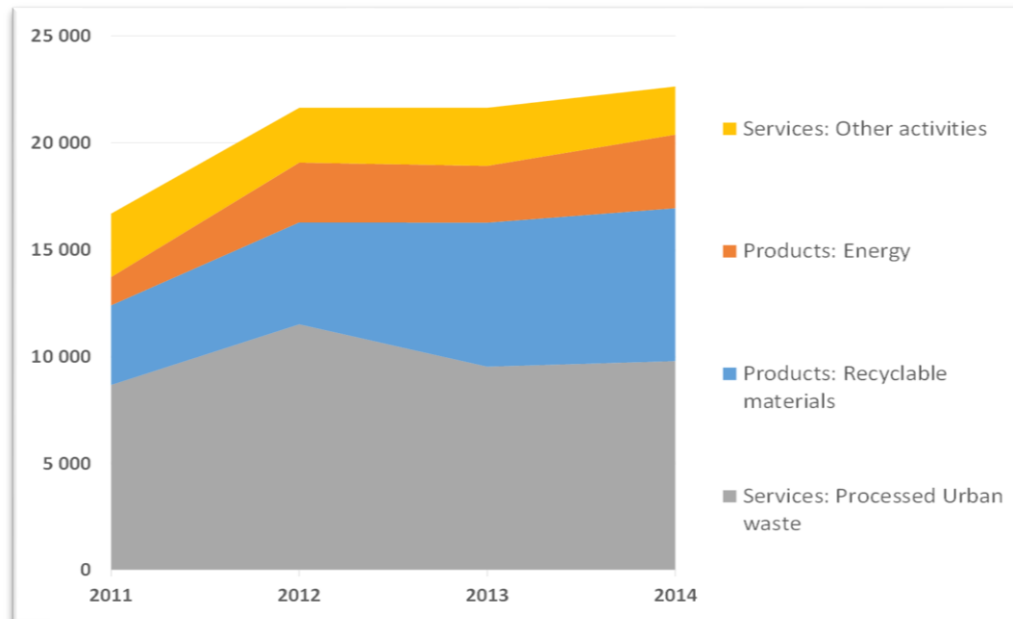
Construction delays, which certainly have a negative impact on the economic effectiveness of the project, had no negative impact on the short-term financial sustainability (as payments were also delayed).

In fact, the financial sustainability of the project operation is ensured "by design" as far as the concession contract guarantees that tariffs should cover all costs incurred by the concessionaire, after deducting all non-tariff related revenue¹⁴. This is the "cost plus" or "cost reimbursement" type of contract, where a contractor is paid for all of its allowed expenses plus additional payment to accommodate a profit.

ERSUC turnover in recent years are in line with the planned budget. They show a stabilisation trend after a sharp rise determined by the gradual coming into stream of the new facilities (Figure 2-3).

¹⁴ In the case of ERSUC the non-tariff related revenue includes basically the sale of recyclable materials and energy and the provision of other services (such as urban cleaning services in some municipalities).

Figure 2-3 ERSUC Revenue



Source: Reference 15, Appendix B

Even though there is an increase of the overall turnover, the revenue from processing urban waste (coming from tariffs charged to city councils) is showing a stabilising/decreasing trend. Actually, the share of the city council charges in the overall revenue decreased from 52% to 43% between 2011 and 2014. This is a direct consequence of the “cost plus” system, as the net benefits from increased sales of recyclables and energy are deducted in the amount of tariffs charged to the city councils.

The “cost plus” contract is the model that governs most of partnerships that are running multi-municipal systems in Portugal. The “cost plus” model applies to all costs borne by the concessionaire deducted of revenues other than tariffs and net of all non-repayable financing, such as the Union contributions via ESIFs (usually the ERDF or the CF)¹⁵ and the national public or equivalent subsidies¹⁶. Usually contracts have provisions setting benefits resulting from foreseen efficiency or productivity gains that must be taken into account in the calculation of the guaranteed profit of the concessionaire. This tariff system is overseen by an independent regulator, ERSAR¹⁷.

¹⁵ Calculated in accordance with the existing rules concerning the ‘funding gap’ and the ‘co-funding rate’ of the applicable priority axes.

¹⁶ Fixed assets owned by the city councils or the central state at the moment of the creation of the concession are kept as property of the original owner. At the end of the contractual period, other assets acquired by the concessionaire are to be passed on to the municipalities (which have the first refusal option) or to the central state, at book value (net of fiscal depreciation and corrected for inflation). Assets should be in good operational condition.

¹⁷ ERSAR is in charge of regulating public water supply services, urban wastewater management services and municipal solid waste management services (http://www.ersar.pt/website_en/Home.aspx).



No reference is made in any of the various versions of the feasibility study that accompanied the submissions to Cohesion Fund financial assistance to any previous affordability research concerning access of the population to urban solid waste collection, processing and disposal services.

Regardless of the above, tariffs of ERSUC are below country average¹⁸, also meaning that affordability was reasonably ensured in the territory¹⁹. It should be noted that, in spite of the stabilisation trend shown by the average tariffs, there are systems with increasing and others with decreasing trends. Usually increasing trends are due to updating processing technologies to more costly solutions required by EU and national regulations (from the disposal of unseparated waste into landfills to integrated systems ensuring sorting and processing for recycling, composting, incinerating and other waste-to-energy solutions). On the other hand, decreasing trends usually refer to improved efficiency and/or economies of scale brought about by consolidating smaller operations.

In the case of ERSUC there is a clear tariffs increase from 2008 to 2012 (when more sophisticated processing systems were coming into stream) and a decreasing trend after 2013 (the first years of full operation of the new facilities), indicating the efficiency gains mentioned at the beginning of this section.

2.6 Good practises and possible policy implications.

This project is a fairly good example of a faulty planning process that was counter balanced by a good execution.

Besides the more notorious time-schedule over run due to unrealistic forecasts, the planning process was impaired by other flaws, such as poor feasibility studies and risk analyses, lack of market/affordability research, inconsistencies in various submission documents. Some of these insufficiencies were spotted by the Commission's services and were in the origin of several clarification and correction requests. These requests were mostly related to formal aspects (notably accounting criteria) and none to more substantial issues (unrealistic time schedule, faulty feasibility, market and risk investigations).

Notwithstanding, most of the changes required by the Commission concerned formal aspects, not substantive ones, as mentioned in the previous section. This suggests that the Commission services should make an additional effort to scrutinise the quality and comprehensiveness of the documentation that accompanies the submission forms of major projects seeking financial support from ESI Funds.

¹⁸ Source: ERSAR

¹⁹ The affordability we could discuss here is at the municipality level not the consumer level. This means that multi-municipal systems should transfer the actual costs (provided the systems are cost-effective) to the city councils. The multi-municipal systems are not supposed to provide direct or indirect subsidies to the population. City councils are responsible for setting tariffs at consumer level and they have a wide range of possibilities to compensate family income inequalities and deficiencies (they actually practice a lot of cross-subsidising in their pricing strategies for environmental services).



From the three dimensions that are at play in large industrial or infrastructure projects (cost, time, performance), this project did well in two: costs and performance (scope, capacity, running costs, turnover).

Good performance as regards capital investment costs was only a trivial consequence of faulty budgeting. Over budgeting is a mistake that seldom occurs in project planning and has less critical implications than the reverse (investment costs overruns). In this case it appears to be an honest mistake due to lack of experience²⁰. The impact of this mistake is small or negligible (possibly some higher costs due to excessive financing).

Although time is not enough to allow for a comprehensive appraisal of the operational performance (facilities have been in operation only for two years), so far, performance looks fairly good.

The most salient fault concerns the implementation time. This has to do mainly with the planning phase, not the execution phase. The time schedule outlined in the planning phase was quite unrealistic by not providing any slack to accommodate significant contingencies, which are frequent in these type of projects. The bankruptcy of the main contractor was also a major factor in the time overrun. This also happens in some projects (and is more likely in economic downturns) but is more difficult to compensate.

The execution phase duration seems reasonable when compared with projects of similar size and complexity.

It was mainly in the planning phase that the risks of delay were not adequately addressed, parts of which were foreseeable since the beginning.

Given the circumstances, the implementation team did a good job by keeping the capital costs strictly within initial budget of the turn-key construction contract and managing a reasonable time scale for project completion. This may be attributed to the long and consolidated experience of EGF (see section 2.2.1), the organisation behind ERSUC, which played a central role in containing the investment costs of the initial turn-key contract based on a competitive tender. This containment requires, besides well designed technical and legal documents, a close follow-up of construction execution to avoid technical changes, which lead to price increases negotiated in a non-competitive environment. Such price increases induced by contract revisions are major sources of cost overruns in public investment projects in Portugal (and in many other countries).

²⁰ Some classify the reasons for forecasting into three broad categories: 1) delusions or honest mistakes; 2) deceptions or strategic manipulation of information or 3) bad luck.



3 Integrated Waste Management System in Cluj County, Romania

3.1 Executive summary

INTEGRATED WASTE MANAGEMENT SYSTEM IN CLUJ COUNTY

Location (country and region/city)	Romania, Cluj County
Total investment costs (planned)	<i>N/A (EUR 76.5 million)</i>
Total CF/ERDF contribution (planned)	<i>N/A (EUR 38.8 million)</i>
Start (planned)	January 2012 (March 2011)
End (planned)	N/A (January 2013)
Beneficiary	Cluj County Council
Implementing body	Cluj County Council
Assistance from JASPERS	yes

The main objective of the project was to establish an integrated waste management system in Cluj County in Romania. This included a central waste management facility with sorting and treatment plants and a new landfill replacing a number of non-compliant landfills, which will be closed down as part of the project. To ensure waste segregation household waste containers had to be acquired and transfer stations established. Collected waste was to be gathered at the transfer stations before being transported to the central facility.

The project beneficiary is Cluj County Council. Cluj County is located in the North East of Romania and has almost 0.7 million inhabitants.

The proposed project seeks to resolve the significant environmental and operational problems related to waste generation and management and develop an integrated waste management system in the County that will improve the living conditions of its citizens and support Romania in achieving the waste management targets imposed by the Accession Treaty. The project is in line with the EU national and regional strategic framework for the environment sector and the waste sector in particular.

The project is not completed and no parts are operational, thus project objectives remain unfulfilled. It is expected that objectives will be met once the project is completed.

The designed capacity of the system is sufficient for dealing with the waste generated in the county in the future. The project is deemed sustainable from a technical point of view in spite of the fact the construction phase has been delayed significantly due to a set of problems of various kinds, primarily caused by poor performance of the contractor on the new landfill. A delay of five years is expected as compared to original plans. Thus, full operation is not expected until late 2017.

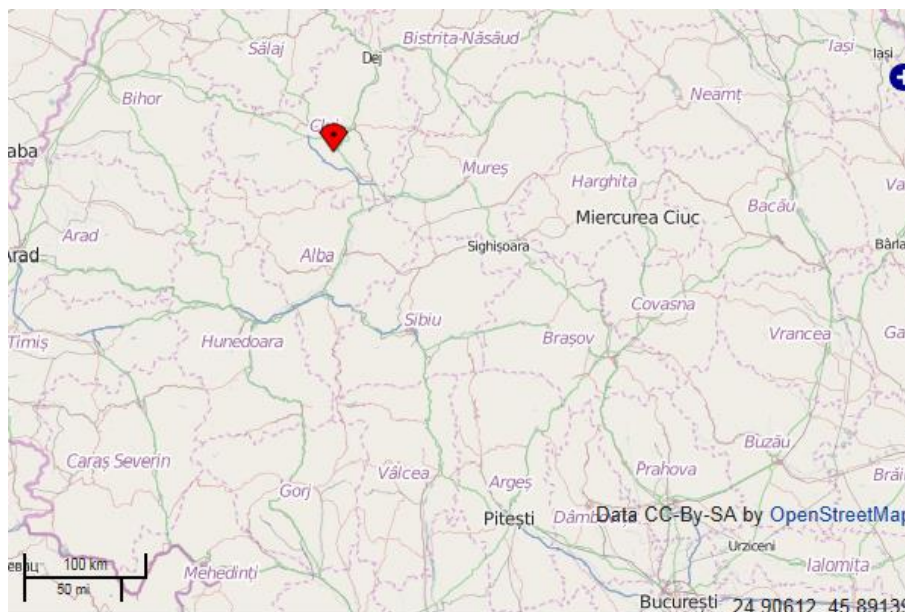
Waste tariffs will most likely be insufficient to cover the operational and maintenance costs as well as proper rehabilitation costs. Revenues may fall short of the required level and thus the financial sustainability of the system is unlikely to be reached within 10 years, where tariffs are gradually increased following increased income in low-income families. Tariff increases are restrained by the low income households affordability. There are no plans for dealing with this scenario as all focus is on securing the implementation of the project.

3.2 Project description

3.2.1 Key facts about the project

The project name is "INTEGRATED WASTE MANAGEMENT SYSTEM IN CLUJ COUNTY" - CCI No 2009RO161PR036. It is located in Cluj County in Romania.

Figure 3-1 Cluj County



Source: OpenStreetMap.

The project concerns the set-up of an integrated waste management system in Cluj County in north-western Romania. The population is just below 700,000 residents in the five municipalities (Cluj-Napoca, Turda, Dej, Campia Turzii and Gherla), one town (Huedin), 75 communes and 420 villages of the county on its some 7,000 km² of surface area. The topography of the county is partly mountainous with the Apuseni Mountains in the western part.

The investments of the project include:

- procurement of waste collection containers and home composting units;
- establishment of three waste transfer stations in Huedin (western part), Gherla (north-eastern part) and Mihai Viteazu (southern part);



- construction of central waste management facility (CWMF) with a sorting plant, a mechanical-biological treatment (MBT) plant, and a sanitary landfill to EU standards; and
- closure of six non-compliant landfills in six cities of the county.

The waste containers will be for the source segregation of waste into dry (recyclable) and wet (biodegradable and rest) waste. The transfer stations will be for long haul waste transfer to the central waste management facility, the sorting plant for separation of recyclable waste into fractions, the mechanical biological treatment plant for the production of a 'compost like output' and the landfill for the final disposal of waste.

Investment costs

The total investment costs were in the Application anticipated to be EUR 76.5 million of which the eligible investment costs constituted EUR 52.9 million, while the difference of EUR 23.6 million were ineligible costs which included VAT, and primarily closing down of existing dumpsites, taxes and cost for establishing an access road.

Due to the non-completeness of the project the exact investment amount is not known. However, the tenders held so far turned all out to be cheaper than foreseen (see discussion of this in section 3.6). Hence, savings have been obtained in general on all tenders – both contractors but also on services. The savings are due to the economic environment prevailing at the time of the tender. The competition among the contractors were fierce due to the financial crisis whereby prices were reduced. Nonetheless, delays and other problems during the construction phase have significantly increased the risk of total budget overrun.

Source of finance

The sources of finance of the investment costs of EUR 76.5 million were according to the Application anticipated to be from an EU grant (ERDF) of EUR 38.8 million, State budget EUR 8.7 million, County Council EUR 14.4 million totalling EUR 61.9 million and VAT amounted to EUR 14.5 million implying a grand total of EUR 76.5 million. The exact financing structure is not yet known as the project is not completed. The EU financing constituted 51% of the total financing in the Application.

3.2.2 Project history and key milestones

The project had a relatively long planning horizon. From November 2008 to November 2009, national feasibility studies were undertaken for how to deal with the waste in the County. Design studies were also undertaken at that time. The environmental impact assessment was undertaken from November 2008 to August 2010. The CBA analysis was undertaken from November 2008 to September 2010. Preparation of tender documents were planned to be from November 2009 to end of 2010. The first Application was submitted 31 of December 2009 and the final Application was submitted to the Commission on 11 of March 2011. The Commission approved the project on 10th of June 2011. The operational phase was anticipated to begin by January 2013.



The construction starting date was assumed to be March 2011 and the completion date was anticipated to be end of the calendar year 2012.

The supply contracts for the waste collection containers and home composting units were initiated in May 2014 and completed by May 2015. The contracts for the transfer stations were initiated May 2012 and completed by June 2014.

The contract for establishing the new landfill, the sorting plant and the mechanical biological treatment plant was initiated by March 2012, and is not completed yet.

The operation of all the infrastructure assets was anticipated to start in January 2013. However, due to an unsettled dispute, basically caused by poor quality of works delivered on the new landfill by the contractor, between the Project Beneficiary and the contractor all works have stopped. As a consequence, the whole process will be prolonged further with an expected start of operation not until late-2017.

3.2.3 Main objectives and outputs

The project's general objective is to develop a sustainable waste management system with reduction of environmental impacts in Cluj County, by improving the waste management service and eliminating the existing uncontrolled non-compliant landfills in line with EU practices and policies.

The objective of the project was to comply with the below listed directives and treat and dispose all collected waste in the Cluj County and with targets set in the EU Accession Treaty of Romania and Bulgaria.

- The landfill Directive (1999/31/EC)
- The packaging Directives (04/12/EC) amending Directive (94/62/EC)
- The IPPC Directive (08/1/EC)
- The waste framework Directive (08/98/EC) and (06/12/EC)
- The WEEE Directives (02/96/EC)

The target of the project was to manage waste sustainability, reduce quantities disposed and dispose only in compliant landfill. In addition, waste generation was sought to be reduced through home-composting.

The anticipated capacity of the integrated waste management system for the County was aimed at handling all waste generated from inhabitants and economic units in Cluj County amounting to some 350,000 tonnes of waste in 2016 increasing to 374,000 tonnes of waste in 2032.

The main target in relation to waste recycling concerns the installation of sorting stations, with total capacities sufficient to assure the sorting of the entire quantity of separately collected waste.

The main quantitative targets foreseen for the recycling of waste for the year 2013 (expected start of operation in the Application) include the recovery / recycling of:

- 60.0% of paper and cardboard;
- 22.5% of plastic;



- 60.0% of glass;
- 50.0% of metal
- 15.0% of wood

The main target in relation to waste treatment is the diversion of municipal biodegradable waste from landfilling and increased recycling of waste.

The main target in relation to waste disposal refers to the construction of a central county landfill, according to the specifications and requirement of the 1999/31/EC Directive and the respective Romanian Legislation (Government Decision no 349/2005, Order of the Ministry of Environment and Water Management no. 95/2005 Order of the Ministry of Environment and Water Management no. 757/2004). Also all rural and urban non-compliant landfills should cease their operation and be appropriately rehabilitated.

3.2.4 Key stakeholders

The project beneficiary is Cluj County Council. In the county, five municipalities and 75 communes are responsible for provision of solid waste management service. Their competence towards the project is exerted through the Inter-communitarian Development Association (IDA). IDA will play an active role in the implementation and administration of integrated waste management system.

The members of IDA are: the County Council, the Local Councils of all 6 municipalities and towns and the Local Councils of all communes (75). The IDA has the status of legal person of public utility recognized by law.

Waste generators are intended to finance operation. The Application envisaged cost recovery of operations through tariffs on waste collections imposed on households and economic agents.

The Ministry of European Funds and Regional Development (i.e. the Managing Authority (MA)) is currently responsible for the operational programme. Formerly, the responsibility was placed with the Ministry of the Environment and Climate Change. The MA has further a local arm in Region 6 North-West, where the Project is located.

Additional stakeholders include the Government's local representative in the County – the prefect – and the county environmental protection agency and the county representation of the National Environmental Guard.

3.3 Relevance of the project

3.3.1 Coherence with policy objectives

The project is in line with the national strategic framework for the environment sector and the waste sector in particular, because of waste deposited at landfill is reduced, old landfill are properly closed and new landfill are properly designed. The project is one of 32 projects within the waste sector. Eighteen are major projects (approved by the European Commission) and 14 additional, smaller projects were implemented as



part of the operational programme, but without the requirements for major projects. Of these projects one [Bistrita-Nasaud] is operational as per July 2015. For five projects, all works contracts are finalised, but the projects are not yet in operation (this is, however, expected to take place within a short time horizon). There are various reasons for the assets not yet being operational depending on the specific site, but in general all projects have been delayed.

The project is part of the Sector Operational Programme (SOP) for Environment. More specifically, the project is part of Priority Axis 2 of the SOP Environment, dealing with waste, which aims at developing sustainable waste management systems and reducing the number of historically contaminated sites in a minimum of 30 counties by 2015.

The project was designed in coherence with the National Waste Management Plan as well as the Regional Waste Management Plan for Region 6 North-West and Cluj County Waste Management Plan. The project is contributing to the achievement the commitments of Romania with regards to the Accession Treaty signed prior to the country's accession to the EU in 2007.

The National Waste Management Plan points to a regional approach to waste disposal and management. The project objectives of a county level approach to collection, transport, treatment and disposal are well-aligned with the ambitions of regionalisation of solid waste management services.

Furthermore, the project is coherent with the Sector Operational Programme Environment which refers to implementation of integrated waste management projects comprising county level management systems, a shared integrated waste management centre which is supported by transfer stations and waste collection. The project contributes to the achievement of the recycling targets; c.f. section 3.2.3 above for the quantitative recycling targets, and is coherent with the waste hierarchy.

3.3.2 Consistency with needs in the territory

The initiation of the contracts of this project aimed at closing down existing non-compliant landfills during the summer 2015, as the national strategy emphasised the need for a sustainable waste management system in Cluj County. Newspaper front pages demonstrate the pressing need for completion of the project. Waste is currently being transported to neighbouring counties, while a temporary deposit is being searched for. The longer transport has reduced collection frequency and waste is beginning to pile up in the streets.

The current situation is unsustainable and the temporary solution to disposal where waste is transported to compliant landfills in neighbouring counties appears to be insufficient for longer periods of time - as is the proposed, new temporary landfill.

The project will when completed resolve this issues. It is expected that the project design will accommodate the needs of the county. No major changes in project scope were made during project implementation, and no major change in quantities generated are foreseen by the project Beneficiary. The latter, however, relies on the fact that no new estimations of waste quantities have been made since the Application



was submitted. In some places in Romania where similar projects have been implemented, waste quantities are lower (15 per cent) than expected at the time of design. There are uncertainties with respect to the amount of waste to be collected and delivered to the waste management facility. If the amount of waste is lower than projected it will imply that the construction of the next landfill cell will be postponed. However, the Romanian authorities informed that the waste amount are close to the initial waste assumptions.

3.4 Project performance

3.4.1 Fulfilment of objectives

The project objectives are outlined in section 3.2.3 and section 3.3.1. To date, the project remains unimplemented. While the non-compliant landfills in the Cluj County are no longer in use, they remain unclosed. Hence, the project objectives are not fulfilled and the current situation is unsustainable. However, project objectives will most likely be fulfilled when the project eventually is completed. However, the road to finalisation of the project is still long, as the Beneficiary wants a new contractor to complete the project and the existing contractor contests the decision taken by the Beneficiary to cancel the original contract due to unacceptable performance.

3.4.2 Implementation effectiveness

Table 3-1 shows the anticipated dates for the start and completion of the construction works as well as the operational starting date as reported in the Application. This is compared to the actual progress in the right most column.

Table 3-1 *Planned and realised implementation plan*

Ref.		Application	Realised
AF p. 59		Date	Date
	Construction start date	01/03/2011	01/01/2012
	Construction end date	31/12/2012	Not realised
	Operation start date	1/1/2013*	Not realised

* The Application Form states that operation is to start prior to construction has completed (1/1/2012). Here it is interpreted as a mistake and corrected to 1/1/2013, which is at the end of construction phase.

The project is not proceeding as anticipated due to delays. Some project elements are more progressed than others, but both partial and full operation appears to be far away.

The contracts signed correspond to approximately 80 per cent of project budget. Some projects elements need still to be tendered, while others have been tendered and contracts have been signed, however, they are on hold as fundamental elements of the project are delayed. Due to costly delays, the Beneficiary expects that the total cost will exceed original budget. The Beneficiary has cancelled the original contract and the controversy must now be settled in the courts. The Beneficiary wants to



retender the remaining part of the construction works, and expects the tender price from a new contractor to increase. Hence, the Beneficiary expects a cost overrun compared to the original tender prices. The financing of the cost overruns will be covered by the Cluj County Council.

Implementation status and prospects for implementation

The status on project implementation is shown in Table 3-2. It shows that completion is distant as the project will only be fully functioning with the completion of a new, compliant landfill. It is the expectation of the Beneficiary that the current approved project extension to 31/12/2015, will not be sufficient for completion of works. In total, the Beneficiary has paid contractors 36 per cent out of the budgeted amount.

Table 3-2 Implementation status

Selected project element	Status
Procurement of collection containers and home composing units	Started 05.2014 Completed 05.2015
Establishment of 3 transfer station	Started 05.2012 Halted 06.2014 Approx. 95 % completed
Construction of sorting plant and mechanical biological treatment plant	Started 03.2012 Works stopped 07.2014, while contract was terminated 10. 2014 Approx. 70 % completed
Construction of compliant landfill	Started 03.2012 Works stopped 07.2014, while contract was terminated 10. 2014 Approx. 15 % completed
Closure of non-compliant landfills	Tender completed
Operation contracts	Not tendered

The Beneficiary has wished to annul contracts on the construction sorting plant, the mechanical biological treatment plant and landfill due to contractor's poor performance. Arbitration has been made and the situation is unsettled, but the Beneficiary wishes to retender the remaining works.

This entails that project is split and that the landfill construction is phased to the next programming period. Currently, the Beneficiary expects that the sorting plant and the mechanical biological treatment plant can be completed by mid-2016, which will ensure partial operation of the project. Full operation requires completion of the landfill which is not expected until late-2017.

Important delays were encountered in the implementation due to insolvency of the contractor and also due to technical deficiencies in the design (geotechnical constraints requiring redoing most of the already executed landfill works). As a result, temporary (and compliant) landfilling capacity has to be urgently identified, as the current main landfill shall cease operations (expiration of environmental authorisations and cells already at their full capacity). Temporarily solutions whereby waste is



channelled to neighbouring counties will no longer be possible (absence of available compliant landfills) and neither financially sustainable anyhow (high hauling costs). The risk of generating new illegal dumpsites is therefore very high.

Compared to the anticipated start of operation on 1/1/2013, the total delay is foreseen to reach five years.

Reasons for delay

The delays are explained by a number of reasons comprising both technical, legal and financial issues.

- **Too optimistic planning**
The Application envisaged that tender procedures to run from end-2010 to mid-2011 overlapping with a construction phase of 22 months. The planning process seem often to be optimistic biased. Due to a number of reasons (poor quality delivered by the Contractor, contract termination, legal processing, re-tendering) tendering is still ongoing and construction has progressed only slowly.
- **Lengthy tendering**
Proposal evaluation and awarding of contract was delayed. First, the beneficiary selected a contractor for works which was met by complaints and legal process, from the contractor who was evaluated second. The essence of the complaint was that the winning contractor had used unverifiable documentation. Courts overruled the Beneficiary's decision and awarded the contract to the complainant. This delayed the process by more than a year.
- **Financial capacity of contractor**
Soon after construction was begun, the lead contractor filed for insolvency. An associate partner in the consortia took over the obligations under the contract with regards to sorting plant and the mechanical biological treatment plant, and sought for a new partner to complete the new landfill. A new partner was found, but the performance of the partner was not satisfactory and the construction of the landfill stopped. During the process, construction was halted and especially construction of the landfill delayed.
- **Contractor performance**
Performance of the Contractor was unsatisfactory in terms of preparing the design and carrying out construction works. In all, due diligence was not observed in terms of quality of construction works causing further delays.
- **Capacity of Engineer**
The project has experienced unnecessary problems as a consequence of a technically weak Engineer who did not solve complications in time and approved work which should not have been approved.
- **Corruption allegations**
Suspensions of corruption being part of contractors' poor performance, have been substantiated by recent arrests of managers of both lead contractor, subcontractor and Engineer. It was stated that the winning contractor was only interested in the pre-payments and not fulfil the obligations under the contract.
- **Natural conditions**



The project site was damaged by landslides following heavy rains. Further, the idle period following the insolvency of the lead contractor meant that the landfill site was exposed to the elements for approximately ½ year. This exposure caused deterioration of structures and further delays.

- Changing political environment
During the project the county council changed president three times. In combination with a complex stakeholder structure, which includes five municipalities and 75 communes, the political environment has been continuously changing. These changes have potentially caused slowed decision making and alterations in plans and priorities.

3.5 Technical and Financial Sustainability

3.5.1 Technical operation

The project addresses all stages of the integrated solid waste management cycle, i.e. from waste generation and collection to the final disposal of the residues. Since the project is not finally implemented the facilities are not in operation. Based on the site visit and the technical documentation of the project, it is assessed that, overall, the chosen technological solutions are of low complexity and likely to prove technically sustainable provided adequate training is provided to the operational staff, in particular for operation of the sanitary landfill.

Generally, the main and most critical uncertainty relates to the actual efficiency of the home composting and of the selective collection system, which will directly impact on the mixed waste quantities, on the basis of which the capacities of the MBT and the landfill have been designed but they have unfortunately not been assessed.

3.5.2 Operating budget

The budgets in the Application for waste collection and transfer, waste sorting and waste treatment (composting and landfilling) include the direct operating costs, i.e. no reservations are set aside for either depreciation (asset renewals) or for new landfill cell construction. It is anticipated that these will be covered by the royalty payments to the Cluj County Council – or other sources.

The landfill budget as presented in the feasibility study include, however, direct operating costs and reservations for the construction of a second landfill cell, and for closure of two landfill cells (works and equipment). Allowances for other equipment renewal (mobile equipment) is not foreseen. This should have been included as this form of equipment has a relatively short operating life.

The unit cost for collection and transfer stations does appear high but is difficult to judge as it links to hauling distances and time as well as to service quality. As the project area is 1/3 rural and partly mountainous hauling costs will be comparatively high. Application information also points to a high service quality with daily collection. Sorting plant unit operating cost cannot be assessed for the same reason as for the



unit investment cost. The unit cost for the mechanical biological treatment plant is well below (approximately half the expected level) general expected unit costs (12-15 EUR/tonne) for operating an mechanical biological treatment plant and may relate to low assumed maintenance costs (only 3% of investment costs).

The landfill 'cost recovery' unit cost in the CBA is three times higher than the unit costs included in the tariff calculation. This unit cost includes in a reasonable way depreciation costs and reserves for new landfill cell construction, for replacement of mobile equipment and for landfill cell closure.

Maintenance costs are given as lump sum amounts only. As compared to the level of investment costs they appear low at 2-3% for the mechanical biological treatment plant and for the sorting plant which contain relatively high share of equipment at the installation. Capital maintenance costs are not in the budget. Depreciation costs are presented only for the landfill cf. above and included only in the full cost recovery gate fee.

Staff numbers are seen as fair. Staff training is not covered. Training is needed for operation of the central waste management facility.

In general, the operational budgets are seen as on the low side; i.e. underestimated. This may imply that there are not set sufficient resources for operation and maintenance of the waste facilities. Since the project is not implemented yet, the operational costs are not known and thus comparable to the budgeted costs.

3.5.3 Financial sustainability

The local public authorities in Cluj County decided on the solid waste management operational contracts and payment mechanism as follows:

- To award four (4) contracts for the waste collection and transport services. The service management will be granted under the delegation procedure organized by the Intercommunity Development Association (IDA). The tender process to appoint the four waste collection and transport operators have not been initiated yet.
- For the operation of the central waste management facilities, one operator will be selected for the operation of the three (3) transfer stations and the central waste management facility in Cluj - Feleacu (ecological landfill, sorting plant and simple mechanical biological treatment plant), including the long-haul of waste from the transfer stations to the central waste management facility. The tender process to appoint the operator of the central waste management facility has not been initiated yet.

In some areas of the county, PHARE projects are under implementation which concern mainly the development of selective collection, the recovery of small quantities (5,000 tonnes/year) of recyclables and the treatment of small quantities (1,000 tonnes/year) of biodegradable waste. These projects are integrated into the system especially in relation to the utilization of the collection equipment that they include.

The existing PHARE projects will be integrated in the new central waste management facility. The existing waste collection and transport contracts with operators will stay in



force until the obligations assumed by the local authorities under PHARE conditionalities cease.

Payment mechanism for solid waste management services

In terms of payment mechanism for solid waste management services, it has been decided that a tariff system should be introduced at Cluj County level.

- In both urban and rural areas a tariff system will be established for households and economic agents.
- The solid waste management tariffs shall be collected directly by the four waste collection and transport operators.
- The tariffs shall cover the operational costs of collecting the waste and deliver it to the transfer stations. The tariffs shall also cover the cost of transporting the waste from the transfer stations to the central waste management facility, the sorting of the waste, the composting and the final landfilling.
- In addition to cover the operational costs of the collection, transport and the treatment/final depositing system the tariffs shall also cover royalty payments to both the Cluj County Council (owner of assets), and also a royalty payment to IDA. The royalty payment to the Cluj County Council is intended similar to a rent payment (ring-fenced) which can only be used for rehabilitation of the waste assets owned by the Cluj County Council. The royalty payment to IDA is uncertain as to the purpose – presumably only to cover salary costs of the IDA employees in relation to waste management. The size of the royalty payments are not decided upon.

The IDA will determine the waste tariffs to be charged the households and the economic agents.

The affordability threshold for the lowest decile is defined at 1.8% of household income in that decile. This threshold applies to rural and urban areas and determines the tariff per tonne to be charged all households in the county. Hence household waste tariffs will be based on the income of the households in the lowest decile. Economic agents, such as private enterprises and industries, are supposed to pay a tariff closer to the cost recovery and polluter pays principle level.

The CBA model assumes that non-residential users would pay the full cost recovery tariff from the very start, tariffs paid by residential users are assumed to be gradually increased to reach the full cost recovery tariffs before the end of the reference period (2029), and thereby covering the full depreciation costs.

An earlier increase of residential tariffs to full cost recovery level is not possible due to affordability reasons. Total revenues from tariffs and sales of recyclables may, however, be sufficient to cover costs of O&M including replacement of small equipment with very short lifetime as well as the financial costs of loans assumed to co-finance the initial investment cost of the project and other large asset replacements in the course of the reference period (including the landfill extension after 5 years). Revenues from sales of recyclables are, however, typically overestimated. The market for recyclables is notoriously difficult to predict and swings in the prices of recyclables may give rise to financial sustainability problems, hence it is problematic to rely on



revenues from recyclables to sustain the operations. Royalties returned to local authorities from tariffs are intended to cover (part of) depreciation costs.

Revenues may thus fall short of the required level and thus the financial sustainability of the system is unlikely to be reached within the next ten years following increased tariffs as the families in the lowest decile become richer.

Hence, the proposed tariff system may not secure that principles of full cost recovery and polluters pay are respected. This system is implemented in all counties in Romania, and they will thus face the same financial sustainability problems.

The IDA has been set-up to manage the project and ensure smooth political coordination. However, the association experiences internal political tensions. This absence of effective political leadership - which is burdened by the weakness of decision-making within IDA, based on unanimity and often limited project management skills - can be detrimental to the project with regard to the critical competence assigned to IDA during the operation stage: contracting and management of operation and collection contracts and adjustment of the tariff policy in order to match the actual costs. If this latter fails, the sustainability of the project may be heavily endangered.

3.6 Good practises and possible policy implications

Good practises and prerequisite for smooth project implementation experienced by the Beneficiary can be summarised as:

- The project was rather well planned, as it was the same model for all regions in Romania, albeit optimistic regarding time plan, and was done in accordance with the national plans for the sector. However, the project was severely delayed during implementation and time of completion is currently uncertain. The downside of the nationally coordinated planning process is less involvement of regional and local stakeholders. In this project, the Beneficiary was only involved in the location of the project and this produced a lack of ownership, which is assessed to be part of the explanation why the project was delayed.
- The staffing of the Project Implementation Unit at Cluj County Council possessed the right qualifications and they could draw upon expertise from first the Ministry of Environment and later from the Ministry of European Funds and Regional Development (due to changed organisation of the managing authority).
- Jasper's assistance was provided at the central planning stage, and was informed to be helpful.
- It was emphasized that a good contractor of works which is financially strong and delivering high quality outputs is essential for proper project implementation.
- It was stressed that a strong and good engineer was essential for good project implementation.
- Regionalised waste management systems are complex and need to acknowledge the interests of multiple local stakeholders and the transition they have to



undergo. For this reason, a balance between the national, regional and local planning requirements needs to be struck.

Problems experienced by the Beneficiary for the implementation of this project are summarised below. Some of these are specific to the project and others relate to general practises in Romania and thus have a broader perspective for lessons learned.

- A financially weak contractor became insolvent and thus the construction works stopped. However, the second partner in the consortium continued the work as main contractor and sub-contracted a construction company who was not sufficiently qualified and financially strong for a project of this size. The Romanian authorities inform that bankruptcy of the leader of a consortium happened in the case of two other waste management projects co-funded by Cohesion Policy Programmes. However, in these two cases, the delays were less and the projects will be finalised during the current planning period (2007-2013).
- Contractor performance was unsatisfactory in terms of preparing the design and carrying out construction works. This has led to several disputes with the Project Beneficiary and the contract was terminated. Subsequently, this has also produced work at the arbitration.
- A technically weak engineer who did not solve the problems in time and approved work, which should not have been approved.
- Several appeals were raised regarding the selection of the contractor. This prolonged and delayed the process. The Romanian authorities inform that the procedure by which one company from the competing candidates can block (and thereby delay) the awarding procedure by placing a complaint at the authorities is wide spread in Romania. This relates to the legal framework for public procurement and the national rules implementing the EU Directive on public procurement.
- It was raised by the Beneficiary that the selection process of the winning bid was based on the lowest price was not appropriate as the quality of the consortium (Contractor) was not included as a parameter in the final evaluation. The contractor who won the bid was the one who offered the lowest price of the bidders who passed the technical threshold. Hence the quality of the proposed offers was not taken account of in the final selection of the bid. The same procedure is adhered to for other projects in Romania and it is therefore considered likely that these projects may also face some of the same challenges as the case study.



4 Case study on Renovation of Water Supply Systems in the Kohtla-Järve Area, Estonia

4.1 Executive summary

RENOVATION OF THE WATER SUPPLY SYSTEMS IN KOHTLA-JÄRVE AREA

Location (country and region/city)	Estonia, Region of Ida-Viru, Kohtla-Järve Area
Total investment costs (planned)	<i>Expected EUR 44.7 million (EUR 45.9 million)</i>
Total CF/ERDF contribution (planned)	N/A (EUR 30.7 million)
Start (planned)	May 2009 (April 2009)
End (planned)	n./a.(November 2015)
Beneficiary	Järve Biopuhastus OÜ
Implementing body	Ministry of the Environment
Assistance from JASPERS	no

The main objective of the project was to renovate the water supply system in the Kohla-Järve area of Estonia. The project consists of new pipelines, water treatment plants and other infrastructure, which will increase the quality of water services and reduce the water losses.

The project beneficiary is Järve Biopuhastus OÜ, a water company in North Eastern Estonia, which operates the water networks in the four municipalities of the Kohtla-Järve area. The Company provides water supply and wastewater collection and treatment services. The four municipalities are also owners of the water Company and the project improves service to a major share of inhabitants in three of the four municipalities.

The objective of the project was to comply with the EU Drinking Water Directive 98/83/EC and to renovate the water system for more than 50,000 inhabitants in the Kohtla-Järve area.

The project is in line with the national strategic framework for the environment sector and the water and wastewater sector in particular.

The project was implemented according to the outlined plan in the Application, but the scope was expanded and completion time extended. For this reason the Project is expected to be fully completed in November 2015. The 98 % of the system which is currently completed is, nonetheless, operating as intended and satisfactorily and the project objectives have been fulfilled.

Savings were made as compared to the application budget, which made it possible to expand scope and include extra elements while respecting the budget. Available information on the project operating budget does not permit an assessment of

whether cost are realised as planned. The Beneficiary is assessed to be financially sustainable and operates the project technically well.

4.2 Project description

4.2.1 Key facts about the project

The project name is 'Renovation of the Water Supply Systems in Kohtla-Järve Area'. It is located in the in North Eastern Estonia in the Region of Ida-Viru.

Figure 4-1 Kohtla-Järve



Source: Open Street Maps.

In the project area the overwhelming majority (approximately 95 %) of the population is supplied with public water supply services. Public water supply of the project area is based on the use of groundwater only.

Prior to the project, most of the water system was old, in unsatisfactory condition and in need of renovation:

- Unsatisfactory condition of public water supply systems of Project area resulted in high rate of unsold water – up to 50 % of the water pumped into the network (see also *Annex III Feasibility Study. Final Report, chapter 7*).
- Unsatisfactory groundwater quality which did not meet the drinking water quality requirements without treatment (see also *Annex III Feasibility Study. Final Report, chapter 7, sub chapter 7.6, part 7.6.3*).

Most water mains were made of cast iron pipes, service lines of cast iron and steel. Some new plastic pipelines had also been constructed in the area and some old pipelines had been rehabilitated by replacing them with thinner plastic pipes.

The present investment project covers investments in water treatment facilities, water pipelines and other infrastructure, which will increase the quality of water services and



reduce the water losses. The project does not include new connections for households or industrial consumers.

The total investment costs were in the Application anticipated to be EUR 45.9 million excl. VAT.

In 2014, the Beneficiary resubmitted the Application to the Managing Authority with minor expansion of scope and an extension of the project which postponed the completion date from July 2014 to November 2015. Savings during implementation allowed for both a reduction of total Project cost (investment cost down EUR 1.2 million compared to totals in the original Application) and for expanded project scope (which amounted to EUR 2.2 million). The expansion in scope comprised renovation of an additional pipeline and equipment for water plants.

The project is at the time of this review 98 % complete with an expected total of investment cost of EUR 44.7 million. The investment cost figures are listed below.

Table 4-1 *Planned and realised investment cost*

Ref.		Application	Realised (expected)
Application Form, Annex II, p. 6 and stakeholder interview	Total investment cost, EUR million	45.9 (1)	44.7 (2)
	Expansion of scope, EUR million	-	2.2 (3)
	Total savings (1)-(2)+(3), EUR million	-	3.4

The sources of finance of the investment costs of EUR 45.9 million were according to the Application anticipated to be from an EU Cohesion Fund grant (67 %), from local municipalities (21 %) and own financing (12 %).

Both municipalities' share of investment costs and the Beneficiary's own financing were financed through the Estonian Environmental Investment Centre. In turn, the Environmental Investment Centre obtained funds from the European Investment Bank which was distributed to local projects through loans.

The small, rural municipality of the three municipalities in the project area was exempt from co-financing due to resource constraints leaving the municipal contribution to the two larger municipalities. The last municipality in the Beneficiary's service area was not part of the project area.

The final financing structure and the size of the EU Cohesion Fund grant is not yet known as the project is not completed.

4.2.2 Project history and key milestones

In 2008, feasibility studies were undertaken together with the required preliminary EIA. The following year the final Application was submitted on 05.05.2009 and design studies initiated. Tendering was planned to be launched in September 2009, but the first contract was tendered slightly later than anticipated in early 2010.



The Application was resubmitted to the Managing Authority in July 2014 in which the project scope was expanded and the completion date postponed. The final contract was tendered in May 2014 and works are expected to be completed in November 2015.

The construction starting date was assumed to be 01.04.2010 whereas the realised starting date was 21.05.2010. The completion date was anticipated to be end of June 2014, but works under the original scope was finalized already in February 2014. However, with the expansion of scope (cf. 2014 application) the final completion is expected in November 2015.

The project components were put into operation gradually following their completion. Thus, at the time of writing (July 2015), all components within the original scope are in full operation.

4.2.3 Main objectives and outputs

The objective of the project was to comply with the EU Drinking Water Directive 98/83/EC and to renovate the water system for more than 50,000 inhabitants in the Kohtla-Järve area. The specific objectives included:

- The amount of unsold water was to be reduced from on average 50 % to below 25% as a result of the project.
- Improvement of water service and quality

The output of the project was renovation and construction of wells, reservoirs, and pipelines as well as construction of pumping stations and treatment plants. In total, a full renovation of the water system in the Project area with Project components summarized in the table below. The 2014 expansion of scope included additional pipelines (of which some are still being implemented) and miscellaneous equipment.

Table 4-2 Project elements

Ref.	Project element	Realised	Under implementation
Stakeholder interview	Water pipelines (km)	104	14
	Water transfer main (km)	38.5	
	Water treatment plant (pc)	2	
	Bored wells (pc)	26	
	Plugging of bored wells (pc)	25	
	Water reservoirs (pc)	4	
	Trucks and vehicles (pc)	5	
	CCTv (pc)	1	
	GIS (pc)	1	



4.2.4 Key stakeholders

The project beneficiary is Järve Biopuhastus OÜ, a water supply company, which operates water supply and wastewater networks in the Kohtla-Järve area. The Company provides water supply and wastewater collection and treatment services. Järve Biopuhastus OÜ is the project owner and applicant.

The relevant authorities apart from the water company are the municipalities benefitting from the improved water service and own the water company. The main national stakeholder is, the Ministry of the Environment and its Environmental Investment Centre.

The Ministry of the Environment is responsible for the operational programme, preparation of the legislation of measures and for strategic planning for the environmental sector.

The Environmental Investment Centre is an institution under the Ministry of Finance which is responsible for investments within the environment sector and administers sectoral EU grants including supervision of project implementation.

4.3 Relevance of the project

4.3.1 Coherence with policy objectives

The project is in line with the EU urban wastewater and water directive, national strategic framework for the environment sector, water act, public water and sewerage act and the water and wastewater sector in particular. EU directives and national priority is given to larger settlements with above 2,000 households. Being a major project, the Application was approved by both the Ministry of the Environment and the Environmental Investment Centre. The latter ensures alignment with national priorities and legislation both in project planning and implementation. This includes review of tender documents and continuing advice.

4.3.2 Consistency with needs in the territory

The drinking water system of the the Kohtla-Järve area was in poor condition; most of the pipelines were old, unsatisfactory maintained and in need of renovation.

Low water quality was seen in both colour, odour and taste of the drinking water leading to numerous complaints from consumers. Further, supply was unstable and the share of unsold water amounted to about half the water produced.



4.4 Project performance

4.4.1 Fulfilment of objectives

From a chemical point of view, the drinking water now complies with standards and consumer complaints are, according to the Beneficiary, down from hundreds annually to practically zero. Water supply is stable thanks to e.g. emergency power supply (generator) for pumping stations.

The Beneficiary noted that the amount of unsold water dropped from on average 50 % to well below 25 % as envisaged in the Application.

4.4.2 Implementation effectiveness

Table 4-3 shows the anticipated dates for the start and completion of the construction works as well as the operational starting date as reported in the Application. This is compared to the actual dates in the right most columns.

Table 4-3 *Planned and realised implementation plan*

Ref.		Application	Realised (original scope)	Realised (expanded scope)
Application Form p. 16 and stakeholder interview		Date	Date	Date
	Construction start date	01/04/2009	21/05/2009	21/05/2009
	Construction end date	20/06/2014	28/02/2014	Expected 10/11/2015
	Operation start date	01/07/2014	Gradually	Gradually

The project scope and the implementation plan were subject to change in a revised application submitted in 2014, which explains the extension of the project and later completion date than planned.

In spite of the two-month slippage of the construction start, all contracts within the original scope (cf. 2009 Application) were completed by February 2014. Thus, some four months ahead of plan.

Following the approval of the project extension in time and scope additional pipeline works and equipment were acquired during 2014. The expected completion date is November 2015.

The main challenge in respect to project implementation, according to the stakeholder interviews, was the adjustment of technology to local conditions. This was the case of water filters at the water treatment plant which required more time (½ year) than expected to test and adjust prior to full operation.

Furthermore, when additional pipeline works were tendered in spring 2014, 12 contractors submitted bids for the eur 0.6 million contract. Of these, only six were deemed to be conditional. A subsequent legal process, caused delay and the contract was not signed until April 2015 with expected completion in November 2015.



These delays did not obstruct the timely progress of the overall project as they only involved the Project components under the expanded scope, which are also expected to be complemented within in extended time plan. However, if the final pipeline works experience further delays there is risk that the project is not completed in 2015. The Beneficiary expects this risk to be low.

4.5 Technical and Financial Sustainability

4.5.1 Technical operation

After inspection of the key elements of the system and through discussions with stakeholders including the technical staff, it is concluded, that the system is operating as intended and satisfactorily.

There are no organisational issues related to the operations of the system, which can impede the operational sustainability of the infrastructure.

4.5.2 Operating budget

The incremental operating savings of the renovated water system were budgeted to be around EUR 0.2 million in 2015²¹. The savings included primarily lower energy costs, but also environmental charges and personnel. The budgeted net savings also included increased maintenance costs.

No information was presented to confirm that savings had materialised. On the contrary, the most recent annual report on the activities and financial performance of Järve Biopuhastus OÜ shows increasing operating costs for the Beneficiary in current terms, which can at least partly be explained by increases in service area as the Beneficiary now serves four municipalities as compared to the previous three. While the Projects serves a population comparable to the number foreseen in the Application, the total population served by the Beneficiary rose from 45,300 in 2008 to 59,400 in 2014. This increase in service area was not expected in the Application, where the Project area equalled the service area. Now, the service area exceeds the Project area.

No separate account for the project related operating costs has been made, and the total annual report figures for the Beneficiary do not reveal isolated Project performance. The changes in served population affects the total operating budget of the Beneficiary and blurs the isolated Project operating cost. As the Beneficiary's service obligations have increased in correspondence, the fact that more users pay water tariffs does not necessarily affect the financial sustainability of the Project.

In the original budget, water quantities produced and number of consumers were assumed constant. In reality, total water production of the Beneficiary increased from 3.2 million m³ in 2008 to 3.7 million m³ in 2014. Again, the Beneficiary explains this

²¹ ref. Table 5-1 in Annex II of the Application



by increased service area rather than changes in consumption per household or economic agents. In addition, the Beneficiary stated that the share of unsold water decreased the 25 % aim in the Application, which increases the effectiveness of operation in the 2008-2014 period.

The Beneficiary is confident that both water system and organisation is in place for a stable and viable operation in many years to come and does not expect significant deviations in the operational costs.

4.5.3 Financial sustainability

In the Application, tariffs were projected to be harmonised across the project area and to increase gradually over time with the calculated affordability limit. Tariffs have been held constant over the project period, thus, deviating from the planned projection. One reason for this has been to a strategy to deliver improved service quality first and later increase tariffs.

Currently, the Beneficiary has sent a proposal for tariff harmonisation and increase to the national competition board for approval. When approved and implemented the average tariff increase in 2015 is 50 %. The Beneficiary has announced the expected changes in the regional media followed by some attention by local politicians. Some reactions are expected, but the Beneficiary does not foresee risks related to the tariff increases which could jeopardise the financial sustainability of the Project.

Tariffs are intended to be harmonized over time, thus eliminating the local differences and cross-subsidizing. According to both Beneficiary and municipalities, there will - after harmonization - remain an apparent need for continued support from urban users, where high quality service provision is relatively cheap, to rural users where system renovation is costly.

The tariff increase will raise operating income of the Beneficiary substantially and, in time, cover operation costs, maintenance and depreciation. The Beneficiary expresses a future aim of being financially self-sustained and no longer depended on subsidies.

No data demonstrates the effect of the proposed tariff increases on affordability, but the Application assessed that a doubling of tariffs between 2008 and 2015 would not alter the share of household income made up by water and wastewater expenditures being well-below the 4 % threshold²². This was explained by an expected real growth in GDP of e.g. 4.8 % in 2015²³. In all, it is not expected that the proposed changes will cause affordability concerns in spite of the fact that economic development turned out slower than foreseen; according to Statistics Estonia, GDP rose by only 1.9 % from Q2 2014 to Q2 2015²⁴.

According to the Beneficiary, the forecast of Estonian statistical bureau projects decreases in the population of the Ida-Viru region of approximately 1 % per year. The Project area is part of the Ida-Viru region and the demographic change will affect the

²² ref. Table 4-17 and 4-21 in Annex II of the Application

²³ ref. Table 2-2 in Annex II of the Application

²⁴ <http://www.stat.ee/90683>



water consumption in the Project area. However, in the urban areas of the Project the number of inhabitants is expected to be constant or decrease to a smaller extent than for the region as a whole. These changes in population pose a long-term but manageable risk to the financial soundness of the Beneficiary.

4.6 Good practises and possible policy implications

Good practises and prerequisite for smooth project implementation experienced by the Beneficiary can be summarised as:

- The project was well planned. The feasibility study behind the renovation was well prepared, including precise estimates of costs, and there was no need for major changes during the project.
- In the last 15-20 years, the number of staff with the Beneficiary has risen from two to 83, representing strong technical, procurement and project management competence. The Beneficiary's staff implementing the Project possessed the right qualifications and they could draw upon expertise especially from a previous major project within wastewater treatment as well as from the Environmental Investment Centre.
- In the 2007-2013 operational programme, processes and decision-making was decentralised and shifted from the Ministry to the Beneficiary as compared to the earlier programming period. Both the Ministry and the Beneficiary saw this as a healthy progression towards self-sufficient water companies.
- The availability of funds channelled from the European Investment Bank via the Ministry of the Environment ensured accessible financing of municipalities' share of investment cost and Beneficiary's own financing at a point in time when banks were less willing to lend.

Problems experienced by the Beneficiary:

- The large portfolio of EU supported projects with similar implementation horizon had two consequences as noted by the Beneficiary: (1) it can be difficult to procure adequate advisory services as a number of projects compete for a limited number of qualified suppliers; for this reason the Beneficiary itself provided technical support to contractors with regards to design and implementation and drafted the major part of tender documents in-house and (2) competition for contracts by the end of the implementation period (i.e. for the expanded scope) was fierce, causing aggressive behaviour by bidders and legal procedures which delayed implementation.



5 Water and sewage management project in Żory, Poland

5.1 Executive summary

COMPREHENSIVE ORGANIZATION OF WATER AND WASTEWATER MANAGEMENT IN ŻORY

Location (country and region/city):	City of Żory
Total investment costs (planned):	EUR 43.7 million (64,4)
Total CF/ERDF contribution (planned):	EUR 30.4 million (42.6)
Start (planned):	March 2007
End:	July 2015 (December 2011)
Beneficiary:	Przedsiębiorstwo Wodociągów i Kanalizacji Żory Sp. z o.o. (PWIK)
Implementing body:	Ministry of Regional Development
Assistance from JASPERS:	yes (project preparation by reviewing the application form and feasibility study, as well as providing recommendations)

The project covers the improvement of water supply and sewage collection infrastructure for the town of Zory (population around 60 thousand) located in the Silesia region in the south of Poland. Zory is a mid-size city and covers an urban area only.

The objectives of the project are to increase the sewage system connection rate (to around 98%), improve service standards and reduce environmental impact. The project will also modernize part of the old water network in order to reduce leakages. The objective of the project was to comply with the EU Urban Wastewater Directive. In addition, the objective of the project was to comply with the Drinking Water Directive.

The project objectives have been reached in full and the planned capacities constructed. The investment cost budget was about 32 per cent less than planned (43 680 691 EUR actual compared to the 64 419 574 EUR planned)²⁵.

Regarding the time schedule, the project started with delay due to delayed decision on project financing. As a result, tender procedures could not be conducted until the financing agreement from the Cohesion Fund was signed. In the case of some contracts, additional small delays resulted from a long public procurement procedure.

Generally speaking, no formal problems with contracts occurred. In the case of two contracts, however, implemented using the International Federation of Consulting Engineers (FIDIC) Yellow Book for Design-Build contracts, the designs were prepared in 2010 and the Environmental Decision was issued in 2007. This meant that the

²⁵ Eligible costs. Total costs were EUR 65.419 million planned and EUR 44.975 million realised.



environmental decision procedure had to be repeated, which took time but did not cause delays.

Problems also arose during the implementation phase in the case of two contracts. Both were won by a consortium that had financial problems and the main contractor declared bankruptcy, but with an intention to formulate a restructuring plan (and not liquidation). Works had to be suspended and the beneficiary had to conduct an inventory of works underway so that it could be a starting point for a new tender procedure. In addition, the beneficiary had to settle with sub-contractors based on a court agreement, which used the inventory as a basis for what was done by the main contract and what by the sub-contractors. This process lasted about nine months during which it was not possible to announce a new tender.

Otherwise the project implementation unit and supervising engineer were diligent in their oversight of contractors.

No technical, staffing or organisation issues were noted by the beneficiary. The work was routine for such an enterprise – sewers, pumping stations, water treatment plant, and a relatively small component related to modernisation of the wastewater treatment plant.

The operating costs have been realised almost as planned, albeit their allocation by activity (water supply and wastewater collection/treatment) is different than planned, which has had an effect on tariffs. The actual, implemented tariffs for water are slightly higher than planned in the application while for wastewater they are lower. As regards tariffs for water, this is because water supply was not a subject of the project and, accordingly, for water supply the feasibility study projected business as usual. There were nonetheless some investments in water supply. Thus depreciation increased. Regarding wastewater the major factor for lower tariff was depreciation. Given lower investments costs, depreciation was lower and, accordingly, a lower tariff was applied.

The implemented tariffs cover all costs (including depreciation) and profit margin (in accordance with the tariff calculation formula approved at the national level).

In general, the operating company does not have any cash flow problems. The lower revenues from sewer services caused by lower demand for these services are compensated by the lower costs of providing this service. The lower demand means that variable costs (electricity for pumping, wastewater treatment, part of salaries) are also lower. Fixed costs were not affected.

The beneficiary related a common opinion in the country – that Poland was not prepared to implement the operational programmes in the first year when they were introduced in 2004 and 2007. They also see that the situation is repeating itself in 2015. The guidelines were published with great delay, which necessitates updates in supporting documentation that had already been prepared.



Furthermore, the beneficiary pointed out that the guidelines²⁶ changed during implementation and decidedly too often.

The beneficiary also had three comments related to tender procedures:

- Public procurement procedures should be more flexible with respect to financing construction of sewers and modernisation of roads, which would have enabled better coordination of major investments going on at the same time in the city.
- Additional selection criteria beyond price for works contractors should be introduced, such as financial condition of bidder and technical proposal.
- Resources – references and personnel – should not be possible to be borrowed from other firms with the declaration that they will be used in the course of implementation. Companies declared intention to use specific subcontractors and their experience, but in reality did not do so.

The beneficiaries also complained the arbitrary outcome of using the minimum density indicator for new sewer construction 120 persons/km²⁷, stating that the indicator should be calculated for the entire agglomeration; otherwise, priority development areas are excluded.

5.2 Project description

5.2.1 Key facts about the project

The major project “Comprehensive organization of water and wastewater management in Żory” is located in Żory, Silesia region in the south of Poland.

²⁶ The set of guidelines prepared by Managing Authority, Intermediate Body and especially by Implementing Authority/Second Level Intermediate Body – The National Fund for Environmental Protection and Water Management includes detailed information on costs qualification, reporting and details on preparing the application form.

²⁷ Indicator set by Polish guidelines prepared by the National Fund for Environmental Protection and Water Management. According to the guidelines, only areas covered by new sewer development can be used to calculate the density, which means that low density areas in need of sewer lines cannot be included in the investment. If the entire agglomeration could be used as a basis for calculation, high priority, but lower density areas could be included in the project.

Figure 5-1 Żory



At the time application was prepared, there was almost full service connection to water supply, but only 80.38% of the population was connected to the sewer system.

The objectives of the project were to:

- increase the sewage system connection rate (up to 98%);
- improve service standards;
- reduce environmental impact.

The project also aimed to modernize a part of the old water network in order to reduce leakages.

The storm water network was also expanded under the project and partially separated from the sewage network, which significantly reduced infiltration and the inflow of storm water to the wastewater treatment plant.

Under the project, a wastewater treatment plant was also modernized and its capacity increased. The modernization component, however, was limited to sludge management and to modernizing biological part of one biological reactor.

A new water treatment plant was also constructed and treated groundwater covered a (small) part of the water demand.

The modernization of wastewater treatment plant and construction of water treatment plant do not have a significant share in the investment costs, due to limited scope of modernization and limited size of water treatment plant. The majority of drinking water is still purchased from another water utility (Górnośląskie Przedsiębiorstwo Wodociągów w Katowicach), which is a regional utility providing a bulk water supply for other utilities.

The overall investment amount, as realised, was EUR 44.975 million, compared to planned outlays of EUR 65.785 million, including ineligible costs.

The project was co-financed from a Cohesion Fund grant through the Polish Operational Programme Infrastructure and Environment 2007-2013 that covered EUR 30.45 million (nearly 68% of the total) of the investment amount compared to planned EUR 42.63 million (nearly 65% of the total). The next highest source of financing was a commercial loan with an interest subsidy (EUR 6.15 million, or 13.7%



of the total), although the plan did not call for such funding sources. The third highest financing source was a soft loan from the National Environmental Fund (EUR 3.8 million, or about 8% of the total, though it was planned to have EUR 13.3 million in such financing, or just over 20% of the total financing). The reason for replacing a large portion of the soft loan from the National Environmental Fund with a commercial loan with an interest subsidy is described in the next section.

Own sources covered 3.7% of the total, compared to 9.7% that was planned. The reason is that beneficiary found more sources of soft financing than was originally expected.

5.2.2 Project history and key milestones

The city of Żory prepared the first feasibility study for the project and submitted an application to the Cohesion Fund in 2004. The project was placed on the reserve list, since it was not a priority due to relatively small size of the agglomeration (compared to other applications at that time).

As a result, the feasibility study and application had to be updated several times, even once every six months, due to the changing national guidelines and passage of time. Moreover, for a long time in 2007 no guidelines were available and the beneficiary did not know how to prepare the update, though they knew that the guidelines from 2004-2006 no longer applied.

A problem arose when the city received a grant for modernisation of regional (voivodship) roads within the city limits. The scope of this project was huge and these roads constituted the road network that enabled traffic to move from the city centre to other districts. As a result, the most sensible approach would be to construct the new sewer system together with the road modernisation project because the main sewer lines should run under these roads.

This is why the city and utility decided to start the project and not wait for the financing decision. Paradoxically, however, this eventually led to delays in project implementation because the beneficiary could only finance the project using own funding sources and the project could not move further until co-financing from the Cohesion Fund became available. Because the storm sewers were then under the management of the city, the city had to transfer these assets to the water and wastewater utility (Przedsiębiorstwo Wodociągów i Kanalizacji Żory Sp. z o.o., or PWiK, Ltd.) in order to have a single beneficiary for the project.

Initially, PWiK planned to issue bonds for the beginning stage of the project. Instead, they obtained PLN 35 million (about EUR 8.5 million) in preferential loans (commercial loans with a subsidy to cover part of the interest payments) and were able to start the project. This made it possible to conduct part of the sewer construction at the same time as the city implemented the roads project.

In 2009, a conditional contract was signed with the National Fund for Environmental Protection and Water Management, which was upgraded to a final contract in July 2010. In December 2009, the beneficiary obtained reimbursement for the investment



costs incurred in the amount of PLN 29 million (about EUR 7.1 million) in works out of a planned scope of PLN 35 million (about EUR 8.5 million).

The following table presents the implementation plan as from application and realised. It has to be noticed that as final decision on project co-financing from Cohesion Fund was made in July 2010 (by signing the final contract), almost all works were postponed by about a year.

Table 5-1 Contracts and planned start and end dates

#	Contract	Application (date)	Realised (date)
	Contract 1 Promotion campaign		
1	Construction start date	2009-01-31	2010-05-10
2	Construction end date	2011-12-31	2014-08-14
	Contract 1 Additional works		
1	Construction start date		2014-03-12
2	Construction end date		2014-08-07
	Contract 2 Contract engineer for contracts 3, 3A, 4 and 5 (affected by regional roads)		
1	Construction start date	2007-09-25	2007-09-25
2	Construction end date	2009-12-31	2009-12-31
	Contract 2A Contract engineer for other works contracts (contracts 6, 6A, 7, 8A, 9, 10, 11, 12)		
1	Construction start date	2009-02-28	2010-07-12
2	Construction end date	2011-12-31	2015-07-12
	Contract 2B Contract engineer for contract 8		
1	Construction start date	2008-09-15	2008-09-25
2	Construction end date	2009-05-31	2010-05-31
	Contract 3 Modernisation and reconstruction of Wodzislawka Street in Zory		
1	Construction start date	2007-03-16	2007-03-16
2	Construction end date	2008-03-31	2008-08-18
	Contract 3A Modernisation and reconstruction of Wodzislawka Street in Zory		
1	Construction start date	2006-12-21	2006-12-21
2	Construction end date	2007-10-30	2007-11-12
	Contract 4 Modernisation and reconstruction of Rybnicka Street in Zory		
1	Construction start date	2007-10-01	2007-11-05
2	Construction end date	2008-07-31	2008-08-06
	Contract 5 Modernisation and reconstruction of Pszczyńska Street in Zory		
1	Construction start date	2007-11-05	2007-10-01
2	Construction end date	2008-07-31	2008-08-20
	Contract 6 Construction of water and sewer network in Rój and Rogozna districts, and part of the Zachód district in Zory – West		



#	Contract	Application (date)	Realised (date)
	Area		
1	Construction start date	2009-03-31	2010-10-11
2	Construction end date	2011-02-28	2013-11-04
	Contract 6a Construction of water and sewer network in Rój and Rogozna districts, and part of the Zachód district in Zory – West Area		
1	Construction start date	2009-03-31	2010-09-27
2	Construction end date	2011-02-28	2013-11-29
	Contract 7 Construction of water and sewer network in Rowien district, and part of the Zachód district in Zory – Northwest Area		
1	Construction start date	2009-03-30	2010-11-25
2	Construction end date	2011-03-15	2014-02-10
	Contract 7 (finalization)		
1	Construction start date		2013-04-24
2	Construction end date		2014-02-10
	Contract 8 Construction of water and sewer network in Kleszczów district, and part of the Sródmiescie district in Zory – East Area		
1	Construction start date	2008-09-15	2008-09-29
2	Construction end date	2009-03-31	2009-06-09
	Contract 8a Construction of water and sewer network in Kleszczów district, and part of the Sródmiescie district in Zory – East Area		
1	Construction start date	2009-04-21	2010-10-01
2	Construction end date	2010-12-31	2013-11-27
	Contract 8a (finalization)		
1	Construction start date		2013-03-26
2	Construction end date		2013-11-27
	Contract 9 Construction of water and sewer network in Baranowice and Osiny districts in Zory – South Area		
1	Construction start date	2009-02-28	2010-10-25
2	Construction end date	2011-08-31	2013-09-20
	Contract 10 Construction of water and sewer network in Sródmiescie, Zachód, Folwarki districts and part of the housing estates in Zory – Sródmiescie Centrum Area		
1	Construction start date	2009-03-10	2010-08-05
2	Construction end date	2011-08-31	2013-12-02
	Contract 11 (water treatment plant)		
1	Construction start date	2009-04-30	2010-08-11
2	Construction end date	2011-06-15	2012-10-30
	Contract 12 Construction and expansion of the wastewater treatment plant in Zory		
1	Construction start date	2009-03-31	2011-05-26
2	Construction end date	2011-05-31	2013-08-23



5.2.3 Main objectives and outputs

The objectives of the project were to:

- increase the sewage system connection rate (up to 98%);
- improve service standards;
- reduce environmental impact.

To accomplish this, the project foresaw the:

- construction of sewer systems;
- modernisation of the old water network to reduce leakages;
- expansion of the storm water network, including partial separation from the sewage network;
- modernisation of the wastewater treatment plant, including increasing its capacity. The modernization component, however, is limited to sludge management and to modernizing biological part of one biological reactor;
- construction of a new water treatment plant.

The constructed capacity is presented below. The constructed capacities are almost as planned in the application.

Table 5-2 Planned and realised capacities

	Unit	Application	Realised
Water treatment plant capacity	m ³ /day	11 622	11 622
Water treatment plant capacity	P.E./yr	70 000	64 702
New water distribution pipes	km	60.00	58.70
New wastewater collection pipes	km	117.00	116.80
New storm water network	km	45.00	45.00

5.2.4 Key stakeholders

The key stakeholders are the city of Żory, the water and sewer utility in Żory (PWIK) – the beneficiary, the National Fund for Environmental Protection and Water Management (Managing Authority for the priority axis I of the Operational Programme 'Infrastructure and Environment').



5.3 Relevance of the project

5.3.1 Coherence with policy objectives

The objective of the project was to comply with the EU Urban Wastewater Directive (The Council Directive 91/271/EEC concerning urban waste-water treatment) and treat wastewater in the Żory agglomeration. In addition the objective of the project was to comply with the Drinking Water Directive (Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption).

The EU Urban Wastewater Directive was reflected by Polish Operational Programme Infrastructure and Environment and also by the National Program of Communal Sewage Treatment (the major planning document which implements EU Urban Wastewater Directive). The National Program of Communal Sewage Treatment explicitly enumerates agglomeration of Żory as a part of the EU Urban Wastewater Directive implementation in Poland. Additional criterion used for the project selection was density of the population connected to the sewage network, which is discussed later (in chapter 3.2).

In addition to EU and national policy documents, projects reflects objectives stated in local planning documents:

- The 1998 long-range programme for management of liquid communal waste in the Żory Municipality foresees construction by 2011 of sanitary sewers for the entire municipality.
- The Development Strategy for the city of Żory, 2000-2015 contains strategic objective 5 "City taking care of health and safety of its citizens and the national environment" and the task "restoring high quality of surface waters, protecting the quality of groundwater and optimising their use."
- The Development Strategy for the city of Żory, 2005 contains strategic objective 5 "Good health conditions of citizens and improvement of the natural environment" including a task related to addressing water and wastewater management.
- The City of Żory has a Development Strategy from 2007 in which Task PNI 3/20 "Construction of a sanitary sewers in districts and neighbourhoods".
- The Environmental Protection Programme of the city of Żory contains a long-range objective "Optimising the management of water resources" and short-term objectives "Improving the protection of surface and ground waters, based on construction of sewers and modernisation of the wastewater treatment plant.

5.3.2 Consistency with needs in the territory

Essentially, there were no changes in the scope of the project. Minimal differences arose in the length of constructed sewers due to the fact that in the process of design the actual lengths were taken into account and not estimates. The constructed capacities are shown in section 2.3.



The population forecast for Żory for 2014 presented in the application turned out to be slightly overestimated compared to reality. This small difference, however, did not affect the needs in the territory, the project design or its sustainability. The current forecast prepared by the Central Statistical Office of Poland in 2014 is less pessimistic and the forecast population of the city of Żory for 2037 is 53,129 compared to the forecast of 46,378 proposed in the application.

Regarding the household demand for water, two issues are noteworthy:

- Poland has almost a 100% water metering rate, which can be observed for example in the data provided by international benchmarking (IB-NET);
- In Poland, the client of a water utility is the owner of the building (for a multi-dwelling building, this could be a cooperative or condominium). Thus, the water utility reads meters at the entrance to the building (and this is the end of the utility ownership and responsibility). Individual meters in individual apartments do exist (though not 100% coverage), but are used internally by the owner of the building in the majority of cases. Thus, the unit consumption is based on reading main water meters at the entrance to the building and is as good as the demographic data.

The financial analysis does not distinguish unit water consumption in different areas. The project covers solely urban areas while the new sewage network will be built in outskirts of the city, where water consumption could be slightly different. At any rate, the project does not cover rural areas, thus the error on using average unit consumption is insignificant.

A nearly flat future unit consumption for water was assumed in the application, with a very limited influence of price and income elasticities. The realised unit consumption for water is slightly higher than planned, which has a positive influence on cash flow.

The water treatment plant capacity was implemented as planned. The reduced number of population equivalents is due to the fact that formally the water permit is issued based on the number of population equivalents that are currently in the area and not the actual capacity of the treatment plant. The capacity in m³/day, however, was as planned (see section 2.3).

Still, the beneficiary indicated that under different guidelines it would have been possible to do more. The National Fund for Environmental Protection and Water Management guidelines imposes an indicator for a minimum density of 120 persons/km for newly constructed sewer networks. Because the indicator is calculated only for areas with new sewer networks, areas with lower population density had to be excluded from the project despite the fact that they were specified in local spatial plans as priority areas for construction of new houses and businesses. The beneficiary contends that indicator should be calculated for the entire agglomeration and not just for the new sewer networks.



5.4 Project performance

5.4.1 Fulfilment of objectives

The project objectives with regard to construction of facilities have been reached in full and the planned capacities constructed. The sewage network was constructed. The objective with regard to connection rates is not yet fully achieved. The connection rate to the new sewers was 67% at the time of performing the case study. The beneficiary does not foresee problems in achieving assumed collection rates, but expects that it will still take some time to reach the objective. Various measures are being taken to ensure this – and this is also important to ensure the planned revenue and thus for financial sustainability. See discussion in section 5.5.2.

5.4.2 Implementation effectiveness

The investment cost budget is presented in the following table. The values were calculated from PLN using the same exchange rate as presented in the application.

Table 5-3 Investment cost budget, planned and realised

	Application	Realised
	EUR	EUR
1. Project preparation incl. design	2 349 222	2 187 412
2. Land purchase and site preparation	201 149	54 295
3. Construction works	55 392 341	41 384 632
4. Contingencies	4 720 345	0
5. Technical assistance	272 989	0
6. Project promotion	71 839	295 826
7. Construction supervision	2 920 977	555 067
8. TOTAL	65 785 184	44 975 365
9. TOTAL eligible costs	64 419 574	43 680 691

As seen above, the budget was significantly less than planned and according to the beneficiary, there are three causes of this:

- Large competition on the market caused, among others, by the financial crisis. Another important reason is the fact that the market is fairly saturated with companies that can construct sewer systems and the barriers to entry are low. In a crisis situation, this places additional downward pressure on prices;
- Dividing the project into many tasks enabled small companies to participate in the tenders, which further increased competition. The project budget was calculated using average prices and indicators for cost items like overheads that in reality turn out to be less than assumed. The high competition from smaller companies caused that especially lower overhead costs were applied.
- Including in the budget unplanned expenditure contingencies that later went untapped.



Regarding the time schedule, the project started with delay due to delayed decision on project financing (please see sections 2.1 and 2.2 on the project description and implementation schedule). The main cause was the delay in awarding financing. As a result, tender procedures could not be conducted until the financing agreement from the Cohesion Fund was signed. In addition, the beneficiary had exhausted its capacity for financing from its own sources. Therefore, the start dates of most of the contracts had to be postponed, which naturally impacted the planned completion dates. As a result of the delay, it was furthermore not possible to exploit the synergies with the road modernisation project that was initially foreseen to be carried out in parallel with the sewer construction.

Generally speaking, there were not any formal problems with contracts. In two cases, however, implemented using FIDIC Yellow Book, the designs were prepared in 2010 and the Environmental Decision was issued in 2007. This meant that the environmental decision was outdated and the procedure had to be repeated, which took time but did not cause delays.

In some cases, the delays resulted from a long public procurement procedure. For example, formal complaints were lodged during the selection of the supervising engineer. The tender for the expansion of the wastewater treatment plant had to be repeated due to a lack of compliant offers.

Contracts 7 and 8a were discontinued and new contracts were signed. Problems arose during the implementation phase in these two projects. Both were won by a consortium that had financial problems and the main contractor declared bankruptcy, but with an intention to formulate a restructuring plan (and not liquidation). Works had to be suspended and PWiK had to conduct an inventory of works underway so that it could be a starting point for a new tender procedure. In addition, the PWiK had to settle with sub-contractors based on a court agreement, which used the inventory as a basis for what was done by the main contract and what by the sub-contractors. This process lasted about nine months during which it was not possible to announce a new tender.

Otherwise, the Project Implementation Unit (PIU)²⁸ and supervising engineer were diligent in their oversight of contractors. If delays in completion of works reached two months, a remedy plan was developed and implemented to reduce these delays. They now hold the opinion that it would have been better if they could have implemented the project for a longer period of time. Given the very long period of time during which the financing decision was pending, it became necessary quickly to implement the project. Had the decision come when expected, it would have been possible to extend the implementation period to the overall benefit of the city. The beneficiary had to expand the Project Implementation Unit in order to implement the project quickly. On the other hand, the city was not able to do quickly and in parallel both the repair of regional roads (which was very important to the city) and the scope of the project.

At the same time, the parties stated that these delays were beyond their control and better organisation would not have changed anything. The problem with restructuring

²⁸ A Project Implementation Unit was established within the organizational structure of the beneficiary to monitor and report on project progress, as well as act as the employer in the relationship between the beneficiary, the supervising engineer and the contractors.



bankruptcy is a question of Polish public procurement law and they do not have any influence over this.

The main complaint from the beneficiary was the changing guidelines between the financing periods and the large delays in developing the new national guidelines for preparing projects for Cohesion Fund financing at the beginning of the next financing period. In addition, the beneficiary had problems with the provisions of the public procurement law and the proper and timely announcement to the Public Bulletin. At the time, Polish law did not require publishing annexes to tenders in the European Bulletin. After the tender was published, the beneficiary was later assessed a penalty of 10% reduction in the Cohesion Fund grant, but only on a small contract such that it did not present a significant financial burden. Later, this amount was financed through a grant from the state budget.

5.5 Technical and Financial Sustainability

5.5.1 Technical operation

No technical, staffing or organisation issues were noted by the beneficiary. The work was routine for such an enterprise – sewers, pumping stations, water treatment plant, and a relatively small component related to modernisation of the wastewater treatment plant.

5.5.2 Operating budget

The operating costs have been realised almost as planned. For example, in 2014, the actual operating costs plus depreciation were PLN 28.44 million (EUR 6.67 million), while in the financial projection it was assumed that the costs for 2014 would be PLN 31.12 million (EUR 7.3 million). The differences in operating costs are shown in the following table.

Table 5-4 Operating costs, planned and realised

	Unit	2014	
		Application	Realised
Operating costs + depreciation water	ths PLN/yr.	9 906 577	10 886 968
Operating costs + depreciation wastewater	ths PLN/yr.	16 044 836	13 842 130
Operating costs + depreciation stormwater	ths PLN/yr.	5 165 126	3 708 424

In general, the operating budget was correctly estimated, although the actual operating revenues were different for water and wastewater. Total revenues from the sale of water were similar as planned in the application, while for wastewater they were lower (following the general sales of water and wastewater services), mainly due to delays in project implementation.



Tariffs for water are higher than planned in the application while for wastewater they are lower. The major reason is that costs for water supply are higher and for wastewater are lower than planned. It has to be emphasized that tariffs cover all costs (including depreciation) and profit margin (which is a part of the tariff calculation formula).

With respect to sewer construction, about 60% of residents immediately connected when it became possible. Currently, the connection rate to the new sewers is 67%. Because the project was delayed (late start of tender procedure, delays in performance of two tenders), the entire process of increasing the sewer connection rate has been delayed. The beneficiary does not foresee any problems to achieve the assumed connection rates (and therefore also revenues from sewer sales), but this will take time. Currently, the city and PWiK and undertaking a series of measures in this regard. For example, the city is ensuring that septic tanks are emptied (administrative control) and because collection of wastewater from septic tanks is more expensive per cubic metre than paying for a centralised system, this works well. The main problem with the connection rate is the cost of performing the connection works on the property of the customer that should be financed by the connecting party. New sewers are in areas dominated by single-family dwellings.

The city is also conducting information campaigns. At the urging of the National Fund for Environmental Protection and Water Management, the project budget was increased to cover these campaigns. This is done through meetings with citizens and events aimed at pre-schools and schools, films, educational trails, as well as advertisements on television and radio.

5.5.3 Financial sustainability

The application assumed an affordability constraint of 3% of household disposable income. Calculating the affordability ratio using the current tariff and water unit consumption, however, results in 2.63%. The reason behind is the higher households income and a bit lower combined tariff for water and wastewater. This has likely been a key reason as to why the revenue collection rate is high and the unit consumption is stable.

Subsidies are not used. When a payment was introduced for storm sewers, however, the city initially made additional payments to calculated tariffs. In other words, the city paid an additional amount to the tariff charged to residents, but not as a subsidy to the general budget of PWiK (such approaches are not used in Poland).

In general, the operating company does not have any cash flow problems. The lower revenues from sewer services are compensated by the lower costs of providing this service.

The utility did not have problems related to the tariffs. There were no issues related to the acceptance of the tariff from the city because the tariff must be calculated according to a formula set by law and correctly calculated tariffs must be accepted. With respect to acceptance of tariffs from citizens, and thanks in part to lower tariffs as a percentage of disposable household income than originally estimated and the fact



that the utility makes efforts to inform its residents, the revenue collection rate for the tariffs is very high, essentially 100%.

5.6 Good practises and possible policy implications

The beneficiary related a common opinion in the country – that Poland was not prepared to implement the operational programmes in the first year when they were introduced in 2004 and 2007. They also see that the situation is repeating itself in 2015. The guidelines are published with great delay, which necessitates updates in supporting documentation that had already been prepared. According to the beneficiary, the guidelines for financing sources are usually issued late and the rules frequently change, stressing that the guidelines should not change much between budget periods. It is often the case that an application is prepared in one programming period, but the financing comes in the next programming period.

Furthermore, the beneficiary pointed out that the guidelines changed during implementation and decidedly too often. Examples of these changes include the definition of what are and are not eligible costs, as well as what to do with supplementary tenders. It was also noted that interpretations varied across institutions, with the National Fund for Environmental Protection and Water Management advocating one approach that was later challenged during control by the State Treasury, which is responsible for controlling how EU funds are spent.

A good practice then for the next programming period would be to complete the programming phase before collecting applications for the next one. This applies in particular to applications that are parked and should be implemented as quickly as possible to complete the previous programming (but already while the new period is underway) before collecting applications for the next programming period. This also means that project selection procedures need to be accelerated.

The beneficiary also had three comments related to tender procedures:

- Public procurement procedures should be more flexible with respect to financing construction of sewers and modernisation of roads. When sewers are constructed, road surfaces should be reinstated but this is done only for the part that was damaged, that is, not for the entire width. Cities want the entirety of the road to be reinstated and would even pay for the paving the other part of the width of the road. The simplest solution would be to pay one contractor for both tasks.
- Additional selection criteria for works contractors should be introduced. While current (in 2015) Polish public procurement law allows non-price criteria due to recent amendments, the permitted criteria apply to the subject of the tender and not to the characteristics of the contractor. This means, for example, that the employer cannot apply a criterion related to the financial situation of the bidder (such as liquidity ratios). Criteria related to the financial situation of the bidder should also be permitted.
- According to public procurement law, resources – references and personnel – can be borrowed from other firms with the declaration that they will be used in the course of implementation. This not only leads to abuse, but also renders most



would-be non-price evaluation criteria, such as contractor experience, meaningless since companies can always borrow references and personnel from others.

The beneficiaries also cited the arbitrary outcome of using the minimum density indicator for new sewer construction 120 persons/km, stating that the indicator should be calculated for the entire agglomeration; otherwise, priority development areas are excluded.

According to the beneficiary, the following factors guarantee success:

- Project Implementation Unit (PIU) – a solid PIU has clear and applicable procedures, an experienced staff, and appropriate training. The beneficiary recommended that the PIU be established even earlier than in their case, for example before the tenders are conducted for works, supervision, or supply. The beneficiary modelled its PIU after the unit in the neighbouring town of Jastrzębie Zdroj. While the PIU did not have technical assistance, their personnel took part in many trainings organised by the National Fund. The PIU had as many as 12 personnel and was successful in project implementation.
- Operating costs as an evaluation criterion – Despite the previous comments on public procurement, the beneficiary used operating costs of the water treatment station as an evaluation criterion for the tender. This had the desired effect and the contractor had to ensure that the use of chemicals and energy were in line with what was declared.



6 Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas, Greece

6.1 Executive summary

COLLECTION, TRANSPORT, TREATMENT AND DISPOSAL OF SEWAGE IN KOROPHI AND PEANIA AREAS

Location (country and region/city)	Greece – Attica/Koropi-Peania
Total investment costs (planned)	N/A (EUR 123.9 million including VAT ²⁹)
Total Community contribution (planned)	N/A (EUR 87.2 million)
Start (planned)	July 2013 (December 2010)
End (planned)	Not in operation (end of 2016)
Beneficiary	Region of Attica
Implementing body	Directorate of Technical Works of the Region of Attica
Assistance from JASPERS	<i>no</i>

The project concerns the construction of the sewage collection network of Peania, the main sewage collection pipelines of the cities of Koropi and Peania, the sewage transportation pipelines from the cities of Koropi, Peania and the settlement of Karelas, the wastewater treatment plant (WWTP) of Koropi –Peania and the disposal pipelines for treated sewage from this WWTP and from the existing WWTP of Markopoulo.

The project is foreseen to be completed by end of 2016.

The project addresses an imperative need for wastewater collection, treatment and disposal in accordance with Directive 91/271/EC; the two towns concerned are among the last in the region of Athens (Attica) that do not yet fulfil the requirements of the Directive. The reason for this shortcoming was the lack of consensus about the need for a WWTP in eastern Attica (e.g. a plan to pump the wastewater to the existing Psittalia WWTP - which however entails excessive pumping costs - had been circulated and discussed in the past) and the particular location (NIMBY syndrome³⁰).

²⁹ The project is not completed therefore the final cost is not fixed yet, however according to the existing data budget overruns in the range of 4,35 m€ are expected.

³⁰ NIMBY: an acronym for the phrase "Not In My Back Yard", is a pejorative characterization of opposition by residents to a proposal for a new development because it is close to them, often with the connotation that such residents believe that the developments are needed in society but should be further away.



The application for co-financing was submitted on 18 June 2010 and the project was approved for financing by the Regional Operational Programme Attica on 30 November 2010; the financing approval of the EC was issued in August 2014³¹. The project construction was procured in December 2010 as a conventional construction contract for the collection pipelines and a design/construct project for the WWTP and disposal pipelines.

Significant delays were experienced during and after the award stage, due to appeals by competing candidates. As a result, the project was initiated in July 2013 with an initial contract period until July 2016. Some further delays have taken place during its execution resulting in an extension until February 2017.

There are no cost overruns to date on the (foreseen) construction budget. Overruns of ~ EUR 4.35 million are due to unforeseen archaeological investigations and necessary relocation of utility networks.

The technology used for the WWTP and its capacity is appropriate, for the population envisaged. The operation of the WWTP will be undertaken by EYDAP, the water and sewage company of Athens, which has extensive experience in the operation of such facilities.

According to the provisions of Greek Law, within 6 months of the completion of construction an surcharge of 75% for sewage disposal is applied on all water supply bills in the area served, irrespective of whether households are connected to the sewage network (or not). Moreover, the financial sustainability of the project is further enhanced by the fact that it will be operated by EYDAP, a large utility company serving the whole of Attica (approx. population 5 million): the revenues from this system and the associated operational costs will be compounded with those over the whole of Attica.

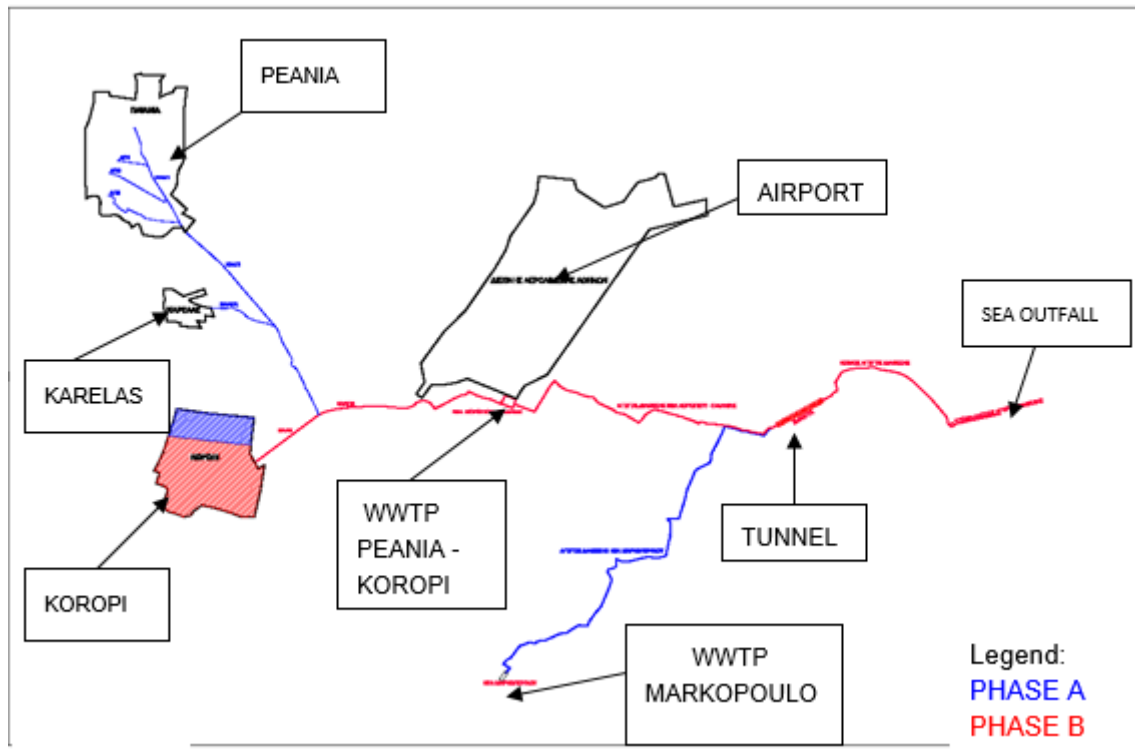
6.2 Project description

6.2.1 Key facts about the project

The project name is "COLLECTION, TRANSPORT, TREATMENT AND DISPOSAL OF SEWAGE FROM THE KOROPI AND PEANIA AREAS". The project concerns two settlements which were fined by the EU for delay in implementation of Directive 91/271/EC. The lack of sewage networks in regions of Attica and the lack of adequate WWTP downgrade the environment of the area; in the Municipality of Koropi today there are 8,000 sumps, of which 10% are septic and 90% are absorbent, polluting the environment.

³¹ [C(2014)6166 final, 27 August 2014]

Figure 6-1 Project area



The investment cost foreseen is 123.862.181 € including VAT 21,242,312 €, of which 105,910,034 € in Phase A' (2007-2013) and 17,952,147 € Phase B' (2014-2020), as stated in the Application Form. Of this, the eligible amount for financing is the total investment cost less VAT, i.e. 102,619,869 € and the Community contribution is 85% i.e. 87,226,889 €.

The project is co-financed by the ERDF for the period 2007-2013 and the Community contribution is 74,820,933 €. According to the Management Authority, Phase B will be financed by the Cohesion Fund, and the Community contribution is 12,405,956 €.

The project is not yet in operation, so the final investment cost is not known. At present the investment cost stands at 107,5 million € taking into account actual contract value (after tendering) and some overruns for the archaeological investigations necessitated by the implementation of project and the necessary relocations of utility networks³².

6.2.2 Project history and key milestones

The project was initiated in 1993 with the award by EYDAP (the Sewage and Water company in Attica) of the design contract for the collector pipelines and the wastewater treatment plant; this was completed in December 2009. In parallel, the

³² From the existing documentation, it is not possible to determine the precise reasons why relocations were necessary, however, from experience in similar projects, it is considered likely that this is due to planned pipelines intercepting with existing underground utility infrastructure.



design of the sewage collection network of Koropi was awarded by the Municipality and completed in March 2010.

The reason for the delay was the lack of consensus about the need for a wastewater treatment plant in eastern Attica. Reactions mounted because local interests did not want a wastewater treatment plant in their area, more so when it includes a disposal pipeline on the valued coastline in response. EYDAP had put forward a plan to pump the wastewater to the existing Psittalia wastewater treatment plant in the west of Attica; this solution was (correctly) abandoned, since it entails excessive pumping costs.

Following submission of an Environmental Impact Assessment Report, the environmental terms of the project were issued in 2009 (JMD 144233/9.9.2009), renewed on 4 April 2013 and valid until the 9th September 2019.

The project was approved by the Intermediate Managing Authority of the Attica Region (M.A) for financing by the Regional Operational Programme Attica on 30 November 2010. The financing approval of the EC was issued in August 2014 [C(2014)6166 final, 27 August 2014]³³.

A framework contract was signed on 19 November 2010 between the Municipality of Koropi (the owner), the Directorate of Technical Works of the Region of Attica and EYDAP, the utility company for water supply and sewage of Athens. According to this contract, the Directorate of Technical Works of the Region of Attica was decided as the implementation body and EYDAP as the operating body.

The project construction was procured in 1 December 2010 as a conventional construction contract for the collection pipelines and a design/construct project for the wastewater treatment plant and disposal pipelines. The contract was awarded on 31 August 2012; the large delay was due to appeals of the candidates, at various stages of the award process. The implementation started (with further delays due to legal issues) on 25 July 2013 with an initial contract period of 36 months i.e. until 25 July 2016.

By decision of the Region of Attica of 28 August 2014, an extension was granted until 10 February 2017, ref. also section 4.1 below. At present, work on the project construction has been suspended as of 8 June 2015, since the government is in arrears on two construction bills (shortage of financing related to the Greek crisis)³⁴.

³³ According to the existing financing arrangements, Greece makes the financing decision first and the EC subsequently confirms; in this case, the application for financing from the E.C. was delayed until the contract award until the uncertainties arising from the litigation were resolved.

³⁴ This happens despite the fact that the project is co-financed by the E.C. because, according to the existing financing arrangements, Greece first makes all project payments from its national budget within each year and subsequently receives the E.C. contribution. Because of the current situation however the government has effectively suspended all project payments since the beginning of 2015. The financing problems were overcome and construction works began again late August 2015.



6.2.3 Main objectives and outputs

The project concerns the construction of:

- the internal sewage collection network of the city of Koropi including two main sewage collection pipelines (total length 81 Êm *)
- the main sewage collection pipelines for the city of Peania (total length 4 Êm*) (its internal sewage collection network will be implemented by another contract and will be financed by the Operational Programme, Environment and Sustainable Development)
- the sewage transportation pipelines from the city of Peania (farthest), the housing development of Karellas and the city of Koropi (total length 12.7 Êm*); the internal sewage collection network of the settlement of Karellas will be implemented through a future construction contract and isn't included in project³⁵.
- the wastewater treatment plant (WWTP) of Koropi-Peania, which includes, primary, secondary and tertiary treatment as well as sludge treatment (the capacity of the wastewater treatment plant is 94,298 inhabitants*)
- the disposal pipelines for treated sewage from the wastewater treatment plant of Koropi-Peania (length 6.2 Km *) and from the existing wastewater treatment plant of Markopoulo (length 9.3 Km*) as well as the main (joint) disposal pipeline (length 4.7 Km*), including a tunnel (D = 4 m and length 1.28 Km*) and sea outfall (length 1 Km)³⁶.

The population to be served by the project, with a planning horizon of 40 years, is 94,298.

The project objectives are quantitatively defined by means of indicators and target values as follows:

³⁵ According to the census of 2011 the population of Karellas was 1,579 vs. 30,307 for Koropi and 26,668 for Peania, i.e. it constitutes 2.8% of the total to be served by the WWTP in the coming period.

³⁶ * The length of pipes, the capacity of WWTP and the tunnel diameter are according to the application.



Table 6-1 Project indicators

Indicators	Measurement Unit	Target Values
Sewerage pipeline	Km	97.75
New wastewater treatment plant	number	1
Estimated population to be served by the Wastewater Treatment Plant	number	94,298

6.2.4 Key stakeholders

The key stakeholders of the project are:

- Managing Authority of the project is the Intermediate Managing Authority of the Attica Region (M.A)
- The project Beneficiary is the Region of Attica (B)
- The Proposing Body is the Municipality of Koropi (PB) as indicated in the Technical Fiche of the Project for financing by the Managing Authority
- The Implementation Body is the Directorate of Technical Works of the Attica Region (IB).

According to the framework contract between the Proposing Body, EYDAP and Implementation Body, the project will be operated by EYDAP, the utility company for water supply and sewage of Athens³⁷.

6.3 Relevance of the project

6.3.1 Coherence with policy objectives

The project is being implemented in accordance with obligations arising from Directive 91/271/ EC on the Management of Urban Wastewater, transposed into Greek Law by the Joint Ministerial Decision (JMD) 5673400/1997. The Directive determines the minimum necessary technical infrastructure for collection and disposal of wastewater that cities and settlements of the European Union must have, depending on the population equivalent and the recipient of treated wastewater. It also specifies the maximum permissible limits of quality characteristics of treated wastewater to be achieved at the exits from WWTP and also provides specific time limits within which the settlements must complete the required infrastructure for collection, treatment and disposal of urban Sewage.

³⁷ In the approval of project financing by the EC [C(2014)6166 final, 27 August 2014], it was foreseen that the PB would also be responsible for the operation of the project. In the new application however, it's foreseen that EYDAP will take over the operation of the project.



As mentioned in the application, the project is considered of high priority by the Management Authority, since it includes two towns, for which the Court of Justice of the European Communities has fined Greece, because of not fulfilling the requirements of Directive 91/271/EC (the sewerage network and WWTP should have been implemented by the end of 2005). As such, the project objectives are fully consistent with targets of the above Directive.

In response to an invitation by the Management Authority for proposals for financing of "Sewage networks and wastewater treatment plants in the Region of Attica" applicable to wastewater treatment plants for settlements of 2nd priority³⁸, the municipality of Koropi submitted a request for project funding. The decision to fund the project was subsequently taken by the Managing Authority after a comparative assessment of the candidate projects submitted following the above call for financing. The evaluation criteria set by the Managing Authority were: comprehensiveness and clarity of the proposal, compliance with national and Community rules, the feasibility and the maturity of the project.

The financing decision absolutely consistent with the provisions of the Directive 91/271/EC. The area is one of the few left in Greece that do not yet meet the requirements of the abovementioned Directive and the transposed Joint Ministerial Decision 5673400/1997.

The implementation of the project was referred to the priority axis 2 «Sustainable Development and improving of quality of life» of the Regional Operational Program of Attica for 2007-2013 (ERDF) and the priority axis 14 « Preserving and protecting the *environment* and promoting resource efficiency» of the Operational Programme Transport Infrastructure, Environment and Sustainable Development (YMPERAA) 2014-2020 (Cohesion Fund). The project objectives are fully linked with the targets of the operational programmes.

6.3.2 Consistency with needs in the territory

The population was estimated in the Preliminary Design study of 2004³⁹, which was not available; moreover, the supplied documents do not give information substantiating this population estimation.

According to the answers of the municipalities and EYDAP representatives, the actual demand will be close to the estimated values at the time of application submission. It was also mentioned that, since the Municipalities of Koropi and Peania have residents with middle to high income level , it is estimated that the majority will be connected to the sewage network.

No ex-post data on demand are available for comparison since the project is still in construction. However, it should be noted that:

³⁸ Includes all settlements with population equivalents above 15.000 that dispose their wastewater in non-sensitive water bodies as per the Directive.

³⁹ [CBA, p. 6]



- the estimated population of the Municipalities of Koropi and Peania for the year 2012 was 43.647 inhabitants in the Cost Benefit Analysis, and
- the actual population of the Municipalities of Koropi and Peania⁴⁰, according to the last census of 2011 was 45.926 inhabitants.

These data show a slightly greater population growth (5%) than initially foreseen.

The subsequent crisis may actually have reduced population growth since then and as well as the per capita consumption of water (for a few years), so demand data may not exceed projections for the next few years. Moreover, if demand actually lags behind projections, additional population sources e.g. the area of Glyka Nera, may be eventually covered by the WWTP with their own collector pipelines. Such collector pipelines would need to be included in a new, separately funded, project.

6.4 Project performance

6.4.1 Fulfilment of objectives

The project is not in operation; hence the fulfilment of its objectives cannot be ascertained in practice; however, once EYDAP takes over the project, there is no reason to question the fulfilment of its objectives since the processing technology is established (teething problems can of course be expected in the initial period of operation).

As mentioned above, the population estimates of the design are close to the actual population development to date; hence the population is not a source of uncertainty for the near future. The percentage of population to be connected to the network could be less than expected because of the extra cost required for connection in this time of crisis; however, the expectation of connection rates in this particular area is high according to the statements of representatives of municipalities. Finally, the volume of wastewater per person is a source of uncertainty; the estimations in this respect are consistent with standard practice. .

In the long term population will grow so, some time in the future, before or after the 40 years it will exceed capacity; this is to be expected since the estimation of growth and water consumption patterns that far into the future entails uncertainties.

Having the above in mind, if demand proves to be less than the capacity of the WWTP, the representatives of Municipality of Peania have put forward that the existing network could be extended to include the sewerage network of Glyka Nera (after the necessary permits by the competent authorities for the implementation of the project are obtained).

⁴⁰ Excluding the area of Glyka Nera, which has joined the municipality of Peania in the last restructuring of municipalities, but is not included in the project



And, when demand exceeds capacity (in the future, expected in 40 years), the plant will have to be expanded; according to the information available, the plant extension has not been foreseen.

As mentioned above (see 6.1.3), the construction of the sewage collection network for the city of Peania (which is not included in this project but is necessary for the fulfilment of its objectives), is funded by the Operational Programme Environment and Sustainable Development 2007-2013. It was procured in January 2015 by the Municipality of Peania with a budget of 13,558,900 € and a contract period of 24 months. The date of submission of proposals was 24 March 2015; the contractor was selected on 19 May 2015 (following the rejection of an appeal).

6.4.2 Implementation effectiveness

The project implementation began on 25 July 2013. The initial contract period was 36 months, i.e. until 25 July 2016. By decision of Region of Attica of 28 August 2014, an extension of 200 days was granted until 10 February 2017, for the following reasons:

- delays in the endorsement by the Land Service of the survey defining the waterline and beach area in Chamolia, the location of the disposal pipeline.
- significant delay for the archaeological excavations in the start date of earthmoving at the WWTP Koropi-Peania.
- delays in the construction permitting of a section of the disposal pipeline crossing (highly used) roads, delaying the start of its construction.

The project budget included all relevant cost components for the project implementation including construction cost, cost of operation and maintenance, consultancy services and land acquisition cost for the WWTP (~5 ha).

However, the initial investment cost did not include costs of archaeological excavations which were unforeseen and became necessary during project execution (3.35 million € to date) and relocation of utility networks (1 million €).

The project does not have any other budget overruns or underruns to date; however there is clearly a time overrun. The factors that contributed to delays in the implementation of this project (in addition to those described above) include:

- degree of project complexity and scope.
- uncertainty about procurement strategy and difficulties with procurement procedures (appeals of competing candidates related to project award can stop the whole process).
- delays in obtaining permits and/or land for the project.
 - delays due to archaeological excavations
 - time for site preparation e.g. unexpectedly difficult soil conditions and time needed for additional surveys in areas of geology/hydro-geology etc.



- lack of funding in a timely manner to pay for project expenditure, particularly because of complicated and time-consuming procedures for additional funding.

As stated above, the project was approved by the Intermediate Managing Authority of the Attica Region (M.A) for financing by the Regional Operational Programme Attica on 30 November 2010 and the financing approval of the EC was issued in August 2014 [C(2014)6166 final, 27 August 2014]. Thus, financing of the project, from initiation of construction on 25 July 2013, was carried out from national funds until the E.C. contribution was received in 2014 after financing approval.

6.5 Technical and Financial Sustainability

6.5.1 Technical operation

EYDAP will undertake project operation after checking the construction quality and the operational status of the sewage collection system.

EYDAP has experienced staff (and equipment) for the operation and maintenance of the sewerage network and the operation of the WWTP; in case of any shortage of staff, it is possible to assign the operation of WWTP to an experienced contractor.

6.5.2 Operating budget

In the CBA, the operational budget has reasonable provisions for staff salaries and maintenance costs and foresees other operational costs, the scope of which is unclear in the available documentation. However, the replacement costs, e.g. of EM equipment (which is necessary every 15-20 years), were not taken into account; this leads to a small underestimation of operational costs.

Although the total accumulated operational revenues according to the CBA slightly exceed the total operational costs in the period of analyses, the revenues are less than the costs until 2029 (after that, the population growth is adequate to cover the operational costs).

However, the tariff revenues have been overestimated in the CBA by about 6% due to an error in estimation⁴¹. This overestimation will in effect be covered to some extent in the short run by the higher increase in population than foreseen referred to in section 3.2.

⁴¹ The municipal wastewater volumes were overestimated by 40% (the municipal wastewater volumes used were the water supply volumes) - but the (much smaller) industrial wastewater volumes were significantly underestimated (the daily volume was used as annual volume), so the net overestimation of revenues is 6%.



6.5.3 Financial sustainability

The project is widely accepted by the local community after awareness campaigns that have been made by the municipality of Koropi. It is estimated, that the greater part of the population of the two municipalities (Paiania and Koropi) will be connected to the network because the economic status of local people is medium to high.

According to the provisions of Greek Law, EYDAP which will bill all residents within 6 months of construction, regardless if they connected to the network or not, with a surcharge of 75% over the water supply tariff⁴². Thus, project revenues are expected to have small variations from the estimated values.

The issues with the operating budget mentioned in the previous section will not be a problem however, since the sewage system is foreseen to be operated by EYDAP: as discussed with the representatives of the company, the revenues from this system (in the order of EUR 2 million per year in this period) and the associated operational costs will be compounded with those over the whole of Attica (in the order of EUR 125 million per year, with total EYDAP revenues, including those from water supply, in the order of EUR 400 million per year). It is thus ensured that the project will be financially sustainable.

In particular, EYDAP is the largest company of its kind in Greece and serves approximately 4,300,000 customers (2,030,000 water meters) while the length of water pipelines is 9,500 km. The sewerage sector serves 3,500,000 residents with sewers spreading at almost 6,000 km.

Table 6-2 EYDAP balance sheet (EUR million)

Balance sheet	2012	2010	2009	2008
Turnover	353	379	386	403
EBITDA*	74	63.2	48.3	78.3
EBIT**		34.7	23.5	55.8
Earnings before taxes	62	29.8	18.0	49.2
Earnings after taxes	47	11.3	5.7	31.2

*(EBITDA) Earnings Before Interest, Taxes, Depreciation and Amortization, **(EBIT) Earnings Before Interest, Taxes

6.6 Good practises and possible policy implications

From the experience to date of the authors of this report, the main *general* problems in project implementation in Greece are:

- 1 The difficulties in obtaining consensus for project implementation. Since the 1990's, it has been pursued as part of the environmental permitting process, but this process needs to be strengthened with explicit dialogue in the concept design

⁴² a discount of 30% is given to properties with gardens of over 200 m²



- stage for controversial projects e.g. waste disposal, wastewater treatment and disposal.
- 2 The declining quality of project design, since virtually all such contracts are awarded with abnormally low prices since 2005.
 - 3 The omission of mapping of utility networks in the design phase; this would facilitate planning the necessary relocations in the design stage. Instead, this is normally done during construction, leading to delays and budget overruns.
 - 4 The inappropriate timing, slow process and high cost of archaeological investigations; in cases of known archaeological interest, such investigations should be carried out during design and not during construction (effectively halting its progress). Archaeological excavations during construction should only be carried out for unforeseen archaeological findings.
 - 5 The slow process of expropriating land for project implementation; some measures have been taken for speeding up the process in the current programming period, but it still is too slow.
 - 6 The insufficient supervision of construction; normally it is undertaken by the implementing body, but staff experience and availability are inadequate; this often leads to sub-standard project quality as constructed.
 - 7 The slow progress of courts (in general) and in considering appeals related to project award (in particular).
 - 8 The inflexibility of (design and) construction financing. In both cases, changes in the contract scope and remuneration may be necessary – and these have been covered by the national contribution to date; this introduces significant delays and effectively alters the distribution of financing. Clearly a balance should be struck, in order to avoid excessive cost overruns.
 - 9 The complicated procedures for project implementation, due to the requirements of national law regarding construction contracts, the procedures of the Managing Authorities in order to ensure consistency with EU funding requirements, European legislation and European financing regulations. As a result, the Management Authorities are overwhelmed leading to delays in project implementation, taking into account the shortage of necessary staff. Despite good intentions, this complexity has increased in the last programming period.

Of the above, points 1, 3, 4 and 7 are of relevance to this particular project.

In this particular project, it was further observed that some fundamental errors were made in the demand estimation (ref. section 6.5.2). Such errors should have been captured by proper quality assurance.

As discussed above, the project's financial sustainability was ensured by foreseeing its operation by EYDAP, which serves the whole Attica region. It is assessed that a more rigorous cost/benefit study or a closer cooperation with EYDAP during the preparation of the cost/benefit study would have contributed to avoiding such errors and thus to ensuring an operating budget of improved reliability.



7 Sanitation sub-systems of Barreiro/Moita and Seixal (SIMARSUL), Portugal

7.1 Executive summary

SANITATION SUB-SYSTEMS OF BARREIRO/MOITA AND SEIXAL

Location (country and region/city)	Portugal, Setubal Peninsula
Total investment costs (planned)	EUR 51.5 million (51.2)
Total CF/ERDF contribution (planned)	EUR 15.0 million (15.0)
Start (planned)	March 2007 (March 2007)
End (planned)	April 2012 (December 2011)
Beneficiary	SIMARSUL
Implementing body	SIMARSUL
Assistance from JASPERS	No

The expansion and modernisation of urban wastewater processing facilities of three municipalities located on the south bank of Tagus River. The facilities will collect urban wastewater from the municipal sewerage systems and will treat and discharge it into the Tagus estuary as 'reclaimed' water. Main components of the project are two wastewater treatment plants with a combined capacity of 460 thousand p.e.⁴³ and about 36 km of piping, including several pumping stations.

Project capacity objectives were attained and the facilities can easily accommodate a moderate demand expansion (not expected for the medium term).

The project was completed in April 2012, approximately 3.6 months behind schedule. This is a small delay of about 5%, considering the duration of construction period.

Actual investment costs were reduced by 0.5% when compared with the cost foreseen in the initial feasibility studies and submission documents.

This is considered a very good performance and is consistent with the small variation of the actual construction duration.

The systems came into stream in 2011 (for 2 municipalities) and 2012 (for the third municipality) and their operations are running smoothly. Operation and maintenance costs are in line with the budget.

No financing restrictions or shortcomings were experienced and some short-term cash-flow problems due to collection delays, although not formally foreseen in the risk

⁴³ p.e. or PE or population equivalent: (industrial) pollution load equivalent to the pollution generated by one person in a household.



analysis of the feasibility studies, did not interfere with the project construction due to proper financial planning.

In principle, financial sustainability of this project (as well as of other similar projects in Portugal) is ensured by the "cost-plus" approach that is used in concessions for urban water supply and wastewater processing and disposal. According to this model, tariffs are designed to cover the full non-subsidised costs of the project after deducting any non-tariffs related revenue.

The project is an example of good practice in many respects: good performance in terms of investment costs, implementation timeline, conformity to the original specifications, fulfilment of operational objectives (technical operation, operating and maintenance costs), as well as the critical importance of the undertaking in meeting regional environmental needs and complying with mandatory provisions of UE and national legislation.

The unforeseen risk of slow tariff collection from city councils (caused by delayed payments from the councils) did not have an impact on the financial sustainability of the project because the managing organisation was able to recourse to own funds and bank loans to fill the short-term financial gap.

The project also illustrates that the "cost-plus" model may be impaired by contextual factors that supersede the built-in safeguarding contractual clauses. In effect, there is a large amount of tariff deficits (which are supposed to reconcile actual revenue with the Polluter Pays Principle) that are long overdue. Possibilities for its recovery will be considerably belated.

7.2 Project description

7.2.1 Key facts about the project

The project concerns the expansion and modernisation of urban wastewater processing facilities of three predominantly urban (86%) municipalities located on the south bank of Tagus river: 'Barreiro', 'Moita' and 'Seixal'. It is designed to collect and treat urban wastewater to be discharged into the Tagus estuary as 'reclaimed' water in compliance with the quality requirements of applicable environmental regulations. Although operated independently, the new and improved facilities are part of the "SIMARSUL" system of the 'Setúbal' peninsula⁴⁴.

⁴⁴ The Setúbal Península is a NUTS III subdivision of the region of Lisbon (NUTS II). Comprising several municipalities and urban centres, this sub region stretches from the southern bank of the Tagus River opposite to Lisbon to the northern bank of Sado River, some 30 km south of the Portuguese capital.

Figure 7-1 Setúbal Peninsula and the three municipalities



Source: SIMARSUL

SIMARSUL, S.A., a public company owned by local city councils and a central state company, “AdP – Águas de Portugal”, is the sole concessionaire of the collection, treatment and discharge of wastewater in eight of the nine municipalities⁴⁵ of the ‘Setúbal’ peninsula: ‘Alcochete’, ‘Barreiro’, ‘Moita’, ‘Montijo’, ‘Palmela’, ‘Seixal’, ‘Sesimbra’ and ‘Setúbal’ (in ‘Almada’, the most populated of the 9 municipalities, wastewater collection and processing is handled directly by the city council). One of the municipalities of the concession, ‘Setúbal’, is not as yet connected to the SIMARSUL wastewater system due to be bound to a previous concession contract with another operator; it is expected that the linkage to SIMARSUL system will occur in the next decade.

The concession was awarded in 2004 and will be in force for 30 years. Once completed, the overall SIMARSUL system will include: 28 wastewater treatment plants, 130 pumping stations and 420 km of piping networks.

The project includes:

- A wastewater treatment plant to service the municipalities of ‘Barreiro’ and ‘Moita’ with a capacity of 64,790 m³/day (294,000 p.e.);
- A wastewater treatment plant to service the municipality of ‘Seixal’ with a capacity of 42,050 m³/day (155,000 p.e.);
- A drainage/pumping system for the ‘Barreiro’ and ‘Moita’ municipalities (eight new pumping stations, revamping of 5 existing pumping stations, 25 km of new piping works);
- A drainage/pumping system for ‘Seixal’ (four new pumping stations, revamping of two existing pumping stations, 10.5 km of piping works).

⁴⁵ There are about 300 municipalities in Portugal



This system will replace the existing outdated and inefficient system⁴⁶ covering a total area of about 1.5 km² and aiming at servicing about 90% of the population of the three municipalities (ca. 483 thousand citizens in 2005), or about 50% of the 'Setubal' peninsula inhabitants⁴⁷.

Table 7-1 Key facts

Title:	Sanitation sub-systems of Barreiro/Moita and Seixal
Country:	Portugal
Priority theme:	Water treatment (wastewater). Code 46
Investment amount:	EUR 50.3 million. (eligible amount)
Sources of finance:	Union assistance (30%), National public (70%)
Share of Cohesion Policy funding:	EUR 15.0 million (30%)

Table 7-2 Investment budget (planned / realised)

Project components	Planned	Realised	Variation
	M EUR	M EUR	%
Project preparation incl. design ⁴⁸	0	0	0
Land purchase and site preparation ⁴⁹	0	0	0
Construction + Equipment	46.1	46.4	+ 0.3
Price adjustment	2.3	2.3	0
Supervision	2.6	2.5	- 0.1
Total investment costs	51.0	51.2	- 0.2

Sources: Reference 1, Appendix C and POVT

7.2.2 Project history and key milestones

A multi-municipal system for wastewater collection, treatment and disposal covering eight of the nine municipalities of the 'Setúbal' Peninsula was created in 2003⁵⁰. The

⁴⁶ The concession territory, an area with sensitive environmental assets, had a very deficient situation with regard to the drainage and treatment of wastewater at the time SIMARSUL was created and the intervention planned: dates set forth by EU Urban Waste Water Treatment Directive were long overdue; only 25% of the population was covered by integrated wastewater drainage and treatment systems; larger agglomerates like 'Barreiro', 'Moita' and 'Seixal', were discharging untreated wastewater in the Tagus River basin; most of the wastewater treatment systems were small and inefficient; some of the larger wastewater treatment plants had design shortcomings and poor operational performances.

⁴⁷ In 2 municipalities the coverage will be shared with other systems already available or under construction. Thus, the foreseen direct coverage of the system under consideration will be: 'Barreiro – 85%; 'Moita' – 90%; 'Seixal' – 53%. The direct coverage will comprise a population of 324.7 thousand when the project is completed.

⁴⁸ Cost included in "Construction and Equipment" item.

⁴⁹ Cost included in "Construction and Equipment" item.

⁵⁰ Decree-law 268/2003, of 8 November 2003



following year SIMARSUL was incorporated⁵¹ and was granted a concession contract for managing this system for 30 years.

The concession contract was based on a feasibility study of the wastewater system of the territory. A first application to financial support from the Cohesion Fund was submitted in 2004. This submission concerned a first set of the planned sub-systems that were apt to be implemented immediately as environmental requirements were less stringent. At the same time, environmental assessment and allied studies were initiated for a second set of sub-systems, which make up the investment project under review: sub-systems of 'Barreiro/Moita' and 'Seixal'.

As soon as the environmental and other preliminary studies were completed, SIMARSUL launched the public tenders for the construction works and, in 2009, submitted a second application to the Cohesion Fund concerning the 'Barreiro/Moita' and 'Seixal' sub-systems.

The project was reviewed several times following requests from the Commission concerning clarifications and additional information⁵². The latest project application to the Cohesion Fund (dated 7 February 2013) was approved by the Commission Decision C(2013)2477/F1, i.e. subsequent to implementation of the project. There is a reprogramming process still underway in August 2015.

Table 7-3 Implementation plan (planned / realised)

	Application	Realised	Variation
Construction start date	21/03/2007	21/03/2007	0
Construction end date	31/12/2011	20/04/2012	+ 3.7 months
Operation start date	01/09/2010	01/12/2010	+ 3 months

Sources: Reference 1, Appendix C and SIMARSUL

As seen in Table 7-3, both the planned and realised operation start dates occur before the construction end dates. This is because the start date refers to the coming into stream for the testing period of the first wastewater treatment plant ('Seixal') and the construction end date refers to the second wastewater treatment plant ('Barreiro/Moita') being accepted by the owner after being tested by the contractor.

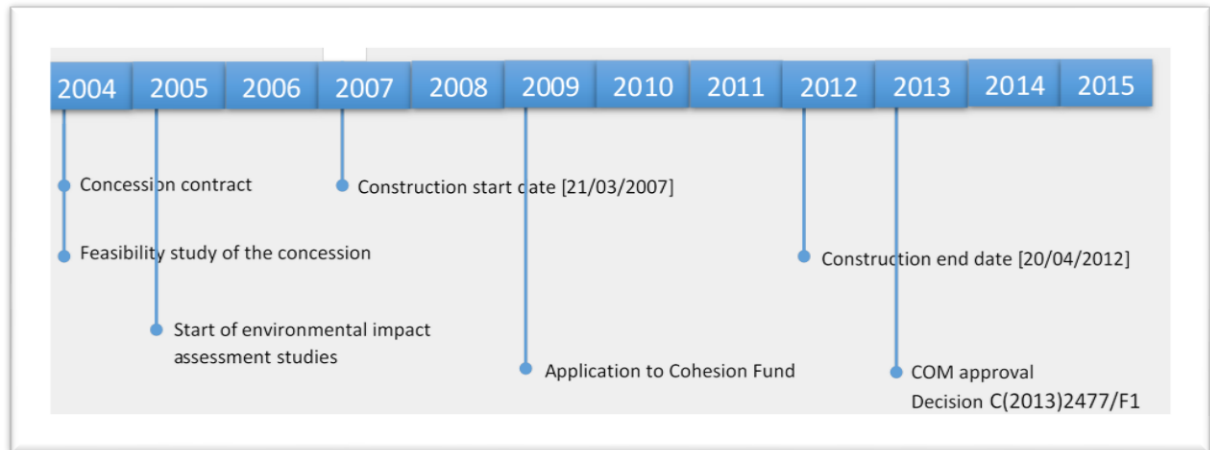
⁵¹ 49% of SIMARSUL shares are owned by the 8 municipalities and 51% by "AdP - Águas de Portugal", a company wholly owned by the central state and operating as the main state intervention arm in water supply and wastewater treatment activities. According to Portuguese legislation (Law no. 88-A/97 of 25 July 1997, article 1.3) the businesses of drinking water supply and urban wastewater sewage and treatment can only be run by institutions majority held by the central state or local city councils, except when the business converts a single municipality under a concession contract granted by the city council.

⁵² COM requests were sent on: (1) 20/10/2010 (asking for the inclusion of VAT in table H.1, the non-inclusion of price adjustments in section E.1.2.3, of the missing residual value and the correction of an error in the calculation of the net present worth); (2) 24/11/2011 (following the change of priorities and co-financing rates, the need to adapt table H.2.1, and sections B.3.3, B.5.1, B.5.2 and B.5.3); (3) 05/06/2012 (which insists that price adjustment amount should be excluded from table H.1) besides the correction of minor inconsistencies.

In both cases, the contractor operated the wastewater treatment plant for a full year to test its performance and to confirm that design or code parameters were successfully achieved; only after this period (and any extension thereof needed to perform corrections to comply with such parameters) were the facilities accepted by SIMARSUL.

The following timeline shows the main milestones of the project.

Figure 7-2 Project timeline



Sources: Reference 1, Appendix C and POVT⁵³

7.2.3 Main objectives and outputs

The main investment capacity objectives were kept invariant along the four different submissions. The realised capacities are in line with the design figures (Table 7-4).

Table 7-4 Project capacities (planned / realised)

	Application	Realised	Variation
Waste water treatment plant: 'Barreiro/Moita' (no. of PE)	294,000	294,000	0
Waste water treatment plant: 'Seixal' (no. of PE)	155,000	155,000	0
New wastewater collection pipes (km)	35.3	36.3	+ 1.0

Sources: Reference 1, Appendix C and SIMARSUL

7.2.4 Key stakeholders

The major project stakeholders are the inhabitants and businesses of the concession territory, which are represented in the managing organisation through the city councils as shareholders of SIMARSUL. Stakes of the municipalities vary from 1.5% held by 'Alcochete' (population 17,579 in 2011) to 12.3% held by 'Setúbal' (population

⁵³ POVT – Programa Operacional Temático Valorização do Território, the PT operational programme 'Territorial Enhancement'



121,185 in 2011). The combined shareholdings of the 3 municipalities covered by the new wastewater treatment system amount to 23.95%. The project was overseen by the managing authority, the operational programme management office of POVT.

SIMARSUL is currently being merged with other multi-municipal systems as explained in the next paragraphs.

In recent years, the Portuguese government has been running a restructuring process on state owned companies, notably in the environmental and transportation industries. The reform was approved in May 2015⁵⁴ for water management businesses. This reform is a major restructuring process that applies to whole of the mainland territory. The new configuration of the overall system is based on five regional companies, three of which are mergers of 16 former multi-municipal systems. These regional companies encompass all water related activities (supply, sewage, treatment and disposal). SIMARSUL merged with other eight firms to form a new company "Lisbon and Tagus Valley Waters" (*Águas de Lisboa e Vale do Tejo, SA*). The management of this new company is assigned to an already existing company, EPAL⁵⁵, that will ensure the co-ordination of the larger multi-municipal system.

7.3 Relevance of the project

7.3.1 Coherence with policy objectives

In the concession territory, the project aims at contributing to objectives and targets set out in:

- the national Strategic Plan for Water Supply and Waste Water Treatment II⁵⁶, notably by:
 - Servicing at least 95% of the population with wastewater treatment infrastructure.
 - Providing a wastewater treatment service of high and measurable quality.
 - Pursuing an affordable tariff policy.
 - Prioritising the fulfilment of EU relevant legislation.

⁵⁴ Decree-Law No. 94/2015 of 29 May, approving the formation of the "Lisbon and Tagus Valley " multi-municipal system of water and sanitation and the creation of the state owned company "Águas de Lisboa e Vale do Tejo, SA". This Decree-Law came into force on June 30 2015.

⁵⁵ EPAL supplies drink water at low pressure to the city of Lisbon and at high pressure to 34 municipalities of the Great Lisbon Area. It serves approximately three million people. The company resulted from the nationalisation in 1974 of "CAL - *Companhia das Águas de Lisboa*", which was founded in 1868. In 1993 EPAL, SA became 100% owned by AdP – Águas de Portugal.

⁵⁶ The second version of the national plan titled "PEAASAR II – Plano Estratégico de Abastecimento de Água e de Saneamento de Águas Residuais 2007-2013" and approved by the government in December 2006. Appendix A, Ref 17.

- The “Water Law”⁵⁷, which transposes into national legislation the EU Water Framework Directive⁵⁸, by:
 - Avoiding the continuous downgrade of the water quality of Tagus estuary.
 - Promoting a long range sustainable use of water of the hydrological resources of Tagus River basin.

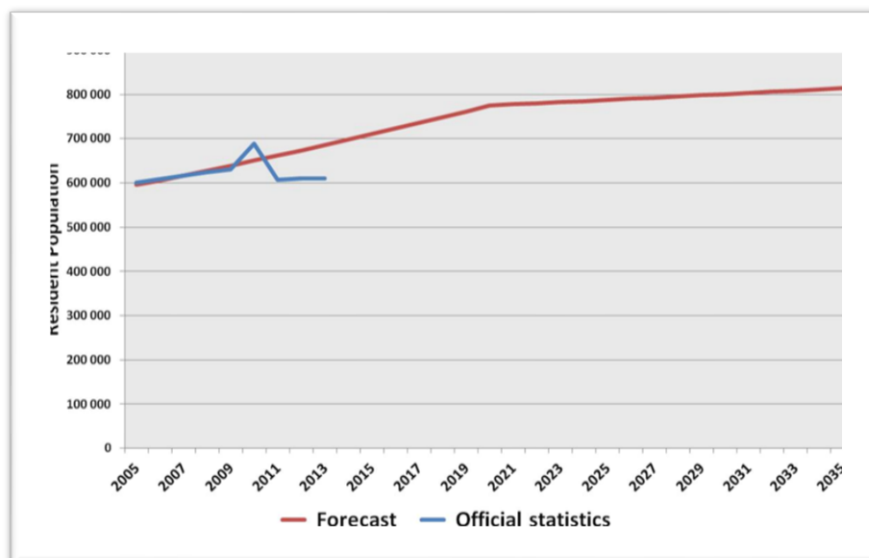
Project objectives are consistent with POVT the operational programme 'Territorial Enhancement', through priority 3: “Prevention, Management and Monitoring of Natural and Technological Risks (Cohesion Fund)”.

7.3.2 Consistency with needs in the territory

The conclusion of project under appreciation, together with the first project already concluded with the financial assistance of the Cohesion Fund⁵⁹, thoroughly improved the environmental situation of the concession territory by upgrading the wastewater treatment facilities of the 'Barreiro/Moita' and 'Seixal' municipalities, which are now complying with the provisions of the EU Waste Water Directive.

Demand projections used to sizing the wastewater treatment plants are fairly consistent with actual values (official statistical data) until 2011 (see Figure 7-3).

Figure 7-3 Demand projections



Sources: Reference 1, Appendix C and INE (National Institute of Statistics)

More recent demographic studies are showing a plateauing trend in the Portuguese population since the middle of the last decade. This trend, which is also occurring in

⁵⁷ Decree-law 58/2005 of 29 December

⁵⁸ Or WFD: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000.

⁵⁹ Project submitted in 2004, mentioned in section 7.2.2, second paragraph.



the project territory, explains the overshooting of the population projections. At the time of the project planning none of the Portuguese population projections predicted such an acceleration of the trend. Major migration phenomena were not part of the predictions, such as the emigration of Portuguese nationals since 2008 (according to some sources it has already accrued to 5% of the total population).

The overshooting of population growth in the forecast was considerably compensated by the increase of the per person average of the wastewater generated in the concession. Thus, capacity constructed meets the service demand and, as part of an integrated system, is more apt to respond to demand fluctuations.

Table 7-5 Wastewater treated in 2014 (planned / realised)

	Projection	Actual	Variation
Concession territory population (2014)	325,000	272,158	- 52,842 (- 16%)
Total wastewater billings (million m ³ /year)	13.2	11.1	-2.1 (- 16%)

Sources: Reference 1, Appendix C and SIMARSUL

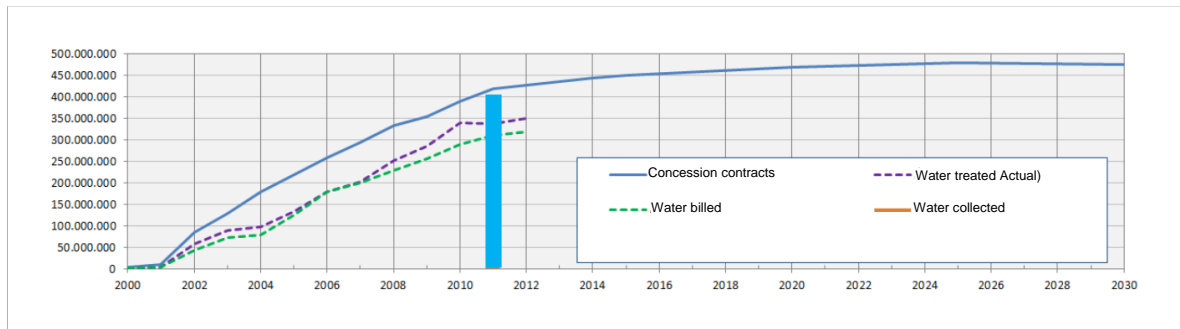
7.4 Project performance

7.4.1 Fulfilment of objectives

As noted in section 2.3 project capacity objectives were attained. This also means that the agglomerations of 'Barreiro/Moita' and 'Seixal' of concession territory and covered by the project are now complying with the EU Urban Waste Water Treatment Directive. This can be confirmed in the thematic map of the European Environment Agency⁶⁰.

Although demand increase is not foreseen during the project economic life (Figure 7-4), the facilities have the flexibility to accommodate a moderate capacity expansion, as well as seasonal demand peaks (e.g.: in holiday periods) and the intensification of processing (e.g.: following stoppage periods for extensive maintenance work).

⁶⁰ <http://www.eea.europa.eu/data-and-maps/uwwtd/interactive-maps/urban-waste-water-treatment-maps-1>, accessed August 2015.

Figure 7-4 Projection of wastewater treatment by multi-municipal systems⁶¹

Source: Reference 18, Appendix C, 3rd volume, p. 37

7.4.2 Implementation effectiveness

In the initial submission, the **time frame for the construction** of the facilities was set from March 2007 to December 2011. In all 4 submissions the milestones were kept invariant. The project was completed in April 2012, approximately 3.6 months behind schedule. This is a small delay of about 5%, considering the duration of construction period.

As already noted, the actual **investment costs** were reduced by 0.5% when compared with the cost foreseen in the initial feasibility studies. This difference is negligible and consistent with the small variation of the construction duration. It is thus assessed that costs were very correctly estimated and this is evidence of a good planning performance.

7.5 Technical and Financial Sustainability

7.5.1 Technical operation

Both wastewater treatment plants and allied piping and pump stations are operating normally since 2011 ('Barreiro/Moita') and 2012 ('Seixal').

Some minor adjustments are now in progress due to the Intensive Energy Consumer System⁶², which became applicable to the new wastewater treatment plants on the 1st year after starting their full operation. These are minor adjustments entailing small capital costs compared to the total investments (EUR 13.2 and 26.0 thousand for the 'Seixal' and 'Barreiro/Moita' wastewater treatment plants, respectively). Though not

⁶¹ Appendix A, Ref 18, Volume 3, p. 37

⁶² SGCIE – *Sistema de Gestão dos Consumos Intensivos de Energia*, approved by Decree-law 71/2008 of April 2008. This system applies to facilities with an energy consumption above 500 toe/year (toe = Tonne of oil equivalent). Such facilities should perform periodic energy audits to screen energy consumption equipment and spot energy consumption inefficiencies. Then an "energy efficiency plan" should be prepared and implemented; frequently these energy efficiency plans have payback periods ranging from 2 to 7 years.



foreseen in the project preparation, the adjustments are quite small and it is considered likely that the energy saving actions will pay the investment cost in a couple of years.

7.5.2 Operating budget

The reported reduction of 4% in the operating costs (Table 7-6) when converted to constant prices of 2007 augments to 13%. This reduction of 13% is only 3% lower than the reduction of the volume of wastewater treated (- 16%, ref. Table 7-5).

This difference is explained by the existence of fixed and other non-proportional costs (e.g.: depreciation, payroll, some consumables) that make the variation less than proportional. So, the variation is reasonable, the costs being in line with the budget.

Table 7-6 Operating costs (planned / realised)

	Projection	Actual	Variation
Operating costs 2014 (EUR thousand/year)	3,121.5	2,994.4	- 127.1 (- 4%)

Sources: Reference 1, Appendix C and SIMARSUL

7.5.3 Financial sustainability

Financing costs were not included in the sensitivity analysis of the feasibility studies appended to the applications⁶³. Some of the financial costs are caused by a major risk the project faced: significant arrears on collecting tariff revenues from city councils.

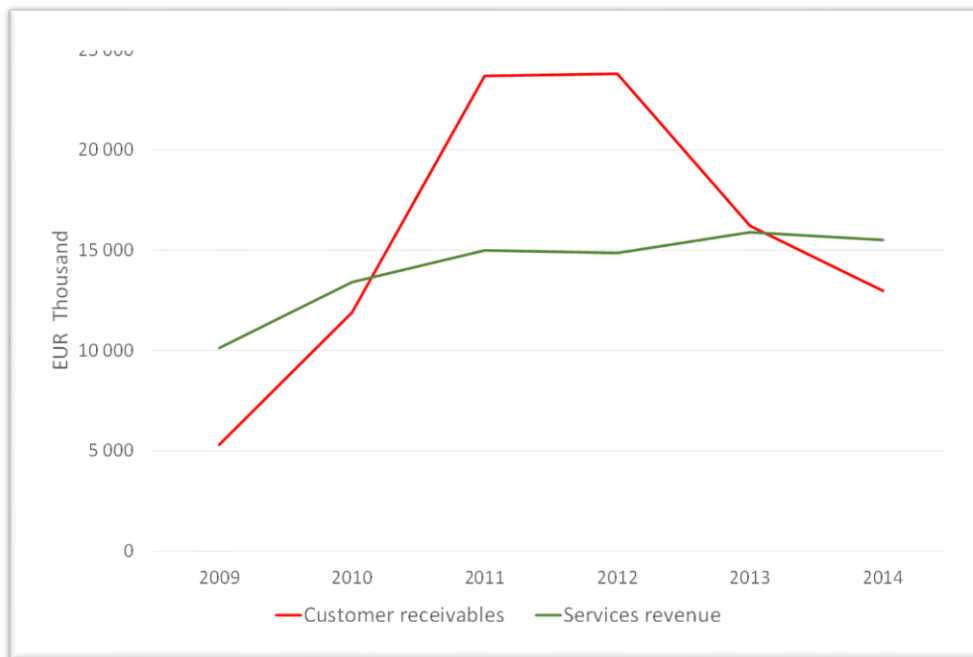
During project execution, significant payment delays arose. Slow payments and arrears from city councils, and from other governmental bodies, are endemic to Portugal since long. This behaviour has been recently exacerbated by the sovereign debt crisis the country has gone through since 2011, which inflicted financial constraints to all layers of governmental institutions.

Other payment delays that were experienced by the project owner concerned the funds coming from the Cohesion Fund assistance. These delays are quite common in operations of EU funding of projects that may be due to formal errors in documentation needing correction, changes of scope or amounts needing re-programming, lengthy procedures in incorporating such changes in formal decisions and other contingencies. Project owners are usually aware of the likelihood of these delays and do some contingency planning to deal with them (e.g.: negotiating bridge financing facilities with banks).

⁶³ In the experience of the authors, major project applications submitted to CF and ERDF by Portuguese and Spanish governments in the last 5 years, generally did not consider these type of financing costs (interest paid to short term credit facilities to compensate collection arrears). Collection periods are usually predicted as a sure thing in the project assumptions submitted with the applications. Furthermore, the risk analysis submitted are usually very poor and frequently not quantified.

City councils arrears accrued during 2011 and 2012 increased customer accounts receivable from EUR 5 million to about EUR 25 million. This fivefold growth of customer dues occurred when turnover from services increased only 11% (Figure 7-5).

Figure 7-5 SIMARSUL Customer receivables (including arrears)



Sources: Reference 19, Appendix C

Since 2013, SIMARSUL negotiated individual agreements with defaulter city councils⁶⁴ to recover the arrears. Since then, the situation is improving as shown in Figure 7-5.

In spite of SIMARSUL cash difficulties brought about by the slow collection from city councils⁶⁵, no negative effect was felt in the rolling out of the project. This is because the sources of financing of the investment operation were properly negotiated and the time schedule carefully prepared. The sources of bridge financing included credit facilities in several banks and the financial support of the major shareholder, 'AdP - Águas de Portugal'.

From a formal stand point, the financial sustainability of the project operation is ensured "by design" as far as the concession contract guarantees that tariffs should cover all costs incurred by the concessionaire. This is the "cost plus" or "cost reimbursement" type of contract, where a contractor is paid for all of its allowed expenses plus additional payment to allow for a profit.

⁶⁴ With the exception of 'Alcochete' city council, which refused to enter into an agreement. Actually this city council keeps defaulting payments and are only paying debts under court order. SIMARSUL financial statements for 2014 reports more than a dozen filed court claims concerning 'Alcochete' arrears amounting to more than EUR 2.1 million.

⁶⁵ That, according to SIMARSUL, forced the reduction of "all actions with financial effort implications", Ref. 16, Appendix 1, p. 5.



The “cost plus” contract is the model that governs most of the multi-municipal systems and central-state/local-state⁶⁶ partnerships in Portugal. The “cost plus” model applies to all costs borne by the concessionaire, net of all non-repayable financing, such as the Union contributions via ESIFs (usually the ERDF or the CF)⁶⁷ and the national public or equivalent subsidies⁶⁸. Usually the contracts have provisions setting benefits resulting from foreseen efficiency or productivity gains that must be taken into account in the calculation of the guaranteed profit of the concessionaire.

Under this “cost plus” system, for each fiscal year, the concessionaire submits tariff revisions⁶⁹ by September of the previous year to an independent regulatory authority⁷⁰. After approval by the regulator⁷¹, tariff changes must also be approved by the grantor of the concession⁷².

This way tariffs and costs are set based on budgetary amounts for a given fiscal year. It is only natural that, after final financial statements for that year are available, variations between the budgeted and the actual revenues and costs are found. Such differences correspond either to deficits (when tariffs and/or costs are underestimated) or surpluses (when they are overestimated).

Figure 7-6 depicts the cumulative values of the tariff differences for ‘AdP’⁷³ in the last five years showing aggregated values of EUR 590.6 million (deficits) and 138.3 million (surpluses) and a net accrued tariff deficit of EUR 452.3 million.

⁶⁶ In mainland Portugal there are only 2 state layers: central state and city/town councils. In the autonomous Atlantic regions of Madeira and Azores archipelagos (about 4.9% of the country’s population) there is an additional intermediate level: regional governments.

⁶⁷ Calculated in accordance with the existing rules concerning the ‘funding gap’ and the ‘co-funding rate’ of the applicable priority axes.

⁶⁸ Fixed assets owned by the city councils or the central state at the moment of the creation of the concession are kept as property of the original owner. At the end of the contractual period, other assets acquired by the concessionaire are to be passed on to the municipalities (which have the first refusal option) or to the central state, at book value (net of fiscal depreciation and corrected for inflation). Assets should be in good operational condition.

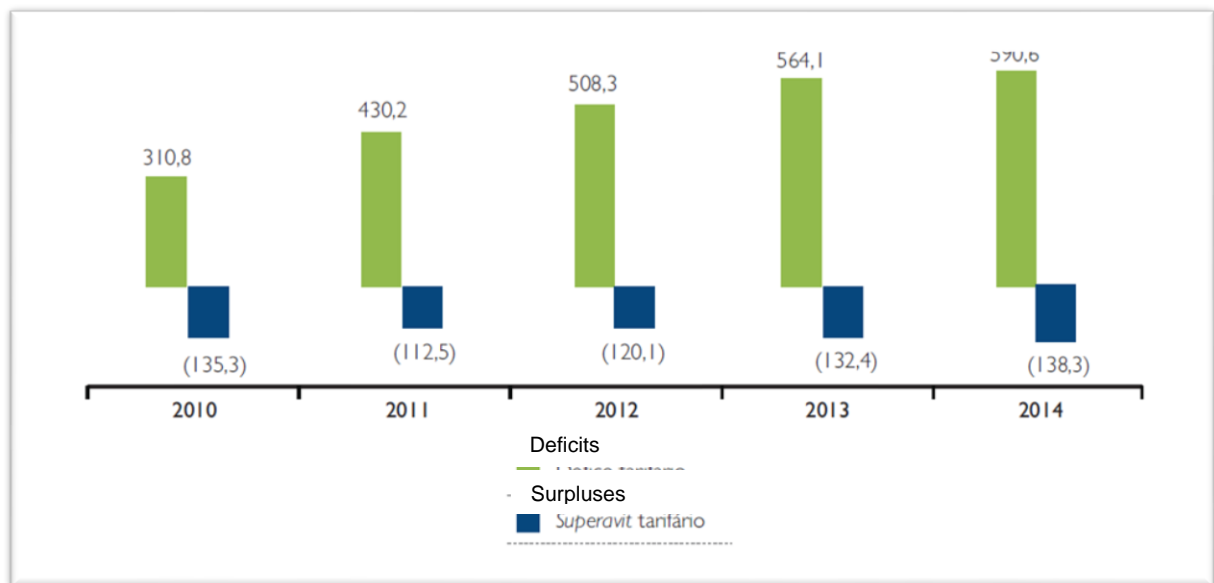
⁶⁹ This revision must conform to the minimum tariff of EUR 0.443/m³ of wastewater, set out in the concession contract. This tariff was defined at 2004 prices and should be corrected in each year by the respective inflation rate.

⁷⁰ In the case of SIMARSUL the regulatory authority is ERSAR, the water and waste services regulation authority, in charge of regulating public water supply services, urban wastewater management services and municipal solid waste management services (http://www.ersar.pt/website_en/Home.aspx).

⁷¹ When differences occur central government may intervene as mediator between the concessionaire and the regulator.

⁷² Typically an agency or different branch of the government from the one that acts as mediator in tariffs setting.

⁷³ Ref. 19, Appendix 1

Figure 7-6 *Águas de Portugal – Tariff differences*

Sources: Reference 19, Appendix C

The difficulties of invoicing and collecting these tariff deficits is still an unresolved issue. In fact, the new legislation passed on 2013⁷⁴, although mentioning the problem, did not offer any solution. More recently, in a presentation of the Ministry of Environment concerning the re-structuring of the 'urban water sector', the recovery of the tariff deficit was estimated to take not less than 25 years, "to avoid worsening more the consumer tariffs"⁷⁵.

The "cost plus" model for SIMARSUL was based on a feasibility study conducted in 2004 by AdP – Águas de Portugal with the collaboration of the city councils. No reference is made in this feasibility study to any previous affordability research concerning access of the population to sanitation services. In the study, tariffs were set at the minimum value needed to ensure that enough revenue is generated to meet the needs of (1) creating a fund for asset replacement, (2) paying dividends in accordance with the target shareholders profitability⁷⁶ and (3) paying the expenditure (operation and maintenance costs, overhead expenses, interest, corporate tax, regulator fee, etc.) required to run the concession and covering other annual costs, such as asset depreciation⁷⁷.

⁷⁴ Decree-law 92/2013 of 11 June 2013.

⁷⁵ "Reestruturação do Sector das Águas – Ciclo Urbano", Ministry of Environment and Urban Planning, October 2014, pp. 40 and 45.

⁷⁶ Gauged to the interest rate of treasury bonds (3-years maturity) plus a spread of 3 percent. The resulting rate is applied to the outstanding share capital (at par) plus accrued legal reserves.

⁷⁷ Ref. 20, Appendix 1, p. 12



7.6 Good practises and possible policy implications

The case under review is an example of good practice in many respects: good performance in terms of investment costs, implementation timeline, conformity to the original specifications, fulfilment of operational objectives (technical operation, operating and maintenance costs), as well as, the critical importance of the undertaking in meeting regional environmental needs and complying with mandatory provisions of EU and national legislation.

Notwithstanding the above favourable conditions under which the project was planned and executed, there are two issues that should be mentioned.

Collection risks

Even though not addressed in the application and allied documentation, the financial risk of slow collections from city councils did not affect the implementation schedule, because contingency financing mechanisms were in place when these risks materialised in 2011/2012.

Collection risks are seldom properly addressed in the submission and accompanying documentation such as the feasibility and risk analysis of the applications Cohesion Policy funding. The nature and size of these risks, which depend on national and local conditions, should be addressed in the feasibility studies and duly incorporated in the risk analysis.

Cost plus approach to the concession contract

Theoretically, the "cost plus" model when properly designed ensures the financial sustainability of the project compatible with fair and affordable tariff policies, notably under public-private partnership arrangements. In the case under review the multi-municipal systems are run by a "public-public" partnership: a central state holding company, "AdP", partnering a service business with local municipalities (which are also the main customers of the service). This, because Portuguese law precludes the majority participation of private interests in multi-municipal systems (see footnote in section 7.2.2).

Thus, in Portugal most of the multi-municipal systems (handling more than 90% of water supply and wastewater treatment) are regulated utilities not operating on market conditions. The role of the regulator also comprises consumer protection, which more frequently than not directly conflicts with the idea of the "essential" nature of the water infrastructure and the "full cost recovery" principle that are predominantly stances of the central government.

Some of the problems of SIMARSUL project illustrate that the "cost plus" model exist within a regulatory and political framework that may supersede the built-in safeguarding clauses of the concession contracts.

As noted before, there is a large amount of long due revenues of the wastewater utilities derived from the tariff deficits (Figure 7-6). In 2010, the regulator submitted a legislation proposal geared to recover such deficits, but so far no legislation was approved to that respect. The supervising ministry already hinted that such recovery would take more than 25 years, to avoid worsening more the consumer tariffs.



In contrast with the declared purposes of the above delay, according to the regulator, "only about 19% of all wastewater utilities recover the full costs", which is publicly corroborated by various utilities that are pressing to increase their revenues from tariffs. The gap of full cost coverage is particularly prevalent in northern, central and 'Alentejo' regions of mainland Portugal.

The regulator states that the "majority of water supply and wastewater sanitation in the Lisbon and Algarve regions show a positive recovery of costs". SIMARSUL, located in the Lisbon region, is probably one of the utilities that are accomplishing the full cost recovery principle with tariffs slightly below the country average.

There are expectations that the recent consolidation of the multi-municipal systems will help in solving the delays that are affecting the financial sustainability of wastewater utilities in Portugal.

Avoiding delays in project implementation

A small delay of about 3 months was inevitable: after contract awarding the site where one of the waste water treatment plants was to be erected was formally retained by the government for the construction of one of the pillars of the planned new bridge across the river Tagus estuary. This entailed the need identifying and studying a new location for the waste water treatment plant.

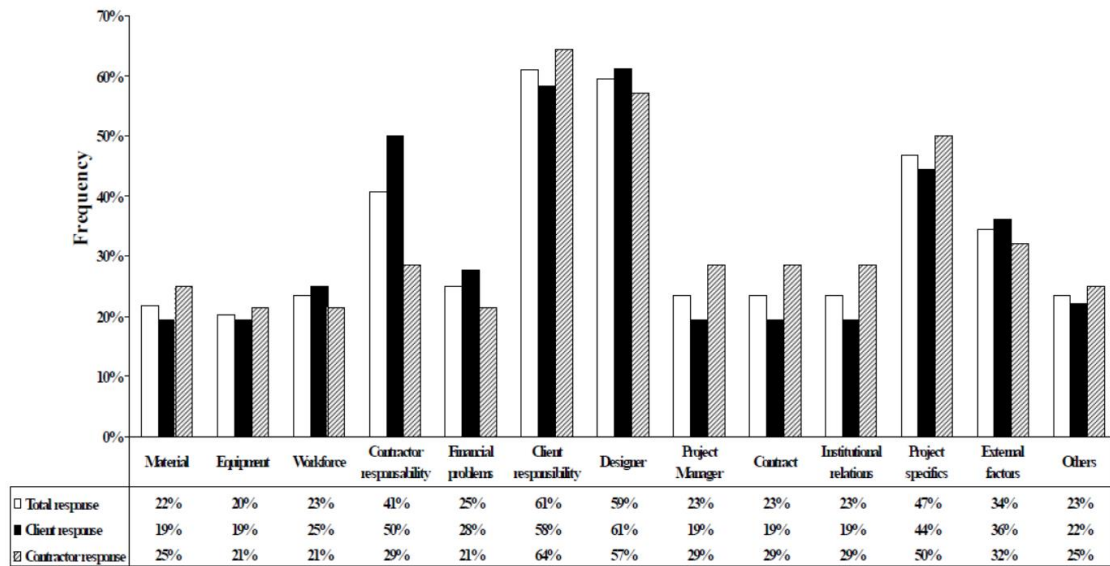
Except for this unforeseeable occurrence, the project was carried out in substantial agreement with budgeted costs and time schedule.

In Portugal, construction delays were specifically addressed in a research project funded by the FCT, the Science and Technology Foundation in 2007/2008⁷⁸. Findings concerning major causes for delays are summarised in Figure 7-7, which is based on a survey carried out at the time among project owners, designers and contractors. In general, the respondents in the survey blame the project owner as the responsible for most of delays.

⁷⁸ Couto, JP & Teixeira, JC, "The Evaluation of the Delays in the Portuguese Construction", CIB World Building Congress, 2007, pp. 292-301

Couto, J.P., "Establishment of the Reasons for the Delays in the Portuguese Construction Industry", 2010 SHEWC - Safety, Health and Environment World Congress, July 25 - 28, 2010, São Paulo, BRAZIL

Figure 7-7 Major causes of delays in Portuguese construction projects



Source: Couto, JP & Teixeira, JC, "The Evaluation of the Delays in the Portuguese Construction", CIB World Building Congress, 2007

The SIMARSUL project was conducted by a subsidiary of "Águas de Portugal", a company with extensive experience in the water supply and waste water processing industry. The company has a significant cadre of well trained and experience technical staff able to cover competently the various disciplines relevant to the successful completion of investment projects in the field.

The project was prepared carefully and benefited from the participation of main stakeholders (the concerned municipalities). Preliminary investigations included engineering and technical studies, site surveys, screening of regulatory environment and other situational variables that could be sources of risk. Contractual and legal factors, including public procurement conditions, were also extensively taken into account. This way it was possible to launch well-grounded public tenders enabling the selection of experienced contractors. Turn-key contractual arrangements led to a very comprehensive, clear, unambiguous and enforceable set of clauses. These included delay related matters, covering both excusable and non-excusable delays.

Well-thought-out construction programmes with a realistic time schedule were submitted by the contractors providing a formal standard against which progress of the works could be measured. The contractual documents also described the methods that the contractor intended to adopt and detailed the personnel and equipment required on site for each stage.

SIMARSUL created an internal task-force made up of own technical staff with appropriate experience and qualifications that followed up closely the constructions works.



8 Renovation and construction of the sewerage system in Brno, Czech Republic

8.1 Executive summary

RENOVATION AND CONSTRUCTION OF THE SEWERAGE SYSTEM IN BRNO

Location (country and region/city)	Czech Republic, Brno
Total investment costs (planned)	<i>EUR 81.1 million (EUR 91.0 million)</i>
Total CF/ERDF contribution (planned)	<i>EUR 35.0 million (EUR 37.8 million)</i>
Start (planned)	March 2012 (July 2011)
End (planned)	February 2014 (December 2013)
Beneficiary	City of Brno
Implementing body	State Environmental Fund
Assistance from JASPERS	yes

The project "Modernisation and Completion of the Brno Sewer System" is located in Brno in the Czech Republic. The project involves enlarging and enhancing the quality (completion and modernisation) of the sewer system that serves the public in two agglomerations, "Brno" (476,370 PE) and "Brno – Žebtín" (2,833 PE) which is a city district within the City of Brno. The project comprises two components. The first component is the modernisation and completion of the sewer system in Brno. The second component involves the extension of the sewer network to three City districts and providing new sewerage connections to increase the service area. Some 4,700 new inhabitants were connected to the sewer system.

The project Beneficiary is the Statutarni Mesti Brno (City of Brno) who owns the infrastructure water and wastewater assets in the City. It has leased the assets to Brněnské vodárny a kanalizace (BVK). BVK is a joint stock company owned by the City of Brno and Suez Environnement/Ondeo. BVK provides water supply and wastewater collection and treatment services.

The objectives of the project are to enhance stormwater management and improve wastewater collection and treatment and thus to comply with the EU Directive 91/271/EEC by improving the water quality of the Svatka River basin in accordance with EU Directive 2006/44/EEC (Quality of Fresh Water needing protection or improvement in order to support fish life).

The project is in line with the national strategic framework for the environment sector and the water and wastewater sector in particular.

The capacity of sewer and stormwater system was constructed as planned and is sufficient for dealing with the stormwater and wastewater from inhabitants in the Brno area. The project objectives have been fulfilled. The project was more or less

implemented according to the outlined plan in the Application, although actual construction start was delayed by 8 months. However, operation of project assets began in May 2014 with a delay of 4 months compared to planned operation. The cost of the construction work was some 10% below estimated construction costs.

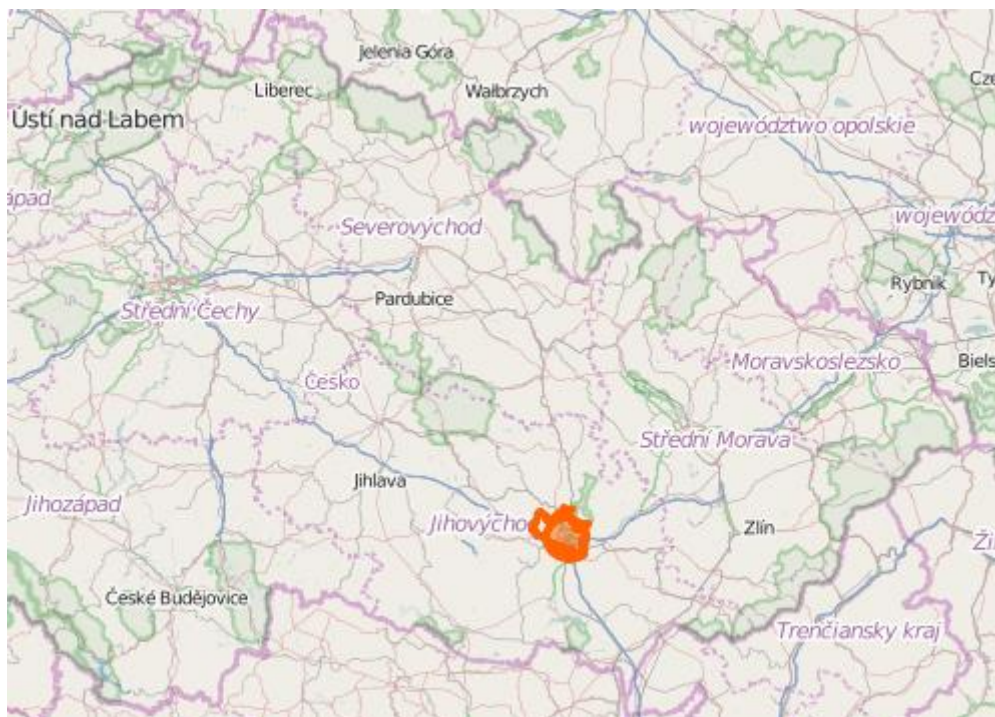
The project is operated sustainably from a technical point of view. No problems have been experienced and no problems are foreseen. The actual operating budget is also in line with what was specified in the Application. BVK does not have any financial problems as all costs are covered by the tariffs and there is a 100% collection rate on tariffs. The project operator is assessed to be financially sustainable and operates the project technically well.

8.2 Project description

8.2.1 Key facts about the project

The project “Modernisation and Completion of the Brno Sewer System” (2009CZ161PR009) is located in Brno in the Czech Republic. Brno is the second largest city in the Czech Republic.

Figure 8-1 Brno



Source: OpenStreetMap.

The project involves enlarging and enhancing the quality (completion and modernisation) of the sewer system that serves the public in two agglomerations, “Brno” (476,370 PE) and “Brno – Žebtín” (2,833 PE) which is a city district within the City of Brno. The project comprises two components. The first component is the



modernisation and completion of the sewer system in Brno with the objective of enhancing stormwater management and improving the water quality in the Svratka and Svitava Rivers. The second component involves the extension of the sewer network to three City districts and providing new sewerage connections to increase the service area.

The total investment costs were in the Application anticipated to be EUR 91.0 million of which EUR 19.6 million were VAT and contingencies for unforeseen expenses. The sources of finance of the investment costs of EUR 91.0 million were according to the Application anticipated to be from an EU grant (EUR 37.8 million), National grants (EUR 38.0 million), and own financing from the Beneficiary – City of Brno (EUR 15.1 million).

The total realised investment costs were after the tenders reduced to EUR 81.1 million, including VAT and allowance of EUR 1 million for unforeseen expenses emerging during the construction period. The reduced construction price is primarily because of realised savings of approximately EUR 4 million on the contractor, but, in general, savings were realised on all cost components including reduced VAT costs. Investment costs were thus EUR 9.8 million or 10% below the estimated investment costs. The financing was obtained as follows: EU grant (EUR 32.6 million), National grants (EUR 35.0 million) of which the State Environmental Fund under the Ministry of Environment provided EUR 1.9 million and the Municipality of Brno provided EUR 33.1 million, and own financing from the Beneficiary (EUR 13.5 million). The Beneficiary is the Application while it amounted to 40% in the actual funding.

8.2.2 Project history and key milestones

The project had a relatively long planning horizon. In April 2007 to December 2008 national feasibility studies were undertaken on how to deal with the stormwater and how to rehabilitate and extend the sewer system. The environmental impact assessment was undertaken from July 2007 to August 2007. The CBA analysis was undertaken from October 2008 to January 2010. Preparation of tender documents was done from March to May 2007.

The construction starting date was assumed to be July 2011 and the completion date was anticipated to be December 2013, with a construction period of 29 months. The actual starting date for construction works was March 2012, some eight months later than the anticipated starting day, and the end date was February 2014; i.e. only two months later than planned. The realised construction period was only 23 months; i.e. 6 month faster than anticipated.

The operation of the infrastructure assets was anticipated to start in January 2014, whereas the actual start of operations took place in May 2014. Hence, the actual implementation period was more or less in accordance with the planned implementation period.



8.2.3 Main objectives and outputs

The main objective of the project was to comply with the EU Directive 91/271/EEC by improving wastewater collection and treatment in the City of Brno. This is achieved by:

- Enhancing stormwater management by reducing the discharges of untreated stormwater / wastewater from the combined sewer system entering the Svratka and Svitava Rivers. The results obtained are thus improved water quality of the Svratka River basin in accordance with EU Directive 2006/44/EEC (Quality of Fresh Water needing protection or improvement in order to support fish life).
- Collecting and disposing of the wastewater produced by the population in three locations with no sewer services and hence to reduce the contamination to the environment.

The output of the project was:

- Completion and modernisation of the sewer system;
- Modernisation and establishment of the stormwater system including establishment of retention tanks;
- Reconstruction and extension of the sewer system in City Districts of Bohunice, Turany, Žebětín and Ivanovice

The planned capacity of the modernisation project was that 11.6 km of main sewers was to be rehabilitated, 13 km of new sewers should be constructed and 3,475 new inhabitants should be connected to the sewer system.

The realised capacity was that 11.0 km of main sewers was rehabilitated, 13 km of new sewers were constructed and 4,712 new inhabitants was connected to the sewer system.

8.2.4 Key stakeholders

The project Beneficiary is the Statutarni Mesti Brno (City of Brno) who owns the water infrastructure and wastewater assets in the City. It has leased the assets to Brněnské vodárny a kanalizace (BVK). BVK is a joint stock company owned by the City of Brno (51%) and Suez Environnement/Ondeo (46%). BVK provides water supply and waste water collection and treatment services.

The relevant authorities apart from the City of Brno and BVK are the Ministry of Environment, the State Environmental Fund and the Ministry of Finance.

The State Environmental Fund under the Ministry of Environment is responsible for the Environmental Operational Programme and for strategic planning in the environmental sector in the Czech Republic. The State Environmental Fund assists also in preparing the Application of the major projects and approves public contracts together with the Ministry of Finance. The State Environmental Fund handles all processes in relation to EU and supervises projects implemented on behalf of the Ministry.



8.3 Relevance of the project

8.3.1 Coherence with policy objectives

The Operational Programme Environment (OPE) is the second largest Czech operational programme. Between 2007 and 2013, the programme has offered around five billion EUR from the Cohesion Fund and the European Regional Development Fund, and an additional EUR 300 million from the National Environmental Fund of the Czech Republic and the state budget. The Operational Programme's main goal is to protect and improve environmental quality throughout the Czech Republic.

The OPE areas of intervention are divided into eight priority axes. This project in Brno falls within the first priority axis:

- "1. The Improvement of Water Management Infrastructure and Reduction of Flood Risks"

Which deals with reduction of pollution of ground and underground water, improve the quality and supply of drinking water and reduce flood risks.

- 1.1 The reduction of water pollution
- 1.2 Drinking Water Quality Improvement
- 1.3 The reduction of flood risks

The project objectives are consistent with the EU Urban Wastewater Directive targets.

The project is in line with the national strategic framework for the environment sector and the water and wastewater sector in particular. Before and after EU Membership, the first priority was wastewater treatment and improvement of environmental conditions in the Czech Republic. The project objectives are coherent with the objectives outlined in the national strategies for the water and wastewater sector. This was part of the selection criteria for the project.

The relevance of technology was investigated during the feasibility study. The chosen technology is appropriate for the problem to be addressed. The technology was relatively simple as it was primarily rehabilitation of sewers and construction of new sewers.

8.3.2 Consistency with needs in the territory

The previous state of the mixed sewer system in the agglomeration of Brno limited the contamination of recipients from rainwater insufficiently. Brno's sewer system was in general very sensitive due to the relatively small water capacity of the wastewater recipients - especially Svatka River and the confluence of the Svitava and Svatka Rivers in the southern part of the city. During heavy storms, there was significant wastewater overflow and an enormous deterioration of water quality in the water courses exceeding the quality indicators for water specified by Government Regulation No. 71/2003 Coll., as amended, implementing Council Directive 78/659/EEC on the quality of fresh water needing protection or improvement in order to support fish life.



With the new system and with the retention tanks constructed the combined rain and wastewater can be retained and directed to the Modrice wastewater treatment plant instead of discharging it to the sensitive rivers. Judging from the first years of operation, the capacity is proportionate to the needs.

It is also deemed appropriate to connect the previous three unserved City districts to the sewer system.

8.4 Project performance

8.4.1 Fulfilment of objectives

The project objectives are outlined in section 8.2.3 and section 8.3.1. The objectives of the project have been fulfilled.

This regards also for the completion of the length of the modernised main sewers, the new sewers as well as the new sewerage connections in the City of Brno area.

8.4.2 Implementation effectiveness

Table 8-1 shows the anticipated dates for the start and completion of the construction works as well as the operational starting date as reported in the Application. This is compared to the actual dates in the column to the right.

Table 8-1 *Planned and realised implementation plan*

Ref.		Application	Realised
		Date	Date
	Construction start date	July 2011	March 2012
	Construction end date	December 2013	February 2014
	Operation start date	January 2014	May 2014

The project was implemented more or less according to planned implementation schedule. The actual construction started 8 months later than anticipated. This was due to various reasons as stated by the Beneficiary:

- (1) Slightly optimistic planning as this was the first major project in the Czech Republic
- (2) compliance with all conditions provided by the State Environmental Fund to the project took slightly longer than anticipated
- (3) the contract between BVK and the City of Brno had to be amended before the launch of the tenders.

The operation of the project assets began in May 2014 with a delay of 4 months compared to planned operation.

The construction work was implemented on schedule and below the estimated budget.



The total realised investment costs were after the tenders reduced to EUR 81.1 million compared to the planned investment costs of EUR 91.0 million. Investment costs were thus EUR 9.8 million or 10% below the estimated investment costs. This size of the savings are primarily due to the economic environment prevailing at the time of the tender. The competition among the contractors were fierce due to the financial crisis whereby prices were reduced. Generally, the State Environmental Fund in the Czech Republic experienced savings of this size on projects during this period.

During interviews with the Beneficiary and BVK as well as the State Environmental Fund, it was stated that contracting a good, experienced and financially strong contractor who delivers high quality outputs was a prerequisite for proper project implementation. However, it was also stated that having an experienced Project Implementation Unit in place employed with proper qualified and experienced staff was essential as well as having a good "Employer's engineer". Those were the main reasons stated for the efficient project implementation.

It was stated by the Beneficiary and BVK, that the support from both the State Environmental Fund as well as from JASPERS was highly appreciated. This project was one of the first major projects to be implemented in the Czech Republic and thus the support in terms of preparing/finalising the Application was appreciated.

No problems or challenges were raised during the interviews.

8.5 Technical and Financial Sustainability

8.5.1 Technical operation

After inspection of three retention tanks which were accessible from the ground and through discussions with the technical personnel of BVK, it is concluded, that the assets are operating as intended and without any operational problems. There have been no operational interruptions in the operations of the assets and no breakdowns since May 2014 where the assets started operating. 70 staff of BVK were trained by the contractor during project implementation and, further, BVK is highly familiar with the operation of such assets. No problems are thus experienced in operating the assets and the workers are capable of operating the assets. There are no organisational issues related to the operations of the facility, which can impede the operational sustainability of the facility.

From a technical point of view, it is thus concluded that the assets are operating as intended and the stormwater is retained in retention tanks before it is led to the Modrice wastewater treatment plant. The reconstruction of the sewerage network was done in order to reduce infiltration of water, which are seen in reduced pumping costs. Hence, the implemented assets are assessed to be technically sustainable.

8.5.2 Operating budget

The operating cost budget was based on the existing operating data from BVK; i.e. historical figures. Hence, it was a question of estimating the additional costs and



savings following the implementation of the project. In this project, there were only additional savings. The incremental savings were due to reduced infiltration of water into the sewer system, which caused a reduction in operating costs. Secondly, given that the sewer and stormwater system was rehabilitated the number of failures on the systems were reduced – which caused savings in operational cost.

The operating costs for the provision of wastewater services was for the years 2012 to 2014 EUR 17.2 million – i.e. the operating costs have been constant. This was also what was expected as per the Application. The costs including depreciation and rent payment has however gone up as expectedly from EUR 30.5 million in 2012 to EUR 32.4 million in 2014. The increase is primarily due to increased rent payment for leasing the beneficiary assets, which have increased following implementation of the project. However, this is covered by the tariffs.

No deviations in the operational costs can be expected in the years to come. No costs elements were misjudged and only small deviations in the operation and maintenance costs will occur due to variations in the volumes of wastewater received at the Modrice wastewater treatment plant.

8.5.3 Financial sustainability

The Beneficiary has not experienced any cash flow problems during the implementation or construction period of the project. The majority of the financing was also provided by the Beneficiary.

The city of Brno owns most of the water and wastewater assets in the Brno municipality. The assets are leased to BVK for operations. In the tariffs are included an element called "rent" which is a lease payment for operating the water and wastewater infrastructure assets. The rent is paid to the City of Brno, but the rent (ring-fenced) has to be used for rehabilitation of the water and wastewater assets. Tariffs are billed customers based on consumed water and collected by BVK and cover all costs. Tariffs have gradually been increased (not substantially as it was not necessary) to cover the net increased rent payments. Water tariffs increased from 26,3 CZK/m³ in 2012 to 27,3 CZK/m³ in 2013 and further to 29,3 CZK/m³ in 2014. Wastewater tariffs were raised from 30,10 CZK/m³ in 2012 to 32,4 CZK/m³ in 2014 exclusive 15% VAT.

BVK has been profitable over the last many years. The company realises an annual net profit of a few percentages of the turnover. BVK have even financed the construction of the Modrice wastewater treatment plant through a 15-year loan from the EBRD back in year 1999. This loan has been repaid, and BVK currently has no loans on the balance sheet.

No cash flow problems has been experienced during the operational period. The City of Brno receives the rent payment and it is used for rehabilitation of the assets. The rent payment is increasing every year – since the network has been expanding. All costs are covered through tariffs charged the consumers for wastewater service provision. BVK does not receive any operating subsidies.



BVK did not experience any problems in relation to the acceptability of tariffs, as tariffs were already increased due to the Modrice WWTP project, and hence the tariff increase following the increase in rent payment was not dramatic following the implementation of this project. The rent payment is increasing gradually until tariffs reaches the estimated level of social acceptable tariffs. Rent payment is used to rehabilitate the assets and covers

The assumptions made in relation to the population's ability to pay for the services are deemed to be realistic and BVK is not experiencing any problems in collecting the water bills, which shows that the water tariffs are below the socially accepted tariff.

No subsidies are required for operations of the new assets as it is fully paid through the tariffs charged to consumers of water for the wastewater services provided.

BVK informed that BVK had annual net profits demonstrating the financial sustainability of the company. For the rehabilitation of the project assets, which deteriorate over time, the City of Brno expects to finance those assets through rent payments, which will be covered in tariff increases

8.6 Good practises and possible policy implications

Good practises and prerequisite for smooth project implementation experienced by the Beneficiary can be summarised as:

- The project was well planned. The feasibility study behind the project was well prepared, including reasonable estimates of costs, and there was no need for major changes during the project.
- The staffing of the Project Implementation Unit at BVK possessed the right qualifications and they could draw upon expertise from the various department within the BVK, the City of Brno and the State Environment Fund as well as from the Ministry of Environment.
- It was emphasized that a good contractor which is financially strong and delivering high quality outputs is essential for proper project implementation.
- Assistance from Jaspers was appreciated.

Problems experienced by the Beneficiary:

- No problems were raised.



9 Malta South Sewage Treatment Infrastructure

9.1 Executive summary

MALTA SOUTH WASTEWATER TREATMENT INFRASTRUCTURE	
Location (country and region/city)	Malta, Malta South, Ta' Barkat
Total investment costs (planned)	EUR 68.0 (68.4)
Total CF/ERDF contribution (planned)	EUR 57.8 million (59.5)
Start (planned)	Dec 2008 (same)
End (planned)	Oct 2010 (same)
Beneficiary	Water Services Corporation, Malta
Implementing body	Water Services Corporation, Malta
Assistance from JASPERS	Yes

The project was intended to bring Malta in line with the Urban Waste Water Directive and the Bathing Water Directive⁷⁹. In doing so it would also contribute to meet the requirements under the Water Framework Directive and selected daughter directives.

10

Until 2010, only a small part of the sewage was treated. One of the consequences hereof was an inability to meet the requirements of the bathing water directive in particular on the beaches in the south eastern part of the main island..

The project was implemented as planned. The project preparations including the drafting of application form had reached an advanced stage in the earlier years of this programming period with the first draft application form being sent to the European Commission in 2007. JASPERS assistance was provided from 2008 up to the approval of the Major Project. The Application was submitted once all permits were issued. The application form was formally submitted in June 2010 and the wastewater treatment plant was commissioned in June 2011.

As a result of the project all wastewater from Malta is now collected. However, discharges do not (yet) comply with the requirements of the Urban Waste Water Directive with respect to pollution removal for Chemical Oxygen Demand and Total Suspended Solids. Malta complies with the Bathing Water Directive. Bathing water quality has improved considerably since 2009 and in 2014 all bathing waters were of excellent quality.

There have been challenges in the technical operation of the plant primarily due to a different than expected composition of the sewage inflow. In particular, since 2012

⁷⁹ See project application form section B.4.1.



some farm waste enters the public sewers. As a result, a large share of the 2013 samples exceeded maximum limits for Chemical Oxygen Demand and Total Suspended Solids. The Water Services Corporation and the Government are working to resolve these issues.

The project application form was accompanied by a tariff and financing plan which includes annual operational subsidies from Government. The application form was prepared in close collaboration with JASPERS and approved by the Commission.

The tariff plan (proposed and realised) includes a volumetric charge on water supplied / wastewater generated, but no component for wastewater composition. Thus, highly polluting non-residential customers pay the same fee as less polluting non-residential customers per m³⁸⁰. In this sense, the polluter pays principle is not fully addressed.

The project assumes annual operational subsidies from Government, and the Water Services Corporation continues to be partly funded from the Government budget. However, this has been the situation since the Water Services Corporation was established in 1991, and there are no indications that financial constraints have impacted negatively on the effectiveness and efficiency of the Water Services Corporation. On the contrary, water supply and sanitation service levels have improved very significantly since 1991 and the Water Services Corporation is a fairly efficient operator in a European perspective.

Data provided by the Water Services Corporation show the actual operational costs to be 38 per cent higher than the estimated operational costs (at full capacity utilization). This is mainly due to two factors: 1) Higher (net) energy consumption than planned due to optimistic forecast of how much energy gas recovery from sludge digestion would generate. 2) Higher consumption of chemicals and more manpower related to higher daily maintenance requirements than planned. This latter factor is linked to the entry of farm waste into the system.

9.2 Project description

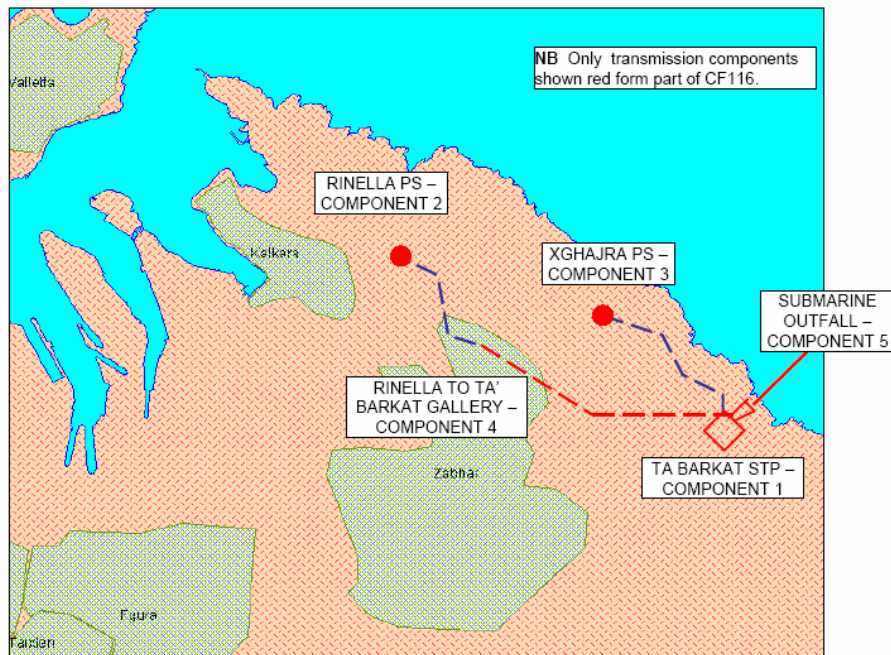
9.2.1 Key facts about the project

The Malta South Wastewater Infrastructure project was funded under priority theme "46 Water Treatment (wastewater)" under the Operational Programme – Investing in Competitiveness for a better Quality of Life, priority axis 5 entitled: "Safeguarding the Environment and Risk Prevention"⁸¹.

⁸⁰ See Project Application Form, Section E.1.3.c.ii., page 47

⁸¹ See page 99 Table 3.3

Figure 9-1 Ta' Barkat



Source: Water Services corporation.

Total realised investment costs were 67.967 million EUR of which cohesion policy funding financed 57.773 million EUR or 85 per cent of the total.

9.2.2 Project history and key milestones

The project has been developed in accordance with the 1992 "Sewerage Master Plan for Malta and Gozo". The first feasibility study was completed in the year 2000. This feasibility study was updated in 2008/09 and the revision was published in May 2010. The first version of the application form and cost-benefit analysis was submitted to JASPERS in October 2008 and the final version of the documentation in June 2010.

Project preparation was very advanced prior to submitting documents to JASPERS. In fact, construction started two months after the initial submission to JASPERS in 2008 and the system became operational in October 2010, four months after submitting the final application form to the European Commission. It is therefore not surprising that the costs and timeline were all estimated with a high degree of precision in the documents submitted to the European Commission.

9.2.3 Main objectives and outputs

Until 2010, only a small part of the sewage was treated. Two Waste Water Treatment Plants in the northern part of Malta and on the island of Gozo treated a combined 24%



of the wastewater of the country (2009) and the new Ta' Barkat plant and related infrastructure was designed to collect and treat the remaining urban wastewater⁸².

The project is intended to bring Malta in line with the Urban Waste Water Directive and the Bathing Water Directive. In doing so it also contributes to meet the requirements under the Water Framework Directive and selected daughter directives.

The project proposed for EU co-funding consist of five components:

- Construction of a new 500,000 p.e. Waste Water Treatment Plant at Ta' Barkat to meet EU discharge standards
- Construction of a new wastewater pumping station at Rinella
- Upgrade of an existing wastewater pumping station in Xghajra
- Construction of a new 1.7 km wastewater gallery for transport of untreated sewage from Rinella to the plant
- Construction of a 1 km submarine outfall for discharge of the treated wastewater into the sea and to serve as storm water outflow.

The planned and realised capacities are identical. The capacity of the plant is 60,000 m³/day and approximately 500,000 p.e. or 29,472 kg BOD₅ / day⁸³. The other project components have been designed to bring wastewater to the new plant and to include a new sea outfall. The capacity of these components match those of the wastewater treatment plant and all components have been physically linked thus allowing the planned environmental objectives to be achieved⁸⁴.

9.2.4 Key stakeholders

The Ministry of Energy and Health (MEH - Energy) is responsible for the public utilities in Malta, including the Water Services Corporation as well as for energy and water policies. The Ministry of Energy and Health (MEH - Health) is responsible for public health including health issues related to drinking water and bathing water.

The Planning, Priorities and Coordination Division from the Ministry for Implementation of the Electoral Manifesto⁸⁵ is the Managing Authority for the Operational Programme – Investing in Competitiveness for a better Quality of Life.

⁸² See project application form section B.5.1

⁸³ According to the application form it is estimated that 20 million m³ sewerage was generated on the Maltese islands in 2009 (equivalent to 55,000 m³ per day) of this 24 percent was treated. The new plant is intended to treat the remaining sewerage and has a capacity of 60,000 m³ per day.

⁸⁴ The evaluation team made a field visit to the Ta' Barkat WWTP on July 8. The plant appears to be fully operational. Construction work on an additional "polishing" unit is ongoing. This "polishing" unit will include UF Reverse Osmosis and Advanced Oxidation (Hydrogen Peroxide combined with UV) and will provide water of potable or near potable quality intended for irrigation and other secondary reuse purposes.

⁸⁵ Previously Office of the Prime Minister up to March 2013.



The Malta Resources Authority is a public corporate body with regulatory responsibilities relating to water, energy and mineral resources. The Malta Resources Authority Act establishes the functions of the Authority which *inter alia* includes the regulation of the utilities and service providers for energy and water services. The Malta Resources Authority is also responsible for regulation of abstraction of groundwater.⁸⁶

The Water Service Corporation (beneficiary and implementing agency) is a 100 per cent Government-owned company established under the Water Service Corporation Act 1991. It is the sole water supply and sanitation service provider on the Maltese islands. The infrastructure resulting from the project is managed by the Wastewater Operations Unit of the Water Services Corporation.

The general public benefits from the improvements to the environment and health (in particular improvements to bathing waters). As households and non-household entities the general public are also Water Services Corporation customers. As such they receive water and wastewater services and pay the corresponding tariffs.

As mentioned below, farmers constitute a small, but important, group of stakeholders. Some farmers are connected to the public sewers, which results in operational challenges as discussed below.

9.3 Relevance of the project

9.3.1 Coherence with policy objectives

As mentioned above the project responds to ecological needs and the need to comply with the Urban Waste Water Directive and the Bathing Water Directive.

Data reported to the European Commission illustrate that Malta complies with Article 3 of the Urban Waste Water Directive⁸⁷ and that four secondary wastewater treatment plants treat all wastewater received. Malta does not discharge to sensitive areas, thus secondary treatment is sufficient. However, Ta' Barkat fails to meet directive requirements for chemical oxygen demand and total suspended solids removal. Thus Malta is not (yet) in compliance with the urban wastewater directive. The reasons for non-compliance and the steps that are being taken to address the issue are discussed in Section 9.5.1.

Full compliance with the Bathing Water Directive has been achieved as illustrated by the EEA Bathing Water Directive Report for the bathing season 2014. Malta has implemented the new Bathing Water Directive, and has reported 87 bathing waters all of which have excellent quality⁸⁸.

⁸⁶ The MRA was established through the Malta Resources Authority Act in the year 2000.

⁸⁷ Article 3 requires that agglomerations are provided with collection systems

⁸⁸ See <http://www.eea.europa.eu/themes/water/status-and-monitoring/state-of-bathing-water/country-reports-2014-bathing-season/malta-2014-bathing-water-report/view>



As noted above, the project is also in accordance with the national sewerage master plan.

Malta does not have a national sludge management plan. The sludge management solution proposed for the initial years is landfilling of sludge. The JASPERS completion note mentions this issue, and offers to support the Maltese authorities in addressing the sludge management issue should they so require⁸⁹. A working group has been established and presented an initial recommendation on a national waste to energy plan. Sludge is one waste stream which is considered as part of this plan. The authorities expect to formulate an action plan and to report this plan to the European Commission⁹⁰.

The project also contributes to meeting the good ecological status requirement of the Water Framework Directive. As mentioned above work is ongoing at the Ta' Barkat site on a "wastewater polishing unit", which will produce 9,000 m³ per day of water of potable or near potable quality intended for irrigation⁹¹. Outside the irrigation season the water will be recharged near the coast into the aquifer system with the intention to slow the natural flow of fresh water to the sea. If successful, this part of the wastewater treatment plant will reduce net abstraction of groundwater and thus contribute to meet the objective for groundwater as per the WFD requirement.

9.3.2 Consistency with needs in the territory

According to the Cost Benefit Analysis, total sewage production was 51,000 m³ / day in 2006 (measured) and is forecasted to reach 60,000 m³ / day in 2020⁹². Gozo and Malta North wastewater treatment plants commissioned in January 2008 and January 2009 respectively constructed before 2008 with a total capacity of 12,700 m³ / day⁹³. The new plant at Ta' Barkat has been designed and built with a capacity of 60,000 m³ / day. It is currently operating close to capacity in terms of hydraulic load and regularly chemical oxygen demand and total suspended solids inflows exceed design capacity. This situation reflects operational challenges which are discussed in section 9.5.1 of this report.

The project was constructed as conceived at the application stage. As mentioned, this is not surprising considering that construction was almost complete at the time of application. The original feasibility study (from year 2000) studied a number of options which all assumed that the existing treatment plant in the area would be upgraded in addition to the construction of a new plant. The 2008/09 revision of the feasibility study found that upgrading of the existing Sant Antnin Plant was not recommended and that building a larger new treatment plant was the more feasible option. At the

⁸⁹ JASPERS completion note section 3.2.2

⁹⁰ Information provided during the interviews on July 8.

⁹¹ The Government of Malta has secured co-funding from this project under ERDF-07-13.

⁹² CBA page 6. The CBA is Annex 3 to the application form. The main text of the application form has slightly different figures, namely actual flow in 2008 of 46,000 m³ /day, forecast dry weather flow for 2010 of 41,642 m³ /day and the value of 60,000 m³ / day is projected for 2023.

⁹³ JASPERS completion note page 4.



same time, a new site for the treatment plant had to be identified as the originally planned site was no longer available. The new site at Ta' Barkat, limits of Xghajra, is 2km South East of the originally proposed site in Kalkara, today accommodating "SmartCity".

9.4 Project performance

9.4.1 Fulfilment of objectives

As described in Section 3.1, the project objectives have been reached in relation to compliance with the Bathing Water Directive, but not yet in relation to compliance with the Urban Waste Water Directive.

9.4.2 Implementation effectiveness

As mentioned above the application preparation process and the actual construction started almost simultaneously. As a result, the formal application was submitted only a few months prior to completion of the construction. Consequently, implementation effectiveness as measured when comparing the application with the actual time schedule and budget is not very meaningful. This notwithstanding, it may be noted that the project was implemented in accordance with the time schedule and budget provided in the application form.

An alternative baseline (alternative to the Application that is) does not exist. However, the evaluation team was informed that an earlier version of the project had originally been proposed for ERDF funding (in 2007). However, it was swapped with a flood management project proposed for CF funding. At the same time, and in response to tender proposals received to the initial request for proposals, the budget for the project was increased⁹⁴. Since the project site was changed at the same time, a straight forward comparison of the original and the revised cost estimates is not meaningful.

9.5 Technical and Financial Sustainability

9.5.1 Technical operation

The Water Services Corporation reports more than 95 percent of all the wastewater generated in Malta is collected and treated. In a few smaller conurbations houses are not connected to the central sewer system, but to a local sewer that is connected to a cesspool. This is emptied on a regular basis by Water Services Corporation.

⁹⁴ Based on oral information received during the July 8 site visit.



In the areas called Marsa Sea, three Cities, Marsa Land and Malta South the collected wastewater is transported to the Ta' Barkat wastewater treatment plant. The wastewater pumping station at Rinella and the new wastewater gallery constructed under the project are important parts of this infrastructure.

The Ta' Barkat wastewater treatment plant is planned to provide secondary treatment meeting the discharge criteria of the Urban Waste Water Directive. Following an analysis of three alternatives, the feasibility study recommended to discontinue the use of the old wastewater treatment plant at Sant Antnin and construct a new centralized treatment plant. Options analysis were also made for site selection and technology. The Ta' Barkat plant uses biological aerated filters technology as recommended by the options analysis. This technology provides operational flexibility and a small footprint for the plant. JASPERS reviewed these analyses and concludes: "The options analysis approach is considered acceptable and results in a technically sound and feasible project."⁹⁵

Treated effluent is discharged to the sea via a 1 kilometre sea outfall, which was also constructed as part of the project. As mentioned above effluent monitoring shows that the effluent does not meet the requirements of the urban wastewater directive in relation to removal of total suspended solids and chemical oxygen demand.

The plant operates at 92 – 94 % of hydraulic load and at almost full capacity in terms of pollution load even sometimes exceeding load capacity with respect to chemical oxygen demand and total suspended solids.

In 2012 and 2013 measured inflow of sewerage received at Ta'Barkat was 56,658 m³ / day and 55,397 m³ / day respectively⁹⁶. This indicates that the plant is being used at 92 – 94 percent capacity from 2012. This is a high rate of utilisation only two years after the plant is put into operation and higher than planned as illustrated in Table 25.

Table 9-1 Ta' Barkat, inflow, treated and capacity utilization

Reference		Expected 1st year full	2012	2013	2014
		Mill m ³	Mill m ³	Mill m ³	Mill m ³
CBA Table 5.3	<i>Flows to Ta' Barkat WWTP:</i>				
	Sewage input received	15.20	20.68	20.22	20.45
	Wastewater treated	15.20	20.68	20.22	18.71
Own calculations	Utilization Rate (inflow)	69%	94%	92%	93%
	Utilization Raten(treated)	69%	94%	92%	85%

Note: During 2014 sewage had to bypass the plant during certain periods due to major cleaning and maintenance operations. The data for sewage inflow 2014 has been estimated (by the Water Services Corporation), not measured.

⁹⁵ JASPERS completion Note page 12

⁹⁶ In the information received from the Water Services Corporation 2014 has been calculated as the average of 2012 and 2013. Therefore, 2014 is not used here.



The Water Services Corporation estimates that as much as 20-25 percent of inflows are due to sea water infiltration⁹⁷. The Water Services Corporation has an ongoing investment program that will reduce infiltration and expect this to provide a sound margin to hydraulic maximum capacity.

"The main operational problems encountered by the plant during the past year are due to the high dissolved organic loading at the inlet which greatly hampers the treatment efficiency of the primary treatment process which in turn impinges on the secondary (biological) treatment stage. Furthermore, unregulated industrial and farmyard discharges are not infrequent and further hamper the treatment process."⁹⁸ Consequently, the plant operates near capacity in terms of pollution load, in particular with respect to chemical oxygen demand and total suspended solids and it experiences a number of mechanical issues (such as wear and tear on pumps, screens, blockages etc.).

The amount of farm waste entering the sewers, has increased in particular since 2012 due to the implementation of the so-called Nitrates Action Program⁹⁹. All Maltese territory has been designated as one Nitrates Vulnerable Zone. The Nitrates Action Program aims to implement the Nitrates Directive¹⁰⁰ and to protect waters against nitrates pollution from agricultural sources. The action program includes a wide range of measures including a requirement that, starting from 2012, farms establish livestock manure storage capacity, which is sufficient to store all manure produced on the farm from the 15th of October to the 15th of March. In view of the short notice, this has not been possible for all farms. While discharge of manure and other farm waste into public sewers is illegal, a decision has been taken at Government level that accepting it for an interim period is the best solution for Malta for the time being. A Farmyard Waste Inter-Ministerial Committee is in the process of concluding a report with options and recommendations as to how to address farm waste,. The Water Services Corporation hopes that they will be able to disconnect farms from the sewers in the near future.

9.5.2 Operating budget

Data provided by the Water Services Corporation show the actual operational costs to be 38 per cent higher than the estimated operational costs (at full capacity utilization)¹⁰¹. The estimated operational costs were based on the experience of running the Sant

⁹⁷ Estimate made by the Water Services Corporation based on measurement of the conductivity of wastewater. Information obtained during interviews on July 8, 2015.

⁹⁸ Annex 1 2012-2013 UWWD Compliance overview submitted to the European Commission.

⁹⁹ Nitrates Action Program, Ministry for Resources and Rural Affairs. Final Draft August 2011.

¹⁰⁰ Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources.

¹⁰¹ The FS table B.1 gives operational costs at 3.6 million EUR (incl. VAT) annually in the first year of operation The CBA table 6.3 gives an annual cost of 4.5 million EUR (including staff) at full capacity operations and the actual figure provided by Water Services Corporation ranges from 6.1 to 7.1 million EUR in the years 2012 to 2014.



Antnin wastewater treatment plant¹⁰². According to information obtained from the Water Services Corporation the higher than planned operational costs are mainly due to two factors: 1) Higher (net) energy consumption than planned due to optimistic forecast of how much energy gas recovery from sludge digestion would generate. 2) Higher consumption of chemicals and more manpower related to higher daily maintenance requirements than planned. This latter factor is (at least partly) linked to the entry of farm waste into the system¹⁰³.

This planning error is a combination of optimism bias in planning (optimistic forecast of gas recovery) and the institutional failure by the Government to deal with the nitrates pollution problem in a timely and adequate fashion, which as described above has led to manure and other farm waste being discharged to public sewers.

The demand analysis included in the application form was reviewed by the authors and this led to several concerns. The methodology applied for demand projections was macro based only (not taking into account the demand from various sectors) and built on an assumed very high income elasticity of demand for water, which is not founded on water being a basic necessity nor on empirical findings¹⁰⁴. While the high income elasticity may have led to overestimation of demand, the lack of attention to specific sectors (tourism in particular) may have led to underestimation of demand. With the current situation of farm waste entering the system, it is not possible to establish whether demand was in fact correctly estimated or not.

9.5.3 Financial sustainability

The final application form included a tariff plan according to which it is, or should have been, clear to the readers that the project would not be financially sustainable. This application form had been reviewed by JASPERS¹⁰⁵. While JASPERS noted that there

¹⁰² See CBA page 49.

¹⁰³ Information received orally during interviews on July 8

¹⁰⁴ It is this very high income elasticity combined with assumed annual GDP growth rates of 2-6% that lead to projections of water demand increasing by 91% in the period 2010-2038. For households this means an increase from 105 l/person/day in 2009 to 200 litres in 2038, assuming an unchanged population. Resulting from this large increase is sewage flows to the proposed WWTP increasing from 41,600 m³/day in 2010 to 60,000 m³/day in 2023 already (AF p. 22) representing an increase of 44% over just 14 years. This level is the design capacity of the WWTP.

¹⁰⁵ The full text of JASPERS conclusions with regard to Financial and Economic Issues is: "The project, with EU financial assistance and the proposed tariff increases, demonstrates a satisfactory financial sustainability and economic viability. The calculations for the funding rate, financial sustainability and economic viability are in line with the requirements of Working Document 4, Article 55 and also comply with comments issued by JASPERS during the revision of the documentation.

The argument presented regarding the affordability levels and the potential problems in willingness to pay if higher tariff increases are considered is, in JASPERS opinion, acceptable in light of the already reasonable high levels of average tariffs, deriving from recent tariff increases meant to move towards a full cost recovery levels. In addition, it shall be considered that further tariff increases might be required in future years as a consequence of the implementation of the Master Plan for Sewage Collection being prepared by the Water Services Corporation.



were issues related to affordability and willingness to pay it was concluded: "The project, with EU financial assistance and the proposed tariff increases, demonstrates a satisfactory financial sustainability and economic viability." One peculiarity in the submitted tariff plan was that tariffs were deemed to be already at the four percent of average household incomes and thus already at the affordability level. The careful reader would have noticed that that these four percent included water as well as electricity expenditures. Hence, despite obvious shortcomings in respect to financial sustainability and full cost recovery, the plan was accepted by JASPERS. This is related to the special system of operational subsidies implemented in Malta.

Operational subsidies have been provided to the Water Services Corporation since 1991. They have been justified with reference to the public goods value of wastewater collection and treatment. When the wastewater re-use and aquifer recharge project has been completed the value of groundwater "saved" will be equivalent to the annual operational subsidy (according to calculations of the value of groundwater in Malta). The Government argues that the subsidy can be considered a payment for ecological services.

The Government of Malta has informed JASPERS and the Commission about these operational subsidies as part of their application for funding. The Commission has financed the project on this basis. Operational costs have exceeded the project budget (with 1 – 2 million EUR annually). However, this has not had any negative impact on operations as the combined Water Services Corporation tariff revenues and Government transfer has been sufficient for effective operations.

The financial sustainability, cost recovery and polluter pays issues were probed with representatives of the Water Services Corporation and the Ministry of Energy and Health during the field visit and meetings on July 8, 2015.

The principle of recovery of costs of water services is considered in the operations of the Water Services Corporation, with the effective cost recovery rate of the entire range of water services currently standing at around 75%. Tariff revenues of approximately 60 million EUR annually cover the full cost of potable water supply (including capital replacement charges etc.) and approximately 50 per cent of the full cost of wastewater¹⁰⁶. The shortfall is covered through an annual national budget allocation from the Ministry of Finance. This has been the system since the Water Services Corporation was established in 1991. Representatives of the Ministry of Energy and Health mentioned that a study on the value of groundwater in Malta has recently been completed. Taking into account the reduced ground water abstraction that is expected to follow from the Waste Water Treatment Plant project including the

The proposed approach for tariff setting shall be confirmed and detailed in a tariff policy by the Water Services Corporation before finalisation of the project implementation." JASPERS Action Completion Note for Malta South Sewage Infrastructure dated July 2, 2010 forwarded to the Government of Malta the same date.

¹⁰⁶ Oral information provided by representatives of the Ministry of Energy and Health on July 8. It is important to remember that most drinking water in Malta is supplied using Reverse Osmosis desalination plants, and thus is relatively costly.



new “polishing unit”, the economic net benefits hereof are equivalent to the annual net transfer from the Government budget to the Water Services Corporation. This budget transfer can therefore be seen as a payment for ecological services¹⁰⁷.

Consumers of water and wastewater services are charged a joint water and wastewater tariff. The tariff structure includes three consumer groups, it has increasing block tariffs for each consumer group, and, a dual tariff system with a fixed fee (depending on the type of connection) and a volumetric fee. The annual fixed fee is lower for residential than non-residential consumers (59 EUR versus 130 EUR per annum). All consumers are metered. There is no special wastewater tariff and no consideration of the quality of effluent discharge to the public sewers. Thus heavy polluters will pay according to the same “non-residential premises” tariff schedule as administration and other services whose wastewater is only a little polluted. In short, the polluter pays principle is implemented in a partial manner, which does not cater for differences in the operating conditions of certain specific sub-sectors of consumers. This is surprising in a situation where high dissolved organic loading at the inlet hampers the treatment processes and is a major reason for non-compliance¹⁰⁸.

The Water Services Corporation informs that in order to protect their revenues, they have outsourced billing and collection to a company that is jointly owned with the Malta electricity distribution company. This company operates a successful billing and collection program with a low ratio of non-collectables. The Water Services Corporation also actively pursues any information on illegal connections and operates a program of spot checks.

On the basis of the information in the Application Form, it was concluded that the financial sustainability of the project was in part dependent upon the continuation of government subsidies to recover the cost of the environmental and resource benefits generated by the project in order to maintain operations at the required service level. However, there are strong indications that the lack of financial sustainability may not be a problem. The Water Services Corporation is a relatively efficient operator with a comparatively low level of Non-Revenue-Water, etc¹⁰⁹. It may also be noted that the water supply and sewerage services quality has increased considerably since 1991 where water supply was intermittent and only a very small proportion of wastewater

¹⁰⁷ Oral information provided by representatives of the MEH on July 8.

¹⁰⁸ In a written response to the draft to this report the Government of Malta has argued: “Given that all legal discharges to sewers from industrial and commercial premises have to attain the qualitative limits prescribed by the Sewer Discharge Regulations, the breakdown of this fixed costs into heavy and non-heavy discharges is not deemed necessary at this stage; given that this annual fee applies to all discharges regulated under the Sewer Discharge Regulations – and which therefore discharge below the limits of these Regulation”. They have also argued that illegal farm waste is a major cause of the high organic load and that the issue of how to disconnect farms from public sewers is being addressed separately. Comments received by E-mail on July 28, 2015.

¹⁰⁹ According to oral information provided by the Water Services Corporation, a water loss of 4,000 m³ loss per hour in 1995 has been reduced to 390 m³ loss per hour. As a result of this aggressive water leakage reduction program, the Water Services Corporation now operates only 3 of the 5 Reverse Osmosis water treatment plants and supplies water 24/7. When compared to other Mediterranean utilities, the Water Services Corporation has low levels of NRW.



was treated. Today, Malta has 24/7 supply of potable water and more than 95 per cent of the wastewater generated is treated in secondary treatment plants.

9.6 Good practises and possible policy implications

Investments have been implemented in accordance with a Master Plan produced as early as 1992. There is a continuous service improvement with a logical sequence. Initially water supply services have been improved through a reduction of network leakages which has enabled Water Services Corporation to provide safe water on a continuous basis¹¹⁰. The entire territory has been sewerred and collected wastewater is now treated. A project to enhance the re-use of wastewater in agriculture and to reduce net groundwater abstraction through aquifer recharge has been initiated and the Government intends to apply for ERDF funding for the purpose.

The Government of Malta follows a practice whereby projects are planned, implemented and financed as per national priorities and with national funding. Eligible projects are then submitted for co-funding under structural funds. This approach minimises delays and cost overruns and enables a more accurate description of environmental objectives to be achieved. The approach of Malta is possible due a combination of a strong government budget balance and a well-planned capital investment program by the Ministry of Finance.

¹¹⁰ Drinking water in Malta is supplied from a mix of desalinated sea-water and ground water. Malta has 11 large water supply zones. With regard to conformity; the 11 Water Quality Zones all comply with all the relevant microbiological and chemical parameters listed under Annex I Part A and B of the Directive, except for Boron in 1 Water Quality Zone for the years 2012 and 2013. Boron is a challenge for water supply based exclusively on desalinated seawater. However, most of the Water Quality Zones being reported fail to conform to 3 to 4 chemical parameters listed under Annex I Part C. Non-compliance for Chloride, Sodium and Conductivity is mainly due to sea water intrusion in the groundwater acquifers. Source: Reporting on drinking water compliance for the year 2011-2013 to the European Commission.



Appendix A Persons met



Project for the treatment, valorisation and final disposal of urban solid waste of the inter-municipal system of the "Litoral Centro" region (ERSUC), Portugal

Title	Name	Organisation, Position
Ms	Helena Martins	ERSUC, Financial Manager
Mr	Ricardo Henriques	ERSUC, Technical Manager
Ms	Isabel Martins	POSEUR, Head of Department
Ms	João Vilhena	POSEUR, Officer

ERSUC SA Rua Alexandre Herculano nº 21 B 3030 - 501 Coimbra Tel : +351 239 851 910 / Fax : +351 239 851 918 www.ersuc.pt	POSEUR (formerly POVT) Av. Columbano Bordalo Pinheiro, 5 1099-019 Lisboa Tel: +351 211 545 000 / Fax: +351 211 545 099 https://poseur.portugal2020.pt/
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Integrated Waste Management System in Cluj County, Romania

Day and time	Organisation	Persons met
Wednesday 01.07.2015		
15:30-17:00	Ministerul Fondurilor Europene (Managing Authority) Calea Serban Voda, nr 30-31, sector 4, Bucuresti	Mrs Valeria SCHIFIRNEȚ-ȘUȚU (Valeria.Schifirnet@fonduri-ue.ro, +40 021 300 62 76, +40 0754 231 559) Mrs Gabriela AUGAISAU (gabriela.dagaiasu@fonduri-ue.ro, +40 754 231 557) Mrs Lauiela CAUSTAUTIA (laluiela.caustautia@fonduri-ue.ro, +40 754 231 155) Mrs Teodora MALETA (teodora.malita@fonduri-ue.ro, +40 754 231 045)
Thursday 02.07.2015		
11:00-13:00	Ministerul Fondurilor Europene (Managing Authority) Organismul Intermediar	Mrs Codruta Simule Mr Bogdan Salajan Mr Catalin Gorgan



	Regional POS Mediu Cluj-Napoca Cluj-Napoca, Romania Str. Minerilor, nr. 47	Mr Vasile Cimbrudean
Friday 03.07.2015		
9:00-11:00	Site visit	Mr Alexandru Cretu - Technical Implementation Coordinator Mrs Rusee Claudia - Technical responsible
11:00-13:00	Meeting with beneficiary, i.e. the Cluj County Council CALEA DOROBANTILOR NO 106, CLUJ NAPOCA. (+40 372 64 00 00)	Mrs Mariana Ratiu - Project Manager Mrs Diana Coman - Project assistant Mrs Cristina Schiop - financial Officer Mr Alexandru Cretu - Technical Implementation Coordinator Mrs Rusee Claudia - Technical responsible
20:00-21:00	Meeting with consultant who assisted IDA in developing tariff structure	Mr Marius BAICAN EPMC Consulting



Case study on Renovation of Water Supply Systems in the Kohtla-Järve Area, Estonia

Day and time	Organisation	Persons met
Wednesday 8/7/2015		
14:00-15:00	Ministry of Environment	Mr Antti TOORMING Head of Projects Bureau, Water Department
Cancelled by interviewee	Environmental Investment Centre	Ms Tiiu NOORMAA Executive Coordinator (water management)
Thursday 9.7.2015		
14:00-15:00	Jõhvi Municipal Government	Mr Aivo TAMM Specialist Mr Rein LUUSE Development advisor
15:00-16:30	Site visit	Mr Robert JÄRVELÄINEN Project manager
Friday 9.7.2015		
10:00-11:00	Lüganuse Municipal Government	Mr Toomas MARTIN Specialist
11:30-12:00	Järve Biopuhastus OÜ	Mr Vladislav PETUHOV Managing Director
12:00-13:00	Järve Biopuhastus OÜ	Mr Robert JÄRVELÄINEN Project manager
13:00-13:30	Järve Biopuhastus OÜ	Ms Andra PÄRNAMÄE Technical officer
13:30-14:00	Järve Biopuhastus OÜ	Mr Tõnis TAMM Financial officer



Water and sewage management project in Żory, Poland

The following persons were interviewed in the preparation of this case study:

From the City of Żory:

Waldemar Socha, Mayor

From the utility company:

Michał Pieczonka, Chairman of Management Board, MAO

Henryka Kołodziej, Member of the Management Board, Main Accountant

Ewa Szypulska, Member of the Management Board, Accountant

From the PIU:

Ewa Kaczmarczyk, Head of PIU

Sebastian Kula, Deputy Head of PIU

Agnieszka Ruszała, Specialist responsible for organization and for procedures at PIU

Monika Sapeta-Pyszny, Specialist responsible for investments and planning at PIU

Anna Gajewska, Specialist responsible for financial issues at PIU

Barbara Zawartka, Specialist responsible organization and for monitoring of procedures at PIU

Collection, transport, treatment and disposal of sewage in Koropiou and Paianias areas, Greece

1. Management Authority

Dimitris Drosis, Director, Intermediate Management Authority of Attica, tel. 213 1501 521

2. EYDAP

Konstantinos Vougiouklakis Executive Director, Project Development and Production, tel. 210 7495 428-30

Stella Raptou, Director of Infrastructure, tel. 210 7495 944

3. Municipalities

Dimitris Kiouis, Mayor of Koropi, tel. 210 6622 324

Dimitris Alexiou, Deputy Mayor of Peania, tel. 213 2030 703

4. Implementation Body

Stavros Lazaridis, Director, Department of Hydraulic Works/ Directorate of Technical Works of the Region of Attica, tel. 213 2065 336



Miltiadis Kirkos, Director, Department of Building Works/ Directorate of Technical Works of the Region of Attica, tel. 213 2065 341

Sanitation sub-systems of Barreiro/Moita and Seixal (SIMARSUL), Portugal

Title	Name	Organisation, Position
Mr	Vitor Ferreira	SIMARSUL, Financial Manager
Ms	Alexandra Fernandes	SIMARSUL, Technical Manager
Ms	Lisete Epifâneo	SIMARSUL, Assistant Technical Manager
Ms	Helena Azevedo	POSEUR, President of the Executive Committee
Ms	Andreia Ramos	POSEUR, Officer

<p>Águas de Lisboa e Vale do Tejo, SA (formerly SIMARSUL SA) Av. Luísa Todi, 300-3º 2900-452 Setúbal Tel: +351 265 544 000 / Fax: +351 265 544 001 http://www.adlvt.pt</p>	<p>POSEUR (formerly POVTT) Av. Columbano Bordalo Pinheiro, 5 1099-019 Lisboa Tel: +351 211 545 000 / Fax: +351 211 545 099 https://poseur.portugal2020.pt/</p>
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Renovation and constr. of sewerage system in Brno, Czech Republic

Day and time	Organisation	Persons met
Wednesday 17.6.2015		
13:00-15:00	State Environmental Fund	<p><u>State Environmental Fund</u> Thomas Prokop, Head of Waste management Section</p> <p>San Srail, Project Manager</p> <p>Gabriela Kriwasnkova, Head of Department of Monitoring water projects</p> <p>Radka Leva, Head of Department of project preparation</p> <p>Vranikova Ivana, Head of Water Protection Section</p> <p><u>Ministry of Environment</u> Zdenik Springar, Ministry of Environment</p> <p><u>PIU:</u> Ing. Karel Komzák (kkomzak@bvk.cz)</p> <p><u>Za OI MMB:</u></p>



		<p>Ing. Jana Jakubů, manažer projektu (jakubu.jana@brno.cz)</p> <p><u>Za spol. COWI, auditní orgán EU</u></p>
Thursday 18.6.2015		
9:00-10:00	Preliminary discussions	<p><u>BVK</u> Ing. Ladislav Haška, generální ředitel, (lhaska@bvk.cz) Ing. Zdeněk Herman, ředitel finanční sekce (zherman@bvk.cz) Ing. Petr Šindler, ředitel technické sekce (psindler@bvk.cz)</p> <p><u>PIU:</u> Ing. Karel Komzák (kkomzak@bvk.cz)</p> <p><u>Za OI MMB:</u> Ing. Jana Jakubů, manažer projektu (jakubu.jana@brno.cz) Jana Indrová, administrátor projektu (indrova.jana@brno.cz)</p> <p><u>Za spol. COWI, auditní orgán EU</u></p>
10:00-13:00	Site visit to the stormwater retention bassins	<p><u>BVK</u> Ing. Zdeněk Herman, ředitel finanční sekce (zherman@bvk.cz) Ing. Petr Šindler, ředitel technické sekce (psindler@bvk.cz)</p> <p><u>PIU:</u> Ing. Karel Komzák (kkomzak@bvk.cz)</p> <p><u>Za OI MMB:</u> Ing. Jana Jakubů, manažer projektu (jakubu.jana@brno.cz) Jana Indrová, administrátor projektu (indrova.jana@brno.cz)</p> <p><u>Za spol. COWI, auditní orgán EU</u></p>
13:00-17:00		<p><u>BVK</u> Ing. Ladislav Haška, generální ředitel, (lhaska@bvk.cz) Ing. Zdeněk Herman, ředitel finanční sekce (zherman@bvk.cz) Ing. Petr Šindler, ředitel technické sekce (psindler@bvk.cz)</p> <p><u>PIU:</u></p>



		<p>Ing. Karel Komzák (kkomzak@bvk.cz)</p> <p><u>Za OI MMB:</u> Ing. Jana Jakubů, manažer projektu (jakubu.jana@brno.cz) Jana Indrová, administrátor projektu (indrova.jana@brno.cz)</p> <p><u>Za spol. COWI, auditní orgán EU</u></p>
Friday 19.6.2015		
8:00-11:00	BVK – Final project discussions	<p><u>BVK</u> Ing. Ladislav Haška, generální ředitel, (lhaska@bvk.cz) Ing. Zdeněk Herman, ředitel finanční sekce (zherman@bvk.cz) Ing. Petr Šindler, ředitel technické sekce (psindler@bvk.cz)</p> <p><u>PIU:</u> Ing. Karel Komzák (kkomzak@bvk.cz)</p> <p><u>Za OI MMB:</u> Ing. Jana Jakubů, manažer projektu (jakubu.jana@brno.cz) Jana Indrová, administrátor projektu (indrova.jana@brno.cz)</p> <p><u>Za spol. COWI, auditní orgán EU</u></p>



Malta South Sewage Treatment Infrastructure



Ex-Post Evaluation Meeting with COWI A/S (DK)

Wednesday 8th July, 2015

AGENDA

- 10:30-11:30 **Introductory meeting and interview with the Managing Authority (PPCD, St Venera)**
- (Mr Jonathan Vassallo, Head MA)
(Dr Scicluna Bajada, Head OPI)
(Dr Daniela Grech, Senior Manager OPI)
- 12:00-13:30: **CF116 Site Visit (Water Services Corporation, Tal-Bankat l-o Xghajra)**
- (Mr Manuel Sapiano, Chief Technical Officer (Water))
(Dr Ing. Paul Micallef, Executive Director, WSC)
(Ing. Stefan Cachia, Project Leader CF116, WSC)
- 14:00-15:00: **Interview with Ministry, MEH-Energy (PPCD, St Venera)**
- (Mr Ronald Mizzi, Permanent Secretary)
(Mr Manuel Sapiano, Chief Technical Officer (Water))
(Ms Karen Demicoll, Director)
- 15:00-17:00: **Interview with Beneficiary, Water Services Corporation (PPCD, St Venera)**
- (Mr Manuel Sapiano, Chief Technical Officer (Water))
(Dr Ing. Paul Micallef, Executive Director, WSC)
(Ing. Stefan Cachia, Project Leader CF116, WSC)

Parliamentary Secretariat for the EU Presidency 2017 and EU Funds
Triq il-Kukkarja, Santa Venera, SVR 1411
TELEPHONE: 00358 2200 1142; TELEFAX: 00358 2200 1141

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Appendix B ERSUC reference documents

1. Application Form (*PEDIDO DE CONFIRMAÇÃO DE APOIO AO ABRIGO DOS ARTIGOS 39.º A 41.º DO REGULAMENTO (CE) N.º 1083/2006*), Helena Pinheiro de Azevedo, 22/01/2009.
2. Application Form *bis* (*PEDIDO DE CONFIRMAÇÃO DE APOIO AO ABRIGO DOS ARTIGOS 39.º A 41.º DO REGULAMENTO (CE) N.º 1083/2006*), Helena Pinheiro de Azevedo, 24/06/2009.
3. Application Form *ter* (*PEDIDO DE CONFIRMAÇÃO DE APOIO AO ABRIGO DOS ARTIGOS 39.º A 41.º DO REGULAMENTO (CE) N.º 1083/2006*), Helena Pinheiro de Azevedo, 27/04/2012.
4. Financial and Economic Feasibility Study (*ANEXO II – Estudo de Viabilidade Económico Financeira*), ERSUC, January 2009.
5. Financial and Economic Feasibility Study *bis* (*ANÁLISE ECONÓMICO-FINANCEIRA DO PROJECTO DE INVESTIMENTO*), ERSUC, June 2009.
6. Annex III – Concession contract between the Portuguese State and ERSUC (*ANEXO III – Contrato de Concessão celebrado entre o Estado Português e a ERSUC*), 14/03/1997.
7. Annex V – Legislation concerning the creation and expansion of the Centre-litoral multi-municipal system, as well as the Articles of Incorporation and Business Plan of ERSUC (*Anexo V – Legislação respeitante à criação e alargamento do Sistema Multimunicipal do Litoral Centro, bem como os Estatutos e o Plano de Negócios da ERSU*), 5 documents, various dates.
8. Annex VI – Authorisations and opinions (*Anexo VI – Autorizações e Pareceres*), 6 documents, various dates.
9. Annex VII – Public procurement documentation (*Anexo VII – Contratação Pública*), 2 tender notices, 19/03/2008 (OJEU) and 26/03/2008 (*Diário da República*).
10. Commission Decisions (Decisões da Comissão), 2 documents: (1) Siim Kallas, 30/11/2009 and (2) Joannes Hahn, 15/01/2013
11. Annex I - Declaration from the Natura 2000 Network authority, ICNB, undated
12. Correspondence (5 documents) and attachments (6 documents), various authors, various dates.
13. PERSU II - Strategic Plan for Solid Urban Waste 2007 – 2016 (*Plano Estratégico para os Resíduos Sólidos Urbanos*), Ministry of Environment, 2007



14. PERSU 2020 - Strategic Plan for Solid Urban Waste 2020 (*Plano Estratégico para os Resíduos Sólidos Urbanos*), Proposal for public consultation, Ministry of Environment, 2014
15. ERSUC, Report & Accounts (*Relatório e Contas*), 2008, 2009, 2010, 2011, 2012, 2013, 2014



Appendix C SIMARSUL reference documents

1. AF - Application Form (*PEDIDO DE CONFIRMAÇÃO DE APOIO AO ABRIGO DOS ARTIGOS 39.º A 41.º DO REGULAMENTO (CE) N.º 1083/2006*), HELENA DA CONCEIÇÃO PINHEIRO LOURENÇO DE AZEVEDO, 2009/08/17
2. AF - Application Form *bis* (*PEDIDO DE CONFIRMAÇÃO DE APOIO AO ABRIGO DOS ARTIGOS 39.º A 41.º DO REGULAMENTO (CE) N.º 1083/2006*), Digitally signed by HELENA DA CONCEIÇÃO PINHEIRO LOURENÇO DE AZEVEDO, POVT, 2011/10/31 11:29:38 Z
3. AF - Application Form *ter* (*PEDIDO DE CONFIRMAÇÃO DE APOIO AO ABRIGO DOS ARTIGOS 39.º A 41.º DO REGULAMENTO (CE) N.º 1083/2006*), Digitally signed by HELENA DA CONCEIÇÃO PINHEIRO LOURENÇO DE AZEVEDO, POVT, 2012/04/18 19:56:29 Z
4. AF - Application Form *quater* (*PEDIDO DE CONFIRMAÇÃO DE APOIO AO ABRIGO DOS ARTIGOS 39.º A 41.º DO REGULAMENTO (CE) N.º 1083/2006*), Digitally signed by HELENA DA CONCEIÇÃO PINHEIRO LOURENÇO DE AZEVEDO, POVT, 2013/02/07 17:52:29 Z
5. Annex I to the AF, item D.1 – Timetable (*CALENDÁRIO SÍNTESE DAS PRINCIPAIS CATEGORIAS DE TRABALHOS*), unsigned, undated
6. Annex II to the AF, Project description (*MEMÓRIA DESCRITIVA DA OPERAÇÃO*), SIMARSUL, undated [Includes 6 appendices with description of specific components of the investment operation: 2 waste water treatment plants, 2 drainage/pumping systems, 2 layout maps]
7. Annex III to the AF, Environmental Impact Assessment and accompanying studies (*AVALIAÇÃO DE IMPACTE AMBIENTAL*), [Includes 8 documents, several authors and dates concerning impact assessment of 2 waste water treatment plants: “Seixal” and “Barreiro/Moita”]
8. Annex IV to the AF, Financial Cost/Benefit Analysis, Rev 1 (*ANÁLISE ECONÓMICO-FINANCEIRA DE PROJECTOS DE INVESTIMENTO A CANDIDATAR AO EIXO II DO POVT, Rev 1*), SIMARSUL, August 2008
9. Annex IV *bis*, Cost/Benefit Analysis, update of chapters 5 through 8 [Financial, Cost/benefit, Sensitivity and Risk analyses and conclusion] (*ANÁLISE CUSTO-BENEFÍCIO, alterações dos Capítulos 5 a 8*), unsigned, April 2011
10. Annex IV *ter*, Cost/Benefit Analysis, Rev. 3.1 update, (*ANEXO G - ANÁLISE CUSTO BENEFÍCIO: Rev.3.1 do Formulário*), unsigned, November 2012
11. Annex V, Environmental declarations (*DECLARAÇÕES AMBIENTAIS*), several authors and dates, [Includes 12 documents]



12. Annex VI, Supplementary information on project indicators, geographical coverage, population served, demographic projections, permitting and licensing, execution timetable, national added value and involved authorities (*INFORMAÇÃO COMPLEMENTAR AO FORMULÁRIO DE GRANDE PROJECTO*), unsigned, undated
13. Technical note (*Nota Justificativa das alterações introduzidas no Dossier de grande Projeto, da Operação SIMARSUL – Sub-sistemas de Saneamento Barreiro/Moita e Seixal (nº 2009 PT 16 2 PR 001), em resposta à Carta CE - ARES(2012)-665116 de 5/06/2012*), POVT, August 2012
14. Commission Decision (*DECISÃO DA COMISSÃO de 26.4.2013*), Johannes HAHN, 26 April 2013
15. SFC Snapshot Reports (4 documents) and Acknowledgements (4 documents), various dates
16. SIMARSUL, 2014 Report & Accounts (*Relatório e Contas 2014*), February 2015
17. Strategic Plan for Water Supply and Waste Water Treatment 2007-2013 (*PEAASAR II – Plano Estratégico de Abastecimento de Água e de Saneamento de Águas Residuais 2007-2013*), Ministry of Environment, December 2006
18. Strategic Plan for Water Supply and Waste Water Treatment 2020 (*PENSAAR 2020 - Plano Estratégico de Abastecimento de Água e Saneamento de Águas Residuais 2020*), Ministry of Environment, May 2014.
19. AdP. Report & Accounts for several years (*Relatório e Contas*). Águas de Portugal, 2013, 2014, 2015.
20. Concession Contract. Annex 3: Financial and economic feasibility study. (*Contratto de Concessão. Anexo 3: Estudo de viabilidade económico-financeira*)

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