



Deliverable D4.5
Financing solutions for water reuse schemes



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Abstract	In this report financing solutions available to the European water sector are provided, where any entity forming part of the European Members States would be able to apply for public and private funding.

Versioning and Contribution History

Version	Date	Modified by	Modification reason
1.0	15.06.2016	Gloria De Paoli	
2.0	30.11.2016	David Smith and Fernando Casado	Rework of the deliverable systematically explaining the content and scope of the various financing tools, case study examples and table summaries. New Introduction and Executive Summary. References to the database removed.

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Executive Summary

The objectives of WP4, Task 4.3 of the DEMOWARE project is to: (i) investigate financing solutions available to the European water; and (ii) identify case studies that indicated the most adapted solutions, with particular attention their financing mechanisms and solutions. As part of Task 4.3, two deliverables were produced:

- Deliverable 4.5: existing financing instruments and case studies;
- Deliverable 4.6: Guidelines for SMEs on how to access available financing solutions.

In this report, the financing solutions are given, where any entity forming part of the European Members States, would be able to apply for public and private funding. Each financing solutions is detailed with the following information: –Name of the financing source; Description; Eligibility; Type of financing; Phases in the innovation chain; Link. The second part of this report lists the case studies of existing water reuse applications in Europe and around the world, focusing on currently operating water reuse systems (thus, research projects are not included). For each case study, a wide range of information is provided, including: (i) general information; (ii) technical information; (iii) type of governance; (iv) investment, O&M costs; (v) financing structures and mechanisms; and (vi) pricing

1 Introduction

1.1 Who would benefit from this document?

This document aims at providing an in-depth list of financial sources to fund water reuse schemes. Under each financial option, details are given of who is eligible, at which part in the innovative cycle the financing is aimed at and a link on how to apply. This document also a break down of water reuse schemes from around the world and how each one of these schemes has been financed, what their investment was and what cost they charge for their water. Therefore, this document is valuable to any entity looking to be involved in a water reuse scheme from an entrepreneurial micro SME to a large multi national construction company. Although international case studies are listed, the main focus of this document is for European entities as all the financing options are available in the European Union Member States.

The differences between this document entitled D 4.5 “Financing solutions for water reuse schemes” and the document D 4.6 “Guidelines for SMEs in the water reuse field to make use of available financing solutions” is that D 4.6 has a pure focus on the Small and Medium Enterprise (SMEs) sector in Europe. Where D 4.6 goes into significant detail of the funding opportunities for SMEs and how, step-by-step, the SMEs can access these funds, this document (D 4.5) gives a broader overview of all the financing options open to all European entities as well showcasing the financing solutions of water reuse schemes from around the world that are already in operation. For a more in-depth overview of where financing comes into play in the water reuse cycle, an in-depth look at EU Funds and how to identify suitable EU funding sources(as an SME), please refer to document D4.6 “Guidelines for SMEs in the water reuse field to make use of available financing solutions”.

1.2 Exploration of Financing solutions for water reuse schemes: overview of the Task

The objectives of this task were to: (i) investigate financing solutions available to the European water; and (ii) identify case studies that indicated the most adapted solutions, with particular attention their financing mechanisms and solutions.

These objectives were achieved by the following actions:

- Investigation of existing financing solutions: financing instruments were screened and assessed, with the objective of identifying: (i) eligible beneficiaries; and (ii) how to access funding available through each instrument. In parallel, water reuse case studies from around the world were analyzed to understand further their financing strategies.

1.3 Structure, contents and the Online Knowledge Platform.

This document starts with a description of each financing solution for entities that are looking to implement new technologies, innovations, process or infrastructures in the water (reuse) sector. A summary table is given at this end of this section to provide an easy to use format of reviewing all the financing options available. This is followed by an analysis of water reuse case study schemes in a global context. These schemes give details on the size of these schemes and how these schemes have been financed and with what amount. As part of the DEMOWARE project, a tool for extracting information from these above-mentioned case studies and financing solutions has also been developed. This tool is housed at the

“Online Knowledge Platform” which is available at the following link: <http://knowledgeonlineplatform.com>

2 Financing solutions for water reuse schemes

In order to develop the list of financing solutions and case studies, a was drawn up from which the information in this document has been derived. The developed database maps and gives an inventory of financing mechanisms and case studies. The financing framework developed based on Quesnel et al. (2016), EEA (2013) and Marsh (2007), illustrated in Figure 1 below.

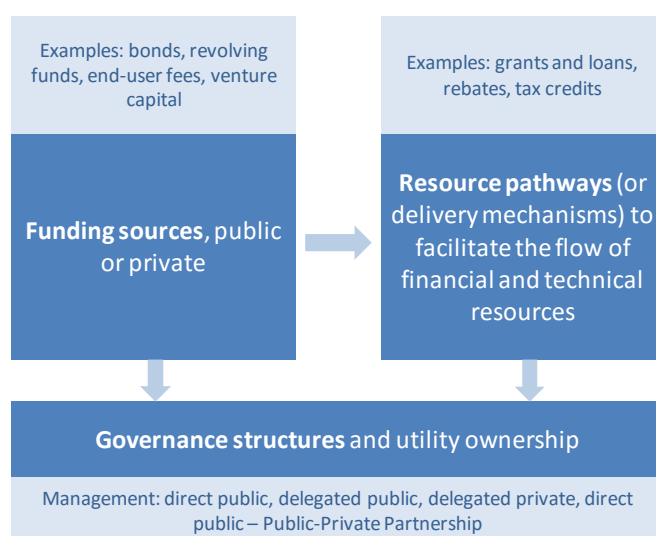


Figure 1 Financing framework developed to map and inventory financing mechanisms for water reuse in the database

A financing strategy is thus defined and composed by three main elements:

- Where do the funds come from? → **Funding sources**
- How are funds delivered to the recipient? → **Resource pathways**
- Who is the recipient, i.e. who owns and manages the wastewater treatment and recycling facilities? → **Governance structure and utility ownership.**

The paragraphs below briefly describe these three components.

2.1 Funding sources: where do financial resources come from?

Funding sources can be distinguished based on where they come from (private, public, water users), as well as on the level from which they are provided (European, national, local). Figure 2 illustrates and classifies funding sources based on these two characteristics.

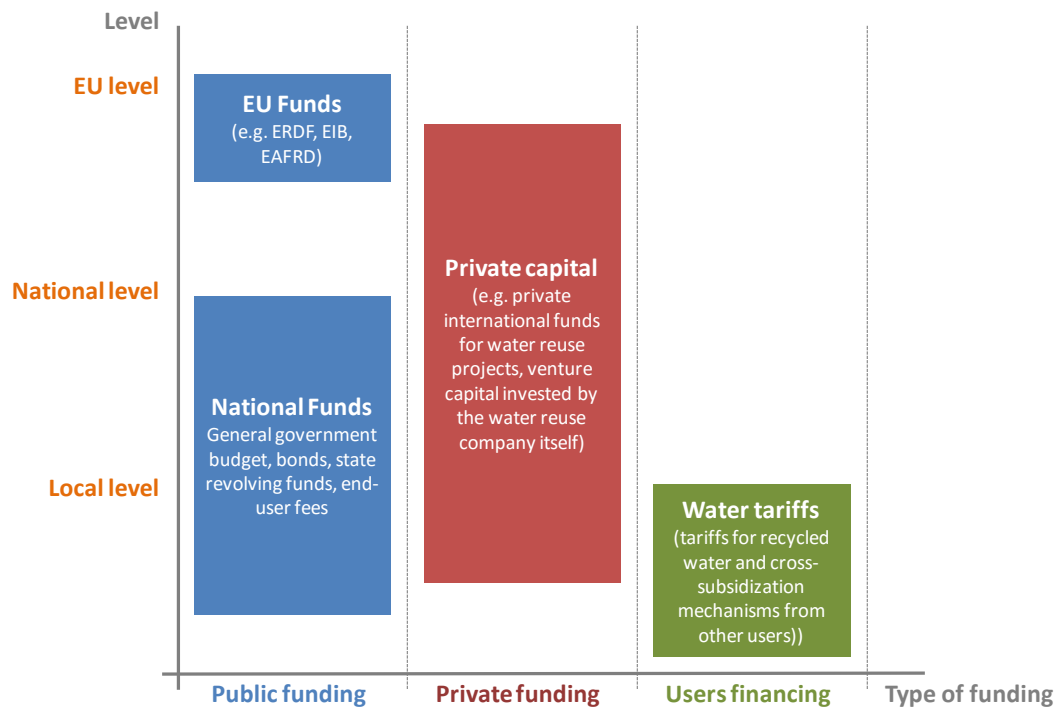


Figure 2 Classification of funding sources depending on the type of funding and the level from which they are provided

European funds are normally provided through the general EU budget. These funds include for example EAFRD (European Agricultural Fund for Rural Development), ERDF (European Regional Development Fund), EFSI (European Fund for Strategic Investment) and Cohesion Fund among others.

In the case of national public funding, it is crucial to understand how these resources are raised; common sources and mechanisms include:

- **General government budget:** water reuse projects can be (partly) funded through public resources generated by general taxes, such as for example on income, sales or properties (Quesnel et al, 2016);
- **Bonds:** it is a debt investment in which an investor loans money to an entity (typically corporate or governmental) which borrows the funds for a defined period of time at a variable or fixed interest rate¹;
- **State Revolving Funds:** these funding sources are very common in the US, for example. Under SRF, states make low-interest loans to local agencies, and repayments are deposited back into the SRF to be loaned to other agencies (US EPA, 2012);
- **End-user fees:** these fees, either flat or per-usage, can be imposed by utilities on users (in addition to the tariff on water and wastewater) in order to gather funds for projects that extend beyond normal operating procedures and might not otherwise be financed, such as for example water reuse projects (Quesnel et al, 2016).

¹ Definition from: <http://www.investopedia.com/terms/b/bond.asp>

Private funding can be provided at different levels. Some funds (e.g. Veolia VIA) are provided by private companies to water infrastructure projects all over the world. An overview of each of these funding opportunities is provided further along in this document. In other cases, private investment occurs at the national level, often taking the form of already existing water companies financing water reuse projects.

Water users contribute to the financing of water reuse schemes through water pricing mechanisms (tariffs). In many cases, tariffs cover 100% of operation and maintenance (O&M) costs, and often they also contribute to the recovery of investment costs. In the case of water reuse projects, costs can be recovered by different pricing mechanisms, or by a combination of them:

- **Tariffs for recycled water:** price charged to consumers for the use of recycled water;
- **Tariffs for wastewater collection and treatment:** price charged on all consumers for wastewater collection and treatment, which cover part of the treatment costs for reusing effluents;
- **Tariffs for freshwater supply (cross-subsidy):** in general, the price charged for water should correspond to the costs of producing and distributing that water. However, producing and distributing recycled water is very often more expensive than abstracting freshwater, treating it and distributing it to consumers. This would result in recycled water being more expensive than freshwater, so that consumers would not have any incentive to consume recycled water. For this reason, water managers may want to encourage the use of recycled water by keeping its price lower than the price of water from conventional sources. This could mean that the price of recycled water does not fully recover the costs of production and distribution: to cover these costs, the price of freshwater can be kept higher than its cost of production and distribution, so as to fully recover the costs of water reuse. This strategy is pretty common and it is known as cross-subsidization (see e.g. Zayas et al, 2016).

In most cases, water reuse projects are funded by a combination of different funding sources. Often, investment costs are funded through European and national funding sources as well as through private investment –and through different combinations of these three sources. In some cases, investment costs are first covered by public budget and then recovered through user tariffs.

Operation and maintenance costs are often recovered by recycled water tariffs charged to users, although public subsidies can sometimes come into play. In a few cases, water tariffs also contribute to recover (part of) the investment costs.

Private investment can also be employed in the construction phase and be refunded by public funding later on.

2.2 Resource pathways: how are financial resources transferred to the water reuse project?

When private capital is invested, the delivery mechanism is straightforward: there is a direct transfer of private capital to the water reuse project.

On the other hand, when public resources are invested, these resources can be delivered through different pathways, and in particular (Quesnel et al, 2016):

- **Grants:** sums of money received by a grantee that do not have to be repaid to the grantor;

- **Loans:** the sum of money received by a grantee must be repaid to the grantor back in the future, often with an interest. Government loans are often partially or fully subsidized, resulting in low or no interest borrowing;
- **Rebates:** in this type of scheme, a customer purchases a device or service using his own money, and afterwards it is partially reimbursed by the government, and utility or another entity;
- **Tax credits:** these are used to promote a new technology or practice. Consumers or investors make the initial purchase or investment using their own money, the credit is then claimed when they file taxes for the previous year, and credit amount is subtracted from taxes they have to pay.

When water reuse projects are funded by a combination of different funding sources, funds are delivered through a combination of resource pathways, and in particular a combination of grants and loans. When loans come into play, the amount received must be recovered later on through user tariffs.

In some cases, the combination of funding sources and resource pathways can have quite a complex structure. In none of the case studies reviewed in this project funds were delivered through tax rebates or end-user fees, although this is possible in principle.

2.3 Governance structures and utility ownership: who owns wastewater and recycling facilities? And who manages them?

Financing schemes can be dependent on the governance structure and ownership of the water reuse facilities, as well as their management. Governance and ownership arrangements for water services (thus including water reuse projects) include:

- **Direct public management:** the responsible public entity is entirely in charge of services provision and their management (EEA, 2013);
- **Delegated public management:** a management entity is appointed by the responsible public entity to execute the management tasks;
- **Delegated private management:** the responsible public entity appoints a private company for the management of tasks, on the basis of a time-bound contract in the form of lease or concession contract (EEA, 2013);
- **Direct private management:** All management tasks, responsibilities, and ownership of water utilities are placed in the hands of private operators, while public entities limit their activities to control and regulation (EEA, 2013);
- **Public-Private Partnership (PPP):** it implies a co-participation in the water reuse project by both public and private entities, and it can take many forms, such as for example a joint venture between a public and a private entity with joint ownership of the water reuse project, or a contract where the management of a public infrastructure is in the hands of a private entity (thus overlapping with a previous category, delegated private management). The World Bank lists several types of contracts and agreements, such as for example: Management, Operation and Maintenance

nance contracts; concessions and Build-Operate-Transfer (BOT) agreements; lease and afterimage contracts; and bulk supply agreements².

2.4 Developing and operating a water reuse systems: when does financing come into play?

Now that funding sources have been defined and clarified, it is crucial to have a clear picture of how and when financing occurs or, in other words, which financial flows are in place.

First of all, the different project phases must be clearly distinguished and identified, as shown in Figure 3 below. In particular, the development and operation of a water reuse system has four distinct phases:

- **Research and development:** this phase is somewhat separate from the others, but it builds on the basis for innovation in the water reuse sector. It includes the development and testing of new technologies and new equipment, but also large research projects on several aspects of water reuse, such as economic, social and governance aspects (the DEMOWARE project itself is an example of such large research project);
- **Planning the water reuse scheme:** the first step in the development of a water reuse project is its design and incubation. Planning and design include both technological and management aspects, such as for example: who will be the users?, what will be the capacity of the system?, how the costs of construction and operation will be covered?, etc.;
- **Implementing the water reuse scheme:** this is the actual construction phase of the water reuse scheme. The system can be built from zero, or it can be developed based on an existing wastewater treatment plant;
- **Operating the water reuse scheme:** this phase refers to the regular operations of a water reuse scheme. It involves different steps: (i) wastewater collection and treatment up to the required quality for reuse; (ii) distribution of the recycled water to the relevant customer groups; and (iii) monitoring of the quality of the recycled water distributed to consumers.

² <http://ppp.worldbank.org/public-private-partnership/sector/water-sanitation>

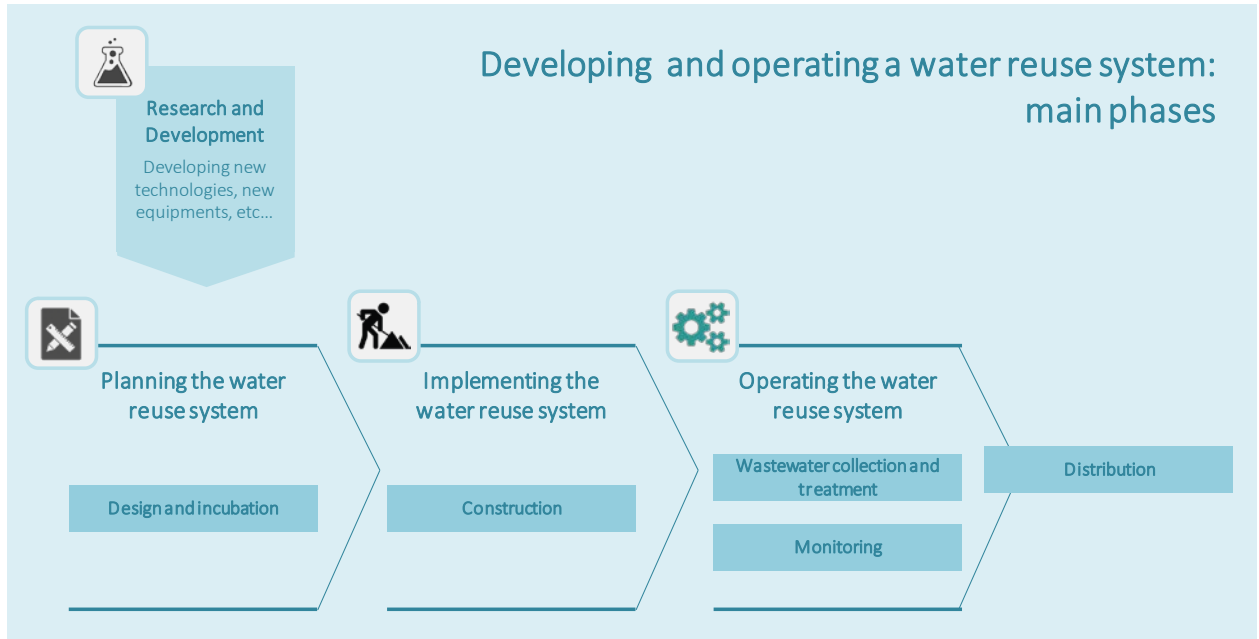


Figure 3 Developing and operating a water reuse scheme: main phases

This representation is very useful for the identification of the financial flows occurring in the overall development and operation of a water reuse system. For a more in-depth look at the financial flows in the overall development and operation of a water reuse system, please refer to the document D 4.6 "Guidelines for SMEs in the water reuse field to make use of available financing solutions"

3 Financing solutions for water reuse schemes

The objective of this list of financing sources is to provide a comprehensive, detailed information base on financing solutions for water reuse projects. To obtain specific information on each of these case studies in a user friendly fashion using various different queries, please refer to the Online Knowledge Platform: <http://knowledgeonlineplatform.com>

This document is composed of two separate sections:

- **Funding sources:** this section provides water managers, SMEs, construction companies and other entities with a comprehensive list of available funding sources for water reuse projects, such as for example EU Funds or private funds. The sources of funding included in this section concern all stages of the water reuse project cycle;
- **Case studies:** this section of the document lists case studies of existing water reuse applications in Europe and around the world, focusing on currently operating water reuse systems (thus, research projects are not included). For each case study, a wide range of information is provided, including: (i) general information; (ii) technical information; (iii) type of governance; (iv) investment, O&M costs; (v) financing structures and mechanisms; and (vi) pricing.

3.1 Financing sources

For each funding source the following information is given:

- **Name of the financing source**
- **Description:-** This includes a short description of the financing source given a general overview of the aims and objectives of this type of financing.
- **Eligibility:-** This gives an overview of which entities can apply to this type of financing, in some cases the eligibility is in a tender by tender case, in others the eligibility is very clearly demarcated.
- **Type of financing:-** This aspect relates to what type of financing is available under the financing source. Options range from grants to venture capital, loans and direct investments.
- **Phases in the innovation chain:-** Different financing sources fund different aspects in the water reuse innovation chain. Some will only fund research while others will only fund infrastructure development and others everything in between.
- **Link:-** Finally in each financing source, there is a link so that the user can gain more information or indeed apply for financing.

ACQUEAU

Description: ACQUEAU supports near water-market projects, in order to facilitate the development of innovative products, processes and systems in the water sector. ACQUEAU is an industry driven EUREKA initiative dedicated to water related technologies and innovation. It aims at promoting innovation and market driven solutions to develop new technologies in the European water sector.

The major goal is to facilitate the generation of market driven, pan-European collaborative water research and technological development projects for the benefit of the European Water Industry.

ACQUEAU is a non-profit association under Belgian law, it was founded by industrial companies. It counts 12 funding members from 6 European countries. ACQUEAU addresses industries that develop and sell

their products or services dedicated to water catchment, production, distribution, collection and treatment, that use water in manufacturing processes and that have interest in developing technologies related to the water cycle.

Eligibility: Any entity from the following countries can apply: Austria, Belgium, Canada, Croatia, Czech Republic, Denmark, Finland, France, Germany, Israel, Luxembourg, Malta, Monaco, The Netherlands, Norway, Portugal, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, UK

Type of Financing: ACQUEAU provides the Eureka Σ label, thus facilitating the access to national funds. Therefore the funding rate is different for each country depending on the national funding rules.

Phases in the Innovation Chain financing supports: Strong market and exploitation orientation

Link: <http://www.acqueau.eu/>

Asociacion Espanola Business Angels (AEBAN)

Description: AEBAN is the Business Angels Networking Association of Spain. Constituted in November 2008 under Law 1/2002, AEBAN's main mission is to promote the activity of Business Angels and Business Angels networks in Spain. Currently AEBAN associates with a total of 38 Business Angels networks with head offices in 11 Autonomous Communities in Spain. These networks in turn associate about 2,000 investors who last year mobilised resources worth 40 million €.

Eligibility: All information is only available in Spanish, however there are no overall restrictions on who can apply.

Type of Financing: Investment

Phases in the Innovation Chain the financing supports: Innovative technologies

Link: <http://www.aeban.es/socios>

Austria Wirtschaftsservice Gesellschaft mbH

Description: Austria Wirtschaftsservice Gesellschaft mbH (aws) is the Austrian federal promotional bank. It assists companies in their implementation of innovative projects by granting loans, awarding subsidies and issuing guarantees at favorable interest rates, particularly in cases in which it is not possible for these companies to obtain the necessary funds in a sufficient amount from other sources of financing. In addition, it provides support in the form of specific information, advisory and other services to prospective, established and expanding companies.

Eligibility: Available to people living in Austria.

Type of Financing: Different stimulus packages offer different products, but there are Loans, grants and guarantees

Phases in the Innovation Chain the financing supports: Innovative Technologies

Link: <http://awsg.at/Content.Node/en/index.en.php>

BeAngels

Description: BeAngels provides to new businesses: (i) support and guidance (entrepreneurial and sectorial expertise, contact web); (ii) financing by investors; (iii) advice and support in the presentation of a project to potential investors; and (iv) support during negotiations.

Eligibility: Mainly for Belgians, Investment criteria: (i) quality of the managing team; (ii) Unique selling point; (iii) a strong growth potential (and thus a return on the investment); (iv) intellectual property.

Type of Financing: Investment

Phases in the Innovation Chain the financing supports: Innovative Technologies

Link: <http://www.beangels.eu/entreprendre/services-aux-entrepreneurs/>

Black Sea Trade Development Bank

Description: BSTDB was established by Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Turkey, and Ukraine which are the 11 founding countries of the Black Sea Economic Cooperation (BSEC) as a financial pillar of BSEC. As of end 2015, BSTDB cumulative portfolio in its 11 member countries has reached 322 approved operations in the key sectors of infrastructure, energy, transport, manufacturing, telecommunications, financial sector and other important areas amounting to about EUR 4.2 billion. The main products offered by BSTDB are Mainly mid-term to long-term loans, equity investments and guarantees. Special programmes are also in place to support SMEs and trade financing (mostly via local financial intermediaries)

Eligibility: Funding is for several projects, and it depends on the country strategy elaborated each year by BSTDB. In Greece, the current Strategy does not have a clear focus on water infrastructures, but it includes among its financing options: (i) development of SMEs through targeted financing; (ii) sustainable agriculture and agribusiness; and (iii) co-financing of projects partly funded by the Cohesion Fund. Thus, water reuse projects might fall under these categories. In Romania, the current Strategy includes water supply and sewage among the focus area of investment (and also SMEs financing). In Bulgaria, the Strategy includes financing to municipal and social infrastructures, and can thus include water reuse systems (also SME financing is included in the Strategy).

Type of Financing: The main products offered by BSTDB are Mainly mid-term to long-term loans, equity investments and guarantees. Special programmes are also in place to support SMEs and trade financing (mostly via local financial intermediaries)

Phases in the Innovation Chain the financing supports: Innovative Technologies and Infrastructure development

Link: <http://www.bstdb.org/about-us>

Business Angels Netzwerk Deutschland

Description: German Association of business angels. It is the central point of contact for innovative seeking capital start-ups

Eligibility: For young innovative companies in the early stage of their business. Focus on innovative and technology-oriented projects, products with unique selling points.

Type of Financing: Investment

Phases in the Innovation Chain the financing supports: Innovative Technologies

Link: <http://www.business-angels.de/en/>

COFIDES

Description: *Compañía Española de Financiación del Desarrollo*, (COFIDES, S.A.), is a state- and private-owned company founded in 1988 that provides cost-effective medium and long term financial support for viable private direct investment projects in foreign countries where there is a Spanish interest. Products offered: Share capital holding in the host country company, Quasi-equity instruments, Medium and long-term loans to the host country company, Medium- and long-term loans to the Spanish investor, Multi-project loans

Eligibility: COFIDES may back any productive or commercial direct investment project involving the incorporation of tangible or intangible assets that require medium/long-term financing. As a general rule, COFIDES does not participate in projects relating to housing construction and defence or projects excluded for their environmental policy. With regard to infrastructure or other public services, COFIDES is in a position to be able to provide backing for these projects, providing they are privately managed. Applications for financing products must include: Project and sponsor description, Economic and financial information, Relevant environmental and social aspects

Type of Financing: Share capital holding in the host country company, Quasi-equity instruments, Medium and long-term loans to the host country company, Medium- and long-term loans to the Spanish investor, Multi-project loans

Phases in the Innovation Chain the financing supports: Innovation and Infrastructure development

Link: <https://www.cofides.es/en/index.php>

Cohesion Fund

Description: The Cohesion Fund aims to reduce economic and social disparities and to promote sustainable development. It includes investment in the environment, including areas related to sustainable development and energy which present environmental benefits. Support to resource efficiency includes investment in the water sector.

Eligibility: Eligible European Member States can access funds if their proposed investments are accepted.

Type of Financing: Grants, however, service contracts are also possible

Phases in the Innovation Chain the financing supports: Infrastructure development

Link: http://ec.europa.eu/regional_policy/en/funding/cohesion-fund/

COSME

Description: COSME is the EU programme for the Competitiveness of Enterprises and SMEs, running from 2014 to 2020, with a budget of €2.3billion. COSME will support SMEs in the following areas: Facilitating access to finance; Supporting internationalisation and access to markets; Creating an environment favourable to competitiveness; Encouraging an entrepreneurial culture

Eligibility: EU Funding is available for start-ups, entrepreneurs and companies of any size or sector.

Type of Financing: Guarantees, Business loans, microfinance, Grants and venture capital to SMEs

Phases in the Innovation Chain the financing supports: Strong market and exploitation orientation, demonstration and commercialisation

Link: <http://ec.europa.eu/growth/smes/cosme/>

Danube Transnational Programme

Description: The Danube Transnational Programme finances projects for the development and practical implementation of policy frameworks, tools and services and concrete small-scale pilot investments. Environment, water, energy and innovation are their important focus areas.

Eligibility: Any local, regional, national public body governed by public law, international organisation and private body (including private enterprises from EU countries of the programme area) that have legal personality. Individual projects will receive an EU financial support up to 85% of their total eligible costs. The projects must form transnational for partnerships to cooperate together in the following programme thematic priorities and specific objectives: Strengthen transnational water management and flood risk prevention; - Foster sustainable use of natural and cultural heritage and resources; - Foster the restoration and management of ecological corridors; - Improve preparedness for environmental risk management.

Type of Financing: Grants

Phases in the Innovation Chain the financing supports: Demonstration phase, small scale pilot investments

Link: <http://www.interreg-danube.eu/calls/calls-for-proposals>

EAFRD

Description: The EU's rural development policy helps the rural areas of the EU to meet the wide range of economic, environmental and social challenges of the 21st century. Frequently called "the second pillar" of the Common Agricultural Policy (CAP), it complements the system of direct payments to farmers and measures to manage agricultural markets (the so-called "first pillar"). The Fund contributes to improving:

- the competitiveness of agriculture and forestry;
- the environment and the countryside;
- the quality of life and the management of economic activity in rural areas.

Financing for water reuse can be founded under one of the programme's priority areas of: "promoting resource efficiency and supporting the shift towards a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors". The rural development priorities are broken down into "focus areas". For example, the priority on resource efficiency includes focus areas "reducing greenhouse gas and ammonia emissions from agriculture" and "fostering carbon conservation and sequestration in agriculture and forestry". The rural development priorities are broken down into "focus areas".

Eligibility: Within their RDPs, Member States or regions set quantified targets against these focus areas. They then set out which measures they will use to achieve these targets and how much funding they will allocate to each measure. The rural development priorities are broken down into "focus areas".

Type of Financing: Grants - Share of funding depends on national and regional operational programmes
Service contracts are also possible

Phases in the Innovation Chain the financing supports: On-farm measures - water reuse infrastructures in agriculture, including new technologies

Link: http://ec.europa.eu/agriculture/rural-development-2014-2020/index_en.htm

EFSI

Description: EFSI is an initiative launched jointly by the EIB Group - European Investment Bank (EIB) and European Investment Fund (EIF) - and the European Commission to help overcome the current investment gap in the EU by mobilizing private financing for strategic investments. EFSI is one of the three pillars of the Investment Plan for Europe that aims to revive investment in strategic projects around Europe to ensure that money reaches the real economy.

With EFSI support, the EIB Group provides loans for economically viable projects where it adds value, including projects with a higher risk profile than ordinary EIB activities. It will focus on sectors of key importance where the EIB Group has proven expertise and the capacity to deliver a positive impact on the European economy, including strategic infrastructures and the expansion of renewable energy and resource efficiency (e.g. water supply and wastewater treatment projects). Although water reuse projects have not been funded so far, they can in principle be financed by EFSI. EFSI funds can also be allocated to independent funding sources which can then finance water reuse projects –thus generating additional funding opportunities (see example in the case study box below).

Eligibility: Entities of all sizes, including SMEs, can apply for EFSI financing, as well as public sector entities, banks to deliver intermediate lending, investment platforms of any for of collective investment.

EFSI focuses on projects, which cannot have been carried out, or not to the same extent, by the EIB, the EIF, or under existing Union financial instruments without EFSI support. Projects supported by EFSI shall typically have a higher risk profile than projects supported by EIB normal operations. However, projects or entities financed under EFSI will not necessarily be high risk.

Type of Financing: Direct loans, loans to independent funding sources (intermediaries) Service contracts might be possible

Phases in the Innovation Chain the financing supports: Infrastructure development, intermediate funding (e.g. banks, investment platforms)

Link: <http://www.eib.org/efsi/what-is-efsi/index.htm>

EIB

Description: The EIB provides long-term loan financing to both public and private clients in the water sector, using a range of instruments. EIB financing has covered investments in all parts of the water cycle including water abstraction and supply (for household, industrial, and agricultural use), wastewater treatment and disposal, as well as coastal erosion, flood control and protection, and hydropower generation. Among the instruments made available by the EIB, here we focus on financing instruments, and namely:

- Project loans: the EIB lends to individual projects for which total investment cost exceeds EUR 25m: thus, the EIB makes loans to large projects only.

- Intermediate loans: the EIB makes loans to local banks and other intermediaries which subsequently "on-lend" to the final beneficiaries, including SMEs.

Eligibility: Open to all entities For direct loans: EIB loan application procedures can be accessed here: http://www.eib.org/projects/cycle/applying_loan/index.htm. All intermediated loans must further at least one of EIB's public policy goals, which include environmental sustainability and climate-resilient growth.

SMEs receive intermediated loans towards investment projects costing up to EUR 25m (and occasionally EUR 50m). The lending decision for EIB loans via credit lines remains with the financial intermediary.

To apply for a loan, SMEs must address their request to EIB intermediaries. The list can be found here: <http://www.eib.org/products/lending/intermediated/list/index.htm>

Type of Financing: Direct loans for large projects (>25 million EUR) or loans to local banks and other intermediaries which subsequently "on-lend" to the final beneficiaries

Phases in the Innovation Chain the financing supports: Infrastructure development

Link: <http://www.eib.org/projects/sectors/water-and-waste-water-management/index.htm>

EISER CEE Infrastructure Fund

Description: EISER is a London headquartered multinational asset manager specialising in deploying and managing equity and debt instruments in the real assets class. EISER also has a representative office in Johannesburg. Investment fund focusing on infrastructure projects in Central and Eastern Europe. The fund aims to build a diversified portfolio of assets both across geographies and sectors (energy, water, sewerage, transport, telecoms)

Eligibility: There is no restriction on eligibility, however most projects are large construction projects.

Type of Financing: Venture capital

Phases in the Innovation Chain the financing supports: Infrastructure development

Link: <http://www.eiserinfrastructure.com/about/>

ERDF

Description: The European Regional Development Fund (ERDF) supports programmes addressing regional development, economic change, enhanced competitiveness and territorial cooperation throughout the EU, and it aims at helping to reduce regional disparities across the Union. Funding priorities include research, innovation, environmental protection and risk prevention, while infrastructure investment retains an important role, especially in the least developed regions –and, in particular, infrastructures providing basic services to citizens. ERDF also supports investments in the development of endogenous potential, through fixed investment and small-scale infrastructure. The ERDF can also offer funding opportunities for innovations in water reuse, if those are in line with the smart specialization strategies of Member States and regions.

Water reuse, together with efficient water supply and wastewater treatment, is an investment priority for the ERDF (as well as the Cohesion Fund): investments in this sector are in fact seen as capable in making a significant contribution to the achievement of the targets and objectives of the EU strategy for a smart, sustainable and inclusive growth.

Support for SMEs is also one of the key priority areas of the ERDF.

Investment in water reuse can be made under two different Thematic Objectives:

- TO6 (Environment and resource efficiency): investments on water reuse projects focused on achieving environmental and resource efficiency targets;
- TO1 (Research and innovation) and TO3 (SME competitiveness): investments on water reuse projects where the innovation and business dimension is the predominant aspect.

Eligibility: Eligibility criteria are established at the national level, in agreement with the European Commission, through the Partnership Agreement and the Operational Programme. SMEs can apply for ERDF Funds. SMEs wanting to obtain funding for a water reuse project should check the Operational Programme for the concerned region to assess whether the project meets the selection criteria and investment priorities.

Type of Financing: Grants - Share of funding depends on national and regional operational programmes. Service contracts are also possible

Phases in the Innovation Chain the financing supports: Research and innovation, infrastructure development

Link: http://ec.europa.eu/regional_policy/index.cfm/en/funding/erdf/

EU Funds Castilla Y Leon Co-Financing 2014-2020

Description: The programme entails the co-financing of investments schemes in key priority areas and selected priorities (including water and sanitation) as defined by the draft 2014-2020 Regional Operational Programme of the European Regional Development Fund (ERDF).

Eligibility: There is no specific restriction on who can apply, however there in each tender the specifications are detailed that need to respect the relevant applicable EU procurement legislation (Dir. 2004/18/EC or 2004/17/EC and Dir. 2007/66/EC), with publication of tender notices in the EU Official Journal, as and where appropriate. .

Type of Financing: Grants

Phases in the Innovation Chain the financing supports: Infrastructure Development

Link: <http://www.eib.org/projects/pipeline/2014/20140697.htm>

Eurostars

Description: Eurostars supports international innovative projects led by research and development-performing small- and medium-sized enterprises (R&D-performing SMEs). A Eurostars project can address any technological area for any market, but must have a civilian purpose and be aimed at the development of a new product, process or service. Water innovation is included. Key is the R&D activity in SMEs.

Eligibility: Any type of organisation can be part of a Eurostars project consortium, although the main partner must be an R&D-performing SME. To qualify as an R&D-performing SME an organisation must first comply with the EC definition of an SME. In addition, it must also meet the thresholds for dedicated R&D FTEs or turnover set by EUREKA. This and all other eligibility criteria are described in detail in the Guidelines for Eligibility.

Type of Financing: Grants - National funding rules can be checked here: <https://www.eurostars-eureka.eu/eurostars-countries/europe>

Phases in the Innovation Chain the financing supports: Research and Innovation

Link: <https://www.eurostars-eureka.eu/>

France Angels

Description: French Network of Business Angels. They can act as a bridge between investors and SMEs/ start-ups and provide training and advice

Eligibility: Innovative SMEs and start-ups

Type of Financing: Investment

Phases in the Innovation Chain the financing supports: Innovative Technologies

Link: <http://www.franceangels.org/>

Green Angel Syndicate

Description: The Green Angel Syndicate was created to help with investments in early stage technologies, processes and installations in the Green Economy. The syndicate has a preference for opportunities within the energy sector and the water sector, however green investments of all kinds are considered. GAS looks for a short to medium term exit, and will frequently be investing in companies which will target a trade sale. Its investments may serve the Venture Capitalist and Fund sector, coprates, where a gap and a need exists, but this is no prerequisite. A cleaner and quicker exit is preferred.

Eligibility: The following aspects are considered for every proposal:

- Return on Investment potential
- Evidence of demand
- Innovation
- Technology or process
- Benefit to green economy
- Market sector and trends
- Relationship to Energy generation, saving or efficiency
- Relationship to Water sector (water reuse and recycling; water and waste water treatment, including recovery of resources; water and energy integration; flood and drought risk management)
- Quality of team
- Size of investment required (ideally £300-800,000 from Green Angel Syndicate, and ideally in the role of junior investor to another experienced Lead, in partnership with other Angel Syndicates)

Type of Financing: Venture Capital

Phases in the Innovation Chain the financing supports: Innovative Technologies

Link: <http://www.gasgat.com/about-gas.php>

Horizon 2020

Description: Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion for funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. Water innovation can be found in the following five H2020 sections:

- Food Security, Sustainable Agriculture and Forestry,
- Marine, Maritime and Inland Water Research and BioEconomy;
- Societal Challenges;
- Climate Action, Environment, Resource Efficiency and Raw Materials;
- Nanotechnology, Advanced Materials, Biotechnology

Eligibility: Any natural or legal persons (any company, big or small, research organisations, universities, non-governmental organisations, etc.).

Type of Financing: Grants - For research and development projects where the share of the EU contribution can be up to 100% of the total eligible costs. For innovation projects up to 70% of the costs, with the exception of non-profit legal entities which can also receive up to 100 % in these actions. In all cases indirect costs will be covered by a flat rate of 25% of the direct costs.

Phases in the Innovation Chain the financing supports: Concept & Feasibility, demonstration, Market Replication and R&D, Commercialisation.

Link: <http://www.eip-water.eu/horizon-2020>

Horizon 2020 (SME instrument)

Description: SME Instrument helps high-potential SMEs to develop ground-breaking innovative ideas for products, services or processes that are ready to face global market competition. Available to SMEs only, which can however organise a project in the way that best fits their business needs – meaning that subcontracting is not excluded – the new scheme has opened a new highway to innovation through phased, progressive and complimentary support.

During the first two years of implementation (2014-2015), more than 1200 SMEs were selected to receive funding under the SME instrument call; as such, 513 million Euros were invested in the success of innovative SMEs. By the end of Horizon 2020, the SME instrument should have supported some 7500 SMEs to get their innovations delivered onto the market.

Eligibility: Open to all European member state SMEs only. These SMEs have to preferably be High growth, highly innovative SMEs with global ambitions; actively investing in innovation, and looking to grow; financing instrument for established SMEs further than start-up stage.

Type of Financing:

- Phase 1 projects: EUR 50,000 (lump sum) per project (70% of total cost of the project)
- Phase 2 projects (development and demonstration): an amount in the indicative range of EUR 500,000 and 2,5 million (70% of total cost of the project as a general rule)

Phases in the Innovation Chain the financing supports: Concept & Feasibility, demonstration, Market Replication and R&D, Commercialisation.

Link: <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/sme-instrument>

INNEON

Description: The INNEON network for eco-innovation investment aims to extend the public and private funding sources available for eco-innovation and social innovation in Europe. It provides a unique forum dedicated to the interaction between a select cohort of innovators and relevant investors.

Eligibility: Companies based in the EU with a product, service or business model that is eco-innovative (i.e. has economic as well as environmental and/or social benefits)

Type of Financing: Potential access to three types of investors servicing different segments of the capital market: business angels, venture capital and corporate investors.

Phases in the Innovation Chain the financing supports: Research and Innovation oriented towards Eco-innovation

Link: <http://www.inneon.eu/>

InnovFin

Description: InnovFin financing tools cover a wide range of loans and guarantees which can be tailored to innovators' needs. Financing is either provided directly or via a financial intermediary, most usually a bank. The EU and the EIB Group have joined forces to provide finance for research and innovation to entities that may otherwise struggle to access financing.

Eligibility: InnovFin Large Projects: EIB finance is based on R&I investment project, which can consist of promoters. R&I programs (typically over three to four years), including related capital expenditure (facilities, prototypes); innovation: deployment of innovative technologies (in particular key enabling technologies (KETs)), including capital expenditure related to commercial launch; Research and Innovation Infrastructures (both multi-country and national) and research and innovation enabling infrastructures.

Type of Financing: Guarantees and venture capital to SMEs

Phases in the Innovation Chain the financing supports: Concept & feasibility, demonstration & commercialisation

Link: <http://www.eib.org/products/blending/innovfin/index.htm>

ISLE Utilities

Description: Isle connects start-up companies with end users and investors focusing on pre-commercial technologies that may be 1–2 years from market. The TAG (Technology Approval Group) assesses technologies and connects with end users and investors.

Eligibility: Start ups developing emerging technologies

Type of Financing: ISLE Utilities connects start-ups with end users and investors

Phases in the Innovation Chain the financing supports: Demonstration phase, pre-commercialization

Link: <http://www.isleutilities.com/>

Italian Business Angels Association

Description: The Italian Business Angels Network acts as a bridge between investors (business angels) and SMEs-Start ups. Project ideas can be submitted to IBAN.

Eligibility: Italian Innovative SMEs and start-ups

Type of Financing: Investment

Phases in the Innovation: Innovative Technologies

Link: <http://www.iban.it/>

LIFE+

Description: The LIFE programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. Water reuse projects can be funded under the sub-programme Environment and resource efficiency. Water reuse projects can be best-practice (application of state-of-the-art techniques), demonstration (application of new techniques and technologies that are new to the project context) or pilot projects (applications of techniques that have never been tested before) projects.

Eligibility: Any legal European Entity can participate. Water reuse projects are likely to be funded as Traditional Projects rather than Integrated Projects (the latter requiring a link to a EU plan/strategy). Application to Traditional Projects goes through a one-stage submission. There is typically one open call per year. Applicants are often formed by more than one entity forming a consortium. The LIFE website provides all relevant information and documents to guide applicants towards and through the application process.

Type of Financing: Grants: maximum 60% of the total eligible project costs Loans: Private Finance for Energy Efficiency (PF4EE) provides loans only to investments in energy efficiency.

Phases in the Innovation Chain the financing supports: Testing of innovative technologies, demonstration phase, setting-up of water reuse pilot systems

Link: <http://ec.europa.eu/environment/life/about/index.htm>

LINC Scotland

Description: Scottish Association of business angels. They can act as facilitators between investors and SMEs/ Start-ups

Eligibility: British Innovative SMEs and start-ups

Type of Financing: Investment

Phases in the Innovation Chain the financing supports: Innovative Technologies

Link: <http://www.lincscot.co.uk/about-us>

Ludgate Resources Efficiency Fund II

Description: Investment Fund (Ludgate Resource Efficiency Fund II) "LREF" targeting resource efficiency projects in Europe. The fund targets the solid waste, wastewater and energy sectors. LREF aims at invest-

ing in a portfolio of 10-15 projects in the above-mentioned sectors. The Fund focuses on the UK, France, Benelux, Germany, Scandinavia and Poland. The operation would contribute to meeting EU recycling targets and renewable energy (RE) objectives as outlined in the EU Directives, thereby strengthening the economic value of wastewater and solid waste.

Eligibility: Companies in the following countries: UK, France, Benelux, Germany, Scandinavia and Poland

Type of Financing: Venture Capital

Phases in the Innovation Chain the financing supports: Research and Innovation, Infrastructure Development

Link: <http://www.ludgate.com>

Medium Sized Utilities Programme Loan

Description: A programme loan for funding capital expenditure investments in water, waste, district heating, electricity and gas networks and public lighting by local utilities.

Eligibility: Open to Italian entities where each individual tender will give certain eligibility requirements where contracts for the implementation of the project have to be tendered in accordance with the relevant applicable EU procurement legislation (2004/17/EC)

Type of Financing: Loans

Phases in the Innovation Chain the financing supports: R&D and infrastructure development

Link: <http://www.eib.org/projects/pipeline/2013/20130451.htm>

Nordic Investment Bank

Description: NIB grants long-term loans and guarantees for public and private companies and the public sector in and outside the Bank's member countries. Financing for small and medium-sized companies is channelled through intermediaries. NIB finances projects that improve competitiveness and the environment. This includes, for example, investments in infrastructure. NIB also finances investments in preventing and treating pollution.

Eligibility: Open to all countries in European Member States. All projects financed by NIB should improve competitiveness and/or the environment, in accordance with NIB's mandate and eligibility criteria. Furthermore, outside the membership area, projects financed by NIB should be of mutual interest to the country of the borrower and the member countries. Loan proposals are directed to NIB's Lending Department. There are no formal requirements for a loan proposal.

Type of Financing: long-term loans and guarantees to public and private companies and the public sector

Phases in the Innovation Chain the financing supports: Infrastructure development, research and innovation

Link: <http://www.nib.int/>

Regione Puglia 2014-2020 Co-Financing

Description: The Structural Programme Loan will support the implementation of the Operational Programme for the Italian region of Puglia between the 2014-2020 period; composed of 12 thematic axes it

covers amongst others: R&D and innovation; adaptation to climate change; natural and cultural resources and sustainable urban development.

Eligibility: Open only to entities in the Puglia region (Italy) The Operational Programme reflects the prevailing priorities of Puglia. The EU Structural and Investment Funds and the EIB loan will strengthen the sustainable economic development through infrastructure construction and rehabilitation and human capital development, thereby contributing to the overarching goals of EU 2020 Strategy.

Type of Financing: Loans

Phases in the Innovation Chain the financing supports: Research and innovation, Infrastructure Development

Link: <http://www.eib.org/projects/pipeline/2014/20140697.htm>

RIS3 Regions

Description: The Smart Specialisation Platform provides professional advice to EU countries and regions for the design and implementation of their research and innovation strategies for smart specialisation (RIS3). Several RIS3 regions have committed to a particular funding focus on water-related innovation.

Eligibility: Open to all EU countries, Main target audience: Structural Funds Managing Authorities, policy-makers and regional development professionals.

Type of Financing: Structural Funds

Phases in the Innovation Chain the financing supports: Research Innovation and Demonstration

Link: <http://www.eip-water.eu/structural-and-regional-development-funds-ris3-regions>

UK Business Angels Association

Description: British association of business angels. It provides guidance on how to get funding for innovative SMEs/ Start-ups

Eligibility: UK Innovative SMEs and start-ups

Type of Financing: Investment

Phases in the Innovation Chain the financing supports: Innovative Technologies

Link: <http://www.ukbusinessangelsassociation.org.uk/>

Veolia VIA

Description: Veolia's Open Innovation initiative VIA acts as a matchmaker between innovative solution providers and the Veolia ecosystem: researchers, Business Unit managers, experts in France and internationally.

VIA strives to:

- support startups and the Veolia ecosystem and so rapidly and successfully integrate the proposed innovation,
- develop an active sourcing approach, reaching out to those with innovative solutions,
- demonstrate the importance of collaborative innovation for Veolia,

- communicate the Veolia Group's innovation needs more effectively,
- build an internal momentum to ensure a swift go or no-go decision,
- build on the Group's new organization (zone/specialties) to find sponsors and Business Units that will use the solutions.

The Veolia model differs from the investment fund model in that it offers industrial support and operational collaboration. Veolia’s goal is to promote the entrepreneurial ecosystem by providing access to markets, pilot sites and research and innovation capacities. The Veolia Group believes that open innovation drives its own competitiveness and helps deliver more value to its municipal and industrial customers. It offers a successful breeding ground for establishing both large group-startup relations and win-win partnerships.

Eligibility: Open Internationally. There are two ways of working with the Veolia Innovation Accelerator:

- Calls for external solutions, a targeted approach responding to already identified needs, and
- The Open Channel, for submitting innovative solutions at any time to start the matchmaking process in the Group’s areas of expertise.

Type of Financing: Investment

Phases in the Innovation Chain the financing supports: Innovative Solutions

Link: <http://www.veolia.com/en/veolia-group/profile/innovation/open-innovation>

Viveracqua Hydrobond

Description: Innovative financing solution for small and medium-sized local water utilities in the Italian region of Veneto.

Eligibility: Open only to entities in Veneto region (Italy), investments are expected to have a positive net environmental and social impact, considering their focus on compliance and resource efficiency.

Type of Financing: Loans

Phases in the Innovation Chain the financing supports: Infrastructure Development

Link: <http://www.eib.org/projects/pipeline/2013/20130515.htm>

Table 1 Summary Table of Financing Sources for Water Reuse Projects

Financing Name	Type of Financing	Eligibility	Phase in the Innovation cycle	Link
ACQUEAU	Provides the Eureka label, thus facilitating the access to national funds	Eligibility only open to certain countries in Europe and abroad.	Strong market and exploitation orientation	http://www.acqueau.eu/
Asociacion Española Business Angels (AEBAN)	Investment	All information is only available in Spanish, however there are no overall	Innovative technologies	http://www.aeban.es/socios

		restrictions on who can apply.		
Austria Wirtschaftsservice Gesellschaft mbH	Different stimulus packages offer different products, but there are Loans, grants and guarantees	Available to people living in Austria	Innovative Technologies	http://awsg.at/Content.Node/en/index.en.php
BeAngels	Investment	Mainly for Belgians, Investment criteria: (i) quality of the managing team; (ii) Unique selling point; (iii) a strong growth potential (and thus a return on the investment; (iv) intellectual property.	Innovative Technologies	http://www.beangels.eu/entrepreneurs/service-aux-entrepreneurs/
Black Sea Trade Development Bank	The main products offered by BSTDB are Mainly mid-term to long-term loans, equity investments and guarantees.	Depends on the country strategy elaborated each year	Innovative Technologies and Infrastructure development	http://www.bstdb.org/about-us
Business Angels Netzwerk Deutschland	Investment	For young innovative companies in the early stage of their business. Focus on innovative and technology-oriented projects, products with unique selling points	Innovative Technologies	http://www.business-angels.de/en/
COFIDES	Various Loan modalities.	COFIDES may back any productive or commercial direct investment project involving the incorporation of tangible or intangible assets that require medi-	Innovation and Infrastructure development	https://www.cofides.es/en/index.php

		um/long-term financing		
Cohesion Fund	Grants	Entities in the European Member states	Infrastructure development	http://ec.europa.eu/regional_policy/en/funding/cohesion-fund/
COSME	Guarantees, Business loans, microfinance, Grants and venture capital to SMEs	For start-ups, entrepreneurs and companies of any size or sector.	Strong market and exploitation orientation, demonstration and commercialisation	http://ec.europa.eu/growth/smes/cosme/
Danube Transnational Programme	Grants	Any local, regional, national public body governed by public law, international organisation and private body that have legal personality in the Danube region.	Demonstration phase, small scale pilot investments	http://www.interregdanube.eu/calls/calls-for-proposals
EAFRD	Grants	Member States or regions set quantified targets against focus areas	On-farm measures - water reuse infrastructures in agriculture, including new technologies	http://ec.europa.eu/agriculture/rural-development-2014-2020/index_en.htm
EFSI	Direct loans	Open to all entities	Infrastructure development, intermediate funding (e.g. banks, investment platforms)	http://www.eib.org/efsi/what-is-efsi/index.htm
EIB	Direct Loans, Service Contracts	Open to all entities	Infrastructure development	http://www.eib.org/projects/sectors/water-and-waste-water-management/index.htm
EISER CEE Infrastructure Fund	Venture capital	No restriction, but financed projects are large	Infrastructure development	http://www.eiserinfrastructure.com/about/
ERDF	Grants	Eligibility criteria are established at the	Research and innovation, in-	http://ec.europa.eu/regional_policy/index.cfm/

		national level, in agreement with the European Commission, through the Partnership Agreement and the Operational Programme	frastructure development	en/funding/erdf/
EU Funds Castilla Y Leon Co-Financing 2014-2020	Grants	Detailed in each tender	Infrastructure Development	http://www.eib.org/projects/pipeline/2014/20140697.htm
Eurostars	Grants	Any type of organisation can be part of a Eurostars project consortium, although the main partner must be an R&D-performing SME	Research and Innovation	https://www.eurostars-eureka.eu/
France Angels	Investment	Innovative SMEs and start-ups	Innovative Technologies	http://www.franceangels.org/
Green Angel Syndicate	Venture Capital	Any entity with a number of recommendations for each proposal	Innovative Technologies	http://www.gasgat.com/about-gas.php
Horizon 2020	Grants	Any natural or legal persons (any company, big or small, research organisations, universities, non-governmental organisations, etc.).	Concept & Feasibility, demonstration, Market Replication and R&D, Commercialisation	http://www.eip-water.eu/horizon-2020
Horizon 2020 (SME instrument)	Grants in 2 phases	SMEs that are High growth, highly innovative SMEs with global ambitions	Concept & Feasibility, demonstration, Market Replication and R&D, Commercialisation	https://ec.europa.eu/programmes/horizon2020/en/h2020-section/sme-instrument
INNEON	business angels, venture capital and corporate investors	Companies based in the EU with a product, service or business model that is eco-innovative	Research and Innovation oriented towards Eco-innovation	http://www.inneon.eu/

InnovFin	Guarantees and venture capital to SMEs	Open to all entities	Concept & feasibility, demonstration & commercialisation	http://www.eib.org/projects/blending/innovfin/index.htm
ISLE Utilities	ISLE Utilities connects start-ups with end users and investors	Start ups developing emerging technologies	Demonstration phase, pre-commercialization	
Italian Business Angels Association	Investment	Italian Innovative SMEs and start-ups	Innovative Technologies	http://www.iban.it/
LIFE+	Grants	Any legal European Entity can participate	Testing of innovative technologies, demonstration phase, setting-up of water reuse pilot systems	http://ec.europa.eu/environment/life/about/index.htm
LINC Scotland	Investment	Innovative SMEs and start-ups	Innovative Technologies	http://www.lincscot.co.uk/about-us
Ludgate Resources Efficiency Fund II	Venture Capital	Companies in the following countries: UK, France, Benelux, Germany, Scandinavia and Poland	Research and Innovation, Infrastructure Development	http://www.ludgate.com
Medium Sized Utilities Programme Loan	Loans	Open to Italian entities where each individual tender will give certain eligibility requirements	R&D and infrastructure development	http://www.eib.org/projects/pipeline/2013/20130451.htm
Nordic Investment Bank	Long-term loans and guarantees to public and private companies and the public sector	Open to all countries in European Member States	Infrastructure development, research and innovation	http://www.nib.int/
Regione Puglia 2014-2020 Co-Financing	Loans	Open only to entities in the Puglia region (Italy)	Research and innovation, Infrastructure	http://www.eib.org/projects/pipeline/2014/20140697.htm

			Development	
RIS3 Regions	Structural Funds	Open to all EU countries	Research Innovation and Demonstration	http://www.eip-water.eu/structural-and-regional-development-funds-ris3-regions
UK Business Angels Association	Investment	UK Innovative SMEs and start-ups	Innovative Technologies	http://www.ukbusinessangelsassociation.org.uk/
Veolia VIA	Investment	Open Internationally	Innovative Solutions	http://www.veolia.com/en/veolia-group/profile/innovation/open-innovation
Viveracqua Hydrobond	Infrastructure Development	Open only to entities in Veneto region (Italy),	Infrastructure Development	http://www.eib.org/projects/pipeline/2013/20130515.htm

3.2 Case studies

This section of the document presents a collection of case studies from all around the world. The main characteristics of each water reuse project is presented, although the main focus is on financing and pricing strategies.

The following information is given under each case study:

Country:- The country where the water reuse scheme is currently in operation

Supplier/Manager:- This is the name of the entity that supplies or manages the water reuse scheme

Short Description:- A short description of the how the water reuse scheme has come about.

Final Water Use:- The final water reuse applications are divided into mainly public, industry and agriculture

Secondary and Tertiary Treatment Technologies in Use:- This point gives an account of the technologies that are in use to treat the water to reuse quality.

Treated Volume (million m³/year): The amount of volume the reuse scheme treats throughout one year

Capital Investment amount:- The amount of capital that was invested in the wastewater treatment works to obtain water for reuse quality.

Financing of the Water Reuse Scheme:- This part explains how the capital financing was obtained.

Operational Costs (€/m³):- This give the operational costs to produce 1m³ of water for reuse.

Governance: The governance of the water reuse scheme is either public, private or a public-private partnership.

MADRID

Country: Spain

Supplier / Manager: Canal de Isabel II

Short Description: The plan includes the construction of 20 tertiary treatment plants to supplement the 10 existing ones, in order to make these resources available and incorporate them into the new distribution system as reclaimed water.

Final Water Use: Urban

Secondary and Tertiary Treatment Technologies in use:

- activated sludge
- ultraviolet disinfection

Treated Volume (million m³/year): 3,4

Capital Investment Amount: 200 Million Euro

Financing of the reuse scheme: Canal de Isabel II has also established a tariff policy in order to recover all costs deriving from the infrastructure construction work and the operation and maintenance of the implemented water reuse system.

Operational Costs (€/m³): 0,13

Governance: Public

WATER REUSE FOR THE GROWING POPULATION AND INDUSTRY IN HONOLULU, HAWAII

Country: USA

Supplier / Manager: Veolia on behalf of Honolulu Board of Water Supply (BSW)

Short Description: Veolia Water was selected by the City and County of Honolulu in a competitive procurement in October 1998 to design, finance, build and operate the Honouliuli WRF, which is located less than 16 km (10 miles) west of Pearl Harbor in Ewa Beach. In 2000, construction was finalized and operations commenced. In 2003, the Honolulu Board of Water Supply (BWS), a semi-autonomous city agency, purchased the reclamation facility at a cost of approximately US\$48.1 million based on analysis by outside consultants and a review of the company's costs related to the design and construction of the facility. As part of the agreement, Veolia Water was selected to operate and guarantee the facility's performance under a 20-year partnership designed to maximize savings for BWS and help ensure rate stability for public users. Under the new partnership, BWS owned all treatment and distribution facilities and was the public authority (replacing the City and County of Honolulu) to sell all produced water, just as it did throughout the island of Oahu.

Final Water Use:

- Environmental Flow
- Industry
- Urban

Secondary and Tertiary Treatment Technologies in use:

- Tertiary filtration
- disinfection
- reverse Osmosis

Treated Volume (million m³/year): 17,96

Capital Investment Amount: 53 Million €

Financing of the reuse scheme: In 2003, the Honolulu Board of Water Supply (BWS), a semi-autonomous city agency, purchased the reclamation facility at a cost of approximately US\$48.1 million based on analysis by outside consultants and a review of the company's costs related to the design and construction of the facility. As part of the agreement, Veolia Water was selected to operate and guarantee the facility's performance under a 20-year partnership designed to maximize savings for BWS and help ensure rate stability for public users. Under the new partnership, BWS owned all treatment and distribution facilities and was the public authority (replacing the City and County of Honolulu) to sell all produced water, just as it did throughout the island of Oahu. Initial capital funding to purchase the treatment facility and system was financed through bonds based in part on the avoided costs of potable water development.

Operational Costs (€/m³): 0,48

Governance: Public

BORA BORA

Country: French Polinesia

Supplier / Manager: SPEA (Société Polynésienne de l'Eau et d'Assainissement, Water and Wastewater Treatment Agency)

Short Description: In order to secure water supply for the local and tourist population, seawater desalination and water recycling have been implemented as alternative resources. The raw sewage of the island is collected and transported by a pressurized network by means of 70 pumping stations, then treated by two wastewater treatment plants, one on the north side and one on the south side of the island. Water recycling scheme is operated by SPEA including wastewater treatment, tertiary ultrafiltration and distribution network.

Final Water Use: Landscape irrigation in luxury hotels and other urban non-potable uses.

Secondary and Tertiary Treatment Technologies in use: Advanced tertiary membrane treatment

Treated Volume (million m³/year): 0,1

Capital Investment Amount: 8 Million €

Financing of the reuse scheme: International, territorial and French funding. The needed funds and financial arrangement for water recycling scheme have been found by means of a public-private partnership, governmental subsidies and loans.

Operational Costs (€/m³): 0,68

Governance: PPP

EDWARD C. LITTLE WATER RECYCLING FACILITY, CITY OF EL SEGUNDO, CALIFORNIA

Country: USA

Supplier / Manager: West Basin (private)

Short Description: The Edward C. Little Water Recycling Facility in El Segundo, California is world renown as the only facility worldwide producing five distinct types of “designer” recycled water. Since 1995, these distinct types of treated water are each uniquely suited to specific use, thereby customizing the treatment and cost to the required use: tertiary disinfected water for irrigation and other urban uses, nitrified water for cooling towers, reverse osmosis followed by advanced oxidation water for direct aquifer recharge in a salt intrusion barrier, and single and double pass reverse osmosis for low and high pressure boiler water.

Final Water Use: Landscape Irrigation (+ other multiple uses)

Secondary and Tertiary Treatment Technologies in use: Tertiary disinfected water

Treated Volume for reuse (million m³/year): 62,05

Capital Investment Amount: 442.3 Million €

Financing of the reuse scheme: Capital facilities were financed largely through the issuance of bonds. Grants from the U.S. Bureau of Reclamation have contributed \$94 million. To supplement the product commodity revenue for long-term debt payments, revenues were as follows: \$95 million from Metropolitan Water District MWD Local Resource Program, \$96 million: capital payments from large customers requiring higher treatment, \$187 million: Stand-By Charge.

Operational Costs (€/m³): 0,30

Governance: PPP

WATER REUSE SCHEME IN THE NORTHERN ZONE OF THE COSTA BRAVA

Country: Spain

Supplier / Manager: Consorci Costa Brava (CBB)

Short Description: The gradual development of water reuse in the Costa Brava has led to the beneficial use of reclaimed water for a great variety of uses. Great emphasis has been made to provide a reliable disinfection step in order to protect public health. The measurement of the energy consumption in the water cycle has also been instrumental in order to make steps towards a greater overall sustainability in the area. In 2010, the overall volume treated beyond secondary level has been of 6.4 Mm³, most of them with a beneficial reuse. The larger consumer of recycled water is aquifer recharge, which happens mostly in the Blanes reclamation plant with the aquifer recharge of the lower Tordera river (between 2 and 3 Mm³/yr), followed closely by environmental reuse

Final Water Use:

- Groundwater replenishment
- Environmental flows
- Urban

Secondary and Tertiary Treatment Technologies in use:

- - multimedia filtration
- - UV
- - chlorine disinfection

Treated Volume (million m³/year): 6,4

Capital Investment Amount: 2.6 Million €

Financing of the reuse scheme: The initial projects of the early 90's, when safe water had to be provided for the irrigation of golf courses, consisted simply of chlorination systems which were funded directly by the users. The first true water reclamation plants in Costa Brava and constructed wetlands in the late 90s where financed from 80% from Cohesion Funds, CBB 20%. More recent reclamation treatments were funded 100% by the Catalan Water Agency

Operational Costs (€/m³): 0,34

Governance: Public

CYPRUS

Country: Cyprus

Supplier / Manager: Sewerage Board of Cyprus

Short Description: The reuse of treated wastewater in Cyprus has been steadily growing and is now widely practised. Several reuse schemes are operational and many more are under study or construction. The Government through the WDD has the overall responsibility for the management of the wastewater reuse system throughout the Government controlled areas of Cyprus. The treated effluent produced by the urban and rural Sewerage Boards is delivered to the Water Development Department (WDD) which undertakes its distribution to the various users. Final Water Use: Landscape irrigation and groundwater replenishment

Secondary and Tertiary Treatment Technologies in use:

- Activated Sludge
- Denitrification
- Chlorine disinfection

Treated Volume (million m³/year): 3,5

Capital Investment Amount: 36.2 Million Euro

Financing of the reuse scheme: The Government does not fund capital investment or operational costs for the collection and for the primary and secondary treatment facilities in the urban areas. However, in order to encourage wastewater reuse throughout the country, the Government's policy is to cover the construction and operational costs of the tertiary treatment facilities. The tertiary treatment cost are reimbursed by the Government to the producers of the treated effluent that is, the Sewerage Boards. Water tariffs for recycled water cover 88% of investment and O&M costs.

Operational Costs (€/m³): 0,61

Governance: Public

BEICHEN HI-TECH PARK WASTEWATER TREATMENT PLANT IN TIANJIN

Country: China

Supplier / Manager: Tianjin Water Reclaimed Co., Ltd. (Water Co.), established by the City Council

Short Description: Compared to desalination and water transport, wastewater reclamation possesses obvious advantages in project investments and costs, therefore Tianjin has made water reclamation its main approach in solving water scarcity. The city council established the Tianjin Water Reclaimed Co., Ltd. (Water Co.) in charge of the management, financing and construction of water reclamation facilities, as well as the production, supply, and marketing of reclaimed water.

Final Water Use:

- Industry
- Urban

Secondary and Tertiary Treatment Technologies in use:

- - membrane
- - ozone
- - reverse osmosis

Treated Volume (million m³/year): 69,3

Capital Investment Amount: 15 Million €

Financing of the reuse scheme: Funding mainly comes from the Water Co. funding and loans, with some government investment support.

Operational Costs (€/m³): 0,29

Governance: Public

AGRICULTURAL IRRIGATION IN MILAN

Country: Italy

Supplier / Manager: Milandepur Company

Short Description: The two largest wastewater treatment and recycling plants of Nosedo and San Rocco are located in a protected agricultural estate south of Milan named “Agricultural Park”. The two plants are designed to treat exceptional storm water loads of 3 times the dry weather flows and practically all the treated water can be reused for agricultural irrigation via the existing complex networks of canals and ditches (water mixed with canal water - part of recycled water is not used, but contributes to the canals flows).

Final Water Use: Indirect agricultural irrigation via the existing complex networks of canals and ditches

Secondary and Tertiary Treatment Technologies in use:

- Activated sludge
- Multimedia Filtration
- Ultraviolet disinfection

Treated Volume (million m³/year): 126,1

Capital Investment Amount: 136 Million €

Financing of the reuse scheme: The Lombardy region is in charge of the water resource management. Water allocation to farmers has historically been free of charge, dating back to years when raw wastewater was diluted with the canal water. In a general context of declining agricultural activity, and especially those of the Province of Milan, there is an effort and institutional incentives to helping farmers to maintain and diversify their production activities. Consequently, farmers are using recycled water for free. Only the energy cost for pumping are covered by the farmers association in charge of the two canals distributing the recycling water from the San Rocco WWTRP (about 27,000 €/yr). The Vettabbia Consortium pays only a very low amount of 1827.42 €/yr to the Lombardy Region for the use of recycled water.

Operational Costs (€/m³): 0,25

Governance: PPP

WATER REUSE FOR AGRICULTURAL IRRIGATION IN NOIRMOUTIER ISLAND

Country: France

Supplier / Manager: Community of municipalities

Short Description: This case study illustrates why water reuse is essential for the preservation of tourist and economic activities of Islands with scarce water resources, as well as of a fragile and sensitive environment. Over 90% of irrigation demand for producing early crops, the most famous French potatoes, are covered by reclaimed water. Low cost and easy for operation tertiary treatment is implemented by means of polishing and storage ponds. The wastewater treatment system includes two water reclamation plants, one in the north of the island, which receives wastewater from three municipalities and the other in the south of the island, which receives wastewater from the municipality of Barbâtre. These installations are managed by the SAUR Company on behalf of the Community of Municipalities. Secondary treatment: conventional activated sludge. Tertiary treatment: polishing lagoons

Final Water Use: Potato plantations - Recycled water covers 90-95% of total irrigation water demand for potatoes

Secondary and Tertiary Treatment Technologies in use: Conventional activated sludge (secondary treatment) + polishing lagoons (tertiary treatment)

Treated Volume (million m³/year): 0,3

Capital Investment Amount: 5.6 million €

Financing of the reuse scheme: The water reclamation scheme of Noirmoutier includes: Lagoons and storage ponds managed by the Community of municipalities. A pumping station and irrigation network, which belongs to the irrigators' association. The capital costs for polishing and storage ponds were covered by the Community with the financial assistance of the public water board and the Loire Bretagne Water Company. The capital costs of the pumping station and irrigation network were covered by the farmers' association with the help of departmental grants

Operational Costs (€/m³): 0,54

Governance: Public

TORREELE: INDIRECT POTABLE WATER REUSE THROUGH DUNE AQUIFER RECHARGE

Country: Belgium

Supplier / Manager: IWVA (Intermunicipal Water Company)

Short Description: The water reuse via managed aquifer recharge in the dunes of St-André resulted in a sustainable groundwater management and as such reconciled economy and ecology in this area where tourism is an important economic actor. Furthermore it is a pro-active measure to anticipate the expected effects of future climate change in this coastal area. This approach also included environmental rehabilitation of the area and a bigger interest in the recreational and educational aspects of the dunes. This resulted in a “recreation centre” with full-time staff, redevelopment of the recreational structure and more active public involvement.

Final Water Use: Indirect potable reuse after artificial recharge of the dune aquifer of St-André.

Secondary and Tertiary Treatment Technologies in use: dual membrane treatment process: pre-treatment with either microfiltration (MF) or ultrafiltration (UF) membranes + additional desalination with reverse osmosis membranes (RO)

Treated Volume (million m³/year): 1,8

Capital Investment Amount: 7 million €

Financing of the reuse scheme: The total investment costs of 7 million € was borne by IWVA with a 10 year maintenance contract. The cost of recycled water is recovered as part of the overall cost of drinking water

Operational Costs (€/m³): 0,62

Governance: Public

GROUNDWATER RECHARGE CALIFORNIA

Country: USA

Supplier / Manager: Orange County Water District (OCWD)

Short Description: The Groundwater Replenishment System (GWRS) is the world's largest wastewater purification system for indirect potable reuse. Beginning in 1975 with the successful implementation of Water Factory 21, the Orange County Water District (OCWD) has been a world leader in indirect potable reuse. Along with their partner agency, the Orange County Sanitation District, OCWD implemented the GWRS to supply water to take highly treated wastewater that would have previously been discharged into the Pacific Ocean, further treating it using a proven three step advance purification process, then discharging into the groundwater aquifer to provide drinking water for the residents of Orange County, California. Part of the water is injected into a hydraulic barrier to protect the basin from seawater intrusion while the rest of the water is percolated into the aquifer to improve water quality and recharge the groundwater. The GWRS produces a locally controlled, drought -proof and reliable water supply of high-quality water in an environmentally sensitive and economically manner.

Final Water Use: Groundwater replenishment

Secondary and Tertiary Treatment Technologies in use:

- microfiltration membrane (MF)
- reverse osmosis (RO)
- UV

Treated Volume (million m³/year): 165,3

Capital Investment Amount: 426 million €

Financing of the reuse scheme: The design and construction of the GWRS was jointly funded by the Orange County Water District (OCWD) and the Orange County Sanitation District (OCSD). Federal, state and local funding totalling US\$92.8 million was secured for the project. The rest was obtained from loans or contributions from OCSD, OCWD's GWRS partner.

Operational Costs (€/m³): 0,31

Governance: Public

POTABLE WATER REUSE IN THE OCCOQUAN RESERVOIR

Country: USA

Supplier / Manager: Upper Occoquan Service Authority (UOSA)

Short Description: The Upper Occoquan Service Authority (UOSA) water reuse project began operation in mid-1978 with the objective to improve water quality problems observed in the existing surface water reservoir being used as the raw drinking water supply. Since the beginning of the project, the recycled water was recognised as the best quality source water in the Occoquan system, and the plant had several expansions. The drinking quality recycled water is produced by means of a multi-barrier conventional treatment, including biological nitrogen removal, lime clarification, multimedia filtration, granular activated carbon adsorption and chlorination/ dechlorination. More than 34 years of successful implementation has instilled confidence that the pioneered and visionary plan, originally conceived so many years ago, is still working.

Because the reclaimed water flow is so important to the safe yield of the raw supply and to reservoir water quality, a framework of public service has been developed that requires very close collaboration among four main institutional areas: (1) UOSA, the water reclamation agent, (2) Fairfax Water, the potable water supply, treatment and distribution agent, (3) OWMP, the independent reservoir water quality monitoring agent, and (4) Virginia Department of Environmental Quality (VDEQ) and Virginia Department of Health (VDH) the regulatory agent(s). These four institutional areas represent the foundational pillars that support successful implementation of potable reuse in Northern Virginia.

Final Water Use: Reservoir replenishment

Secondary and Tertiary Treatment Technologies in use: multi-barrier conventional treatment: biological nitrogen removal, lime clarification, multimedia filtration, granular activated carbon adsorption and chlorination/ dechlorination.

Treated Volume (million m³/year): 25,55

Capital Investment Amount: 1 Billion €

Financing of the reuse scheme: The original 56,780 m³/d (15 MGD) capacity UOSA reclamation plant was constructed with EPA grant funds that paid for approximately 75% of the construction cost of the plant. UOSA generally issues municipal revenue bonds to fund plant expansions and other major capital improvements. UOSA also takes advantage of other grant funding

Operational Costs (€/m³): 0,59

Governance: Public

WESTERN CORRIDOR RECYCLED WATER SCHEME

Country: Australia

Supplier / Manager: Seqwater (regional water supply authority)/ Veolia Water Australia

Short Description: The Western Corridor Recycled Water Scheme is the largest recycled water scheme in Australia, developed in response to the most severe drought Australia had experienced in a century. The scheme is a part of a long-term insurance policy to ensure sufficient resources are available for the region of South East Queensland, regardless of a constantly changing climate. The scheme is instrumental in conserving water by providing purified recycled water for industrial purposes and to relieve pressure on the region's potable water supplies. It is operated to meet the stringent requirements of Australian Drinking Water Guidelines and even more stringent recycled water regulations in preparation for augmentation to a drinking water supply if drought conditions return to the region. The purified recycled water produced from the Western Corridor Scheme provides an alternative water supply for power stations, to relieve reliance on drinking water sources, and is also available to supplement drinking water supplies if combined dam levels drop below 40% in the future. Two coal-fired power stations currently use the recycled water for cooling and process applications, with additional industrial customers in the process of joining the scheme.

Final Water Use: Industry and Agriculture

Secondary and Tertiary Treatment Technologies in use:

- Microfiltration membrane
- Reverse osmosis
- Advanced oxidation
- UV radiation + hydrogen peroxide dosing

Treated Volume (million m³/year): 25

Capital Investment Amount: 1,75 Billion €

Financing of the reuse scheme: The original 56,780 m³/d (15 MGD) capacity UOSA reclamation plant was constructed with EPA grant funds that paid for approximately 75% of the construction cost of the plant. UOSA generally issues municipal revenue bonds to fund plant expansions and other major capital improvements. UOSA also takes advantage of other grant funding and low interest loans through the Virginia Water

Operational Costs (€/m³): 2,4

Governance: Public

DIRECT POTABLE REUSE IN WINDHOEK

Country: Namibia

Supplier / Manager: Goreangab Water Reclamation Plant (OGWRP) established by the Windhoek city council

Short Description: The Windhoek direct potable reclamation practise is still unique - worldwide. The advanced multi-barrier treatment process is producing purified water of a quality that consistently meets all the required drinking water standards. During the more than 40 years of operation, no health problems have been reported and the health safety was verified by epidemiological studies. The drinking water supplied to the consumers is a blend of reclaimed water (maximum 35%) and treated surface water. Apart from potable reuse, urban water reuse (golf course irrigation, watering of parks, etc.) provides a substantial contribution to the coverage of the city's water demands.

Final Water Use: direct potable reuse (35% of recycled water and 70% treated surface water)

Secondary and Tertiary Treatment Technologies in use: advanced multi-barrier treatment: powered activated carbon dosing, pre-ozonation, enhanced coagulation and flocculation, dissolved air flotation, dual media filtration main ozonation, biological activated carbon, filtration, granular activated carbon absorption, ultrafiltration, chlorine disinfection

Treated Volume (million m³/year): 5,8

Capital Investment Amount: 12,5 million €

Financing of the reuse scheme: The project was financed by the European Investment Bank (55%), the Kreditanstalt fuer Wiederaufbau (40%) and the City of Windhoek (5%). The investment costs for the reclamation plant were approximately E12.5 million including electrical and mechanical equipment of E8.3 million and civil works of E4.2 million.

Operational Costs (€/m³): 0,75

Governance: Public

WATER REUSE AT HAMPTON ROADS DISTRICT FOR THE YORKTOWN REFINERY

Country: USA

Supplier / Manager: James River Water Reclamation Facility/ York river treatment plant

Short Description: The James River Water Reclamation facility provides reclaimed water for the Yorktown Refinery since 2002. 500 000 million gallons/day are provided for diverse uses at the refinery. The source of the reclaimed water is HRSD's York River Treatment Plant (YRTP), located in York County. The influent to the plant is mostly domestic wastewater, as there is little industrial wastewater input to the sewerage system.

Final Water Use: cooling, crude oil desalting, coke cutting, rinsing and chemical mixing

Secondary and Tertiary Treatment Technologies in use: conventional activated sludge secondary treatment, biological oxidation and nutrient removal using SBR and sodium hypochlorite disinfection

Treated Volume (million m³/year): 0,5

Capital Investment Amount: 2,4 Million €

Financing of the reuse scheme: The total capital costs of the project are estimated to be \$2.6 million. Approximately \$1.6 million of the total is funded through the Virginia DEQ's Wastewater Revolving Loan Program. This is the first water reuse project funded through this program.

Operational Costs (€/m³): 0,27

Governance: Public

REDUCING NON POTABLE WATER USES THROUGH WATER REUSE IN ORANGE COUNTY

Country: USA

Supplier / Manager: Michelson Water Reclamation Plant and Los Alisos Water Reclamation Plant/Irvine Ranch Water District

Short Description: Unlike some projects that serve a limited number of customers, IRWD's recycled water distribution system reaches most of its 133 square mile service area, which has a population of 316,000. While some recycled water distribution lines are retrofitted, common practice at IRWD is to install recycled water lines along with domestic water and sewer lines as new housing or commercial developments are built. Currently, there are over 3,400 metered recycled water connections. Two facilities, the Michelson and Los Alisos WRPs, treat wastewater to tertiary standards. Recycled water is delivered throughout the community through a dual distribution system that includes more than 300 miles of recycled water pipelines, 12 storage reservoirs, and 15 pump stations. Two of the reservoirs are open lakes; the others are pre-stressed concrete or steel tanks.

Final Water Use: 300 miles of recycled water pipelines; mainly landscape irrigation (parks, school grounds, golf courses etc.) and non potable commercial and domestic uses (garden, toilet flushing)

Secondary and Tertiary Treatment Technologies in use:

- microfiltration,
- reverse osmosis
- UV
- Chlorine disinfection

Treated Volume (million m³/year): 55,2

Capital Investment Amount: 453 Million €

Financing of the reuse scheme: IRWD has continued to expand and upgrade its reclaimed water program throughout the years, with most of the capital costs financed via the District's internal funding mechanisms.

Operational Costs (€/m³): 0,11

Governance: Public

WATER RECYCLING IN MONTEREY COUNTY FOR AGRICULTURAL IRRIGATION

Country: USA

Supplier / Manager: Monterey county water recycling Project/Monterey Regional Water Pollution Agency and Monterey County Water Resources Agency

Short Description: The Salinas Valley is an agricultural region in northern Monterey County where a wide variety of market crops are grown. Heavy agricultural and municipal groundwater demands beginning in the 1940s led to the development of severe groundwater overdrafting of the underlying aquifers, resulting in seawater intrusion from adjacent Monterey Bay. This was a major factor in the decision to develop a regional wastewater management plan to provide recycled water for food crop irrigation in the Salinas Valley. The Salinas Valley Reclamation Project, a 30 million gallon/day regional wastewater recycling facility constructed adjacent to the regional secondary treatment plant, provides tertiary treated recycled water for agricultural applications as of 1998.

Final Water Use: food crop irrigation (vegetables)

Secondary and Tertiary Treatment Technologies in use: tertiary treated recycled water (flocculation and filtration using dual media filters + chlorine disinfection)

Treated Volume (million m³/year): 27,4

Capital Investment Amount: 72,6 Million €

Financing of the reuse scheme: The total capital cost of MCWRP was approximately \$78 million. Low-interest loans were obtained from the U.S. Bureau of Reclamation (USBR) and the State of California. The USBR loans, for construction of the treatment facilities and distribution, have 40-year terms, while the state loan has a 20-year term.

Operational Costs (€/m³): 0,21

Governance: Public

SOUTH REGIONAL WATER RECLAMATION FACILITY AND WATER CONSERV II WATER RECLAMATION FACILITY

Country: USA

Supplier / Manager: Orange County (Florida) and the City of Orlando

Short Description: The Water Conserv II project is a cooperative water reuse project by the City of Orlando, the Orange County (FL) and the agricultural community. The project objectives are the elimination of surface water discharges (main motive for starting activities following a law suit related to discharges from the local WWTP's to local lake), a reliable, cost-effective supply of reclaimed water for agricultural and other customers, the conservation of groundwater supplies and groundwater recharge via a system of RIBs. The project, located in western Orange and southeast Lake Counties, began operation in December 1986. The City's and County's water reclamation facilities both provide advanced wastewater treatment (i.e., secondary treatment followed by filtration and high level disinfection). They produce a total of approximately 42 mg/d of reclaimed water for the irrigation of citrus fields, open access areas, and residential lawns. About 35 MGD of the reclaimed water produced is sent to Conserv II (and serves the previous uses), and the remainder is beneficially used in the City's and County's individual reclaimed water systems serving urban areas.

Final Water Use: citrus irrigation

Secondary and Tertiary Treatment Technologies in use:

- multimedia filtration
- chlorine disinfection

Treated Volume (million m³/year): 61,7

Capital Investment Amount: 257,8 Million Euros

Financing of the reuse scheme: Conserv II capital costs expended as of 2003 total \$277.7 million. The U.S. Environmental Protection Agency originally provided grant funding of about \$100 million for the project; the remaining costs have been borne by the County and the City.

Operational Costs (€/m³): 0,71

Governance: Public

NEWATER: WATER REUSE IN SINGAPORE

Country: Singapore

Supplier / Manager: The system is managed by the same public entity, PUB. Two plants are directly managed by PUB, two plants are under DBOO contract, different companies designed, built, own and operate different plants

Short Description: Municipal water supply in Singapore comprises local water catchments, imported water, reclaimed water (branded as NEWater in Singapore) and desalates 6 water treatment works in Singapore and a further 3 in the neighboring state of Johor in Malaysia. The total treatment capacity of the 6 existing facilities (4 NEWater plants and 2 Industrial Water Works) add up to 480,000 m³/d, while the fifth and largest NEWater factory in Changi will add another 228,000 m³/d in 2010. NEWater Factories are built to augment Singapore's water resources. Instead of discharging the secondary-treated effluent from the WRPs into the sea, the NEWater factories enable the renewal of wastewater by treating the effluent using advanced treatment for supply to the non-domestic sectors and injecting it back into the reservoirs for indirect potable use. A three-step multiple barrier system has been employed in all of Singapore's NEWater Factories. The three steps: microfiltration/ ultrafiltration, reverse osmosis and UV disinfection, are the most crucial steps to NEWater production. And the cornerstone of this system is the membrane technology found in microfiltration/ultrafiltration as well as reverse osmosis. A schematic of the NEWater process is shown in figure below. Treatment process in NEWater factories

Final Water Use:

- Urban
- Reservoir replenishment

Secondary and Tertiary Treatment Technologies in use: A three-step multiple barrier system has been employed in all of Singapore's NEWater Factories. The three steps: microfiltration/ ultrafiltration, reverse osmosis and UV disinfection, are the most crucial steps to NEWater production.

Treated Volume (million m³/year): 82

Capital Investment Amount: 167 Million Euros

Financing of the reuse scheme: To finance new capital expenditure, besides tapping cash reserves, PUB also raises funds through the Ministry of Finance's (MOF) equity injection and external financing. For the equity it injects, MOF expects returns in the form of dividends. PUB has, in the last few years, used the domestic capital market for its financing needs by issuing bonds.

Operational Costs (€/m³): 0,3

Governance: PPP

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