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Executive Summary

INNOQUA is a project co-funded by the European Union (EU) that brings wastewater sanitation systems to rural communities on a global scale, piloted across regions as described herein. This Deliverable (D1.2) is focused on obtaining and characterizing specific conditions, both in quantitative and qualitative terms for each target market being addressed by INNOQUA, regarding both present and future market trends for the purpose of business case development. This early analysis will serve as a guideline for the modelling and design tasks (WP2) and it will ensure that RTD tasks are strongly market-focused and will seek to optimize the demonstration tasks in real scenarios that are feasible and scalable for replicating the demonstrations of the INNOQUA project after the project lifecycle across multiple stakeholder categories.

1 Introduction and approach

This Deliverable is an update of the document D1.2 released in M9. It is not intended to replace the previous document and it stands as a complementary analysis conducted for the different countries targeted.
A scoring of the PESTEL analysis conducted in the D1.2 submitted in M9 is implemented in this update report in order to define the more suitable country to develop and exploit the INNOQUA technology. Moreover, the update provides a section in which new INNOQUA competitors are analysed to point out pros/cons with INNOQUA technology and to continue watch analysis in the existing market. This Deliverable also presents a market summary info-graphic for each country targeted trying to give, using key water indicators, the potential of the INNOQUA technology in relevant countries. Annex III provides further detail on the visual market key indicators.
Furthermore, on the basis of the work conducted in T1.2 and detailed in the first version of this deliverable released in M9, the report presents the final version of the questionnaire developed for the different stakeholders (Annex I). The survey results analysis of the stakeholders/end-user groups will be presented along the length of the project in other Deliverables.

1.1 Structure, objective, and scope of the document

Structure: This document has five main sections: in Section 2 the further sanitation system alternatives are outlined and a competitors' ranking list is provided, then in Section 3 the summary of the PESTEL analysis for each country targeted is developed and market info-graphic and opportunities are summarized. Furthermore, in Section 4, the work conducted in order to define the final version of the social acceptance questionnaire developed for the different stakeholders are summarized while the questionnaire is available in Annex I.
Annex II presents all the competitor technologies comparison tables with the INNOQUA system.
Finally, conclusions are drawn (Section 5).

Objective: The objective of this report is to provide an update to the work conducted in the D1.2 submitted in M9. Both the documents (M9 and M12) aim to establish the pre-market study that frames the business cases and exploitation strategies related to the INNOQUA wastewater treatment solution. Furthermore, this deliverable is focused on obtaining a visual summary, both in quantitative and qualitative terms for each country target market. Potential competitors are further identified in terms of products offered, associated costs, market share, and strengths. A ranking list of potential competitors is provided and also watch activities are carried out in order to compare and keep attention of potential competitors and find exploitation opportunities.

Scope: This report, coupled with the deliverable already submitted in M9, provides the basis of the first general business model framework for INNOQUA. It will be finally defined in the WP6 (D6.3 and D6.4). State of the art and market opportunities are investigated for countries within and outside the European Union. Hence, a preliminary market analysis and a characterization of

different environments are carried out. Results are provided within the document in a user-friendly way.

1.2 Context, methodology, and stakeholder segmentation

1.2.1 Context of INNOQUA deployment on a global scale

INNOQUA seeks to provide a nature-based solution to domestic wastewater issues by limiting releases in terms of wastewater flow (water reuse) and reducing the production of sludge. In addition, a discrete number of economic sectors such as industrial sector are still in need of adequate and cost effective systems to treat their wastewater. Along the coastal areas in Mediterranean regions, significant areas of developments are not connected to the wastewater collection networks and release into the ground or the sea directly.

Globally, the provision of wastewater treatment is low, and the current levels of service are far less than the required 100% coverage. The Global Water & Wastewater Treatment Technologies market was valued by Research and Markets, the world's leading market research store, at €35 billion in 2015 and is expected to reach €50 billion by 2020 showing a compound annual growth rate of 7.4%[1]. On-site sanitation is a very common technology in France (currently used by 12-15 million people, over 5 million householders are not connected to the collective sewage network). A close-total coverage of the population with collection and treatment of wastewater is Spain. In comparison, provision of on-site sanitations was lowest in the African regions with 42% of facilities lacking an improved source; also in Americas, the provision is close to 43% of facility lacking[2]. Moreover, both urban and rural areas are seeing their population increase and consequently the sewer system are not sized for increased load.

The commonly accepted definition of wastewater includes either "used" waters, and domestic sewage, and either waters coming from manufactories. A failure in the treatment or in the depuration consists of the pollution of seas and rivers, with inevitable consequences for the wild fauna, plants, and human health. It is likely that most new wastewater management systems in developing countries will continue to be advanced, centralised and with a continue high probability for failure. There exist several reasons for this, the most important being the political preference for large, one-off investment. Other reasons include inertia, the desire to have what seems to be an advanced, state-of-the-art system, and the education and experience of wastewater engineers.

Treated wastewater can be used for a variety of non-potable purposes including landscape and recreational irrigation, maintenance of urban stream flows and wetlands, wastewater-fed

[1] Source: http://www.thebiojournal.com/an-irish-technology-reduces-costs-for-wastewater-treatment/ - accessed 01/05/2017

[2] Source: http://www.who.int/water_sanitation_health/publications/wash-health-care-facilities/en/ - accessed 22/07/2016

aquaculture, and toilet flushing. To encourage water-saving innovation, domestic and industrial water prices should be increased. Generalized subsidies should be replaced with subsidies targeted to the poor. Water providers should charge low prices for a basic entitlement of water, with increasing prices for greater amounts of water (IFRI, 2002). Furthermore, the better treatment of the wastewater and the small amount of discharges of untreated wastewater in the environment have allowed to improve the quality of bathing waters. At the beginning of Nineties, only the 60% of the bathing sites could boast of excellent water qualities, while nowadays such amount reaches the 78%. The wastewater that arrives in environmentally sensitive sites (as for instance bathing areas or reserves of drinking waters), is subjected to a further and more rigorous treatment.

The pricing systems for wastewater treatment are rather more complicated than for water supply. This is partly because different bodies hold responsibility for sewerage, sewage treatment, and drainage, each with their own principles and practices. An additional complicating factor derives from the use of the water directly from natural sources in the environment: it represents roughly 75% of total water consumption by the industrial sector. Nevertheless, basic charges for wastewater services are occasionally linked directly to volume of water derived from the public water supply system. Overall, however industrial water consumption levels are actually not a very good proxy for industrial sewerage and sewage disposal costs, as discharges vary so much from industry to another.

1.2.2 Methodology of the enclosed pre-market analysis

A market analysis on the status of onsite sanitation systems around the regions of interest is conducted using a PESTEL format (aspects concerning **P**olitical, **E**conomic, **S**ocial, **T**echnological, **E**nvironmental, and **L**egal) to give a bird's eye view of the whole environment from many different angles that one wants to check and keep a track of while contemplating on a certain idea/plan[3], in this case the INNOQUA market deployment in 2020.

Table 1: PESTEL factors metrics

PESTEL factors	
metrics	*investigations*
GREEN CELL = **score of between 7 and 10**	PESTEL factors are seemingly in line with foreseen market deployment requirements, thus the **market landscape is a driver for 2020 implementation** of the INNOQUA solutions, and PESTEL factors must be further analysed in a detailed manner
YELLOW CELL = **score of between 4 and 6**	PESTEL factors investigated present little or no inputs into foreseen market deployment requirements, thus the **market landscape is a small/non-factor if considering 2020 implementation** of the INNOQUA solutions, and PESTEL factors

[3]Source: http://pestleanalysis.com/what-is-pestle-analysis/ - accessed 27/06/16

	should be further analysed in a semi-detailed manner
RED CELL = **score of between 1 and 3**	PESTEL factors present strong evidence against any foreseen market deployment requirements, thus the **market landscape is a significant barrier and strong limitation/risk** when considering targeted INNOQUA solution integration, and PESTEL factors identified don't require further analysis but are still noted.

1.2.3 Stakeholder segmentation for INNOQUA deployment

The main stakeholder groups (end-users, early adopters, partnerships, etc.) being targeted for demonstrator replication and further exploitation activities are as follows:

- **Houses and multi-houses** that are not connected to the general sewage treatment system are considered by the consortium to be the key early adopters of the INNOQUA technology due to the fact that connection to the water network is not required for market deployment.
- **Parks management entities** to support irrigation and mitigate potential drought impacts, and to improve the efficiency of septic tanks (WWTPs) utilised in most parks worldwide.
- **Transportation vehicles with sanitation needs** (e.g. railway companies) to allow the treatment and reuse of water resources leading to consistent water and cost savings, and to provide wastewater treatment plants suitable for non-potable issues, such as maintenance of coaches, and cleaning toilets.
- **Industries** (e.g. food, agriculture for reducing nutrient and pesticide pollution, etc.) to treat effluent resources and support the setup of onsite sanitation systems in order to reduce energy consumption and water saving with the reuse of water for industrial processes, and as an alternative/upgrade to the traditional Waste Water Treatment Plans (WWTPs). Also, industrial wastewater contains a diversity of impurities and therefore its treatment constitutes a special task. Furthermore, the emission limits for industrial effluent are constantly being hardened. Closed circuits and product recovery in several production processes are becoming a priority among manufacturing companies. Such measures represent an additional contribution to the protection of aquatic ecosystems and possess great cost-cutting potential. Indeed, whether the system would be extended for industrial aims, the return for each industry would be significant: besides benefits in terms of maintenance costs and reuse of the treated water, the image of the industry itself would be improved in terms of eco-sustainability. In addition, an important aspect that can facilitate a factory to adopt INNOQUA system is the total respect of environmental regulations, always more cogent. This shall give protection to the environment, and shall allow the reuse of purified waters. The possibility to adapt the system to industrial scopes could be have higher installation cost, but with a consequent recovery of the expenses due to the low maintenance cost. Although agriculture could be a hard customer segment to

reach, INNOQUA envisages agreements between farmers and governmental bodies to be a feasible market deployment strategy.

- **Tourism sector** needs a special attention. Indeed, the implementation of INNOQUA technological solutions in the touristic sector could be relatively easy. Generally there are many touristic facilities in the rural area (inns, agro-touristic boarding houses, holiday villages, etc.) that can implement the INNOQUA solution. The situation becomes more complex considering that the contribution of tourism is generally characterized by high consumption of water in the hotel sector. For these reasons the tourism sector could make wastewater infrastructure challenges particularly acute, prompting some countries to undertake ambitious efforts to address those challenges. Furthermore hotel, resorts can be interested in a technology which allows to reuse water especially for irrigation of gardens.
- **Government agencies** (controlling purification plants) which are actively involved with the regulation and facilitation of wastewater or sanitation services. WWTPs (typically controlled by governments) face large operational problems dealing with excessive load input because they are often under-sized and require high energy and maintenance costs, especially for sludge production and disposal. In general, governmental companies manage large scale WWTPs that directly treat the effluent of entire cities. For this reason, the INNOQUA system, as decentralized WWT system, is not suitable to substitute the existing systems but it could play a good role in order to support the existing systems. In the future whether the small demonstration sites scale within the project will validate the performance of the INNOQUA system, one could guess to test in a large-scale demo site by installing a series of INNOQUA systems in parallel with an existing WWTP. This solution could lead to an overall reduction of maintenance costs and operational energy costs as well as a substantial reduction of sludge and related costs.

2 Existing sanitation system market landscape from a competition perspective

Detailed study of the potential INNOQUA system competitors has been presented in the D1.2 report submitted in M9. This report (and on-going work) will continue to monitor decentralized/on-site sanitation systems, which are close to the INNOQUA sanitation system concept. Chapter 2 presents an overview and a ranked list of existing sanitation technologies that should also be taken in consideration. To get an improved understanding of the market viability of the INNOQUA system, the competing technologies have been ranked according their main features in comparison to the expected INNOQUA capabilities.
Competing products receive a score according a fixed set of product characteristics. Based on this score, each product is placed in one of the four categories as shown in Table 2. The most competing products are characterized by a minor environmental impact in terms of sludge reduction, treated water reuse and complete treatment process. The Annex II presents the score assignment for each targeted technology and the results are summarised in the Table 3.

Table 2: Competitive factors metrics

Competitive factors	
Competition metrics	*Competitive investigations*
GREEN CELL **score of 12 or greater**	Analysed product features or services being offered **requires a detailed further comparison** in relation to INNOQUA solutions, a cost-benefit analysis will occur.
YELLOW CELL **score between 8-11**	Analysed product **requires a limited further analysis** in relation to INNOQUA solutions, further research about costs will occur
ORANGE CELL **score between 4-7**	Analysed product is not a direct INNOQUA system competitor but it could occupy a market share**. Further analysis about the market potentiality could occur**
RED CELL **score between 0-3**	Analysed product **requires no further analysis**

Table 3 shows the main competing products, while detailed product descriptions can be found in Annex II. For each product, also the average price per PE is calculated, using an arithmetic average between the purchase, the installation and the maintenance costs.

Table 3: Ranked list of on-site existing sanitation technologies
(Ranked sanitation technologies list based on a review of competitors in various markets-See Annex II)

Products	**Country / region**	Average cost per PE [€]	Competition metrics score
DEWATS	India	€ 185	Score 13
BIONEST SYTEM	Europe	€ 1890	Score 13
CMPACT CB	Europe	€ 1811	Score 13
PRO ACT	Europe	€ 1980	Score 12
BioCycle System	Europe	€ 450	Score 12
BIOKUBE	Europe	€ 665	Score 12
BIOROCK-S	Europe	€ 910	Score 10
LANAERJET	Europe	€ 438	Score 9
VALROM	Europe	€ 545	Score 9
ASWAFLOW Pumped Airlift	Europe	€ 1100	Score 9
TRICEL NOVO	Europe	€ 115	Score 9
ROTOPLAS	Ecuador	€ 240	Score 9
BIOFLOC MBBR	Latin America	€ 242	Score 9
FA 5	Europe	€ 322	Score 8
ELITE	Europe	€ 250	Score 8
OXIFIX	Europe	€ 805	Score 8
SBR KLARO	Europe	€ 290	Score 8
Imhof Tank	Europe	€ 475	Score 7
Septic Tank	Europe	€ 1650	Score 7
VIPs	South Africa	€ 302	Score 7
Biotanque Septico	Ecuador	€ 275	Score 7

Technology market segmentation has been conducted and the products that had a score of twelve or higher, could be considered direct INNOQUA competitors since they have environmental performance factors very close to the INNOQUA sanitation system.
The scoring assignment allowed us to make a first hypothesis about the INNOQUA market positioning. The results are intuitively illustrated in the Figure 1, in which the area identified by the price gap and the performance gap indicates the possible market positioning of the INNOQUA product.

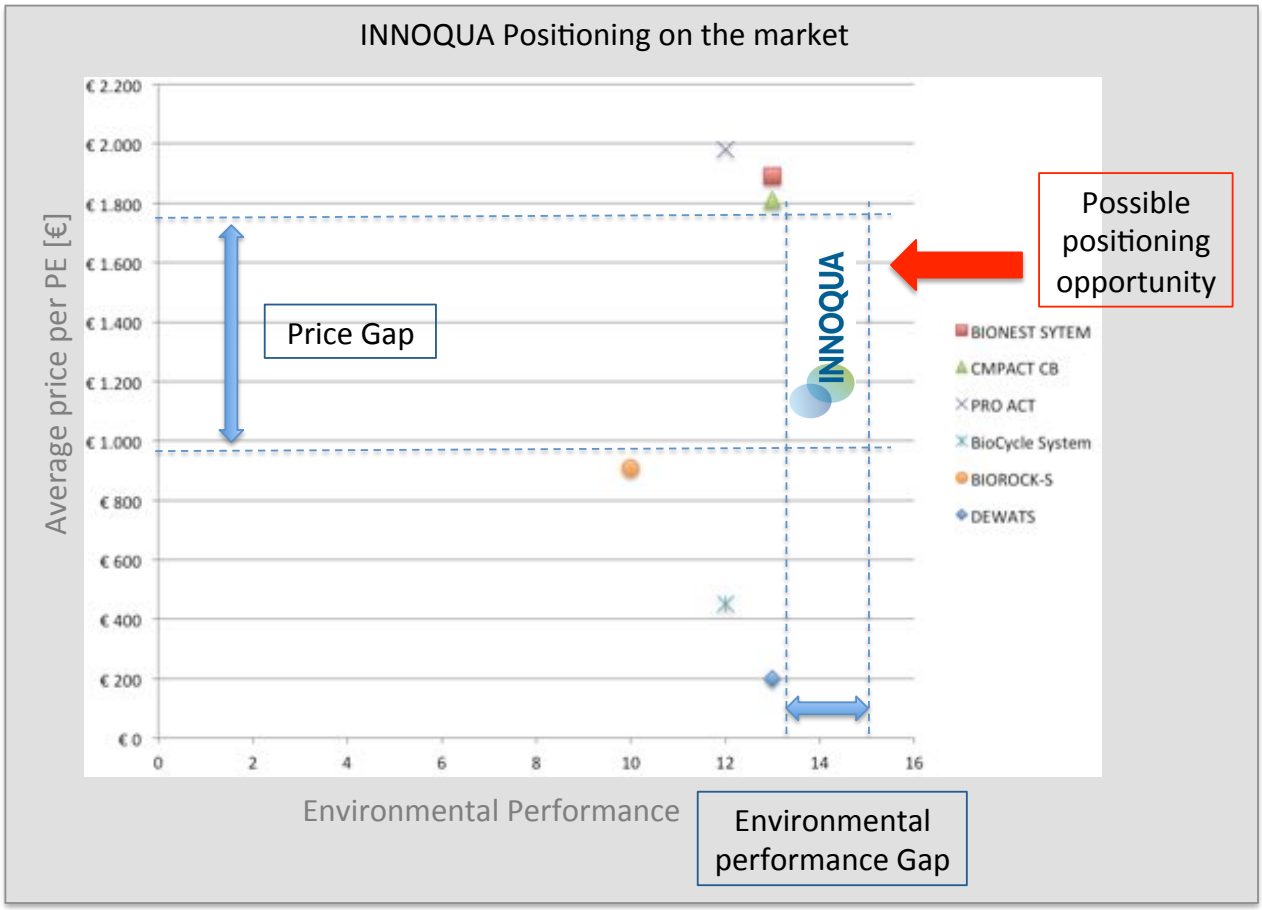


Figure 1: Hypothesis about INNOQUA market positioning

The results of the analysis allowed us to identify the expected competitive advantages of the INNOQUA system in comparison with its direct competitors, Figure 2. The competitive advantages should be at the core of the marketing strategy since they help both in attracting customers and distinguish the INNOQUA product from competitors. Some other competitive advantage could be further defined pending the results of initial prototyping and effluent quality testing.

Figure 2: Expected INNOQUA competitive advantages

3 Market landscape of INNOQUA deployment from a PESTEL perspective

Chapter 3 zooms in to analyse the market feasibility of INNOQUA solutions in regions marked by project demonstrators in:

- 3.1: Western Europe and Romania
  - 3.1.1: France
  - 3.1.2: Italy
  - 3.1.3: Ireland
  - 3.1.4: Spain
  - 3.1.5: UK
  - 3.1.6: Romania
- 3.3: Latin America
  - 3.3.1: Ecuador
  - 3.3.2: Peru
- 3.4: Middle East, Africa and India
  - 3.4.1: Turkey
  - 3.4.2: Tanzania
  - 3.4.3: India

3.1 Western Europe and Romania

Western Europe is generally considered industrialised, an important market driver for INNOQUA deployment. However, various political climates and four distinct climate types exist affecting the standards or regulations of any of its members. European wastewater network rehabilitation market is estimated to be worth €11.52 billion in 2016, driven by the critical need to renew ageing sewer infrastructure. Use of intelligent solutions in inspecting and evaluating networks and services to aid rehabilitation solutions is estimated to have a potential of €1.75 billion by 2021 according to Frost & Sullivan[4].

Cities and conurbations of EU are required to collect and treat their own wastewater under the Directive concerning the treatment of the urban wastewater. The Directive provides for the

[4] Source: Frost and Sullivan, Sustainable Water Treatment Technologies in the 2020 Global Water Market, 2012

biological treatment of the wastewater called as “secondary treatment” and, a more rigorous treatment in the river basins and in water bodies particularly sensitive. In Spain 350 million m^3 and in Italy 240 million m^3 of wastewater are reused per year[5], while in France 7.7 million m^3/year are reused (for context, globally the reuse of wastewater reaches 20 million m^3/day). Since rural, mountainous, and coastal regions in several European countries are frequently not connected to the water network and trends are suggesting the importance on the reuse of natural resources, INNOQUA system shall be integrated into environmental policies of each country and therefore it shall be planned as in important investment in the many Member States.

The key competing technologies in use across EU being studied by INNOQUA, which represent lines of research for INNOQUA on various levels of market deployment strategy development, is detailed in ANNEX II and includes small plants with a complete treatment system (primary, secondary and tertiary), standard septic tanks and imhoff tank often coupled with secondary treatment systems.

3.1.1 France

Table 4: Summary PESTEL - France

Political	**WEIGHTING RATIONALE:** The French government has strict regulations in place or being implemented on wastewater, reuse of water, health, non-collective sanitation, and impending water stress caused by climate change. Water Framework Directive (WFD) is applied in France through the six Regional Water Agencies who implement the objectives and provisions of the Water Development and Management Master Plans. In case of discharge into a natural receptor, such as rivers or lakes, which are sensitive to eutrophication, the threshold for effluent quality is ambitious according to local regulation. Less than 50% of water bodies in France reach the Good Environmental Status (GES) in 2015 whereas objectives were 64,3%. Another ambitious objective is to achieve 87,5% of body water in GES by 2021. This data justifies a score of 7 due to the fact that strict regulations are in place or being implemented that may present drivers for INNOQUA deployment which can help mitigate high costs and overcome difficult maintenance procedures in France in terms of water resource protection. This aspect should indeed be studied further to help foster market uptake strategy development in France.	**SCORE**: 7
Economic	**WEIGHTING RATIONALE:** 800 million euros will be dedicated during the tenth WFD program to support individual sanitation projects. In	**SCORE**: 7

[5] Jimenez B., Asano T., 2007, International survey of wastewater reclamation and reuse practices

	France water cost is 3.78 €/m^3 including drinkable water, wastewater treatment and fees. The cost of wastewater treatment is 1.82 €/m^3[6]. This cost is not uniform on the entire territory, indeed 20% of the French population deviation to the average is over than 0.56 €/m^3. 80% of the French population benefits of a price of sanitation between 1.22 €/m^3 and 2.53 €/m^3. It is important to mention that the cost of wastewater treatment represents 39% of the total amount of the cost of water with 39% for drinkable water and 22% for taxes and fees. If we consider a diagonal from the North East to the South West, the Northern part of France presents a higher price of water (drinkable and sanitation). These high costs of water services means that there is good potential for INNOQUA deployment, therefore this section has been assigned a ranking score of 7 because further work can prove to be helpful for quantifying market uptake conditions in France.	
Social	**WEIGHTING RATIONALE:** Consumption of drinkable water in France is 148 litres per day per inhabitant. Each French citizens produces 3 litres of sludge every day with a classic sewage treatment plant. The waste has to be treated. Only a third of French citizens accept the usage of wastewater for the irrigation of produce[7], which can be increased by adopting and effectively promoting the benefits of the INNOQUA technologies. Despite a relative good sewage network, 18.8% (5 millions of housings) of the French population is not connected to a general sewage system [Eurostat, 2016], and 2% does not have access to any sanitation system. These non-connected buildings are located in mountains, rural areas. Installation of onsite sanitation system is comprising between 5000 and 15000 € according to the 2014-2019 National Plan of actions of non-collective sanitation of French Ministries[8]. Residential on-site sanitation systems are mainly located in rural area where collective system is difficult and expensive to install. 'Basin committees' are deliberating bodies that unite all the stakeholders (local governments, manufacturers, farmers, the State, consumers, NGOs etc.) from each river basin district. This data justifies a score of 8 due to the fact that INNOQUA solutions that intend to reduce maintenance and cost issues, and improve connections to sewage networks for better wastewater management, can potentially be implemented in 'Basin Communities' and therefore strategies must be developed and aligned to technical and business model activities.	**SCORE**: 8

[6] Rapport national des données sispea – synthèse, September 2014

[7] MEDDE/CGDD, mars 2014, Études & documents n° 106 – Ressources en eau: perception et consommation des Français - Résultats d'enquête

[8] Plan d'actions national de l'assainissement non collectif 2014-2019, October 2014

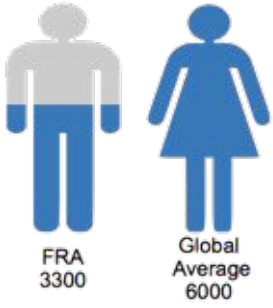
Technological	**WEIGHTING RATIONALE:** The most employed technique in France is WWTPs, which needs maintenance and sludge evacuation. France has 18600 sewage treatment plants where 50% have a capacity lower than 500 PE, which have collectively treated 17 billion m^3 of water in 2008 (wastewater and rainwater). The small capacity of individual plants and large amount of plants justifies a score of 6 since INNOQUA can help streamline the plant management in a uniform way, supporting existing WWTPs and should be quantified accordingly.	**SCORE**: 6
Environmental	**WEIGHTING RATIONALE:** Reuse of water is poorly developed in France, with a volume of 19200 m^3/day. France endures local and seasonal period of deficit of water, because of this reuse of water is limited to specific areas. French climate is mostly mild and hence the combination between Lumbrifilter and Daphniafilter technology shall be adopted, which means that INNOQUA technology needs more study in order to be qualified as ripe for early adoption in France, earning a score of 4 to suggest that further research is required as such.	**SCORE**: 4
Legal	**WEIGHTING RATIONALE:** New sanitation technologies have to obtain accreditation by the French Ministry of environment in order to reach the market, and on-collective wastewater treatment systems must obtain a certification by the French Minister of Health and Ecology. French Municipalities have the jurisdiction in terms of collective or non-collective sanitation with the article L2224-8 of the French General Territorial Public Entities Code. This data justifies a high score of 7 due to the 'red tape' often present when municipalities/ministries are the decision-makers, and specific strategies to mitigate this can be helpful.	**SCORE**: 7

3.1.1.1 Market Key number

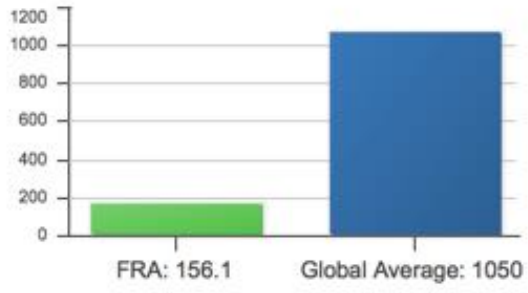
Figure 3: Geographical, Economical and Social indicators - France[9]

Total Population (2017 estimate): 64.896.157 people over 18 years of age

Visual Market Key Indicators for France[10]



Total actual renewable water resources per capita (m3/inhab/yr)

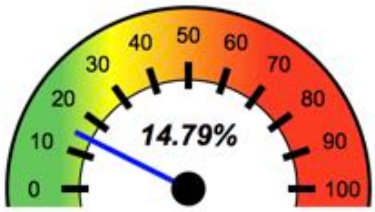


Dam capacity per capita (m3/inhab)

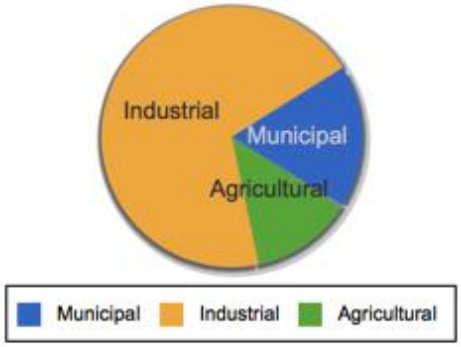
Total cumulative storage capacity of all dams in a country per capita

[9] UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017

[10] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.

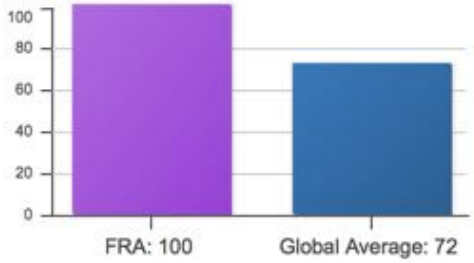


Percent of freshwater resources withdrawn (%)



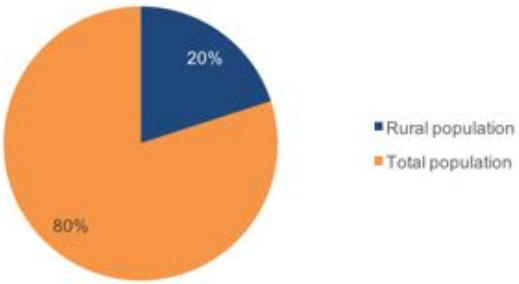
Sectoral withdrawals (%)

Percent of population with access to improved water sources (%)

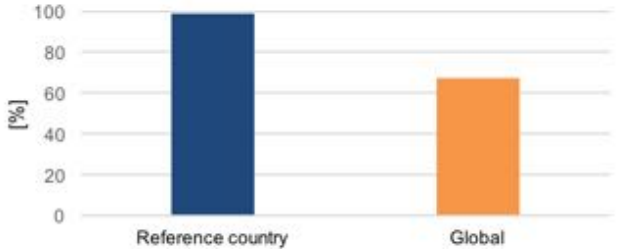


Percent of population with access to improved sanitation (%)

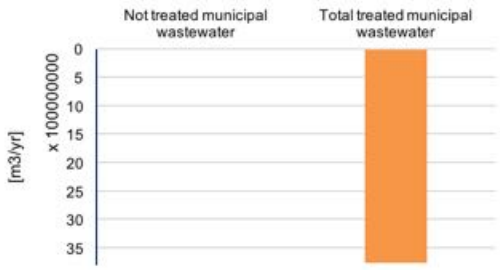
Rural vs Total population



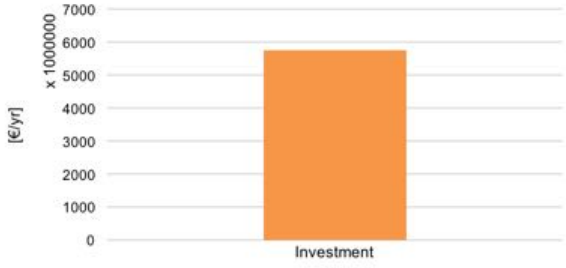
Rural Population with access to improved sanitation facilities

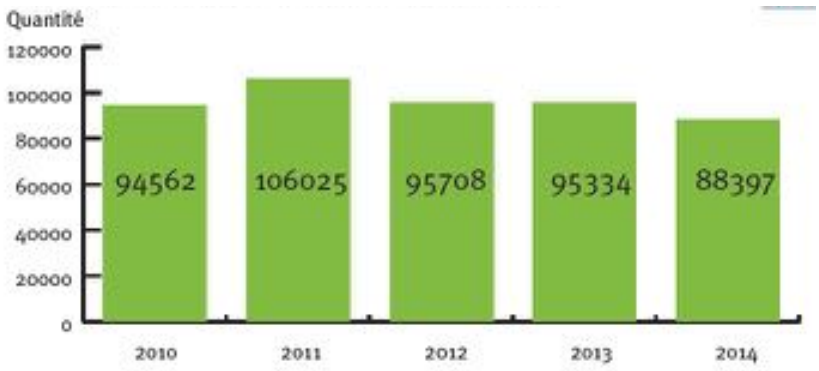


Not treated vs total treated municipal wastewater



Investment in water and sanitation with private participation





Number of sales of onsite sanitation system in France per Year

Number of sales of onsite sanitation system in France per Year:

88.400* units

€ 100.000.000* National on-site sanitation systems Market

*** Source: IFAA, 2016. Ministry of Environment**

3.1.1.2 Market opportunities for the INNOQUA system in France

With an estimated installation of five million WWTPs at individual households, the France market is of interest for INNOQUA. An INNOQUA system, being a combination of lumbrifiltration with the Daphniafilter and the Control Unit, could be marketed as the smart alternative for D-WWTPs offering customers the gains of low sludge removal, enabling water re-use and receiving automated timely warnings in case there is a fault in the system. It can be expected that the introduction of wastewater certificates in 2012, which may not be older than three years, existing D-WWTPs will be renovated or renewed more frequently, resulting in more moments for customers to consider switching to the INNOQUA system. WWTPs are priced in the range of €5000 – €15000 and costs for sludge removal over the lifetime of the system are around €2000. The INNOQUA system should fall within this price range and meet national and local regulations.

3.1.2 Italy

Table 5: Summary PESTEL - Italy

Political	**WEIGHTING RATIONALE:** The adoption of EU water directive occurred in Italy in 2015 and Italy represents a high percentage (22%) of wastewater reuse volume in EU. Although policy is focused on increasing standards, water infrastructure is generally not directly connected to the network (like most coastal regions globally). Court of Justice of the European Communities sentenced Italy to pay a financial penalty because 109 municipalities and conurbations with at least 15000 equivalent inhabitants do not respect the disposition of the 91/271/CE European directive about the treatment of wastewater. In Italy, the regions have been organized in ATO (Optimal Territorial Ambit) in accordance to the Italian legislative decree 152/2006 in order to optimize the entire water cycle. From the last deadlines, several municipalities own a wastewater not conforming to the European directive, or not well designed plants for the different seasonal variations[11]. This data justifies a score of 5 due to the fact that the INNOQUA system deployment will help clear up pitfalls to enable the policy goals, but as of now they are largely in flux and as such not likely to adopt innovative technologies unless success can be proven.	**SCORE**: 5
Economic	**WEIGHTING RATIONALE:** In Italy, the cost of the water is around 1.55 €/m^3, about half of other EU countries[12]. On the contrary, fees applied in Italy are much lower than those applied in the EU, as they average 0.27 €/m^3 of treated wastewater (average 0.56 €/m^3 in the EU), and 0.71 €/m^3 for the integrated water services (average 1.80 €/m^3 in the EU)[13]. For that reason, operative paths for the disposal or the reuse of the wastewater, are traditionally stabilized[14]. While the average water supply rate in Italy is around 0.90-0.95€/m^3 (with wide variations across the country), in many other OECD (Organisation for Economic Co-operation and Development) countries they are already	**SCORE**: 7

[11] Source: http://www.impresaoggi.com/it2/645-trattamento_delle_acque_reflue_urbane_in_europa/ - accessed 25/05/2016.

[12] Source: http://www.gruppohera.it/gruppo/com_media/dossier_acqua/articoli/pagina24.html - accessed 13/06/16

[13] Source: http://www.iwawaterwiki.org/xwiki/bin/view/Articles/Italy - accessed 14/06/2016.

[14] Source: http://www.isprambiente.gov.it/it/progetti/suolo-e-territorio-1/uso-dei-fanghi-di-depurazione-in-agricoltura-attivita-di-controllo-e-vigilanza-del-territorio/files/IRER_2010_rapportofinale.pdf - accessed 14/06/2016

	between 2-3 €/m^3. Charges for wastewater collection continue to be lower than in other OECD countries[15]. This data justifies a score of 7 due to the fact that further research into pricing is required in order to draw conclusions that technical developers can consider.	
Social	**WEIGHTING RATIONALE:** Since coastal and mountainous regions (of which Italy has many) are often not directly linked to the water network they represent opportunities for INNOQUA. Another market segment of interest in Italy is wastewater networks that are undersized or lack capacity. This is the case in many smaller municipalities that could exploit the INNOQUA system for relieving pressure or delaying the need for capacity upgrades. Italy recently started a common definition of new quality parameters for the return of wastewaters to the environment, however a current lack of infrastructure to support plants is evident (e.g., monitoring systems, and remote control). In 2008, 82% of the population was connected to public wastewater treatment plants, while 30% of Italians are not connected to the sewer or to any waste treatment plant, and around 60% of wastewater treated by advanced methods[16]. This data justifies a score of 8 due to the fact that further research into sociological benefits is required in order to draw conclusions that technical developers and early adopters can consider.	**SCORE**: 8
Technological	**WEIGHTING RATIONALE:** The most employed water sanitation technology solution currently in Italy are D-WWTPs with direct dispersal in the ground. This means INNOQUA will be a marketable solution. Italian water networks that are undersized or lack capacity (e.g. in many smaller municipalities) could exploit the INNOQUA system for relieving pressure off these systems or delay the need for capacity upgrades. Another important focus point is due to several Italian made solutions for off-network sanitation systems that were found. They will be further studied for comparison with the costs/performance of the INNOQUA system. This data justifies a score of 6 due to the fact that a market uptake barrier can manifest unless further research is conducted and considered by technical developers regarding sizing.	**SCORE**: 6
Environmental	**WEIGHTING RATIONALE:** Only Florence and Turin reached the 100% of waste treatment[17]. Also, Italian climate (alpine, continental, and Mediterranean) is mostly mild and hence the combination between	**SCORE**: 8

[15] OECD. (2013), OECD Environmental Performance Reviews: Italy 2013, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264186378-en - accessed 30/05/2016.

[16] Source: OECD. (2013), OECD Environmental Performance Reviews: Italy 2013, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264186378-en - accessed 30/05/2016

[17] Source: http://www.regioni.it/newsletter/n-2692/del-27-03-2015/ue-mancano-troppi-depuratori-in-italia-terza-infrazione-13715/ - accessed 06/06/2016

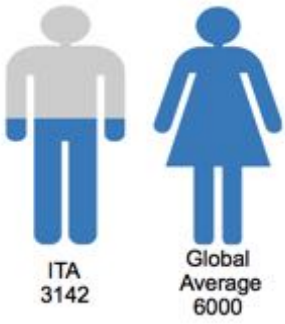
	daphniafiltration and lumbrifiltration technology shall be adopted, thus fostering INNOQUA market deployment for a score of 8 due to further qualifications being required in the context of market uptake.	
Legal	**WEIGHTING RATIONALE:** In order to reduce the gap between wastewater laws of industrialized European countries, the EEC directives regarding wastewaters were adopted also in Italy. This huge effort aims to reduce the big differences from the European standards. Indeed, the percentage of inhabitants served is still inadequate, and therefore a large investment effort begins fundamental for improving the standard quality. In Italy, a lack of infrastructures which supports plants is evident (e.g., monitoring systems, and remote control). This data justifies a score of 7 due to the fact that further qualifications and quantifications are required to avoid legalities being a market uptake barrier for INNOQUA deployment in Italy.	**SCORE**: 7

3.1.2.1 Market Key number

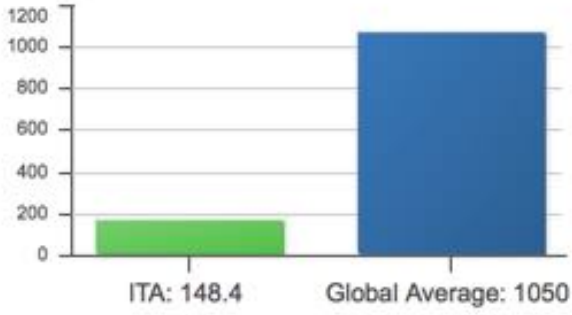
Figure 4: Geographical, Economical and Social indicators - Italy

Total Population (2015 census): 60.800.000 people

Visual Market Key Indicators for Italy[18]



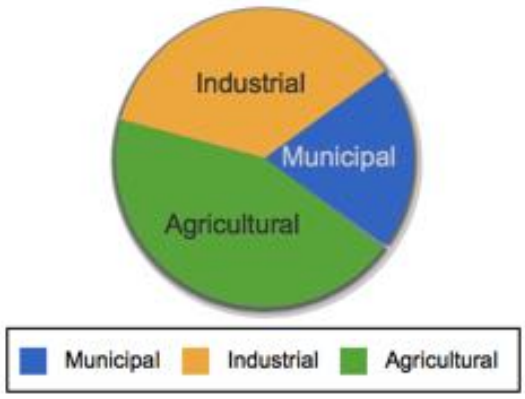
Total actual renewable water resources per capita (m3/inhab/yr)



Dam capacity per capita (m3/inhab)

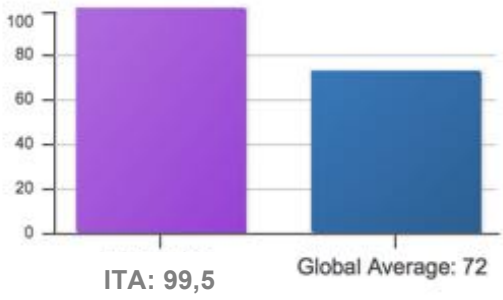
Total cumulative storage capacity of all dams in a country per capita

Percent of freshwater resources withdrawn (%)



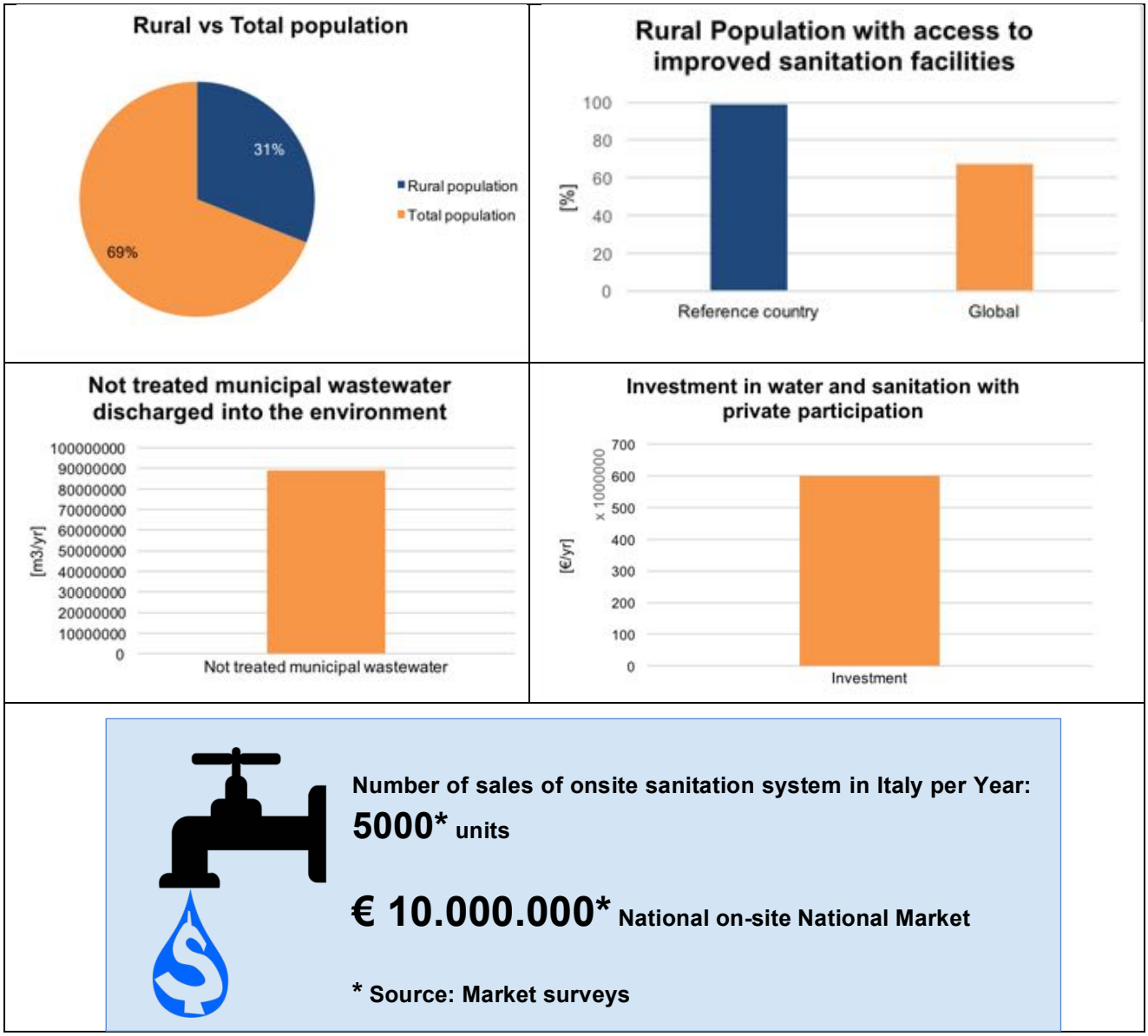
Sectoral withdrawals (%)

Percent of population with access to improved water sources (%)



Percent of population with access to improved sanitation (%)

[18] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.



3.1.2.2 Market opportunities for the INNOQUA system in Italy

Italy is characterised by a fragmented and complex wastewater market, big differences in the quality of wastewater treatment plants and having problems meeting EU directives. Especially the South of Italy and in the coastal areas have a high pressure on groundwater resources due to over-exploitation and salt intrusion. This is an opportunity for INNOQUA who can provide a combination of lumbrifiltration with either the daphniafilter or the bio-solar filter and the Control Unit to individual households and farms who can re-use the wastewater for irrigation. Another option is to deliver a larger scale INNOQUA system to small municipalities helping them with reaching compliancy with local and regional legislation. Scarcity of available funds for local and regional

authorities and the high level of corruption, Italy is ranked third in the list of most corrupt countries in the developed world[19], make it harder to address this market.

3.1.3 Ireland

Table 6: Summary PESTEL - Ireland

Political	**WEIGHTING RATIONALE:** The key piece of legislation in Ireland regarding wastewater services is "WATER SERVICES (AMENDMENT) ACT 2012'[20]. The Irish Water utility company regulates water supply and sanitation services. The clear political framework and regulation policy justifies a score of 7 due to the fact that existing legislation makes provisions that can potentially enable uptake and provide support for INNOQUA deployment.	**SCORE**: 7
Economic	**WEIGHTING RATIONALE:** Under the government's 'Infrastructure and Capital Investment 2012 – 2016' blueprint, €1.58 billion in capital investment is to be allocated for water services between 2012 and 2016. The geographical proximity of Ireland to UK represents a potentially attractive market. The score assigned is 7.	**SCORE**: 7
Social	**WEIGHTING RATIONALE:** In Ireland, wastewaters from single houses in the countryside that are not connected to sewers, the main target for INNOQUA early adoption, are generally treated on-site by WWTPs or individual domestic wastewater treatment systems. Public awareness about health risks related to malfunctioning septic tank systems is relatively low. This means that the market is nearly ready for market uptake and therefore this section of the analysis receives a score of 7.	**SCORE**: 7
Technological	**WEIGHTING RATIONALE:** For wastewater treatment, near 99% of wastewater collected in sewers receives at least secondary treatment, and 1.6 billion litres of water are treated each day nationally; 540 million litres of this is in the wider Dublin area. The low density and spatial distribution of population has resulted in an extensive network of water distribution compared to many other countries – with over 25,000 km of pipes in total. However this also means that less than 10% of rural population doesn't have access to the municipal sanitation. This means that the market has little space to support the INNOQUA	**SCORE**: 5

[19] Source: Corruption Perceptions Index 2016

[20] Source: http://www.epa.ie/water/wastewater/ - accessed 01/05/2017

	market uptake and therefore this section of the analysis receives a score of 5.	
Environmental	**WEIGHTING RATIONALE:** Water shortages have left some larger urban areas – particularly Dublin – with supply issues during prolonged dry spells. A 2006[21] feasibility study for the Greater Dublin water supply urged the development of a new water source, pointing out that it would be needed by 2015–2016 to avert water rationing and the curtailment of economic growth. INNOQUA could help in saving water by reusing the treated wastewater. This means that the market is nearly ready for market uptake and therefore this section of the analysis receives a score of 6.	**SCORE**: 6
Legal	**WEIGHTING RATIONALE:** As of 2011, while 66% of households were connected to public sewerage schemes, with the majority in urban areas, 27.5% of households used an individual septic tank, and 3% adopted other individual sewerage systems. In October 2009, the European Court of Justice ruled against Ireland regarding septic tanks and other on-site wastewater treatment systems. It deemed Ireland non-compliant with Articles 4 and 8 of the Waste Directive in relation to domestic wastewaters disposed of in the countryside. In 2012, the government passed the Water Services (Amendment) Act 2012, which provided for a new inspection system and which would require owners of septic tanks and other on-site treatment systems to register their systems. A new registration and inspection regime was introduced in June 2012. By July 2013, almost 90% of owners of premises connected with such systems had registered their systems. The government also announced details of a grant scheme for remedial work on a septic system. Local authorities stimulate group sewage systems in rural areas. The on-site sanitation systems market could be influenced by local laws that need more detailed study, for this reason the score assigned is 6.	**SCORE**: 6

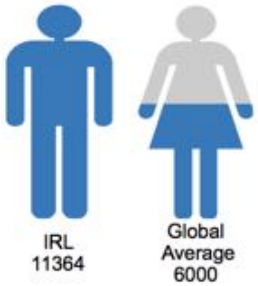
[21] Water charges not on agenda – Gormley, Irish Times, August 26, 2008". The Irish Times. The Irish Times. 8 August 2008. Retrieved 20 January 2011.

3.1.3.1 Market Key number

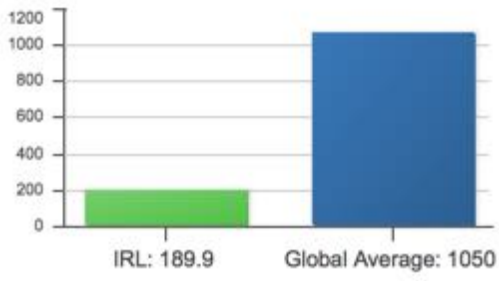
Figure 5: Geographical, Economical and Social indicators - Ireland

Total Population (2016 census): 4,757,976 people

Visual Market Key Indicators for Ireland[22]



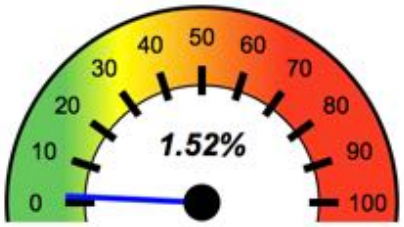
Total actual renewable water resources per capita (m3/inhab/yr)



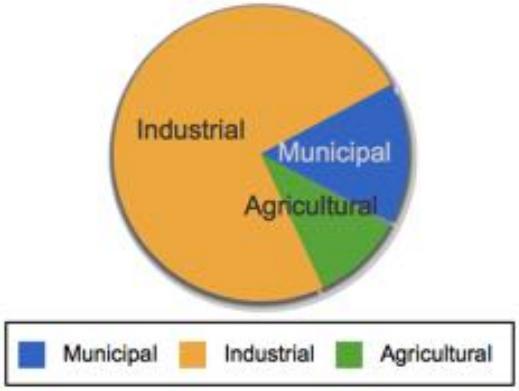
Dam capacity per capita (m3/inhab)

Total cumulative storage capacity of all dams in a country per capita

[22] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.

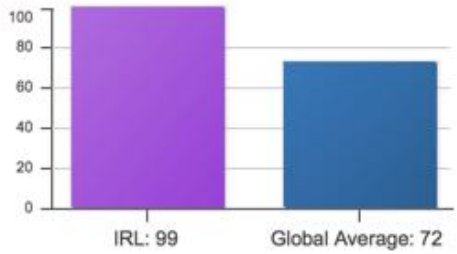


Percent of freshwater resources withdrawn (%)

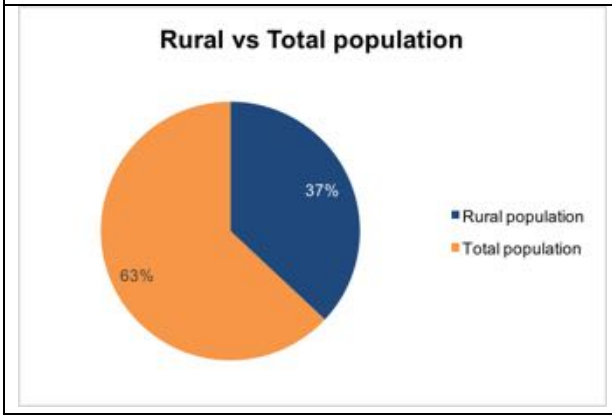


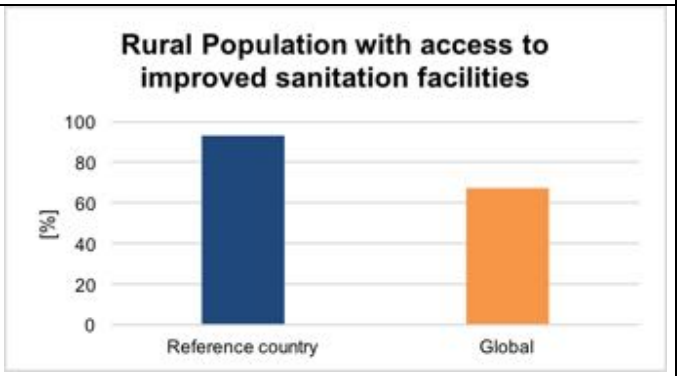
Sectoral withdrawals (%)

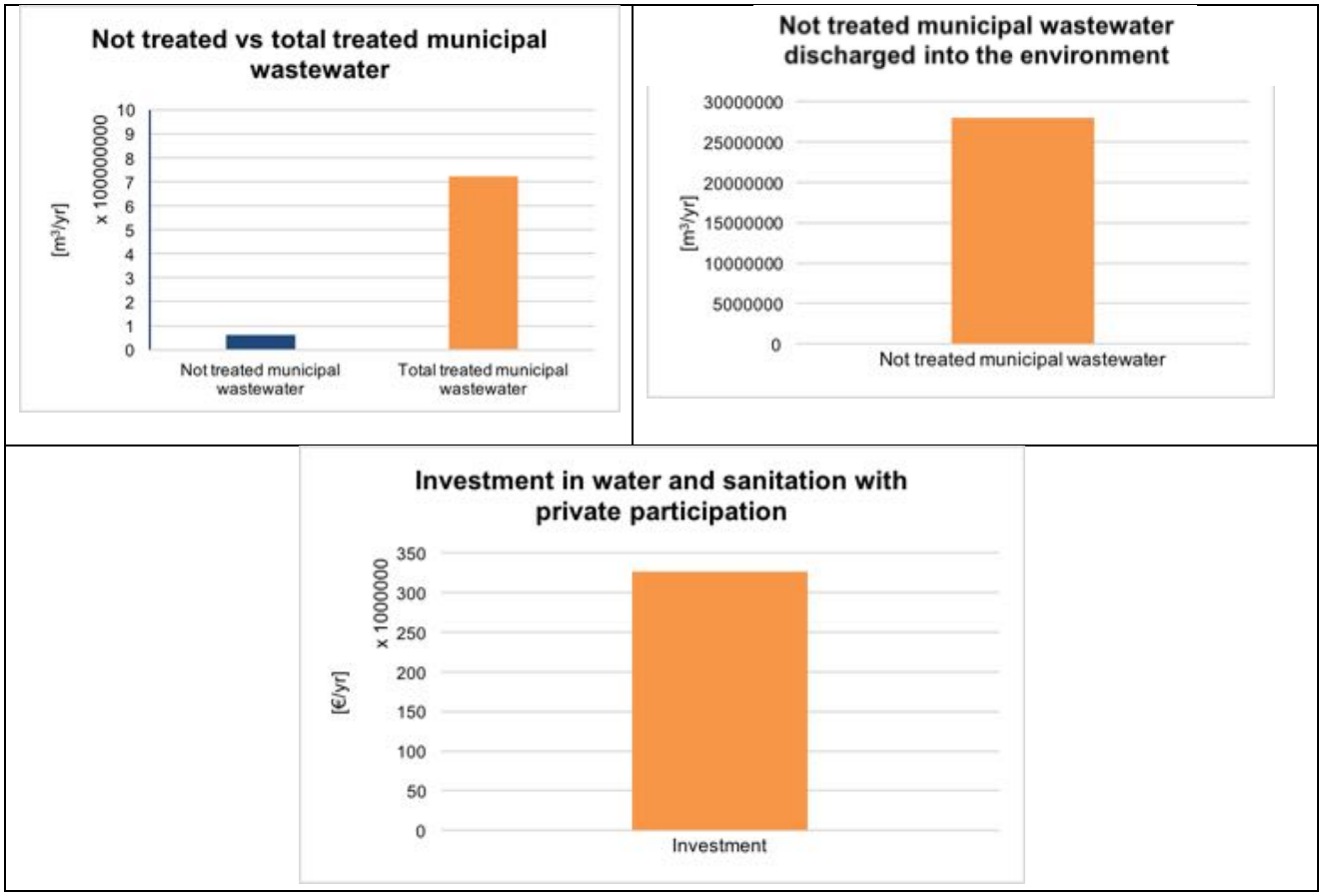
Percent of population with access to improved water sources (%)



Percent of population with access to improved sanitation (%)







3.1.3.2 Market opportunities for the INNOQUA system in Ireland

For three years in a row, Ireland has the fastest growing economy in the Eurozone. It is unsure what the impact of the Brexit will be on the Irish economy, now the UK has officially started the two-year Brexit negotiation. Water charges, which were introduced in recent years for domestic users, have now been abandoned due to political reasons. Albeit, while in place the majority of domestic users had paid the required charges.

In the past decades, wastewater treatment in urban areas has improved significantly but compliance rates of the effluent quality are low compared to EU compliance rates. In 2015, untreated wastewater from 43 areas was routinely discharged in the environment. Irish Water provided a timeframe for the provision of infrastructure to eliminate the discharge of untreated wastewater. Urban wastewater continues to be one of the principle pressures on water quality, effecting bathing water quality and contributing to river pollution. The connection rate to a centralised sewage system is nearly 100%, leaving little room for an INNOQUA system.

In rural areas, wastewater from around 500000 dwellings is treated on-site as there is often no interconnection with a central sewage system. In 2014, a National Inspection Program has started. In a first round of inspections of on-site decentralized wastewater treatment systems nearly 50%

failed to meet safety and health standards[23]. Public awareness about health risks related to malfunctioning septic tank systems is relatively low. Local authorities stimulate group sewage systems in rural areas. The INNOQUA system would fit this market which is currently dominated by mechanical aeration systems and on-site decentralized wastewater treatment systems but would need to address also the public behaviour, awareness and attitudes regarding on-site water treatment systems.

3.1.4 Spain

Table 7: Summary PESTEL - Spain

Political	**WEIGHTING RATIONALE:** Spanish local governments are responsible for providing urban water services and establishing the management model for these services. Spain is formed by more than 8000 municipalities. 84 percent of these have less than 5000 inhabitants. There are more than 2.000 urban water systems (municipalities themselves plus groups of municipalities). Spain uses 80% of its water supply to irrigate crops. At the same time, consumer demand is up 10% following national water plans that were recently approved by the central government, as well as an expansion of areas that require irrigation. The government is trying to restore balance by reducing the amount of irrigated areas from 4 million hectares to 3 million hectares. In general, water tariffs comprise 2 parts (a fixed one and a variable one, which depends on consumption) and are progressive, following a block system of consumption with increasing prices. The most common forms of tariff approval are joint action by municipalities and Price Commissions. Both are dependent of the respective regions, and where the first ones approve tariffs and the second ones authorize price revisions, or through regional public bodies or regional governments. This data justifies a score of 5 due to the fact that initial studies are showing favorable conditions regarding political landscape, but if further analyzed can prove beneficial in the context of strategy development for INNOQUA market uptake in Spain.	**SCORE**: 5
Economic	**WEIGHTING RATIONALE:** In Spain, the urban water sector is financed by the 3T model. This means Taxes, imposed by the local, regional and national authorities; Transfers, mainly, allocated by the European Union and Tariffs, determined by the municipalities. The sector has a turnover of 6.479 M€ (3.854 for water supply and 2.324 for sanitation) and an invoiced volume of 3.360 hm^3 per year. The	**SCORE**: 7

[23] Source: Domestic Wastewater Treatment in Ireland: Septic Tanks. A report on the progress of the National Inspection Plan (2013-2015)

	average urban water price for domestic use in Spain is of 1.78 €/m^3 (1.03 €/m^3 for water supply and 0,75 €/m^3 for sanitation). The price of urban water is highly heterogeneous among regional areas. In fact, Spain has the most variable price in Europe, with differences of up to 500 percent between municipalities. Each municipality or urban water system (consortium of municipalities) has a specific cost recovery distribution and therefore, a different finance distribution model, in which the water tariff does not cover the same costs. We need to bear this in mind when comparing the price of water in Spain. This data justifies a score of 7 due to the fact that a specific economic model has been identified and if further explored and quantified can become integral for INNOQUA market deployment success in Spain.	
Social	**WEIGHTING RATIONALE:** Spain is considered a gateway to markets in Latin America and the Mediterranean area, because water demands are similar. There is a wastewater treatment coverage of around 100 percent of the population. The municipalities with less than 2000 inhabitants are the ones that are having problems with wastewater treatment. Apart from this, there are some specific zones that are having difficulties in eliminating nutrients in wastewater. The treated wastewater rises up to 4000 hm^3 per year, and the use of reclaimed water is approximately 350 hm^3 per year. This data justifies a score of 5 due to the fact that the sociological landscape in Spain is seemingly favorable but limited further research can help to quantify that claim.	**SCORE**: 5
Technological	**WEIGHTING RATIONALE:** In Spain near 100% of the rural population is connected to sewers; few are served by on-site sanitation systems such as septic tanks. Water reuse is encouraged, the National Plan of Sanitation and Wastewater Treatment also has established, the promotion of wastewater reuse, as an important management point in the hydraulic domain. This way, recycled water can replace uses that do not need a high quality, avoiding using volumes of better quality for other more demanding uses. Favourable laws could facilitate the market uptake of the INNOQUA product. The score assigned is 7.	**SCORE**: 7
Environmental	**WEIGHTING RATIONALE:** In Spain, regarding water supply, 34 percent of the population is served by public companies, 10 percent by local entities, 34 percent by private companies and 22 percent by public-private companies[24]. The volume of water abstracted is nearly 4800 hm^3 and the source of raw water is mainly superficial (with a 67 percent) followed by groundwater (30 percent) and desalinated (3%). In the last 20 years, Spain has lost 20% of its fresh water. If the effects	**SCORE**: 7

[24] Source: http://www.dk-export.dk/nyt-og-presse/nyheder/spain-need-for-wastewater-treatment-and-more-energy-efficient-distribution/ - accessed 01/05/2017

	of climate change continue unabated, this figure will rise to 25% by 2021[25]. This data justifies a score of 7 due to the fact that environmental conditions seem favorable for INNOQUA deployment, but require further research to qualify and quantify such aspects.	
Legal	**WEIGHTING RATIONALE:** Water in Spain is of public ownership, and urban water supply is the highest priority among other uses as stated in article 1 of the Spanish Water Law. This data justifies a score of 7 due to the legal importance in Spain and thus the priority to be placed on this aspect of subsequent research during the INNOQUA project.	**SCORE**: 7

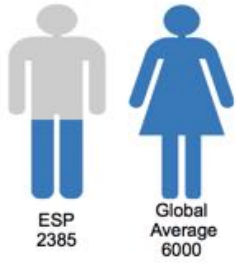
3.1.4.1 Market Key number

Figure 6: Geographical, Economical and Social indicators - Spain

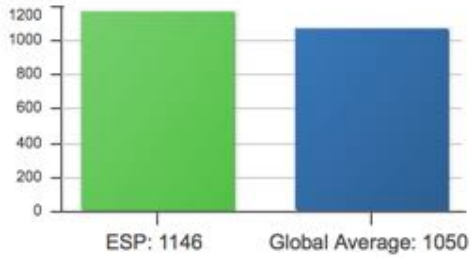
Total Population (2017 estimate): 46.070.145 people

[25] Source: http://www.euractiv.com/section/agriculture-food/news/spain-faces-threat-of-water-crisis/ - accessed 01/05/2017

Visual Market Key Indicators for Spain[26]

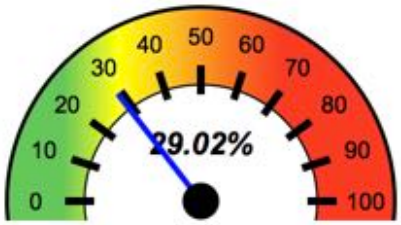


Total actual renewable water resources per capita (m3/inhab/yr)

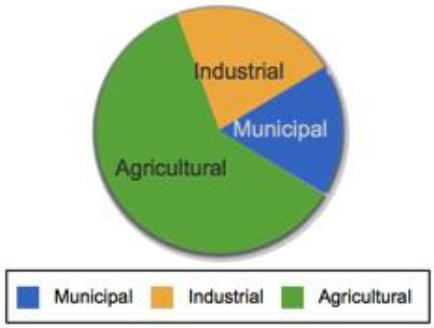


Dam capacity per capita (m3/inhab)

Total cumulative storage capacity of all dams in a country per capita

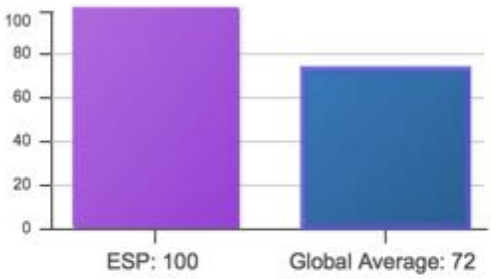


Percent of freshwater resources withdrawn (%)



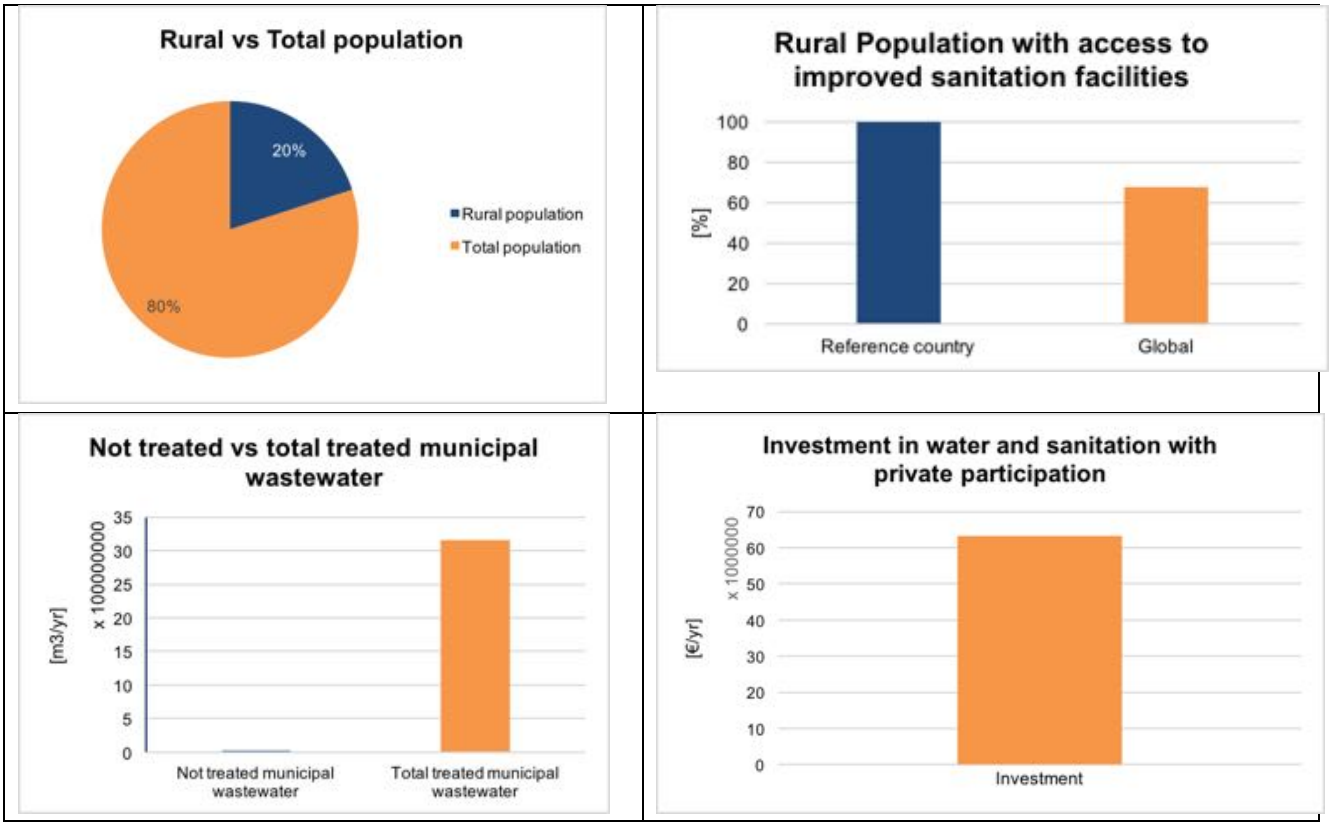
Sectoral withdrawals (%)

Percent of population with access to improved water sources (%)



Percent of population with access to improved sanitation (%)

[26] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.



3.1.4.2 *Market opportunities for the INNOQUA system*

Spain is the fourth-largest economy in the Eurozone. Spain is recovering from a recession that started in 2008 and from which it is emerging since 2013. The unemployment rate is with 18.4% (2016) still high. 98% (OECD, 2012) of the households are connected to public sewer. The number of water stressed regions, especially in the south of Spain is likely to increase because of more frequent droughts due to climate change. Water conservation and water reuse will become more important in the near future. In agriculture, the total irrigable area will increase. In urban areas, water reuse programs have started. This is an opportunity for INNOQUA, which can offer a local wastewater treatment system for farmers.

3.1.5 United Kingdom

Table 8: Summary PESTEL - UK

Political	**WEIGHTING RATIONALE:** In 2008, Future Water, the governments' water strategy for England sets out the government vision for the water sector for 2030. With regard the wastewater industry, nutrient removal is high on the UK agenda, however Brexit will indeed be an obstacle to INNOQUA system market deployment considering EU legislation such as BREF and WFD will likely change in the UK case. It is however unlikely that any drastic change in environmental policy will be	**SCORE**: 5

	implemented in the short term. Thus, there is potential for the INNOQUA technology to provide sustainable treatment and provision of re-usable waters that align with the current environmental political considerations for the UK. This data justifies a score of 5 due to the fact that political landscapes are currently difficult to predict for uptake in the UK market, but further studies will prove beneficial if conducted.	
Economic	**WEIGHTING RATIONALE:** In 2016, the municipal water and wastewater market has been estimated in 2016 at a total valuation of €48 billion, with a growth rate of 4.2%; industrial at €24.5 billion, with a growth rate of 5.8%. In the industrial sector, taking the food industry as an example, which utilizes approximately 10% of all industrial water use, a target of reducing water usage by 20% (from a 2007 baseline) by the year 2020. INNOQUA has the potential to bring value to the UK industrial sector as an inexpensive and eco-friendly onsite treatment system, and for agriculture the INNOQUA technologies could be the direction to take when dealing with nutrient and pesticide pollution. There is a €47 billion spending wave in the UK water market. For the ten water and sewerage companies (WaSCs), planned water and wastewater expenditure amounts to €44 billion clearly demonstrating that these should be the focus of suppliers selling into the market. Total expenditure on maintaining and enhancing wastewater treatment standards is expected to accelerate over the AMP6 period, going from €1.9 billion – a 42% share of expenditure in 2015/16 – to reach a peak spend of over €2.5 billion in 2019/20, which will account for almost 50% of wastewater spending[27]. The Food Industry (which utilizes approximately 10% of all industrial water use) Sustainability Strategy set a target of reducing water usage by 20% (from a 2007 baseline) by the year 2020. This data justifies a score of 8 due to the fact that a 2020 baseline must be identified and projected against uptake forecasts.	**SCORE**: 8
Social	**WEIGHTING RATIONALE:** The average domestic water usage for the UK is 150 l/p/d. Of this, up to one third is utilized for flushing toilets. As such, there is clearly scope for more innovative solutions to water usage; such as rain water harvesting or collection and treatment of wastewaters produced within the house for utilization in toilet flushing. Most of the UK population are connected to large sewage treatment plants though a sewer network. Only less than 1% of population, living in rural area could benefit from the INNOQUA Innovative Bio-based	**SCORE**: 7

[27] Source: https://www.globalwaterintel.com/client_media/uploaded/Chantal/market%20profile%20sample.pdf – accessed 01/05/2017

	on-site Sanitation systems. Based on average household size of 2.32 people and UK population of 64 million, the potential market is about 275000 households. Currently, WWTPs and other small scale treatment plants take care of the wastewater for these households. This data justifies a score of 7 due to the fact that further research is required to specify how these aspects will impact market uptake plans.	
Technological	**WEIGHTING RATIONALE:** There is an estimated market potential in UK of around 275000 households. The strong standards applied in the UK, fed by the European WFD provide a viable framework for INNOQUA to be implemented in the territory. The possible water stress episodes that might affect the UK in the nearby future also increases the need for technologies that can respond to the public necessity and can easily adapt to changing situations. This data justifies a score of 5 due to the fact that both further qualification and initial quantification of product features can lead to uptake strategy.	**SCORE**: 5
Environmental	**WEIGHTING RATIONALE:** UK generates around 1 million tons of sludge each year. Most of the sludge (>80%) is treated and recycled to land for agriculture, reclamation, composting and other uses, around 18% was disposed of through thermal destruction and less than 1%, sent to landfill. Wastewater Network Rehabilitation Market in UK has a landmass area of 242495 km^2, a population of 64.2 million, length of network at Approx. 546200 kilometres, rehab rate of 2%, potential revenue north of €1.61 bilion, and a CAGR of 5.6% between the years of 2016-2021 (Frost & Sullivan, 2016). The UK is represented with Atlantic climate. Due to climate situation of the UK INNOQUA system should be supplied with thermal insulation common to Atlantic climate regions. The possible water stress episodes that might affect the UK in the nearby future also increases the need for technologies that can respond to the public necessity and can easily adapt to changing situations. This data justifies a score of 6 to show further study being helpful to identify how INNOQUA can positively impact this aspect.	**SCORE**: 6
Legal	**WEIGHTING RATIONALE:** All sewage effluent discharges, irrespective of age, volume or location, are subjected to Environmental Agency General Binding Rules. Only sewage treatment plants which have an EN12566-3 Certificate are allowed to discharge into ditches and watercourses. The legislation analysis conducted during this pre-market study applies to UK by way of sewage treatment plants and D-WWTPs. These factors require the assignment of a market feasibility score of 5 to determine market uptake specifics.	**SCORE**: 5

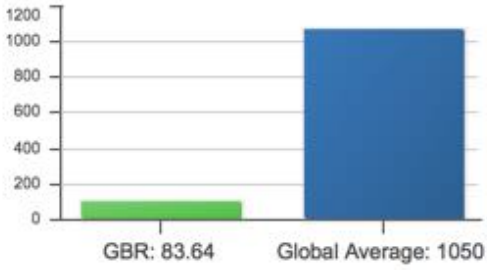
3.1.5.1 Market Key number

Figure 7: Geographical, Economical and Social indicators – United Kingdom

Total Population (2017 estimate): 64.597.000 people

Visual Market Key Indicators for United Kingdom[28]

Total actual renewable water resources per capita (m3/inhab/yr)

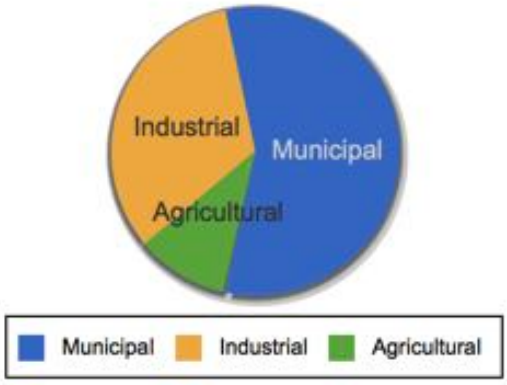


Dam capacity per capita (m3/inhab)

Total cumulative storage capacity of all dams in a country per capita

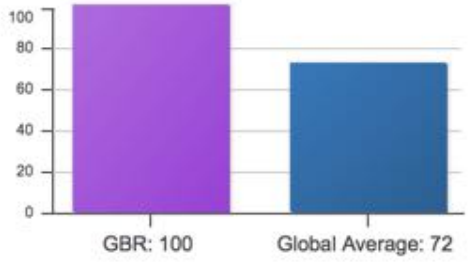
[28] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.

Percent of freshwater resources withdrawn (%)

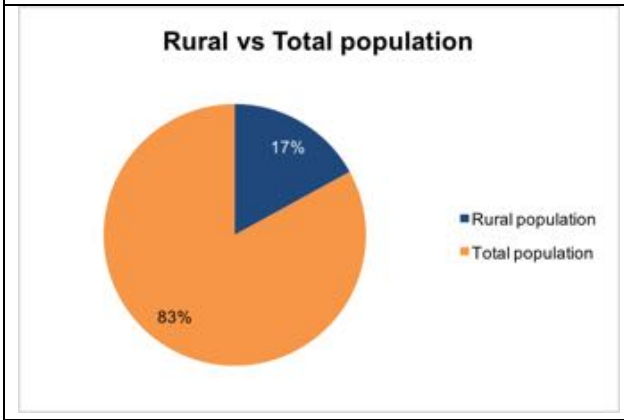


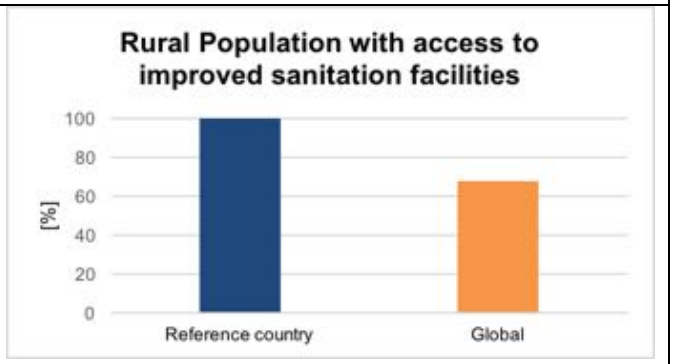
Sectoral withdrawals (%)

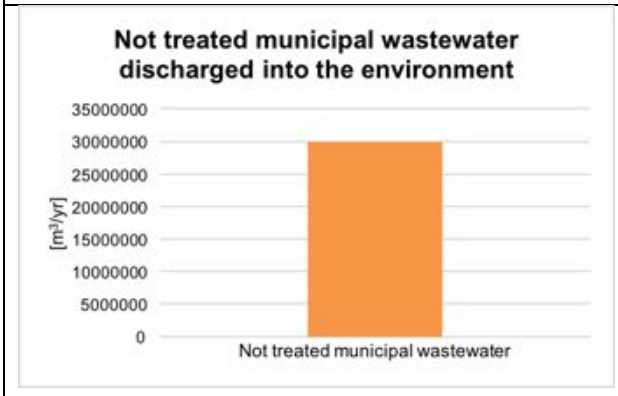
Percent of population with access to improved water sources (%)

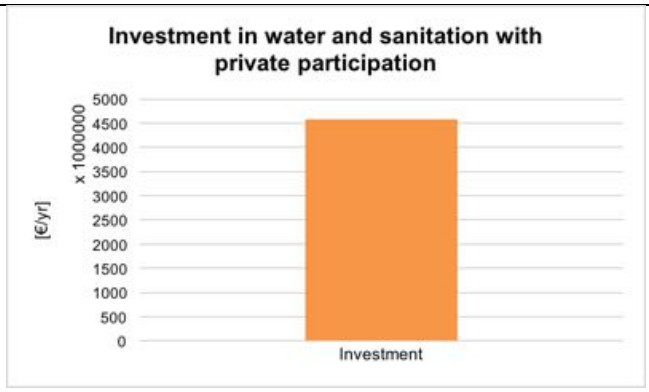


Percent of population with access to improved sanitation (%)









Number of sales of onsite sanitation system per Year: 6.000* units

€ 13.000.000* National on-site sanitation system Market

*** Source: Market surveys**

3.1.5.2 Market opportunities for the INNOQUA system

Nearly 100% of the houses is connected to centralised drinking water and wastewater systems. UK has a highly-developed wastewater management system and has established a strong regulatory framework and supporting policies, in line with the European WFD. The decision of the UK to leave the EU brings uncertainty with respect to the development of the UK economy and the influence on environmental policies and targets is unknown.
When regulation with respect to nutrient and pesticide pollution is becoming stricter, the INNOQUA system could offer an inexpensive on-site solution for agriculture. For remote rural areas, an INNOQUA system providing a low sludge solution is of interest because of the difficulties such areas face with sludge removal. Overall, the UK wastewater market is a mature market and a niche market for INNOQUA systems.

3.1.6 Romania

Table 9: Summary PESTEL - Romania

Political	**WEIGHTING RATIONALE:** For the drinking water and wastewater operators, regionalisation is a primary policy objective in Romania. It entails the merging of two or more local operators (both municipal and rural localities) into one regional working operator, usually at the county level. The local councils will therefore no longer have each a water/waste water operator working solely for their community, but will participate in a regional operating company (ROC) that will serve a number of participating towns and communities. This means that each ROC will be more likely to afford the implementation of INNOQUA solutions, since investments can be shared between individual operators and will likely receive governmental support. Therefore, along with the facts that privatization of water companies and cut-off of state subsidies for water and sewerage are occurring in Romania, a score of 5 is assigned to this section of the pre-market analysis in order to further identify how those initiatives affect market uptake.	**SCORE**: 5
Economic	**WEIGHTING RATIONALE:** Cost of water disposal (directly related to	**SCORE**:

	the operation and maintenance of the sewerage system is, typically, 22-28% of the fresh water cost (roughly 0.18 €) and are established in strict compliance with the provisions of the Concession Agreement and those of H.G. no. 1019/2000. Utility providers practice a single, consolidated cost for drinking water and wastewater. Additionally, poverty and the increase in water cost in Romania means that households have very little financial or technical resources to invest in decent wastewater management systems. Even in the areas where running water systems and sewerage networks are installed, people hesitate to connect to them because of very high operational costs. This suggests that INNOQUA must adapt its cost structure accordingly, and as such this section receives a score of 7 to show the priority being placed on this subject in the context of market uptake.	7
Social	**WEIGHTING RATIONALE:** 46% of the Romanian populations (19.24 million inhabitants) live in rural areas where households are sparsely distributed and connection to centralized water distribution and sewerage systems is very low. In 2013, only 27% of the rural population was connected to public water supply (compared to 92.7% in urban areas) and only 5.3% were connected to a centralized sewerage system (vs 82.8% in urban areas). Also, in 2015, only 20% of schools did not get the necessary sanitary authorization. Even areas where sewerage systems are operational, wastewaters are poorly or not at all processed before being sent to the river network and the most striking example is Bucharest that still lacks an effective and efficient wastewater disposal facility. Where there is an operational sewerage system, it essentially collects municipal and/or industrial wastewaters and rainwater altogether. Rainwater is not collected and used separately. The rural population and public institutions being the main target for implementing the INNOQUA technological solution needs more infrastructure for a profitable market deployment to occur, therefore justifying a score of 6 for this section of the pre-market analysis to denote further research being required.	**SCORE**: 6
Technological	**WEIGHTING RATIONALE:** Two-thirds of rural households in Romania have outside septic tank toilets[29]. In its first eight years as a member of the EU, Romania Countryside, representing approx. 46% of the population, failed to emerge from the primitive state in which there was EU membership. In 2013, only 27% of the rural population was connected to public water supply (compare to 92.7% in urban areas) and only 5.3% were connected to a centralized sewerage system (vs.	**SCORE**: 7

[29] Source: http://www.hotnews.ro/stiri-esential-20827971-romania-inapoiata-doua-treimi-dintre-locuitorii-sate-duc-toaleta-fundul-curtii-80-dintre-romanii-aistati-social-traiesc-mediul-rural.htm - accessed 01/05/2017

	82.8% in urban areas). According to the EC, only 34% of rural households had a toilet inside the house, in 2013. However, the percentage of households with toilet in the home doubled in the first 8 years of the country's accession to the EU. Therefore, the main "technological solution" that INNOQUA is called to replace in rural areas of Romania is the classical septic tank serving a household (3-5 persons). This consists of a pit 1-2 m^2 section, 2-3 m deep. Usually a concrete slab covers the pit and a rudimentary or more elaborated construction houses it. Such data justifies a score of 7 due to the fact that a clear demand must be quantified and aligned to development.	
Environmental	**WEIGHTING RATIONALE:** Available water resource per capita in Romania reaches 9740 m^3/yr (less than the EU value: approx. 4500 m^3/capita/yr). Running water is available only in cities or large communal agglomeration (in this case only part of the inhabitants is connected to the running water system, those living in the densest populated area of the commune[30].Investments are needed to operate tertiary stage modules in all wastewater treatment facilities assisting agglomeration having over 10000 PE and connected to sensitive areas. As Romania intensively use the Danube River source and neighbors the Black Sea (an important habitat that needs special environmental protection measures), all the Romanian territory has been declared as a sensitive area. As a consequence, all wastewater treatment facilities serving agglomeration having > 10000PE must be refurbished so that the exit flow complying to stricter norms (especially for N_2, P) (tertiary stages needed everywhere). Investments are also needed to ensure environmentally friendly chemical and biological conditions for all water courses. Year 2015 was set as deadline for this objective but the figures at the end of 2014 were (for agglomeration having > 2000 i.e.) only 63.04% for collecting wastewater and only 57.37% for their treatment, according to EU standards. Effluent water from INNOQUA-type facilities in Romania can be directed to irrigate adjacent land in agricultural applications, provided that it meets criteria of usability. A list of pollutants of major health risk concern, usually present in wastewater should be considered[31]. Not all sewerage systems available have their own wastewater treatment facilities – only 44.4 of Romanians are connected to sewerage systems having such treatment facilities (2013)[32]. In 2013, the targets were 76.7% of	**SCORE**: 6

[30] Source: Yearly Reports available at the National Agency for Environmental Protection portal: http://www.anpm.ro/ - accessed 01/05/2017

[31] Source: http://www.fao.org/ - accessed 01/05/2017

[32] Source: http://old.econtext.ro/dosar--2/analiza/harta-nationala-a-canalizarii-unul-din-doi-romani-nu-are-toaleta-in-casa-topul-judetelor-dupa-gradul-de-conectare-la-canalizare.html - accessed 01/09/2016

	population connected to centralized sewerage systems by 2015 (not realized) and 100% in 2018 (already problematic). Moreover, only five Romanian cities have park area/capita are aligned to the EU requirements[33]. A resultant score of 6 is assigned due to the need for specific conclusions to be drawn that can facilitate market uptake.	
Legal	**WEIGHTING RATIONALE:** Romanian technological standards in the field of water and wastewater are HG nr. 352/2005 completing HG nr. 188/2002 setting standards for discharges, HG nr. 352/2005 includes 3 standards for wastewaters (NTPA 011, NTPA 002, NTPA 001). Water infrastructure in Romania is being developed with EU financial support through the Sectorial Operational Programme Environment (SOP ENV). Directives are in place that are relevant for the INNOQUA scope (WFD-2000/60/CE, 91/271/CEE, 98/15/CE) as well as other relevant Directives (IPPC, IED) that address the mitigation of pollution at source. However, these Directives are far of being fully implemented in Romania. This data justifies a score of 2 due to the fact that limited further research is required, but technical developers should be sure to consider the identified standards especially in the context of market uptake and demo replication for INNOQUA in Romania.	**SCORE**: 2

[33] Source: http://catcostaclujul.ro/harta-spatiilor-verzi-din-romania-doar-cinci-orase-sunt-peste-cerinta-europeana/ - accessed 01/05/2017

3.1.6.1 Market Key number

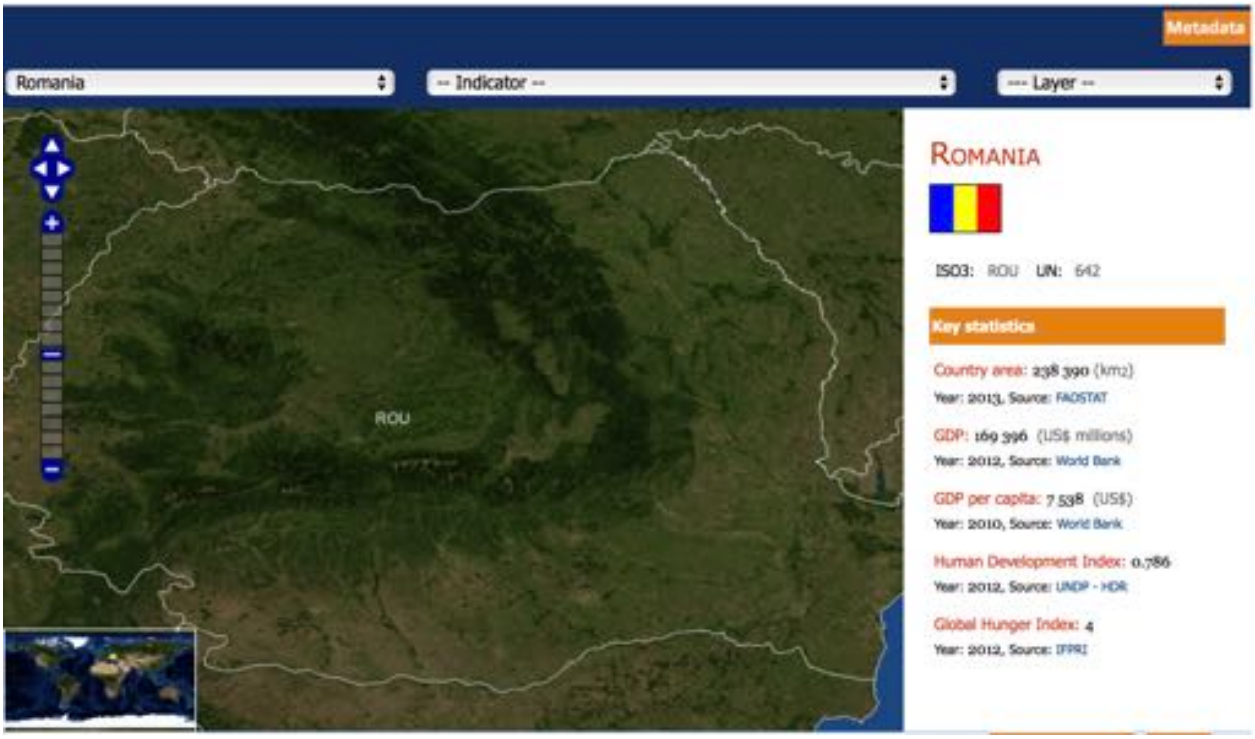
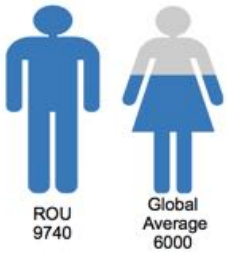


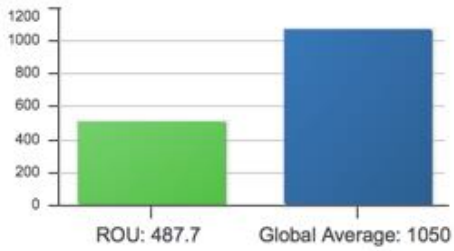
Figure 8: Geographical, Economical and Social indicators – Romania

Total Population (2017 estimate): 19.237.513 people

Visual Market Key Indicators for Romania[34]



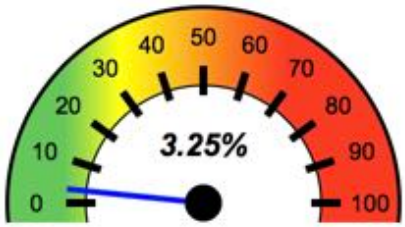
Total actual renewable water resources per capita (m3/inhab/yr)



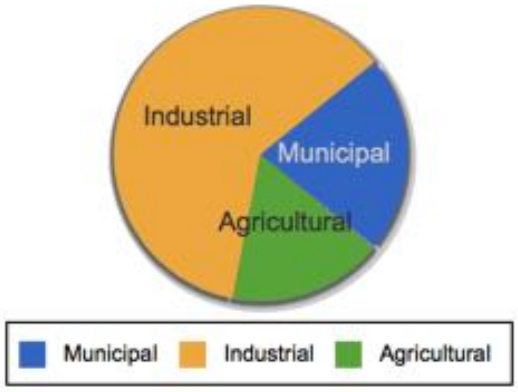
Dam capacity per capita (m3/inhab)

Total cumulative storage capacity of all dams in a country per capita

[34] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.

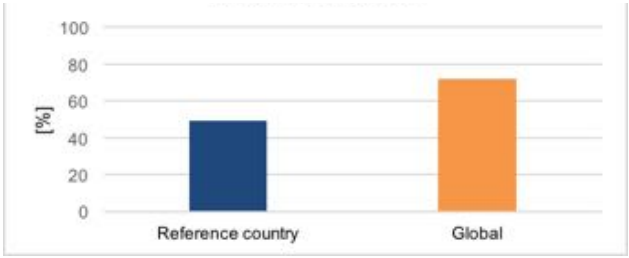


Percent of freshwater resources withdrawn (%)

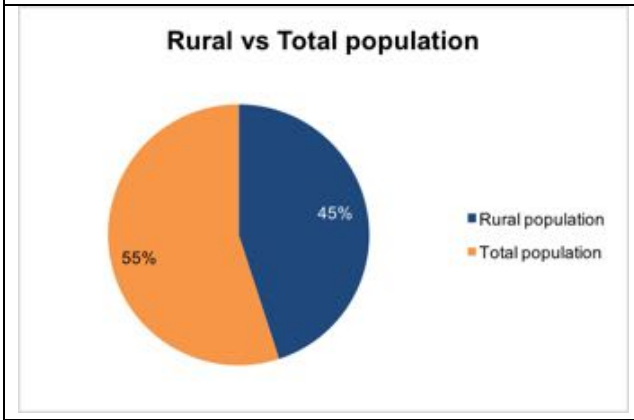


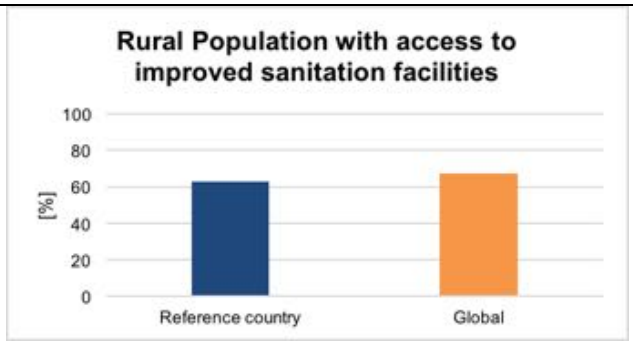
Sectoral withdrawals (%)

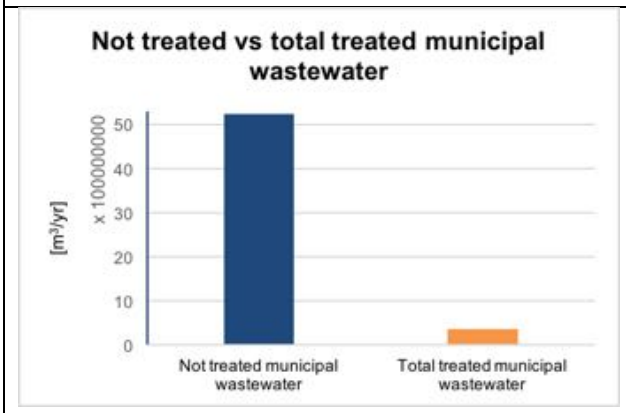
Percent of population with access to improved water sources (%)

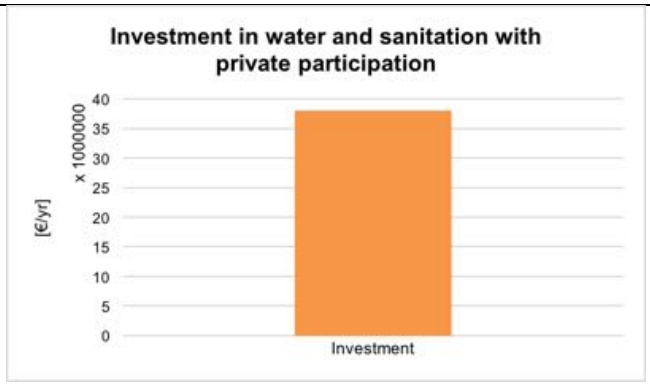


Percent of population with access to improved sanitation (%)









3.1.6.2 *Market opportunities for the INNOQUA system in Romania*

Although the economic situation and living standards have improved since Romania became a full EU member in 2007, poverty remains an important problem. Especially in the rural areas where the majority of the houses is not connected to drinking water or wastewater systems, people have little room for expenditures on sanitation systems. But an inflow of EU funding and expected economic growth make Romania an attractive market for INNOQUA. Possible target customer groups:

- Food & drink industry
- Small communities and rural areas
- Tourism industry
- Public buildings like schools and train stations

Based on the analysis contained herein, and especially from, the key supporting arguments for prioritizing INNOQUA market deployment in the Romanian food and drink industry are:

- Wastewater from this sector are not likely to contain hazardous substance or chemicals that could harm the biologic stage of treatment; yet if this is the case, an extra chemical neutralization stage should be provided before the biologic stage.
- The sector in very dynamic. Apart of major companies (e.g., Coca-Cola, Tuborg, large dairy companies), small local investors develop SMEs in the field (e.g., bread production, fruit and vegetable processing, meat processing, etc.).
- The total all food and drink market in Romania was worth Euro 26.0 billion in 2011 (1.83 share of the EU sector), made up of Euro 20.6 billion in retail (79.5%) and Euro 5.3 billion (20.5%) in foodservice. The Total 2011 Food & Drink Market in Europe was Euro 1420.0 billion.
- This overall market grew at an average annual real 1.19% by value from 2006 to 2011, and approx. 3.69% from 2011 to 2014.
- 634 holding and independent companies plus key subsidiaries (having a different name) are registered and operate, mainly under the SME umbrella, in Romania. The Top-10 companies supplied 18.8% of the total market in Romania in 2011 yet the core of the food & drink industry in Romania is sustained by SMEs, and they should be a large market for INNOQUA solutions.

Local wastewater solutions for small communities and rural areas in Romania should be simple and inexpensive. Apart from the technology provided, INNOQUA should also offer a program that educates people on the importance of responsible wastewater management and offering a methodology for adopting a local wastewater system. An option is to offer INNOQUA as part of a regional development program, involving multiple stakeholders in a single region like tourist facilities, SME's and municipalities.

The high level of corruption, Romania is ranked second in the list of most corrupt countries in the developed world[35] makes it more difficult for external companies to address this market. Licensing of INNOQUA technology to local SME's could be a way to bypass these issues.

3.2 South America

Sanitation is a key word for South American sustainability plans; it has been even integrated in the recent New Urban Agenda delivered by the United Nations in the Conference Habitat 3 in Quito in October 2016. On the other hand, the Latin American market is very heterogeneous and does not benefit from large common legal, cultural or organisational common tools among the different countries in the continent; hence this market is much more a sum of several national markets than a large homogeneous market. However, countries like Ecuador and Colombia are very similar and the same occurs between Peru and Bolivia for example. Hence from the pilot countries we can think of extending the market perspectives through these "brother" countries, and then to a much broader extent.

3.2.1 Ecuador

Table 10: Summary PESTEL - Ecuador

Political	**WEIGHTING RATIONALE:** There are clear opportunities in the Ecuadorian market for new package technologies which could offer high effluent quality for downstream reuse in agriculture or even for freely discharge into any fresh water body under the current legislation for preserving the environment. In the market, there are no alternatives for such purposes today. Within the administrative structure of the Ecuadorian State, the SENAGUA is the only water authority and the agency responsible for water resource management. The functional and operational structure is based on river basin districts across the country, and its resolutions are binding. This data justifies a score of 8 due to the fact that pre-market studies show seemingly favorable conditions, but require further research to align technical development and pricing strategy that fit with current and expected political landscapes and regulatory objectives identified in Ecuador.	**SCORE**: 8
Economic	**WEIGHTING RATIONALE:** Largest municipal enterprises in Ecuador use resources from tariffs, subsidized loans from development banks and in a few cases resources from multilateral banks. INNOQUA system could be a sound alternative not only for focusing into those scale effluents but also for offering a sustainable technology without	**SCORE**: 3

[35] Source: Corruption Perceptions Index 2016

	excessive O&M costs. The average cost of sewer connections is about 23% more expensive than water systems. The "Estrategia Nacional del Agua" analyzed 292 projects, determining an average cost of 1438 EUR per connection and a median of 1328 EUR. Costs vary significantly depending on urban area or rural area. This data justifies a score of 3 due to the fact that limited further research into the economic conditions of Ecuador can prove to be helpful, but not required for strategy development towards market uptake in Ecuador.	
Social	**WEIGHTING RATIONALE:** Less than 10% of the domestic effluents receive any kind of wastewater treatments. Many projects for centralized biological treatments at municipal scale are under preparation in Ecuador; nonetheless, despite the needs, there are no serious plans for small scale and decentralized systems. Most of the population is concentrated in urban areas in Ecuador; however rural areas naturally represent an interesting market potential for decentralized solutions. In urban area, most of the cities is already equipped with a sewer network. The cities tend to grow faster than the infrastructure and the external boundaries of the urban areas are often not connected to the existing networks, they may also represent a potential for the INNOQUA solution (a very cheap version as in these areas the settlements are informal and most of the time realized by inhabitants with very low income). Sanitation is a great challenge for the country where biodiversity is a national treasure. There is a trend of interest for sanitation in the country and large programs have been initiated, especially in urban areas; this is the case for example for Quito and Guayaquil. This data justifies a score of 5 due to the fact that further research can become helpful but clearly a need is present.	**SCORE**: 5
Technological	**WEIGHTING RATIONALE:** Technologies available in Ecuador for small domestic and commercial water treatment systems are available. The legislation in this regard does not limit the offer of new technological alternatives. Nevertheless, it will be always encouraged to the fabricants and sellers to ensemble or even to construct the prototypes in the country as important (practical and economical) importation barriers exist for imported products. This data justifies a score of 7 due to the fact that while preliminary conclusions have been drawn, they should be fleshed out in the context of market deployment strategies for INNOQUA technology uptake in Ecuador.	**SCORE**: 7
Environmental	**WEIGHTING RATIONALE:** The level of sewer network is high in Ecuador, close to 100% in urban area. However more than 90% of the wastewater does not receive any treatment. This leads to pollution in the river even at high altitude (the highest cities are located above 3000 m asl) and grave health issues (650000 people were identified in a study realized in 2013 as suffering from a disease due to water	**SCORE**: 8

	issues). This data justifies a score of 8 due to the fact that further research into the links between pollution and adverse health effects of untreated wastewater in Ecuador should indeed be prioritized and quantified if possible.	
Legal	**WEIGHTING RATIONALE:** In March 2016, the new "health code" was presented, this is the legal basis for the organization and practice of all health-related issues and rights in Ecuador. The main codes of importance to INNOQUA market deployment in Ecuador are articles 100 (respect of human health), 101 (monitoring and follow up of effluents discharge permits), 103 (public water collection network guidelines), and 104 (obligation to install sanitation systems to treat waste water produced on-site in certain building typologies). The specific acts being studied by INNOQUA partners has been identified and therefore gets a score of 7 due to denote further occurring study.	**SCORE**: 7

3.2.1.1 Market Key number

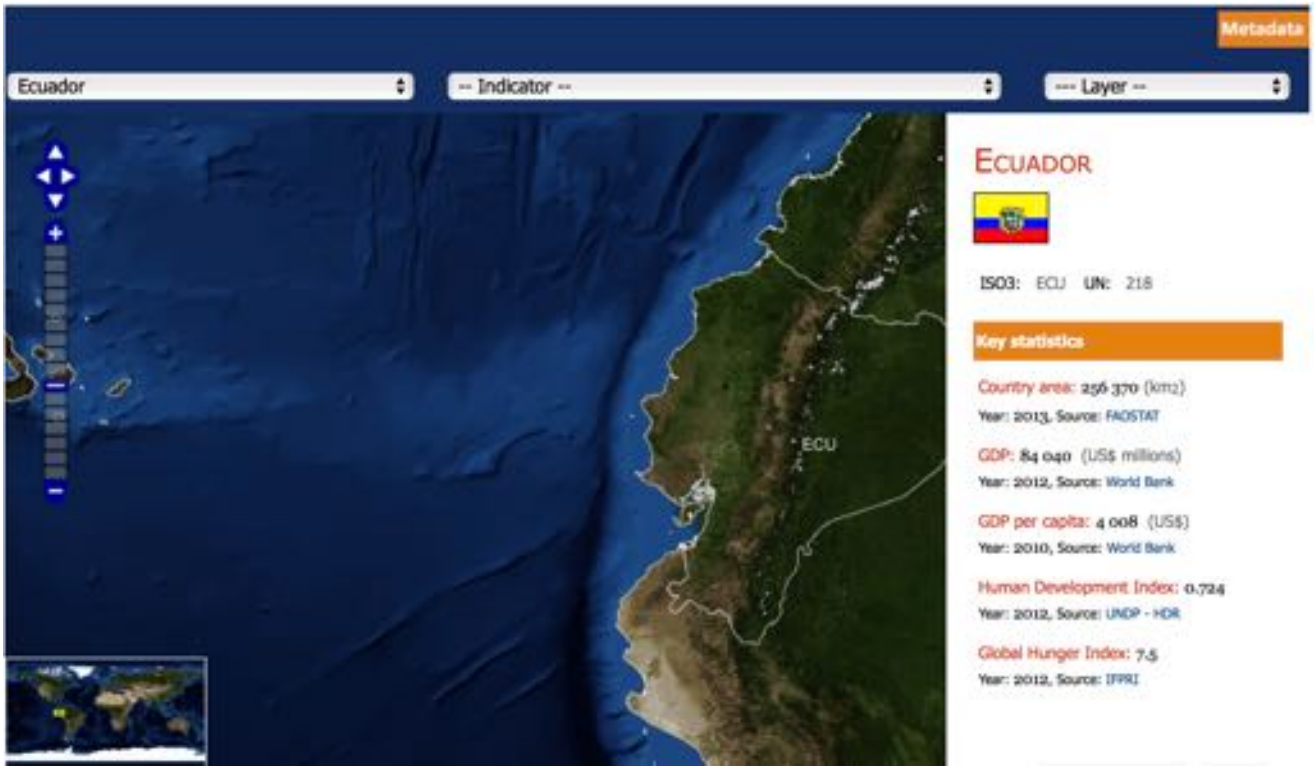
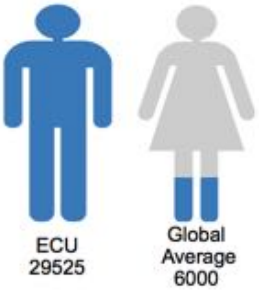


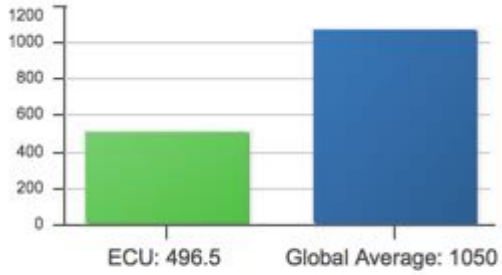
Figure 9: Geographical, Economical and Social indicators – Ecuador

Total Population (2014 estimate): 15.866.664 people

Visual Market Key Indicators for Ecuador[36]

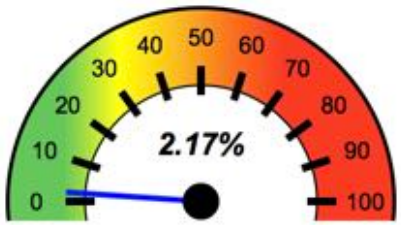


Total actual renewable water resources per capita (m3/inhab/yr)

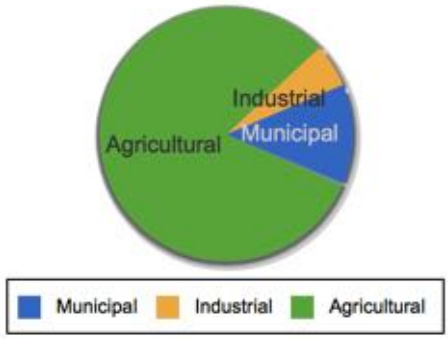


Dam capacity per capita (m3/inhab)

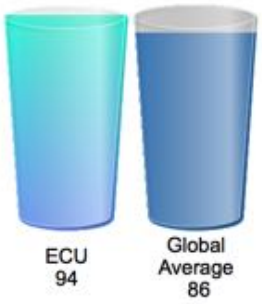
Total cumulative storage capacity of all dams in a country per capita



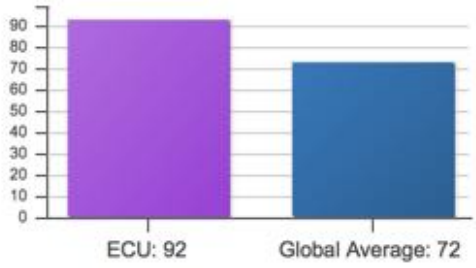
Percent of freshwater resources withdrawn (%)



Sectoral withdrawals (%)

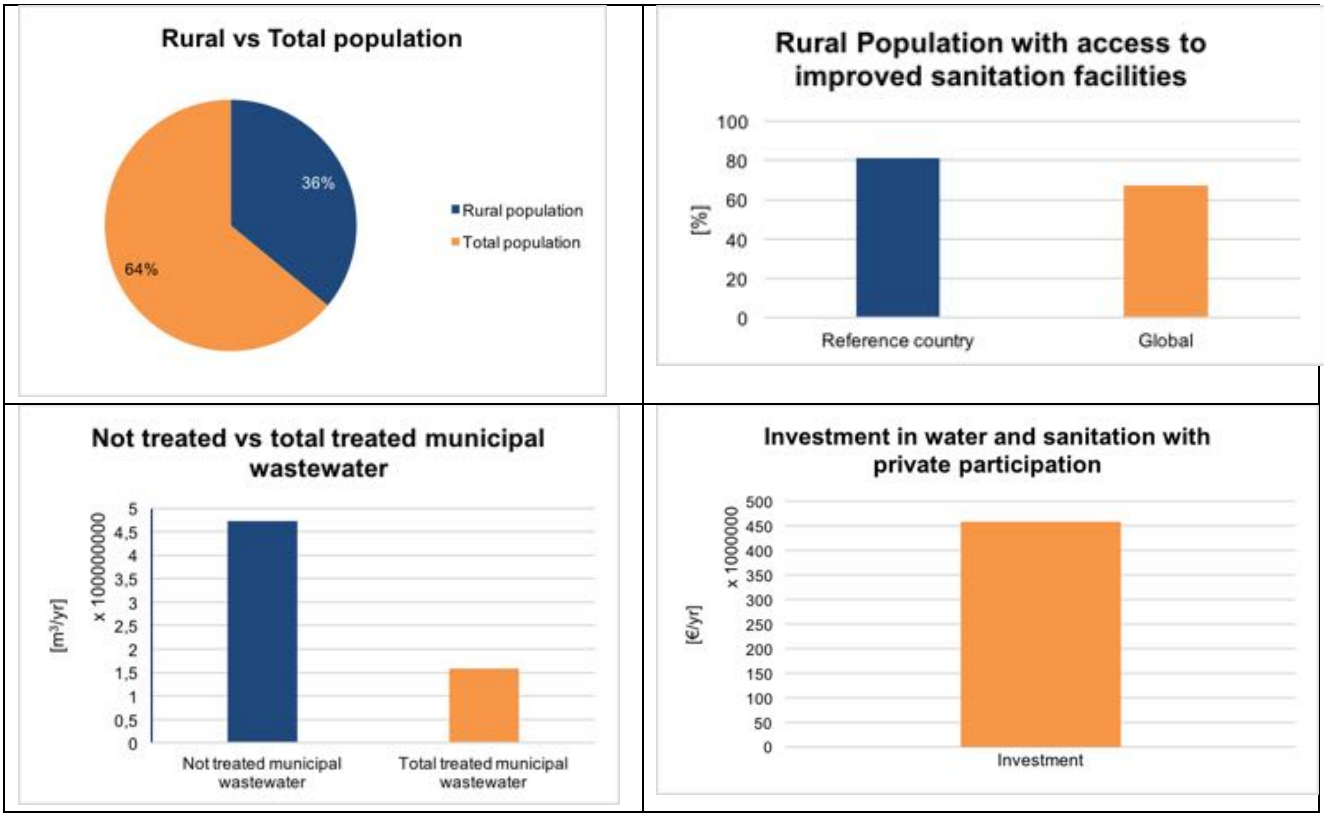


Percent of population with access to improved water sources (%)



Percent of population with access to improved sanitation (%)

[36] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.



3.2.1.2 Market opportunities for the INNOQUA system

With less than 10% of the effluent receiving treatment, Ecuador has a huge market potential for INNOUA technology. With over two-third of the population living in cities, urbanisation rate is high in Ecuador. Although in urban areas the majority of the houses is connected to a sewage network, most of the wastewater is untreated. With the expansion of cities, expansion of infrastructure is lacking. This is an opportunity for decentralised wastewater treatment. Next to the urban areas, rural areas and small municipalities are an area of interest for INNOQUA. Local municipalities struggle with attracting funding from regional or national programs and often lack the skills to implement and maintain a complex wastewater treatment system. To be successful, INNOQUA not only needs to deliver the technology, but also pay attention to the involved stakeholders like local citizens, policy makers and local authorities, offer awareness campaigns and training sessions and provide support with respect to project- and financial management. Linking to existing programs, like green building initiatives or national programs like the Prosaneamiento project[37], will be required to attract the necessary funding. Partnerships with local firms will ensure buy-in from local authorities and the local community. An INNOQUA system should be inexpensive and easy to operate and maintain to ensure local staff is capable of operating the system.

[37] Source: http://www.iadb.org/es/proyectos/project-information-page,1303.html?id=EC-L1122 - accessed 11/10/2016

Alternatively, INNOQUA can target the tourist industry, which for an important part is located in one of the national parks. Luxurious resorts need to comply with strict ecological rules when they are operating in the national parks and INNOQUA can contribute positively to their corporate image.

3.2.2 Peru

Table 11: Summary PESTEL - Peru

Political	**WEIGHTING RATIONALE:** Peruvian environmental policy strongly supports wastewater treatment and reuse, exemplified in the 2021 plan called "Clean water"[38] supported by mining companies, NGOs, and international sponsors. Environmental Quality Standards and associated regulation are constantly being enforced by governments and awareness is being raised among populations about the need of implementing water conservation strategies and environmental protection and preservation. This data justifies a score of 7 due to the fact that links must be identified between the seemingly strong policy support and the specific objectives for INNOQUA market deployment.	**SCORE**: 7
Economic	**WEIGHTING RATIONALE:** The economic growth for the latest years was around 3-4%, which makes Peru attractive for different kinds of investments. An important part of these investments corresponds to the mining industry, which requires big quantities of water. This data justifies a score of 9 due to the fact that very limited documentation has been identified to support Peruvian market deployment and therefore must be further prioritized/aligned to cost-benefit strategies.	**SCORE**: 9
Social	**WEIGHTING RATIONALE:** Most Peruvians are settled down in the coastal line, where (mainly in the south) water is not plenty and rain is scarce. Rivers, which have their origin in the upper parts of the mountains, have least water every year, and this create a problem in the coastal line, where there are big extensions of agricultural land, and the availability of water is not enough to cover the irrigation necessities. In addition, there is lack of green areas, and the INNOQUA system could contribute to re-use waste water to create and irrigate new green areas. The INNOQUA system could also help to produce water for agricultural purposes, since there are several villages and towns in the coastal line. There are more than 150 water treatment plants in the country, and most of them are in Lima. These water plants use several technologies (Stabilized lagoons, aerated lagoons, activated sludge and constructed wetlands). Managing water	**SCORE**: 6

[38] Source: www.agualimpia.org - accessed 11/10/2016

	efficiently in order to meet the country´s demand aims to reduce current levels of water pollution and dissipation for the 6.7 million households, 79% of which are in urban areas and 21% in rural areas[39]. 85.8% of the country's households are supplied with water and have access to sanitation systems, while 72.7% of households have sewer service[40]. Production per capita of drinking water is approximately 216 L/inhabitant/day, and since there is a calculated average of 20% loss of drinking water and other technical losses, sewage wastewater results in 162 L/inhabitant/day[[41]. This section has received a score of 6 because the statistics show favorable conditions for INNOQUA deployment but should be further studied in the contexts of both technical development and market deployment.	
Technological	**WEIGHTING RATIONALE:** There is a significant amount of wastewater that needs to be treated, not only because of the environmental impacts but also because of the potential health risks associated. Moreover, in Peru, out of 253 localities, 89 do not have a system for water treatment. Therefore, houses and multi-houses represent a main customer segment for INNOQUA, since both, urban and rural areas still lack, in a considerable proportion, of infrastructure connecting houses to public sewage system. Some of the most important benefits that INNOQUA can offer them are independency from water network, and the possibility of reusing wastewater, applying an environmentally sustainable and cost-effective system, and improving wastewater, sewage and organic waste management. There is no documented use of bio-based technologies such as worm systems, membrane bioreactors or vertical biological reactors in Peru. Likewise, water sanitation on-site using biotechnological procedures is a novelty since these technologies are not in use in the country, yet. This data justifies a score of 7 due to the fact that technological benefits must be clearly communicated to Peruvian adopters, and therefore further work into the specific quantification of that is needed.	**SCORE**: 7
Environmental	**WEIGHTING RATIONALE:** The focus for INNOQUA in Peru is the coastal line, because population is increasingly dense but water is not plenty due to very little rain. Rivers, which have their origin in the upper parts of the mountains, have least water every year, and this create a problem in the coastal line, where there are big extensions of	**SCORE**: 8

[39] Source: https://www.inei.gob.pe/estadisticas/indice-tematico/poblacion-y-vivienda/ - accessed 24/09/2016
[40] Source: INEI (2015), Peru: Estatistical summary 2015 - *'Perú: Síntesis Estadística 2015'*
[41] Source: SUNASS (2015), Diagnosis of Wastewater Treatment Plants within the scope of Entities Providing Sanitation Services - '*Diagnóstico de las Plantas de Tratamiento de Aguas Residuales en el ámbito de las Entidades Prestadoras de Servicios de Saneamiento*'

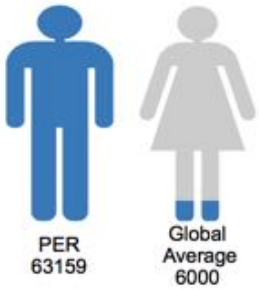
	agricultural land, and the availability of water is not enough to cover the irrigation necessities. There is also a lack of green areas, and the INNOQUA system could contribute to re-use waste water to create and irrigate new green areas. The INNOQUA system could also help to produce water for agricultural purposes, since there are several villages and towns in the coastal line. There are more than 150 water treatment plants in the country, and most of them are in Lima. These water plants use several technologies (Stabilized lagoons, aerated lagoons, activated sludge and constructed wetlands). The latest and the biggest one ('Taboada Plant', located in the north part of Lima) was opened in 2013 and process 14.3 m^3/s but the recovered water is discharged three km. into the sea. This data justifies a score of 8 due to the fact that already the INNOQUA solutions are seemingly in line with environmental objectives of Peru and therefore further qualification and quantification can be lucrative for strategy development in the context of market deployment.	
Legal	**WEIGHTING RATIONALE:** N. 6 Environmental protection Acts are present in the country. For the purposes of the project more work to rank the importance and implications of each must occur. • Environment General Act – 'Ley General del Ambiente (Ley N° 28611)' • Water Resources Act – 'Ley de Recursos Hídricos (Ley N° 29338)' • Bylaw of the Water Resources General Act - 'Reglamento de la Ley General de Recursos Hídricos (D.S. N° 001-2010-AG)' • Sanitation General Act - 'Ley General de Saneamiento (Ley N° 26338)' • Consolidated Text of the Regulations of the General Law of Sanitation Services - 'Texto Único ordenado del Reglamento de la Ley General de Servicios de Saneamiento (D.S. N°023-2005-VIVIENDA)' • Water Resources National Plan of Peru – 'Plan Nacional de Recursos Hídricos del Perú (PNRH)' – 2013 • Water Resources National Policy and Strategy - 'Política y Estrategia Nacional de Recursos Hídricos (PENRH)' - 2015	**SCORE**: 7

3.2.2.1 Market Key number

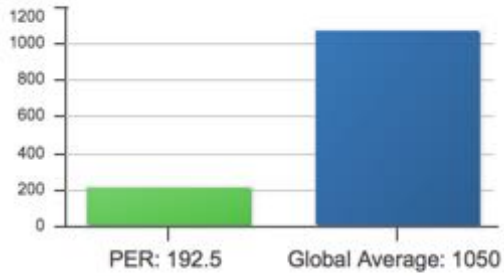
Figure 10: Geographical, Economical and Social indicators – Peru

Total Population (2016 estimate): 31.488.625 people

Visual Market Key Indicators for Peru[42]



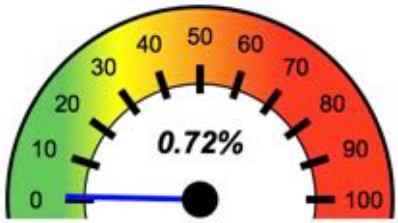
Total actual renewable water resources per capita (m3/inhab/yr)



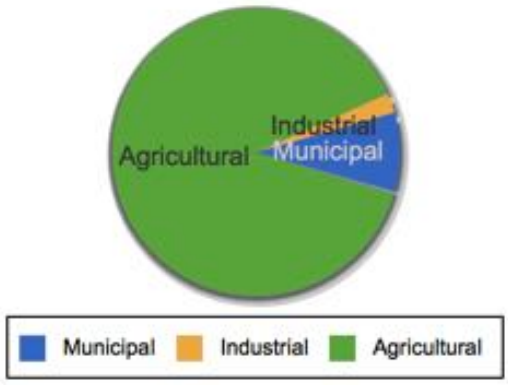
Total cumulative storage capacity of all dams in a country per capita

Dam capacity per capita (m3/inhab)

[42] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.

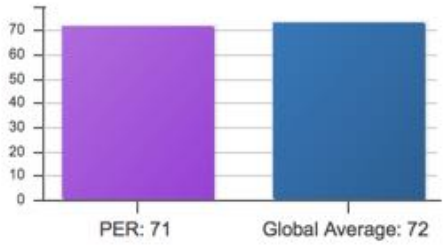


Percent of freshwater resources withdrawn (%)

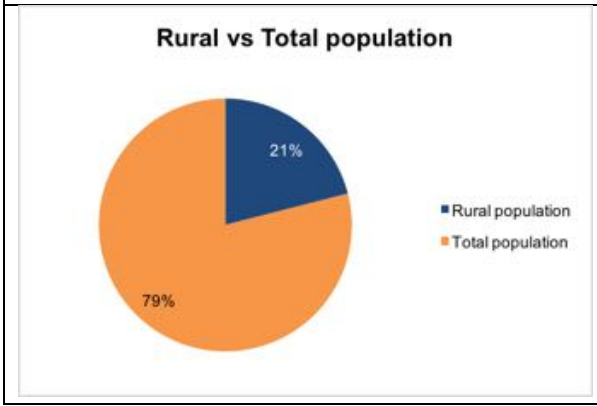


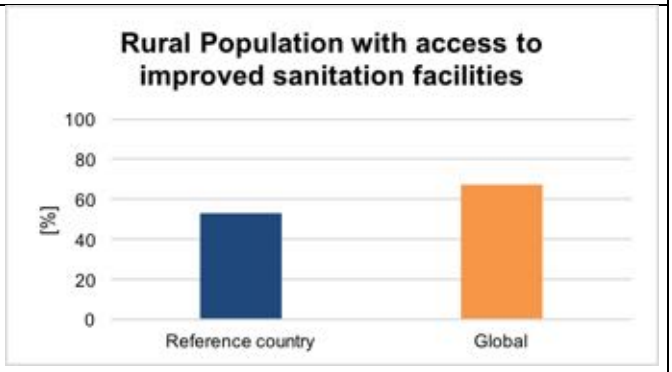
Sectoral withdrawals (%)

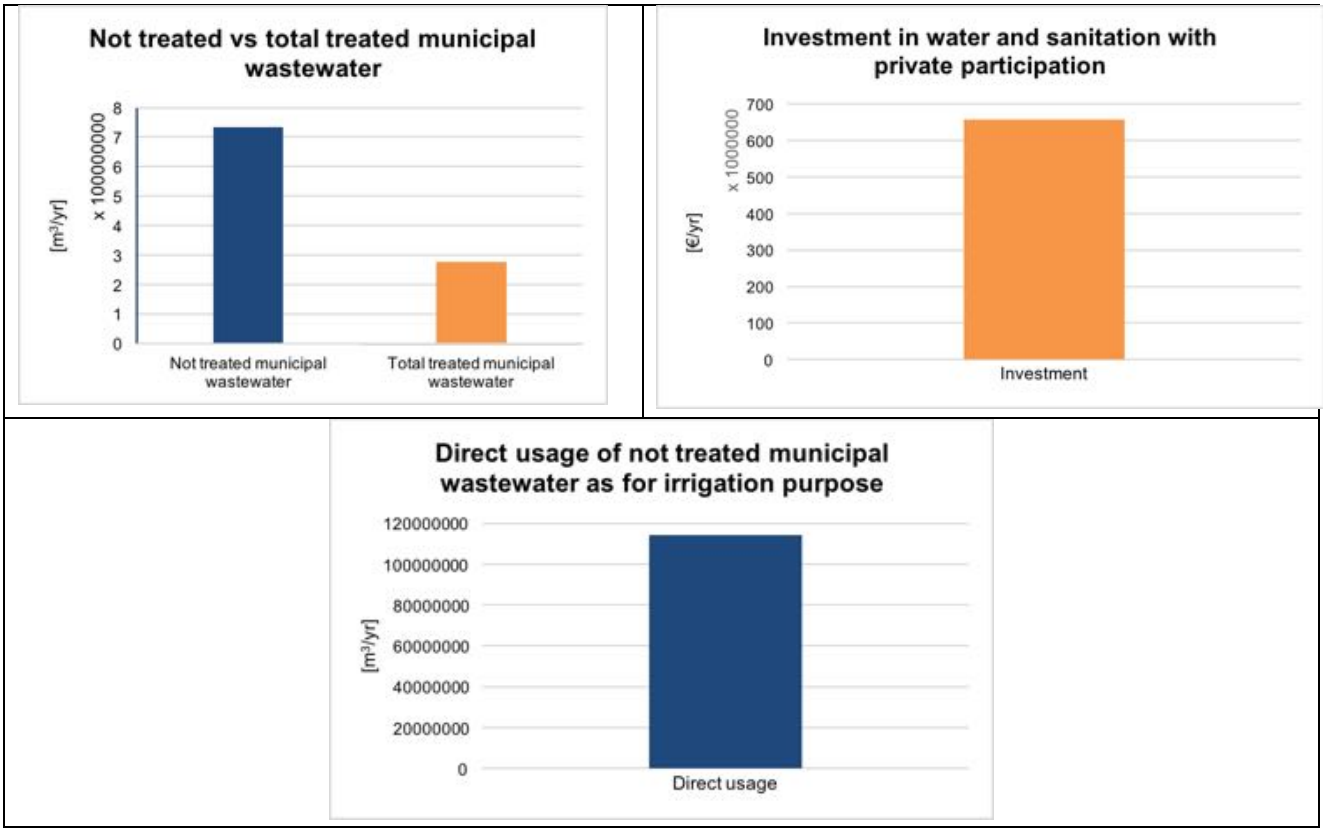
Percent of population with access to improved water sources (%)



Percent of population with access to improved sanitation (%)







3.2.2.2 *Market opportunities for the INNOQUA system*

According to reports from the WorldBank, Peru has a healthy and fast growing economy[43]. People have a high level of environmental awareness and there is strong political support for water management programs. Peru suffers from water shortage, especially in the coastal region, where the majority of the people live. One third of the localities do not have a system for water treatment, providing an opportunity for an INNOQUA system serving individual or groups of houses.
As the largest consumer of water and producer of wastewater, industry is an important market for decentralised wastewater treatment systems. On a per case basis the characteristics of the effluent needs to be studied in order to configure the INNOQUA system properly. This customisation will increase the price of the INNOQUA system.

3.3 Turkey, Tanzania, and India

Wastewater treatment in the Middle East, Africa, and Asia require unique and contextual solutions, which consider metrics such as culture and climate variability, affordability of technologies, space constraints (due to growing costs of real estate), and reduced electrical loading / maintenance requirements. While those indicators are consistent with market research for INNOQUA in other

[43] Source: http://www.worldbank.org/en/country/peru/overview

regions, they become very important when assessing market replication potential in Turkey (3.3.1), Tanzania (3.3.2), and India (3.3.3).

3.3.1 Turkey

Table 12: Summary PESTEL - Turkey

Political	**WEIGHTING RATIONALE:** In Turkey, a range of new investments are planned as part of the Wastewater Treatment Action Plan for 2023 developed by the Ministry of Environment and Urbanization. According to this action plan, the number of wastewater treatment facilities, which was 653 in 2015, will be increased to 2154 with the addition of 1501 new ones until 2023. 1418 of these treatment facilities will be new wastewater treatment facilities while 83 of them will be existing wastewater facilities that will be upgraded. Turkey's 10th Development Plan (2014-2018) outlines a series of challenges in protecting the country's water resources, which puts emphasis on the conservation of surface and groundwater resources. This data justifies a score of 8 due to the fact that by tripling the volume of wastewater treatment facilities in the near future, clearly political objectives are in line with INNOQUA market deployment and therefore must be further studied.	**SCORE**: 8
Economic	**WEIGHTING RATIONALE:** In 2016, the overall environmental technologies market in Turkey including goods and services is valued at an estimated € 6.7 billion. Despite a large amount of investment and an increase in the number of wastewater treatment plants in the last decade, which saw an increase in capacity from just over 2000 million m^3 in 2000 to almost 5300 million m^3 by 2010, the country still needs a lot more investment, as is shown by the various pollution issues caused by faulty or obsolete infrastructure[44]. Despite a large amount of investment and an increase in the number of wastewater treatment plants in the last decade, which saw an increase in capacity from just over 2000 million m^3 in 2000 to almost 5300 million m^3 by 2010, the country still needs a lot more investment, as is shown by the various pollution issues caused by faulty or obsolete infrastructure and increase in public sector expenditures in wastewater management sector. The total cost of investment for the new and upgraded wastewater treatment facilities for the period of 2015-2023 is estimated to be 37.52 billion TL (9.50 billion €)[45]. This data justifies a score of 6	**SCORE**: 6

[44] Source: Business Monitor International, 2014. Turkey Water Report Q1 2015 Part of BMI's Industry Report & Forecasts Series

[45] Source: http://www.istanbulwaterexpo.com/media-press/press-releases/Is-ve-insaat-makinalar%C4%B1-sektorunun-Avrasya-Bolgesi – accessed 01/05/2017

	due to the fact that while initial analysis presents positive conditions for INNOQUA deployment, further conclusions as to how the solution can fit within current Turkish economic objectives should be drawn.	
Social	**WEIGHTING RATIONALE:** In Turkey, a range of new investments are planned as part of the Wastewater Treatment Action Plan for 2023 developed by the Ministry of Environment and Urbanization. According to this action plan, the number of wastewater treatment facilities, which was 653 in 2015, will be increased to 2154 with the addition of 1501 new ones until 2023. Accordingly, the total cost of investment for the new and upgraded wastewater treatment facilities for the period of 2015-2023 is estimated at 37.52 billion TL (9.50 billion €). This data justifies a score of 7 due to the fact that while there are already investments planned or underway, they may limit the potential 2020 deployment plans for INNOQUA but could potentially give way to strategies for private funding or deployment following the 2023 plans.	**SCORE**: 7
Technological	**WEIGHTING RATIONALE:** There is a growing use of reused water in applications other than the traditional agricultural market. Increasingly, urban water reuse in Turkey is helping to reduce urban water stress and provide a higher return on investment to users of water reuse technologies. This data justifies a score of 9 due to the fact that further research into this subject will uncover market deployment strategies.	**SCORE**: 9
Environmental	**WEIGHTING RATIONALE:** Turkey ranks eighth in the 2016 Top Markets Report overall with a composite environmental technologies score of 22.1. Turkey ranks 24th for water with a score of 2.8 and 11th with a score of 1.82 for waste and recycling[46]. This data justifies a score of 8 due to the fact that importance in Turkey is placed on sustainable technologies, and this should therefore be further studied in the context of market deployment, giving way to specific environmental benefits being clearly identified and strategized against.	**SCORE**: 7
Legal	**WEIGHTING RATIONALE:** There are several regulations surrounding water pollution, wastewater treatment, and the provision of water in Turkey**,** which has now been in the process of adoption of a new "Water Law" (a draft was issued in 2016) with an aim of simplifying and streamlining existing legislation as well as harmonizing with the European water legislation, the WFD in particular. Apart from those two legislative efforts underway, some of the major legislative developments and regulations, which are relevant in terms of the treatment and reuse of domestic wastewater, have been identified during the course of the pre-market analysis. This data justifies a score	**SCORE**: 7

[46]Source: International Trade Administration, 2016. Top Markets Report Environmental Technologies Country Case Study: Turkey U.S. Department of Commerce

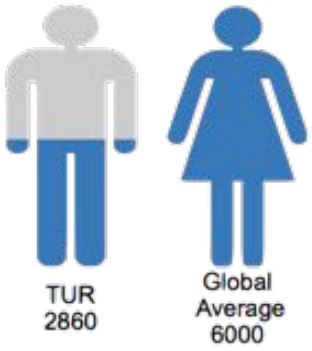
	of 7 due to the fact that legalities for INNOQUA deployment in Turkey can be identified and addressed by aligning tech watch activities to technical development activities, and extrapolating specific strategies.	

3.3.1.1 Market Key number

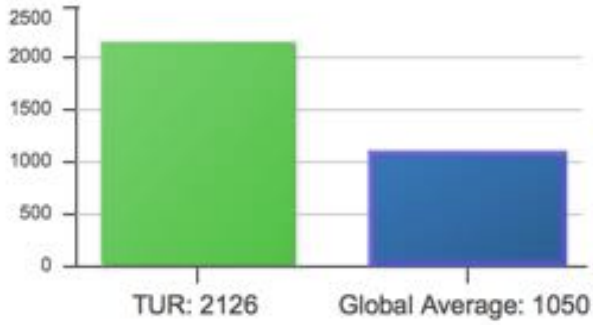
Figure 11: Geographical, Economical and Social indicators – Turkey

Total Population (2017 census): 79.814.871 people over 18 years of age

Visual Market Key Indicators for Turkey[47]

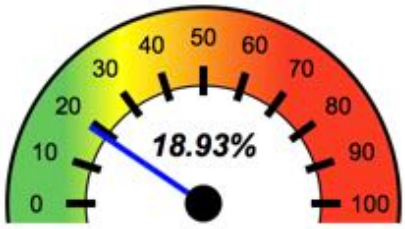


Total actual renewable water resources per capita (m3/inhab/yr)

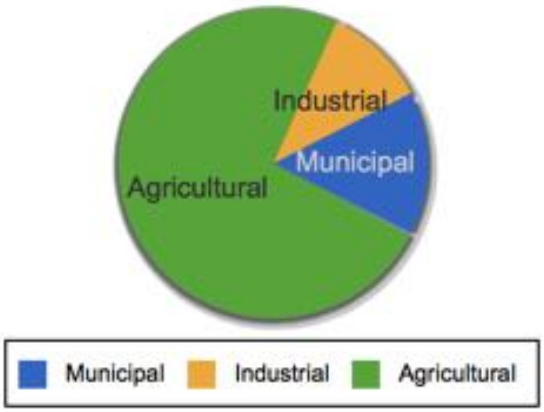


Dam capacity per capita (m3/inhab)

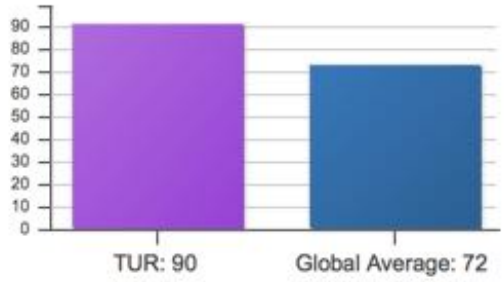
Total cumulative storage capacity of all dams in a country per capita



Percent of freshwater resources withdrawn (%)

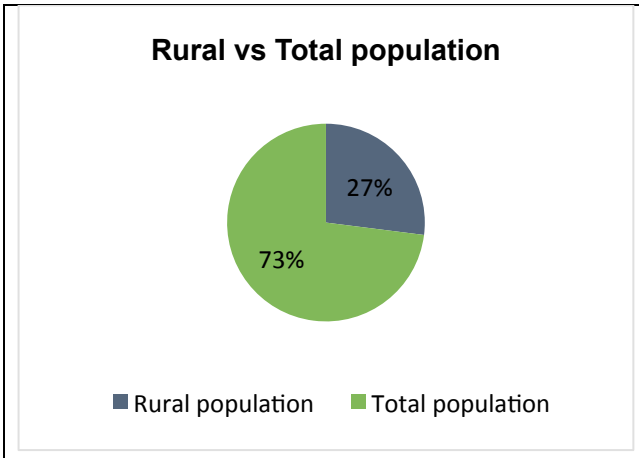


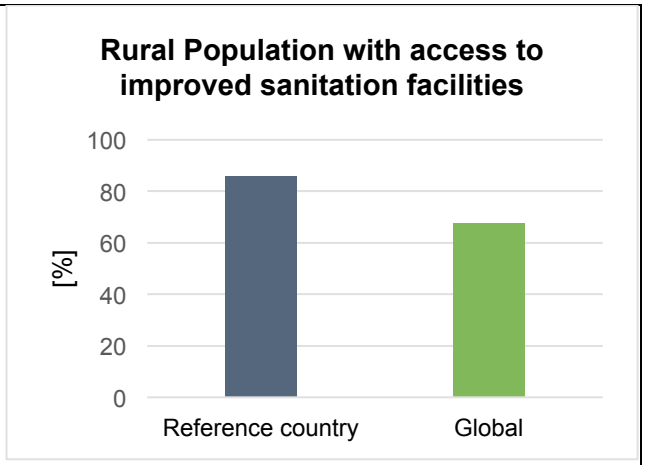
Percent of population with access to improved water sources (%)

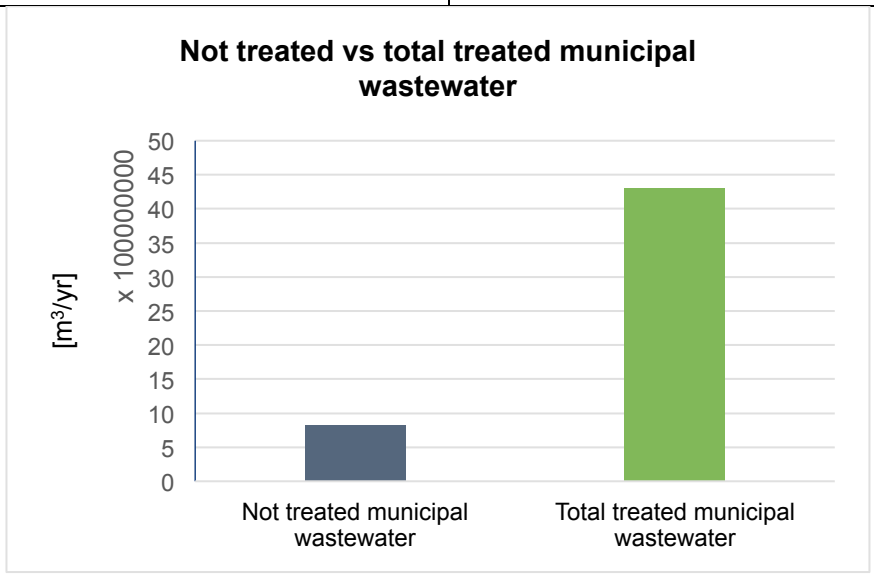


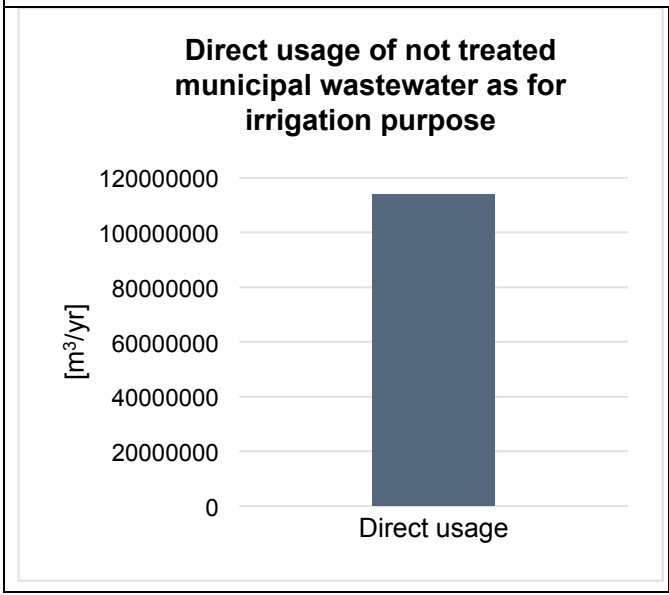
Percent of population with access to improved sanitation (%)

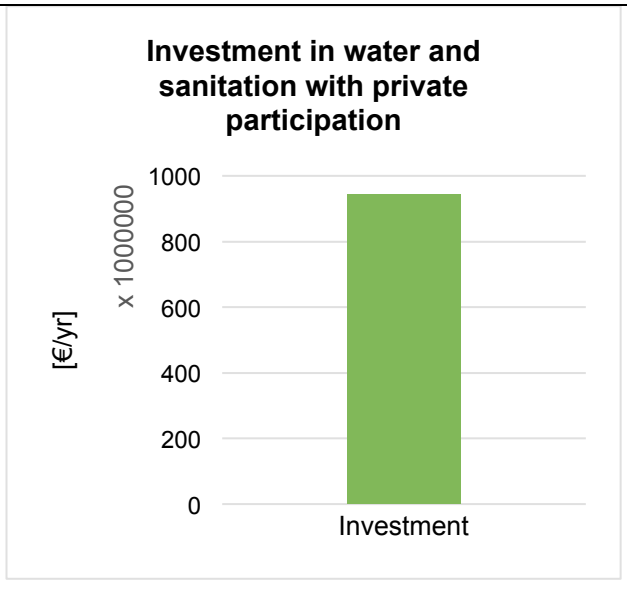
[47] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.

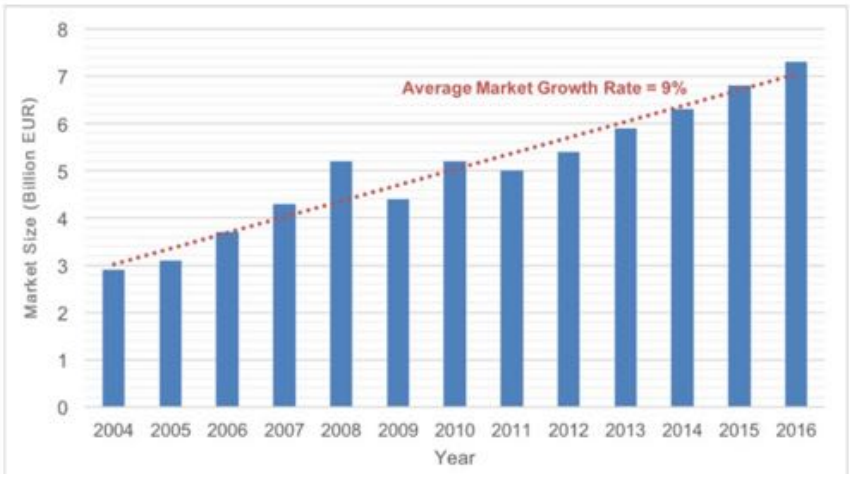

Rural vs Total population
27%
73%
Rural population
Total population


Rural Population with access to improved sanitation facilities
100
80
60
40
20
0
[%]
Reference country
Global


Not treated vs total treated municipal wastewater
50
45
40
35
30
25
20
15
10
5
0
x 10000000
[m3/yr]
Not treated municipal wastewater
Total treated municipal wastewater


Direct usage of not treated municipal wastewater as for irrigation purpose
120000000
100000000
80000000
60000000
40000000
20000000
0
[m3/yr]
Direct usage


Investment in water and sanitation with private participation
1000
800
600
400
200
0
x 1000000
[€/yr]
Investment



Annual growth of environmental technologies market in Turkey

3.3.1.2 Market opportunities for the INNOQUA system

Turkey's economy has developed strongly in the past decades, resulting in increased employment, less poverty and strong urbanisation. Lately, economic growth has slowed due to political uncertainty and terrorist attacks[48]. With the current political uncertainty, it is not clear if reaching EU membership will remain on the agenda of the Turkish government. It is unknown what the effect will be on the further development of water and wastewater regulations since developments were largely driven by harmonising with EU law.

In the past, economic growth has prevailed above environmental performance, which is regarded weak. Enforcement of existing laws and regulations is poor[49].

Opportunities exist in agriculture where water stress increases the need for farmers to re-use water for irrigation, especially in the western part of Turkey. Another opportunity is in the increasing water consumption of the growing industry sector. The need for water re-use will increase and INNOQUA could configure their system to target eco-friendly businesses.

3.3.2 Tanzania

Table 13: Summary PESTEL - Tanzania

Political	**WEIGHTING RATIONALE:** Sanitation is a cross cutting topic and is addressed by the Vice President's Office, in guidelines for liquid waste management, and by Ministries who are responsible for policy formulation and putting in place the legal and regulatory frameworks, while implementation role is vested on the Local Government	**SCORE**: 6

[48] Source: http://www.worldbank.org/en/country/turkey/overview

[49] Source: Turkey Water Report Q1 2015, Business Monitor International

	Authorities. National Sanitation Campaign has recently begun addressing the coordination gap that existed in the implementation of sanitation programs in the country concerning both hardware and software components for delivery of water and sanitation to the rural households, schools and public places. Private sector participation in service provision has been nascent, but remains a priority in majority of sectorial policies. A score of 6 is assigned due to the fact that specific market deployment opportunities arise if the policy gap is addressed.	
Economic	**WEIGHTING RATIONALE:** At a national scale, various Donors contribute to the Water Sector Development Program, a 15-year program that is broken down into three phases of five years each. However, the budget allocated for sanitation and hygiene improvement is still low, at 9%. This data justifies a score of 5 due to the fact that research into follow up funding specific to Tanzania is possible for INNOQUA, but should fit into the 5-year plans identified in this study.	**SCORE**: 5
Social	**WEIGHTING RATIONALE:** Various stakeholders have been active in sanitation and hygiene programs including Ministries, LGAs, Donors, Foundations, local and international NGOs as well as private sector participants. This data justifies a score of 8 due to the fact that further research should be conducted to determine product feature comparisons that match the cost-benefit objectives of INNOQUA and that can give way to strategy development for market deployment.	**SCORE**: 8
Technological	**WEIGHTING RATIONALE:** Various technologies for liquid waste management have been developed for treatment of both domestic and industrial waste water are commercially available in Tanzania, most notably Constructed Wetlands and Decentralised Waste Water Systems (DEWATS). A score of 7 is assigned due to the fact that there is currently a vast competitive landscape requiring further studies.	**SCORE**: 7
Environmental	**WEIGHTING RATIONALE:** According to the recently developed Shit Flow Diagram, for the city of Dar Es Salaam, about 57% of the excreta produced ends directly in the environment without adequate treatment. Water disposal costs are highly varied, from time to time and also from one region to another. Lack of compiled information makes it difficult to estimate average values, however, such information can be obtained from individual regulated water utilities that have sewer networks and also from the Health and Sanitation Departments of the LGAs. This justifies a score of 6 to determine further conclusions that can lead into market deployment strategies.	**SCORE**: 6
Legal	**WEIGHTING RATIONALE:** Environmental Management Act (2004), Public Health Act (2009), Water Supply and Sanitation Act and the related regulation are used as enforcement tools to provide the mechanisms for environmental protection and water quality monitoring to remove the disease burden from the public that may be caused by	**SCORE**: 2

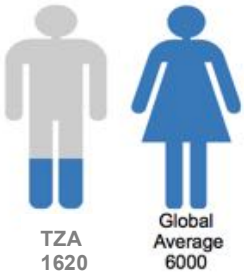
	water pollution. Specific sanitation frameworks are still being drafted, in addition, existing frameworks are fragmented and no clear guidelines and standards for technologies for waste water treatment. A score of 2 is assigned because at this stage not much more market research can be conducted in a deliberate fashion that gives way to specific market deployment strategies, but technical developers can refer to deliverable submitted in M9 for specific legal considerations.	

3.3.2.1 Market Key number

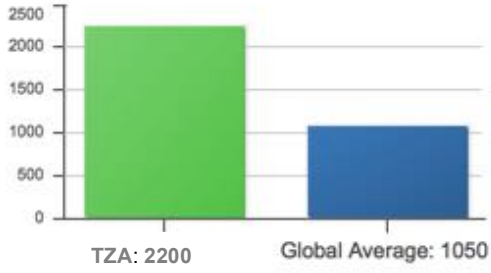
Figure 12: Geographical, Economical and Social indicators – Tanzania

Total Population (2014 census): 44.928.923 people

Visual Market Key Indicators for Tanzania[50]

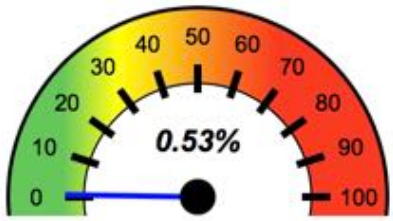


Total actual renewable water resources per capita (m3/inhab/yr)

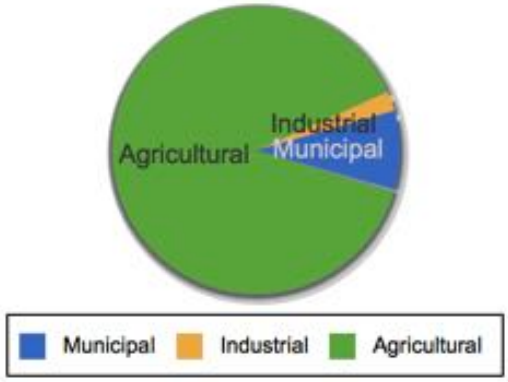


Dam capacity per capita (m3/inhab)

Total cumulative storage capacity of all dams in a country per capita

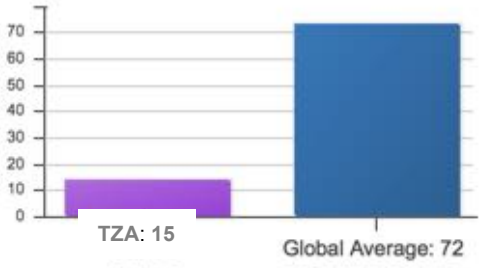


Percent of freshwater resources withdrawn (%)



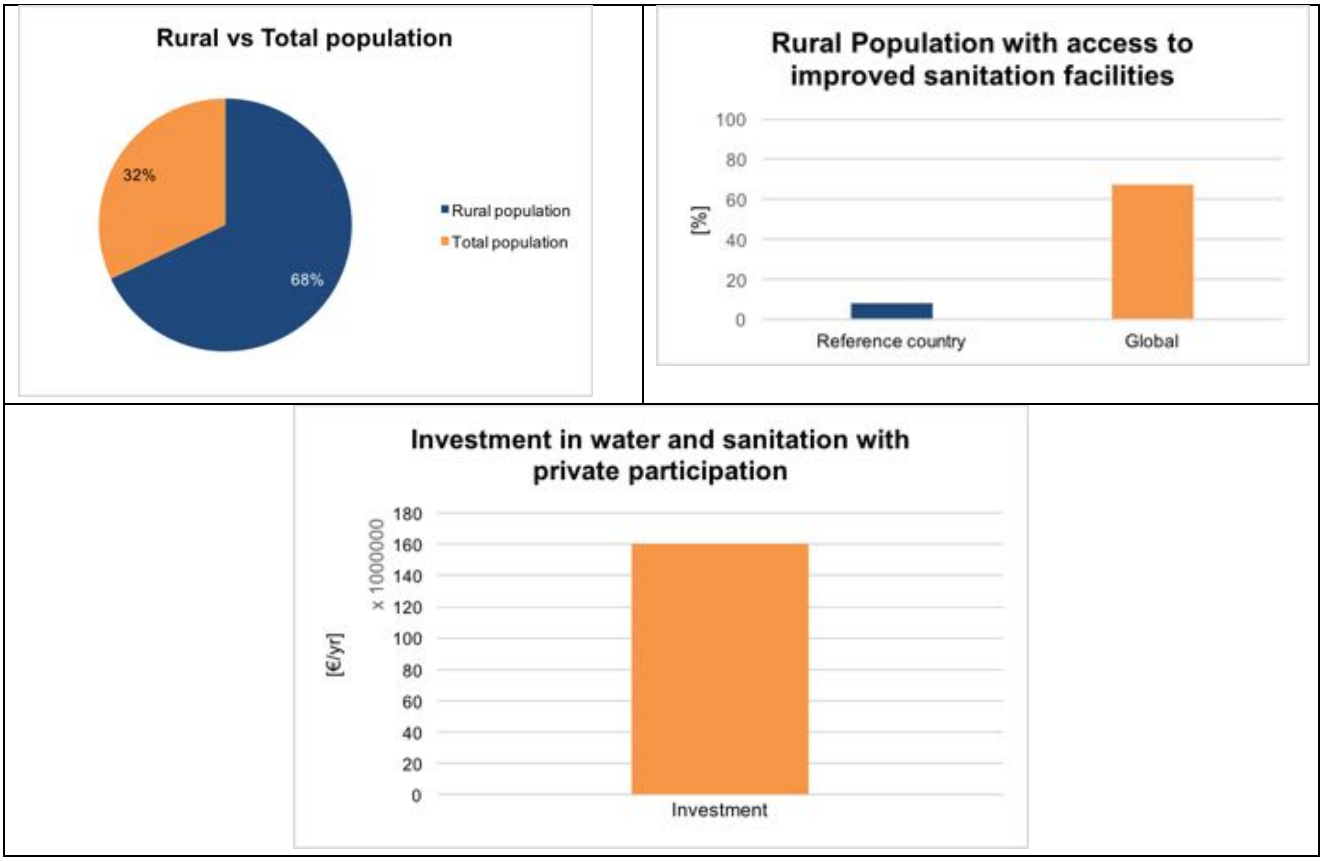
Sectoral withdrawals (%)

Percent of population with access to improved water sources (%)



Percent of population with access to improved sanitation (%)

[50] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.



3.3.2.2 Market opportunities for the INNOQUA system

Both Tanzania's economy and population have grown steadily in the past decade. Despite the economic growth, still around 12 million people live in extreme poverty earning less than US$0,60 per day[51]. Only 10-15% of the urban population has access to a sewerage system. Cultural norms limit the re-use of water to non-food related purposes.

Domestic wastewater is the main source of water pollution resulting in health risks. Lack of road infrastructure makes sludge removal difficult in many remote areas. This is an opportunity for the INNOQUA system to deliver a decentralised low-sludge system in rural settlements although the high poverty levels require new social business models or additional funding from donor programs or private foundations.

Another opportunity are the hotels and the hospitality industry which are heavy water users and need to comply with laws and regulation. They risk being shut down when not meeting these standards. This is a strong incentive to invest in water management and an opportunity for INNOQUA, especially since hotels often have difficulties connecting to a centralised sewage network.

[51] Source: http://www.worldbank.org/en/country/tanzania/overview

3.3.3 India

Table 14: Summary PESTEL - India

Political	**WEIGHTING RATIONALE:** Due to the Indian regulations of sludge (particularly those from effluent treatment systems), any system such as INNOQUA with reduced sludge-disposal requirements is desirable. While the central government often funds investment into this sector, state and city governments (particularly those without water stress) are unable to allocate the required funds for wastewater treatment and water reuse, which is why external investments are being implemented particularly from foreign multinationals. These two pieces of data justify a score of 5 due to the fact that policy and political structure is seemingly favorable for INNOQUA market deployment in India, and a reasonable timeline should be developed that mirrors policy objectives.	**SCORE**: 5
Economic	**WEIGHTING RATIONALE:** Indian wastewater market size estimations suggests a segmentation worth exploring further for entry-point strategy development: €29.5 billion - metering, instrumentation and equipment supply in the demand side; £1400 billion - involvement in Public Private Partnership (PPP) model with the state utilities and urban local bodies for water supply and distribution; €1180 billion - setting up of water treatment plants, sewage and effluent treatment plants; € 42.5 billion - involvement in water EPC business and providing solutions in the form of integrated water resource management for utilities[52]. This data justifies a score of 7 due to the fact that limited further research will be required to develop partnership-oriented deployment strategies that are in line with current market dynamics.	**SCORE**: 7
Social	**WEIGHTING RATIONALE:** Indian wastewater remains largely uncollected and untreated, and currently represents a very competitive market, with high interest and investment from existing local and foreign companies. Wastewater services market pricing remains uncharacteristically low, however, reflecting a current overall low priority given to environmental protection from untreated sewage. Up to 80% of all disease is related to the consumption of the water in India (compared to 5% in Europe), and with 16% of the world's population, living in just 2.4% of global land area with only 4% of the world's renewable water resources. The country is also experiencing an	**SCORE**: 6

[52] Source: https://www.scottish-enterprise.com/knowledge-hub/articles/insight/india-water-waste-water - accessed 01/05/2017

	urbanization explosion, with the 300 million Indians currently living in towns and cities expected to double in the next 25 years[53]. This data justifies a score of 6 due to the fact that health benefits specific to this market in relation to policy and pricing should be quantified & qualified.	
Technological	**WEIGHTING RATIONALE:** With the mixed nature of the wastewater sources (domestic and industrial), and the ability for the treatment solution to handle variable pollutant loading, INNOQUA systems are likely to easily achieve the identified discharge standards, providing a formidable advantage to this product in India when comparing with commercially available and implemented currently. Thus, further evaluation and testing of the INNOQUA system shall be done to evaluate performance against the composition of local wastewater and the level of maintenance by the local workforce. This data justifies a score of 8 due to the fact that INNOQUA technology can fill a need but must be cost-effective and affordable for the market deployment in Indian markets, therefore further research into this topic will be studied.	**SCORE**: 8
Environmental	**WEIGHTING RATIONALE:** Due to cultural, physical, and financial constraints, as well as the growing water stress and legal requirements, India is rapidly shifting its attention to decentralized wastewater management, as opposed to the conventional centralized approach. The total utilizable water supply (from both groundwater and surface water) is estimated at 1123 billion m^3 per year. However, the distribution of the available freshwater is not aligned with the geographic distribution of the points of use, especially concentration of industrial users. Additionally, groundwater recession has been observed, primarily in areas with high utilization for the agriculture sector. The water demand in India is expected to increase beyond the supply availability in the future. Further qualifications and benefit communications are to be developed, justifying a score of 7 for this section.	**SCORE: 7**

[53] Source: https://www.scottish-enterprise.com/knowledge-hub/articles/insight/india-water-waste-water - accessed 01/05/2017

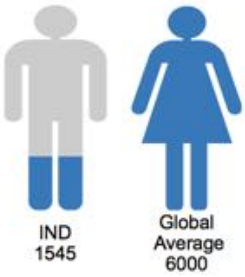
Legal	**WEIGHTING RATIONALE:** Most cities in India face challenges with untreated wastewater entering lakes, rivers, and water tanks due to lack of sewage collection infrastructure and poor enforcement. Above-ground covered storm water drains are commonly used for sewage disposal, and while this violates the municipal regulations, it is a widespread practice. Most cities in India face challenges with untreated wastewater entering lakes, rivers, and water tanks due to lack of sewage collection infrastructure and poor enforcement. Above-ground covered storm water drains are commonly used for sewage disposal, and while this violates the municipal regulations, it is a widespread practice. While not required, a value proposition targeted to how INNOQUA can provide alternatives to this illegal practice is recommended.	**SCORE**: 5

3.3.3.1 Market Key number

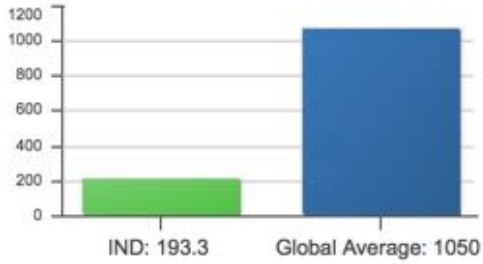
Figure 13: Geographical, Economical and Social indicators – India

Total Population (2017 census): 1.355.250.000 people

Visual Market Key Indicators for India[54]



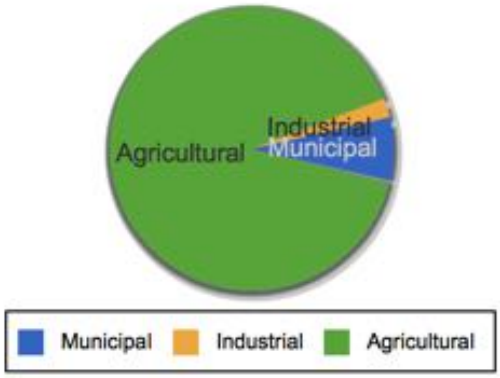
Total actual renewable water resources per capita (m3/inhab/yr)



Dam capacity per capita (m3/inhab)

Total cumulative storage capacity of all dams in a country per capita

Percent of freshwater resources withdrawn (%)

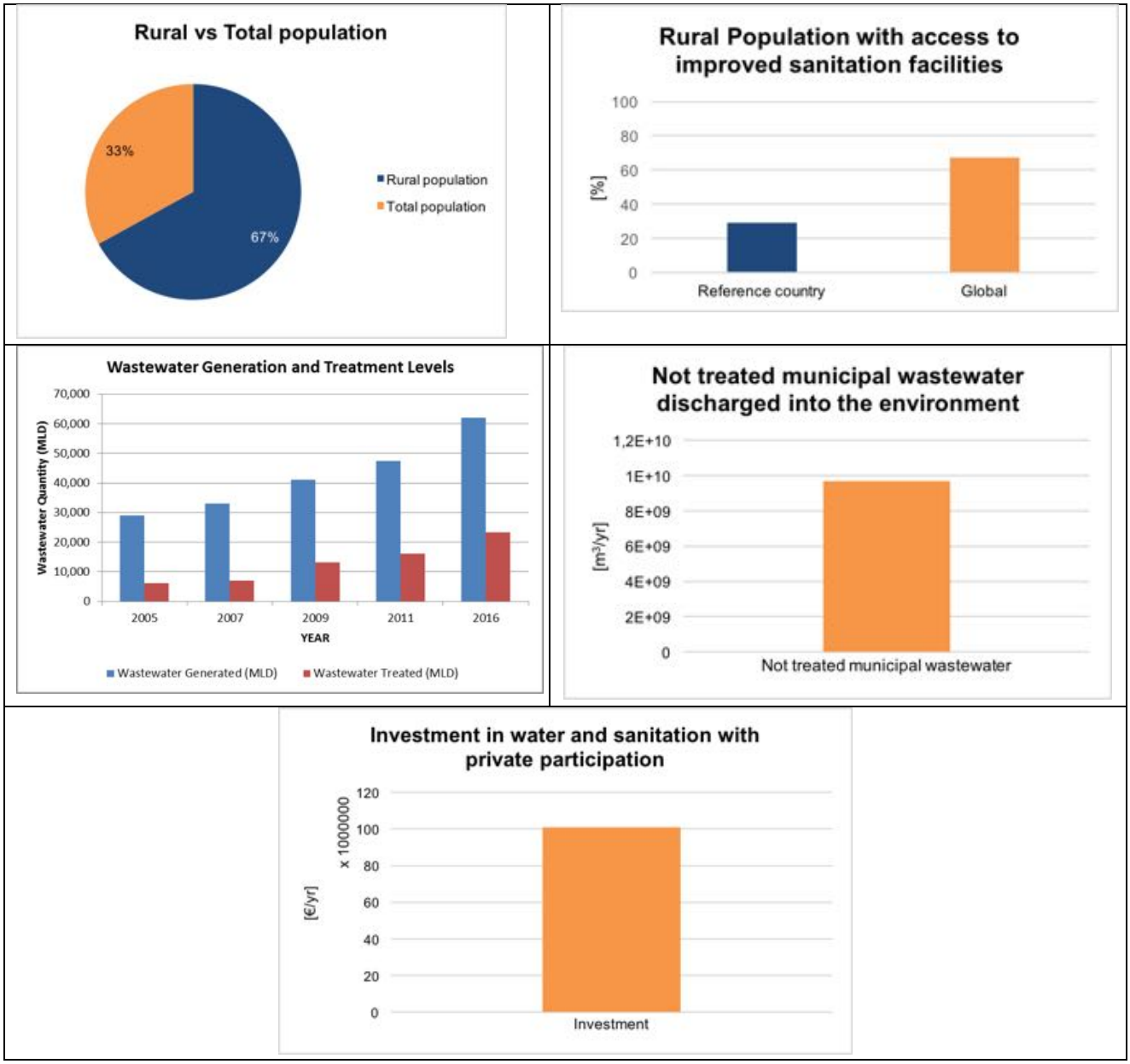


Sectoral withdrawals (%)

Percent of population with access to improved water sources (%)

Percent of population with access to improved sanitation (%)

[54] The Key Indicators have been made possible by the UN-Water Federated Water Monitoring System (FWMS) & Key Water Indicator Portal (KWIP) Project, implemented by AQUASTAT of FAO, accessed on 03 May 2017, as well as specific Innoqua partners contributions.



3.3.3.2 *Market opportunities for the INNOQUA system*

Since its independence in 1947, India has grown to become the world's third largest economy, giving home to over 1.3 billion people. India is still considered a developing country, 400 million Indian people live in poverty[55]. Wastewater treatment is done in a highly decentralised and uncontrolled manner. Much of the wastewater remains uncollected and untreated. Despite environmental initiatives like the Clean India Mission and Clean Ganga Mission, the general environmental awareness remains low. Often, measures for wastewater treatment are being taken by companies only for reputational reasons.

[55] Source: http://www.worldbank.org/en/country/india/overview

Industrial and domestic wastewater is frequently mixed, making it more difficult for INNOQUA to deliver a standard solution for domestic environments. Lack of coordination and enforcement by local authorities has resulted in a broad range of local solutions from industry and households.
Strict laws force apartment buildings to install local wastewater treatment systems. If the INNOQUA system could meet the specific demands for this segment, like a small footprint, function in a basement and low maintenance, this would be a good opportunity for an INNOQUA system. Other areas where the INNOQUA system could add value are buildings or groups of buildings with no access to a central sewage system like schools, hospitals or slumps. Since the wastewater market in India is highly competitive, with many local and foreign solution providers, any INNOQUA system should be priced in line with competing solutions.

4 Social acceptance questionnaire

To aid in obtaining real information on the social acceptance of the INNOQUA technologies, a questionnaire has been developed. This questionnaire will be submitted to potential end users (including domestic customers, private companies, public institutions and other stakeholders) to collect useful information on the social acceptance of the INNOQUA technologies for various regions around the world. A single, uniform questionnaire has been developed that aims to take into account any regional considerations and/or sensitivity. It is hoped that the questionnaire will also help the INNOQUA project team to gain further insight into regional differences in behaviour, attitudes and priorities with regards wastewater treatment. Furthermore, interpretation of the results will allow for a greater understanding of potential issues that may arise, from an users point of view, for installation of the technologies for the treatment of wastewaters and provision of reusable treated effluents. For example, it is anticipated that there may be some uncertainty or resistance to the concept of using bio/nature-based systems utilising living-environments incorporating earth-worms and algae/molluscs. These potential issues may represent a barrier to market entry of the INNOQUA technologies, so by understanding what these concerns are and how they might differ for different populations (e.g. regional differences, domestic vs private uses) we can address these at an early stage in the project to help improve market acceptance.
The questionnaire has been developed to achieve four key objectives:

1. establish the level of knowledge of the respondent in terms of wastewater and wastewater treatment systems
2. establish the normal behaviour of the individual in terms of adopting nature-based, environmentally sustainable wastewater treatment solutions
3. establish the priorities of the respondent if they were to choose a wastewater treatment solution
4. establish whether they would consider installation of an innovative nature-based system, such as those developed by INNOQUA.

The questioning within the questionnaire is multiple choice, which will ensure that the questionnaire can be completed quickly and accurately by various respondents with various levels of understanding and interest in wastewater treatment and environmental sustainability. This should also help to ensure greater participation in the questionnaire.
The line of questioning is ranked on a scale of 1-5, (for example, 1 representing strongly disagree and 5 representing strongly agree). By using ranked questioning, this will again assist with ease of completion the question and reduce the respondents time spent answering the questions. By maintaining a uniform approach to the structure of the questions, data can be represented in graphs and charts to give visual representation and summarise results, allowing for easier interpretation and comparisons of results received for different demographics. It may also be useful to compare results of the survey at the start of the project and at the end of the project to measure, for example, how people's attitudes to nature-based, sustainable wastewater treatment solutions have changed and how this relates to dissemination activities undertaken by INNOQUA.

It is proposed that an online platform (such as survey monkey) is utilised so that the survey can be disseminated to participants via email and completed online. Hard copies will also be printed so that the questionnaire can be completed in the field as required, with results being fed back to the survey coordinator for input onto the system.
The questionnaire is subdivided into 5 sections:

I. General information about you

This section establishes key demographic information for the participant including sex, age, education, employment, home and current wastewater treatment infrastructure.

II. General questions about pro-environmental activities

This section has been developed to understand the participant's attitudes and awareness to environmental issues.

III. Your opinion on the treatment of wastewater

In this section, the focus is on the participant's attitudes and awareness to sanitation and wastewater treatment.

IV. Your views for selecting innovative wastewater treatment systems

In the penultimate section, the survey focuses on the views and factors that affect how the participant would select a wastewater treatment system

V. Your views on adopting innovative wastewater treatment systems

In the final section of the questionnaire, the respondent's views and acceptability of utilising a new nature-based, sustainable wastewater treatment system, such as those proposed in the INNOQAUA project.
The results of the initial questionnaire will be reviewed by the Work Package 2 and 3 co-ordinators when developing guidelines for detailed design of pilot plants, effluent quality targets, operation and maintenance documentation, integration of the technologies with existing sewerage infrastructure (or lack of) and integration of the technologies with one another.
Later in the project, the questionnaires will be used during consultation campaigns at open days held at demo sites to get feedback on potential end-users perception of environmental issues, specifically a lack of sustainable wastewater treatment/reuse, and if they feel the INNOQUA technologies could potentially provide a suitable solution to these issues.
The questionnaires will also be distributed to established channels, identified by experts in environmental and wastewater treatment fields (who will form the Special Interest Group and the INNOQUA Advisory Board), for any additional feedback.
The full survey can be found in Annex I.

5 Conclusions

This report presents important outcomes to take into consideration both when developing the business model and business plan of the INNOQUA product (WP6) and for the implementation of the final INNOQUA system (Technical WPs).
The report is intended as a complementary document of the first version, submitted in M9, and its aim is:

- To highlight the countries that presents the most favourable aspects for INNOQUA market exploitation.
- To perform an external analysis in terms of potential customers and potential competitors.
- To develop the first hypothesis of the INNOQUA market positioning and its competitive advantages.
- To introduce the final version of the social acceptance questionnaire which is going to be exploited amongst end-users in order to get the first real feedback about the INNOQUA innovative natural based system.

A. Which are the countries that present the most favourable aspects for INNOQUA

A PESTEL-analysis has been conducted to uncover which aspects of the pre-market study have been identified as important to conduct further research against in relation to INNOQUA market deployment in 2020. The analysis resulted in the following ranked list (Table 15).

Table 15: PESTEL Scoring results

Position	Country	Competition metrics score
1	Turkey	Score 44
2	Peru	Score 43
3	Italy	Score 41
4	France	Score 39
5	Ireland	Score 38
6	Spain	Score 38
7	Ecuador	Score 38
8	India	Score 38
9	UK	Score 36
10	Tanzania	Score 34
11	Romania	Score 33

Turkey's environment has developed strongly in the past decades, resulting in increased employment, less poverty and strong urbanisation. It is unknown what the effect will be on the further development of water and wastewater regulations since developments were largely driven by harmonising with EU law. In addition with an annual growth of the environmental technology

market of about 10% the Turkish environment seems to be an opportunity for the INNOQUA system. Opportunities exist mainly in agriculture where water stress increases the need for farmers to re-use water for irrigation, especially in the western part of Turkey. The need for water re-use will increase and INNOQUA could configure their system to target eco-friendly businesses.
On the other hand, **Peru** is the second country in the ranked list. Peruvian environmental policy strongly supports wastewater treatment and reuse. Environmental Quality Standards and associated regulation are constantly being enforced by governments and awareness is being raised among populations about the need of implementing water conservation strategies and environmental protection and preservation. This data show a possible links between the seemingly strong policy support and the specific objectives for INNOQUA market deployment.
Italian and **France** environment are very similar with the difference that the Italian laws are going to support much more the water reuse and this could be a competitive advantage that have to be taken into consideration when developing a business model.
India and **Ecuador** also show an interesting market place for INNOQUA due the fact that agriculture is the most important commercial sector, low people have access to sanitation systems. On the other side in India state and city governments are unable to allocate the required funds for wastewater treatment and water reuse while in Ecuador the legislation does not limit the offer of new technological alternatives, nevertheless, it will be always encouraged to the fabricants and sellers to ensemble or even to construct the prototypes in the country as important (practical and economical) importation barriers exist for imported products.
Ireland and **Spain** also present positive aspects for the INNOQUA market uptake but in these countries the D-WWTPs market is already full of technologies/competitors and this could be a barrier for the introduction of the INNOQUA system because It must snatch a large market share to competitors to find a right place in the market.
United Kingdom has a highly developed wastewater management system and has established a strong regulatory framework and supporting policies, in line with the European WFD. 100% of the houses is connected to centralised drinking water and wastewater systems. The decision of the UK to leave the EU brings uncertainty with respect to the development of the UK economy and the influence on environmental policies and targets is unknown. This is a barrier for INNOQUA market exploitation.
In **Tanzania** a barrier to the introduction of the INNOQUA system could be the legal aspect. Specific sanitation frameworks are still being drafted, in addition, existing frameworks are fragmented and no clear guidelines and standards for technologies for wastewater treatment are in place.
Romania presents the most critical environment. Even if the market potential is good in terms of percentage of people connected to the sewage system (in the rural areas where the majority of the houses is not connected to drinking water or wastewater systems), people have little room for expenditures on sanitation systems. Poverty and the increase in water cost in Romania means that households have very little financial or technical resources to invest in decent wastewater management systems. Furthermore problems like corruption could be a barrier for the market uptake.

B. To perform an external analysis in terms of potential customers and potential competitors

The main stakeholder groups (end-users, early adopters, partnerships, etc.) being targeted for further exploitation activities are as follows:

N.	Potential Costumers
1	Houses & Multi-houses
2	Transportation companies
3	Park management entities
4	Industries
5	Governments Agencies
6	Existing centralized WWTPs
7	Tourism facilities

From the country analysis, the target customer groups marked in green seem the most promising. Main competition comes from providers of decentralised wastewater systems like the DEWATS or BIONEST System that target households and small facilities like hotels. These products are compact and support reuse of wastewater.

C. To point out the first hypothesis of the INNOQUA market positioning and its competitive advantages

The report presents the Technology market segmentation and highlight which technology could be considered "direct" INNOQUA competitors by using a scoring methodology and what are the competitive advantages expected for the INNOQUA system.
First results of the analysis, allowed us to identify the expected competitive advantages of the INNOQUA system in comparison with its direct competitors (Figure 14).

Figure 14: Expected INNOQUA competitive advantages

While, the scoring assignment allowed us to make a first hypothesis about the INNOQUA market positioning. The results are intuitively illustrated in the Figure 15 in which the area identified by the price gap and the performance gap indicates the possible market positioning of the INNOQUA product.

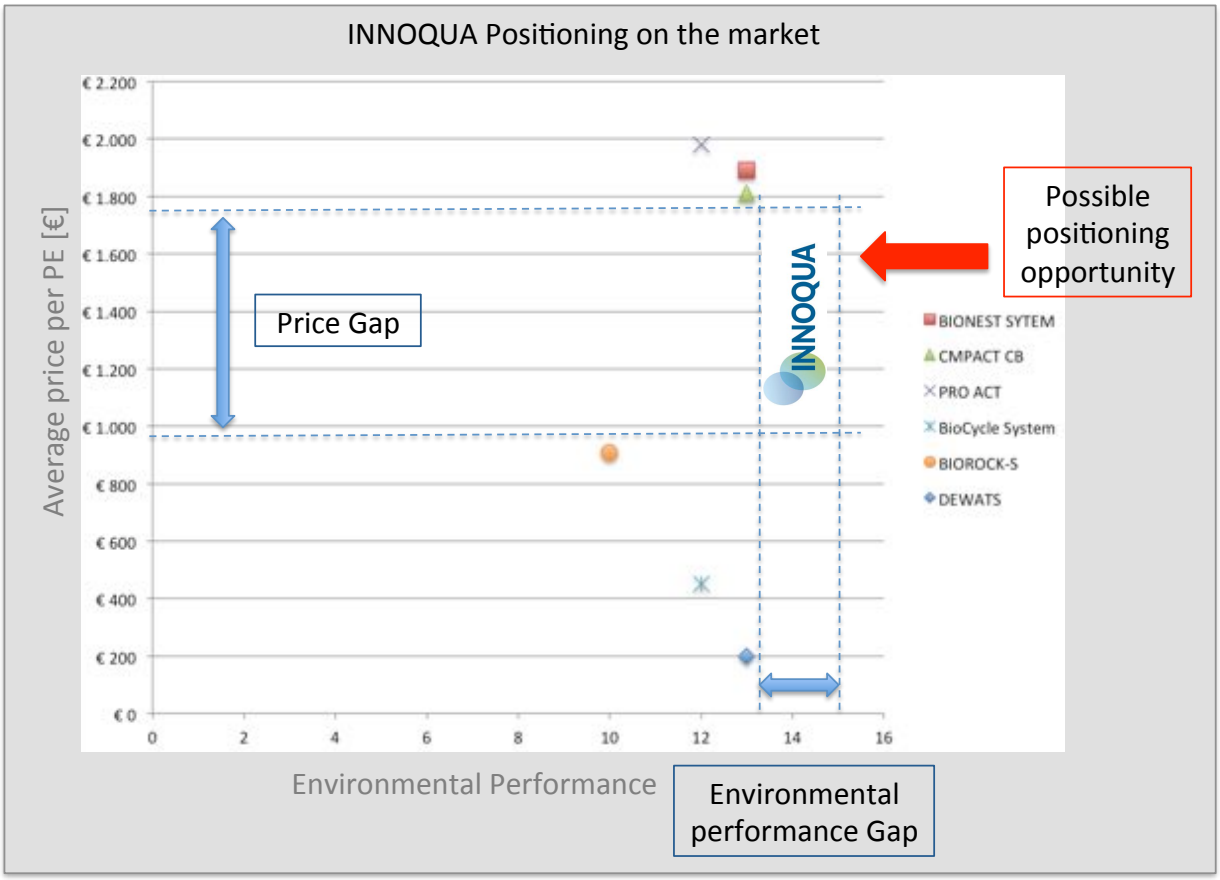


Figure 15: Hypothesis about INNOQUA market positioning

D. To introduce the final version of the social acceptance questionnaire

In order to get real feedback of the end-users on the social acceptance of the INNOQUA technology, a questionnaire has been developed. This report present the final version of the questionnaire that will be submitted to potential end users, including domestic customers, private companies, public institutions and other stakeholders.

A single, uniform questionnaire has been developed (Annex I) that aims to take into account any regional considerations and/or sensitivity. The questionnaire will also help the INNOQUA project team to gain further insight into regional differences in behaviour, attitudes and priorities with regards wastewater treatment. Furthermore, interpretation of the results that will be further more developed in WP2 and WP3 activities, will allow for a greater understanding of potential issues that may arise, from an users point of view, for installation of the technologies for the treatment of wastewaters and provision of reusable treated effluents.

Annex I:

A.1 Social acceptance questionnaire

SOCIAL ACCEPTANCE QUESTIONNAIRE

Thank you for agreeing to take part in this important survey measuring social acceptance of various wastewater treatment solutions.
INNOQUA, an EU-funded project through the *Horizon 2020 Research & Innovation Programme* launched in June 2016, aims to meet the challenges posed by a lack of sanitation by promoting sustainable water sanitation technologies capable of performing a whole water treatment cycle. These technologies resemble natural cleaning processes, and are based on the purification capacity of earthworms, zooplankton, and alternatively microalgae and sunlight exposure.
The Questionnaire will take 5-10 minutes to be completed. Please assure that all answers you provide will be kept in the strictest of confidentiality.

For more information on the INNOQUA project and technologies, you can visit our website at: www.innoqua-project.eu

Part 1 – General information about you

To best assess the information that we collect, we would like to know about you. Please read each question or statement and tick the box that indicates your response.

1. Are you male or female?

Male	Female

2. What is your age range?

17 - 20	21 - 24	25 - 28	29 - 32	33 - 36	37 - 44	45+

3. In which of the following regions do you currently reside?

Europe	South America	North America	Africa	Asia	Other

4. Which (if any) religion do you associate yourself with?

Christian (all denominations)	Muslim	Buddhist	Hindu	Jewish	Sikh	Not Religious	Other

5. What is the highest education that you finished?

No formal education	Primary Certificate	Junior /Inter/ Group Cert (Lower secondary)	Leaving Certificate (Upper secondary)	Certificate/ Diploma	Degree or equivalent	Post Graduate Masters /PhD	Don't want to say

6. What best describes the industry in which you are usually employed?

Agriculture, Forestry & Fishing	Industry	Construction	Wholesale & Retail Trade	Accommodation and food service activities	Information and communication	Financial, insurance and real estate activities	Professional, scientific and technical activities
Administrative and support service activities	Public administration and defence	Education	Human health and social work activities	Other	Not in Employment		

7. What best describes your job?

Management Staff	Professional	Operational Staff	Technical Staff	Administrative Staff	Other

8. What is your average monthly income?

€100-500	€500-1000	€1000-2000	€2000-3000	> €3000	Would prefer not to specify

9. What best describes your living situation?

I am a homeowner	I rent my home	I live with my Parents	I am in a house/apartment share	Other

10. What best describes your main residence?

Detached House	Semi-Detached House	Flat	Other

11. How many persons are in your household?

I live alone	2 persons	3-5 persons	5-10 persons	+10 persons

12. Is wastewater arising from your main residence currently connected to a sewerage network?

Yes	No	I don't know

13. How is wastewater arising from your main residence currently treated?

Untreated	On-site settlement tank system	On-site septic tank & percolation system	Proprietary Biological/Mechanical on-site treatment system	Connected to a Municipal/Centralised Treatment	I don't know

Part 2 – General Questions about pro-environmental activities

In this part of the survey we are interested in your current involvement in pro-environmental activities. Please read each question and indicate how.

1. Do you incorporate pro-environmental activities in your daily routine?

Always	Often	Sometimes	Rarely	Never	N/A

2. Do you take measures to minimise the volume waste that you waste generate?

Always	Often	Sometimes	Rarely	Never	N/A

3. Do you favour nature based solutions when selecting new products or technologies where possible?

Always	Often	Sometimes	Rarely	Never	N/A

4. Do you choose low energy technologies where possible??

Always	Often	Sometimes	Rarely	Never	N/A

5. Do you choose water saving technologies where possible?

Always	Often	Sometimes	Rarely	Never	N/A

Part 3 – Your Opinion on the Treatment of Wastewater

In this part of the survey we are interested in your opinion and feelings regarding the treatment of wastewater. Please read each statement and consider whether you agree or disagree with it. Indicate by ticking a box the strength of your response from completely disagreeing at point 1 to completely agreeing at point 5.

1. I feel a strong personal obligation to ensure that wastewater generated by me or my household is connected to an effective treatment system

Completely Disagree	1	2	3	4	5	Completely Agree

2. I know what wastewater is and the various sources of wastewater occurring at the property where I live

Completely Disagree	1	2	3	4	5	Completely Agree

3. I worry about the negative impact of untreated or poorly treated wastewater on the environment

Completely Disagree	1	2	3	4	5	Completely Agree

4. I consider that biological treatment systems using earthworms that can treat wastewater to acceptable quality before reuse or discharge are positive solutions

Completely Disagree	1	2	3	4	5	Completely Agree

5. I consider that biological treatment systems using crustaceans that can treat wastewater to acceptable quality before reuse or discharge are positive solutions

Completely Disagree	1	2	3	4	5	Completely Agree

6. I consider that biological treatment systems using Sunlight that can treat wastewater to acceptable quality before reuse or discharge are positive solutions

Completely Disagree	1	2	3	4	5	Completely Agree

7. In selecting a new wastewater treatment system or other technology, I'd feel guilty if I chose a less sustainable solution over a more sustainable solution of similar cost

Completely Disagree	1	2	3	4	5	Completely Agree

8. The ineffective treatment of wastewater is a problem for society

Completely Disagree	1	2	3	4	5	Completely Agree

9. I believe that the lack of sustainable and effective wastewater treatment systems has a significant negative environmental impact

Completely Disagree	1	2	3	4	5	Completely Agree

10. It is pointless to make any improvements to my existing system; it will not have an effect on the overall quality of treated wastewater or the resources required to treat it

Completely Disagree	1	2	3	4	5	Completely Agree

11. I think that promoting sustainable and pro-environmental wastewater technologies at work/school/college would have a positive effect in peoples' adoption of such technologies

Completely Disagree	1	2	3	4	5	Completely Agree

12. I think that the provision of incentives for installing/adopting sustainable and pro-environmental wastewater technologies would have a positive effect in peoples' adoption of such technologies

Completely Disagree	1	2	3	4	5	Completely Agree

Part 4 – Your Views on Criteria for Selecting Innovative Wastewater Treatment Systems

In this part of the survey we are interested in recording your views on the importance of certain criteria in adopting wastewater treatment systems. Please consider each criteria and rate it as to whether you consider it to be irrelevant or extremely important. Indicate by ticking a box the strength of your response from irrelevant at point 1 to extremely important at point 5.

1. Ease of installation (e.g., factors such as size, weight, number of ancillary parts, whether this is installed over or underground)

Not Important	1	2	3	4	5	Extremely Important

2. Efficiency and performance (e.g., ability to produce a very high quality final effluent)

Not Important	1	2	3	4	5	Extremely Important

3. Sustainability and energy requirements (e.g., energy consumption during operations)

Not Important	1	2	3	4	5	Extremely Important

4. Aesthetics and visual impacts (e.g., factors such as size of unit, whether this can be installed over or underground)

Not Important	1	2	3	4	5	Extremely Important

5. Initial purchase cost

Not Important	1	2	3	4	5	Extremely Important

6. Ease of use and maintenance requirements

Not Important	1	2	3	4	5	Extremely Important

7. Noise and Odours

Not Important	1	2	3	4	5	Extremely Important

Part 5 – Your Views on Adopting Innovative Wastewater Treatment Systems

In this part of the survey we are interested in recording your views on adopting wastewater treatment systems. Please read each statement and consider whether you agree or disagree with it. Indicate by ticking a box the strength of your response from completely disagreeing at point 1 to completely agreeing.

1. Would you be willing to adopt a nature-based solution incorporating worms or other micro-organisms for the treatment of wastewater at your residence?

Definitely Not	Probably Not	Possibly	Probably	Definitively Yes

2. Would you be willing to adopt a nature-based solution incorporating crustaceans or other micro-organisms for the treatment of wastewater at your residence?

Definitely Not	Probably Not	Possibly	Probably	Definitively Yes

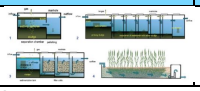
3. Would you be willing to use treated wastewater from an onsite treatment system for non-consumable use?

Definitely Not	Probably Not	Possibly	Probably	Definitively Yes

Annex II:

A.2 Data used in the pre-market assessments for rationalizing the scores assigned to different competitors technologies

Competitive factors	
Competition metrics	*Competitive investigations*
GREEN CELL **score of 12 or greater**	Analysed product features or services being offered **requires a detailed further comparison** in relation to INNOQUA solutions, a cost-benefit analysis will occur.
YELLOW CELL **score between 8-11**	Analysed product **requires a limited further analysis** in relation to INNOQUA solutions, further research about costs will occur
ORANGE CELL **score between 4-7**	Analysed product is not a direct INNOQUA system competitor but it could occupy a market share**. Further analysis about the market potentiality could occur**
RED CELL **score between 0-3**	Analysed product **requires no further analysis**

End-user country	India			Producer country	India	
Climate	Wide range					
Market target	Domestic					
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
DEWATS	CDD India		€ 800 (4 PE)	Low	Easy	Yes
Description	The decentralised wastewater treatment system is a simple design, non-dependent on energy, reliable, long-lasting, tolerant towards inflow fluctuation and low in costs. It can treat organic wastewater from domestic and industrial sources. DEWATS is based on different natural water treatment techniques which are combined according to requirements such as the characteristics of wastewater, desired effluent quality and technical specifications.					
Website	http://www.cddindia.org/dewats.html					

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 13/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	3	3	
Complete treatment process (primary, secondary and tertiary) (2)	3	3	
SCORE	**13**	**15**	
Purchase cost	€800		
Installation cost (3)	€120		
Maintenance cost (3)	€100		
Average cost per PE	€185		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		France
Climate		Atlantic				
Market target		Domestic / commercial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
BIONEST SYTEM	BIONEST		€ 25000 (50 PE)	High	Easy	Yes
Description		Bionest wastewater treatment systems offer high performance water purification using a simple, efficient and durable technology. It is a biological process consisting of an extended aeration fixed film reactor. Biomass (good bacteria) develops and firmly attaches to both sides of the BIONEST ribbon shaped polymer media. The high population of bacteria and the support offered by the media for their growth provide the reactor with an outstanding performance level and resistance to hydraulic shock (peak flow). The major portion of the reactor is aerated through linear air pumps and fine bubble diffusers, which provide turbulent conditions to ensure enhanced treatment. Multiple pumps are used to supply air to the reactor allowing for redundancy, thus ensuring continuous treatment even during maintenance or failure of one or more air pumps. The BIONEST system incorporates a recirculation loop that makes the system a multi-pass process bringing performance to a very high level. To bring the treated effluent to a reuse quality, the BIONEST system can easily be used in combination with chlorination, UV or ozonation or any other disinfection means. With such a high-quality level of the discharged water, 100% of the treated water can be reused.				
Website		http://www.bionest-tech.com/ME-en/product/155/bionest-system.html				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 13/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, etc. The product has similar characteristics, tertiary process can be added in order to reuse the treated water.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	0	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	1	2	
Treated water reuse (2)	3	3	
Complete treatment process (primary, secondary and tertiary) (2)	3	3	
SCORE	**13**	**15**	
Purchase cost	€25000		
Installation cost (3)	€3750		
Maintenance cost (3)	€1300		
Average cost per PE	€ 600		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference scoring would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

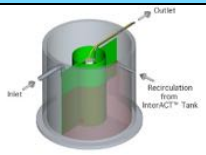
End-user country		Europe		Producer country		Germany
Climate		Continental/Mediterranean				
Market target		Domestic/Industrial/Commercial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
Compact CB	Delphin Water Systems		€6000 (4 PE)	-	supervised by product technicians simple installation	Yes (several retailers in Europe and all over the world)
Description		The wastewater recycling plant DELPHIN® compact CB is a system for the decentralized biological treatment of domestic wastewater and its full recovery for irrigation. The clarification of the wastewater is the result of a fully biological purification process by means of a submerged and aerated fixed-bed. In the final step the treated wastewater is sanitized by UV radiation. For the safe storage of the irrigation water optional equipment is also available.				
Website		http://www.delphin-ws.de/en/products/wastewater-recycling-plants/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 13/15** The INNOQUA system aims to be more eco-sustainable due to the characteristic pertaining to low sludge, which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	3	3	
Complete treatment process (primary, secondary and tertiary) (2)	3	3	
SCORE	**13**	**15**	
Purchase cost	€6000		
Installation cost (3)	€900		
Maintenance cost (3)	€345		
Average cost per PE	€1811		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

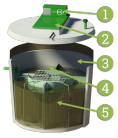
End-user country	Europe		Producer country		Sweden	
Climate	Continental/Mediterranean					
Market target	Domestic					
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
ProACT	Alnarp Cleanwater		€6550 (4 PE)	Low	Technicians needed	Yes (all factories are located in Sweden)
Description	ACT® has an outstanding ability to take care of unwanted substances. For example, a test of the Swedish Environmental Research Institute shows that ACT® purifies the water from drugs better than municipal water treatment plants. ACT® is also cycle based, meaning that nutrients can be returned directly to agriculture. Everything from small homes to large facilities such as hotels can benefit from using ACT®. It can also easily be extended to deal with more sewage or higher treatment requirements.					
Website	http://www.alnarpcleanwater.se/?lang=en					

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 12/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	0	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	3	3	
Complete treatment process (primary, secondary and tertiary) (2)	3	3	
SCORE	**12**	**15**	
Purchase cost	€6550		
Installation cost (3)	€985		
Maintenance cost (3)	€380		
Average cost per PE	€1980		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		Ireland
Climate		Continental/Mediterranean				
Market target		Domestic/Industrial/Commercial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
bioCycle system	bioCycle		€18500 (50 PE)	€ 90 per annum	Easy	Yes
Description		The bioCycle™ system uses the sequential batch reactor technology. The domestic system has an average yearly running cost of €90 per annum. Company purports that the system is low maintenance and requires desludging every 7 to 10 years.				
Website		http://www.biocycle.ie/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 12/15** The INNOQUA system aims to be more eco-sustainable due to the characteristic pertaining to low sludge which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	1	2	
Treated water reuse (2)	2	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**12**	**15**	
Purchase cost	€18500		
Installation cost (3)	€2775		
Maintenance cost (3)	€90		
Average cost per PE	€450		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

<table>
<tr><td colspan="2">End-user country</td><td colspan="2">Europe</td><td>Producer country</td><td>France</td></tr>
<tr><td colspan="2">Climate</td><td colspan="4">Atlantic/Continental</td></tr>
<tr><td colspan="2">Market target</td><td colspan="4">Domestic</td></tr>
<tr><td>Product Name</td><td>Company</td><td>Product Image</td><td>Product Cost</td><td>Management Cost</td><td>Level of Installation</td><td>Availability of materials</td></tr>
<tr><td>BioKube</td><td>BIOKUBE</td><td>  </td><td>€ 22000 (40 PE)</td><td>Medium</td><td>Easy</td><td>Yes</td></tr>
<tr><td colspan="2">Description</td><td colspan="5">BioKube offers a variety of solutions for single households and smaller hotels who are in need of wastewater treatment. It's completely self-contained treatment plant and it's capacity can range from 700 to 18,000 liters per day. This assures that it's applicable in a variety of settings ranging from small households to smaller villages and hotels. The systems are packaged in cylindrical polypropylene containers and can be delivered with phosphorous removal kits and UV-tertiary treatment units. The standard versioni s coupled only with a septic tank. The BioKube Small Systems are typically installed in ground after a locally purchased septic tank. The septic tank should be supplied locally from one of many standard suppliers. Alternatively, it can be casted on site in concrete. The systems can be installed either in or above ground. After the installation, the compact wastewater treatment plants or small sewage treatment plants require minimum service and effort to maintain, without losing its ability to clean the incoming wastewater and sewage.
Compact design, minimum service and effort to mantain, are the strengths of the product.</td></tr>
<tr><td colspan="2">Website</td><td colspan="5">https://www.biokube.com/index.php/biokube-wastewater-treatment-plants-for-houses-resorts-villages</td></tr>
<tr><td colspan="2">CHARACTERISTICS (1)</td><td colspan="2">EXISTING PRODUCT</td><td>REFERENCE TARGET SCORE (2)</td><td>RESULTS</td></tr>
<tr><td colspan="2">Small size</td><td colspan="2">1</td><td>1</td><td rowspan="15">SCORE: 12/15
The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge which do not exist in this product.</td></tr>
<tr><td colspan="2">Modular tanks</td><td colspan="2">1</td><td>1</td></tr>
<tr><td colspan="2">Minimum moving parts/complexity</td><td colspan="2">1</td><td>1</td></tr>
<tr><td colspan="2">No pumping</td><td colspan="2">0</td><td>1</td></tr>
<tr><td colspan="2">Small footprint post installation</td><td colspan="2">1</td><td>1</td></tr>
<tr><td colspan="2">Easy transportation</td><td colspan="2">1</td><td>1</td></tr>
<tr><td colspan="2">Low weight</td><td colspan="2">1</td><td>1</td></tr>
<tr><td colspan="2">Low sludge (2)</td><td colspan="2">0</td><td>2</td></tr>
<tr><td colspan="2">Treated water reuse (2)</td><td colspan="2">3</td><td>3</td></tr>
<tr><td colspan="2">Complete treatment process (primary, secondary and tertiary) (2)</td><td colspan="2">3</td><td>3</td></tr>
<tr><td colspan="2">SCORE</td><td colspan="2">12</td><td>15</td></tr>
<tr><td colspan="2">Purchase cost</td><td colspan="3">€22000</td></tr>
<tr><td colspan="2">Installation cost (3)</td><td colspan="3">€3300</td></tr>
<tr><td colspan="2">Maintenance cost (3)</td><td colspan="3">€1270</td></tr>
<tr><td colspan="2">Average cost per PE</td><td colspan="3">€665</td></tr>
<tr><td colspan="6">NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research</td></tr>
<tr><td colspan="6">NOTE (2): The reference scoring would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher</td></tr>
</table>

End-user country		Europe		Producer country		Luxembourg
Climate		Continental/Mediterranean				
Market target		Domestic/Industrial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
BIOROCK-S	BIOROCK		€4180	€150-300 (empting once a year) €100-200 (power consumption per year) €340-940 (average cost per year)	Easy installation	Yes (each country in Europe can be eligible as a reseller)
Description		The BIOROCK®-S Small sized sewage treatment plant is a sewage treatment plant that caters 2-6 persons domestic application. The BIOROCK®-S Series system functions as a two stage Sewage Treatment Plant. The raw sewage first enters a Primary tank to provide pre-separation and initial breakdown of organic solids. The sewage then passes through an effluent filter before discharging into the BIOROCK® unit itself which incorporates the aerobic filtration process. Where required the BIOROCK® Series can be retrofitted to a traditional septic tank.				
Website		http://www.biorock.com/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 10/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	1	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**10**	**15**	
Purchase cost	€4180		
Installation cost (3)	€600		
Maintenance cost (3)	€670		
Average cost per PE	€910		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference score would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		Romania
Climate		Continental/Mediterranean				
Market target		Domestic/Industrial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
FA5	fECO		€ 1600 (6 PE)	Low	Easy	Yes
Description		Activated sludge (suspended) Modular Continuous flow				
Website		http://www.feco.ro/Statii-de-epurare/Ministatii-de-epurare-cu-namol-activ-c99c102.htm				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 8/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	1	3	
SCORE	**8**	**15**	
Purchase cost	€1600		
Installation cost (3)	€240		
Maintenance cost (3)	€92		
Average cost per PE	€322		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference score would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		Romania
Climate		Continental/Mediterranean				
Market target		Domestic/Industrial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
Lanaerjet	Calor		€ 1450 (4 PE)	Low	Easy	Yes
Description		Activated sludge				
Website		http://www.fose-septice-ecologice.ro/statii-de-epurare-apa-ecologice				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 9/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**9**	**15**	
Purchase cost	€1450		
Installation cost (3)	€218		
Maintenance cost (3)	€ 85		
Average cost per PE	€438		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost.

End-user country		Europe		Producer country	Romania	
Climate		Continental/Mediterranean				
Market target		Domestic				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
ELITE	Aqua-Biotec		€ 1250 (6 PE)	Low	Easy	Yes
Description		Combined anaerobic + aerobic				
Website		http://www.aqua-biotec.ro/p9999.htm				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 8/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	0	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**8**	**15**	
Purchase cost	€1250		
Installation cost (3)	€190		
Maintenance cost (3)	€75		
Average cost per PE	€250		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost.

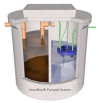
End-user country		Europe		Producer country		Romania
Climate		Continental/Mediterranean				
Market target		Domestic/Industrial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
VALROM	ROMSTAL		€ 2700 (6 PE)	-	-	Yes
Description		Aerobic +anoxic SBR				
Website		https://www.romstal.ro/statie-epurare-din-polietilena-ape-uzate-menajere-valrom-sbr1-6-le-q-1-mc-zi-p38014.html				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 9/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**9**	**15**	
Purchase cost	€2700		
Installation cost (3)	€405		
Maintenance cost (3)	€155		
Average cost per PE	€545		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		Ireland
Climate		Continental/Mediterranean				
Market target		Domestic				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
Aswaflow Pumped/Airlift	Molloy		€3800 (4 PE)	€60 per year (energy costs)	Site specific due to ground conditions to support percolation	Yes
Description		The traditional Aswaflow SBR System is pumped. This means a unit of pumps is used for aeration, to pump effluent between the chambers and to discharge the clarified water. Molloy Precast provide an all-in-one system including the treatment pumps, hose pipes and control panel. The Aswaflow SBR system is now available with air lift technology. This technology eliminates the need of electrics in the treatment tank. Bubbles of air are blown into the system's pipework to move water between the two chambers. When the air enters the pipe it naturally moves upwards pushing water ahead of it. This air is produced using an air compressor. A single compressor is used to feed the transfer pipe, sludge return pipe, discharge pipe and the air diffusers. Molloy Precast provide an all-in-one system including the air compressor, hose pipes and control panel.				
Website		http://molloyprecast.com/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 9/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**9**	**15**	
Purchase cost	€3800		
Installation cost (3)	€570		
Maintenance cost (3)	€60		
Average cost per PE	€1100		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		France
Climate		Atlantic				
Market target		Domestic / commercial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
OXIFIX	eloy water		€ 4000 (6 PE)	Medium	Easy	Yes
Description		Oxyfix® is a wastewater treatment system that operates on the principle of submerged aerated fixed film (SAFF). The process has three phases, driven by gravity: primary decanting, biological reaction and settling. Designed in 2001 by Eloy Water engineers, over 20,000 Oxyfix® purification systems have been installed around the world to date. Oxyfix® was given CE certification in 2006, its first approval in French-speaking Belgium in 2005, French approval in 2010, and BENOR certification in 2015. Oxybee® is the revolutionary bio-carrier used in Oxyfix®. Designed and built by Eloy Water, it is warp-proof and clog-proof, and contains 200m²/m³ of surface area, giving Oxyfix® exceptional performances. The Oxyfix® process is the ideal solution for treating the wastewater of single households, small and medium communities (residential buildings, housing estates, offices, hotels, campsites, etc.) not connected to the municipal treatment network. Compact design, optimised earthworks (rectangular shape), high outlet (about 2cm of grade), easy access to internal components, no submerged electromechanical parts are the strengths of the product.				
Website		http://www.eloywater.com/en/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 8/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	0	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**8**	**15**	
Purchase cost	€4000		
Installation cost (3)	€600		
Maintenance cost (3)	€230		
Average cost per PE	€805		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference scoring would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe	Producer country		France	
Climate		Atlantic				
Market target		Domestic / commercial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
SBR Klaro	GRAF		€ 12000 (50 PE)	High	Easy	Yes
Description		The GRAF SBR wastewater treatment system Klaro E Professional works according to the principle of SBR lifting technology. No live parts need to be installed in the tank. All movement processes are performed by three air lift pumps, which are operated using a compressor. The compressor also provides the plate ventilator on the bottom of the SBR reservoir with air. The compressor and all other technical components are low maintenance offer power failure recognition and stored in a switch cabinet, which can be installed in the plant room of the house. Sequencing batch reactors or SBRs use a separate pre-treatment section to mechanically hold back solids and a biological aeration and settling tank. Small SBR wastewater treatment systems clean incoming wastewater over a number of cycles. GRAF products achieve a cleaning performance of up to 98%.				
Website		http://www.graf-water.com/wastewater-treatment/wastewater-treatment-systems/sbr-klaro-e-professional-one-tank-system/sbr-wastewater-treatment-system-klaro-e-professional-one-tank-system-suitable-for-pedestrian-loading.html				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 8/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	0	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**8**	**15**	
Purchase cost	€12000		
Installation cost (3)	€1800		
Maintenance cost (3)	€690		
Average cost per PE	€290		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference scoring would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country	UK	
Climate		Atlantic				
Market target		Domestic / commercial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
Tricel Novo UK10	TRICEL ENVIRONMENTAL		€ 3500 (10 PE)	Medium	Easy	Yes
Description		Tricel Novo sewage treatment plants, ranging from a population of 6-50. Suitable for both residential and commercial use and offering exceptional system performance for a competitive price. The system works in this way: wastewater enters the primary settlement chamber where sludge and solids separate from the liquid and settle at the bottom of the tank. A scum is formed at the surface of this liquid which keeps smells and odours from escaping. The effluent then passes into the aeration chamber where masses of naturally forming bacteria consume the impurities of the effluent. These bacteria are kept alive with air which is fed from a air compressor. The treated liquid then passes into the final chamber where any residual sludge is returned via the sludge return system. The remaining treated liquid can be safely passed out of the treatment system. Compact design, competitive price, are the strengths of the product.				
Website		http://mpcservices.co.uk/media/wysiwyg/brochures/tricel_Novo_brochure.pdf				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 9/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	2	3	
SCORE	**9**	**15**	
Purchase cost	€3500		
Installation cost (3)	€525		
Maintenance cost (3)	€600		
Average cost per PE	€115		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference scoring would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Ecuador		Producer country	Mexico - Ecuador	
Climate		Wide range (5 -30 °C)				
Market target		Domestic/Commercial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
ROTOPLAS Biodigestor	ROTOPLAS		€2000 (10 PE)	-	Easy installation	Yes (Ecuador has an official Plant a reseller)
Description		The ROTOPLAS ® system has 4 different sizes vary from 2 up to 60 persons. The size described corresponds to the model for 10 people / 1300 litres and is designed only for domestic effluents. ROTOPLAS ® system functions as a two stage Sewage Treatment Plant. The raw sewage first enters to the bottom of the tank to an anaerobic digestion chamber. The wastewater then goes through a filter and leaves the unit to a pit or trench infiltration				
Website		http://rotoplas.com.ec/categoria-producto/biodigestores/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 9/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	1	3	
Complete treatment process (primary, secondary and tertiary) (2)	1	3	
SCORE	**9**	**15**	
Purchase cost	€2000		
Installation cost (3)	€300		
Maintenance cost (3)	€115		
Average cost per PE	€240		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Latin America		Producer country	Level of Installation	Ecuador
Climate		Wide range (5 -30 °C)				
Market target		Domestic/Industrial				
Product Name	Company	Product Image	Product Cost	Management Cost		Availability of materials
Biofloc MBBR	Biofloc Solution		€ 8000 (50 PE)	Medium	Easy	Yes
Description		Moving Bed Biofilm Reactor (MBBR) processes improve reliability, simplify operation, and require less space than traditional wastewater treatment systems. MBBR technology employs thousands of polyethylene biofilm carriers operating in mixed motion within an aerated wastewater treatment basin. Each individual biocarrier increases productivity through providing protected surface area to support the growth of heterotrophic and autotrophic bacteria within its cells. It is this high-density population of bacteria that achieves high-rate biodegradation within the system, while also offering process reliability and ease of operation. This technology provides cost-effective treatment with minimal maintenance since MBBR processes self-maintain an optimum level of productive biofilm. Additionally, the biofilm attached to the mobile biocarriers within the system automatically responds to load fluctuations. Compact design, possibility to easy upgrade it, single pass process, load responsive capacity and minimal maintenance are the strengths of the product.				
Website		http://www.bioflocsolutions.com/tratamiento-de-aguas-residuales.html				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 9/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	0	3	
SCORE	**9**	**15**	
Purchase cost	€8000		
Installation cost (3)	€3500		
Maintenance cost (3)	€575		
Average cost per PE	€242		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference scoring would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		Romania
Climate		Continental/Mediterranean				
Market target		Domestic/Industrial				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
Imhoff Tank	eco-tad		€ 3150 (4 PE)	Low	Easy	Yes
Description		The Imhoff tank is a primary treatment technology for raw wastewater, designed for solid-liquid separation and digestion of the settled sludge. It consists of a V-shaped settling compartment above a tapering sludge digestion chamber with gas vents. In the digestion chamber, the settled solids are anaerobically digested generating biogas. The gas is deflected by baffles to the gas vent channels to prevent it from disturbing the settling process. Imhoff tanks are used by small communities and due to the underground construction, land use is very limited. Investment costs are low and operation and maintenance simple. But the treatment efficiency is low and a secondary treatment of the effluent is required. Moreover, the tanks must be desludged regularly.				
Website		http://www.eco-tad.ro/Fose-septice/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 7/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	0	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	1	3	
SCORE	**7**	**15**	
Purchase cost	€1575		
Installation cost (3)	€240		
Maintenance cost (3)	€90		
Average cost per PE	€475		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The reference score would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		Europe		Producer country		Ireland
Climate		Continental/Mediterranean				
Market target		Domestic				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
Septic Tank	Kingspan Environmental		€6500 (5 PE)	€ 175 per annum (empting) € 790 average annual cost	Site specific due to ground conditions to support percolation	Yes
Description		Septic tanks are a traditional solution to sewage disposal needs for domestic and commercial dwellings without access to mains drainage. Kingspan Klargester offer a wide range of septic tanks for domestic and commercial use, including septic tanks suitable for shallow dig applications. The Gamma septic tank offers industry leading efficiency levels, at 99.7%.				
Website		https://www.kingspanenviro.com/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 7/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	0	3	
SCORE	**7**	**15**	
Purchase cost	€6500		
Installation cost (3)	€975		
Maintenance cost (3)	€790		
Average cost per PE	€1650		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country		South Africa		Producer country		South Africa
Climate		Temperate/Subtropical				
Market target		Domestic				
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
VIPs	Makoko Waterless Toilet		€1000 (4PE)	Low	Easy	Yes
Description		Makoko Loo are dedicated manufacturers of urine diversion systems using VIP precast concrete toilets for better sanitation throughout South Africa. All concrete elements are manufactured to the same specifications as for the Super structure. The pit is designed to suit all types of soil conditions. Emptying of the pit, if and when required is done by removing the back-cover slab. VIP or Precast Concrete Toilets can be dismantled and re-assembled.				
Website		http://www.waterlesstoilets.co.za/				

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 7/15** The INNOQUA system is very different with respect of this product. Anyhow the waterless toilet is suitable for single house installations and it uses the natural treatment process of drying of the organic substance to make it shovelable and reusable without using flushing water. It's suitable also in places without water.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	0	3	
SCORE	**7**	**15**	
Purchase cost	€1000		
Installation cost (3)	€150		
Maintenance cost (3)	€60		
Average cost per PE	€302		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

End-user country	Ecuador		Producer country		Ecuador	
Climate	Wide range (5 -30 °C)					
Market target	Domestic/Commercial					
Product Name	Company	Product Image	Product Cost	Management Cost	Level of Installation	Availability of materials
Biotanque Séptico	PLASTIGAMA		€ 850 (4 PE)	Medium	An installation kit is sold separately	Yes (PLASTIGAMA is an Ecuadorian Company. The unit and parts are manufactured in Ecuador)
Description	The Biotanque Séptico PLASTIGAMA, provides a lighter and simpler installation solution to replace the construction of a septic tank. The fabricants states that up to 80% of purification can be reached by using the unit and afterwards infiltrating the effluent into the soil. No power consumption, no mechanic parts, high durability, requires excavation, effluent requires disinfection before discharge into infiltration pit or soil, no effluent reuse, sludge disposal required after maintenance					
Website	http://www.plastigama.com/biotanque.html					

CHARACTERISTICS (1)	EXISTING PRODUCT	REFERENCE TARGET SCORE (2)	RESULTS
Small size	1	1	**SCORE: 7/15** The INNOQUA system aims to be more eco-sustainable due to the characteristics pertaining to low sludge, treated water reuse, etc. which do not exist in this product.
Modular tanks	1	1	
Minimum moving parts/complexity	1	1	
No pumping	1	1	
Small footprint post installation	1	1	
Easy transportation	1	1	
Low weight	1	1	
Low sludge (2)	0	2	
Treated water reuse (2)	0	3	
Complete treatment process (primary, secondary and tertiary) (2)	0	3	
SCORE	**7**	**15**	
Purchase cost	€850		
Installation cost (3)	€130		
Maintenance cost (3)	€100		
Average cost per PE	€275		

NOTE (1): Characteristics have been agreed with INNOQUA partners and have been gathered from the market products research

NOTE (2): The scoring reference would like to stress the eco sustainability impact of the product. For this reason, the score is 1 for each characteristic with exception of those more related with the Eco sustainability of the product which scoring is higher

NOTE (3): Where not available, the installation cost is estimated as 15% of the purchasing cost. The maintenance cost is estimated (if not specified in the product datasheet) as 5% of the sum of purchasing cost and installation cost

Annex III:

A.3 Visual market key indicators definition

Key indicator short description	Unit of measure	Extended description
Total population	Number of people	Total population for each country.
Total actual renewable water resources per capita	m3/inhab/yr	The maximum theoretical yearly amount of water actually available for a country at a given moment (TARWR) per capita. It takes into consideration the long-term average annual flow of rivers and recharge of aquifers generated from endogenous precipitation, the flow of bordering rivers and lakes, and the water inflow and outflow secured by treaties.
Dam capacity per capita	m3/inhab	Total cumulative storage capacity of all dams in a country per capita. Dam capacity indicates the sum of the theoretical initial capacities of all dams, which does not change with time. The amount of water stored within any dam is likely less than the capacity due to silting and due to the fact that few dams operate at capacity. Data on small dams may not be included, depending on the country's defintions and information.
Percent of freshwater resources withdrawn	%	Total freshwater withdrawn in a given year, expressed in percentage of the total actual renewable water resources (TARWR). This parameter is an indication of the pressure on the renewable water resources.
Sectorial water withdrawal	%	Amount of water withdrawn by each sector (agriculture, municipalities, industy) as a percent of all the water withdrawn. **Municipal** water withdrawal includes withdrawal of renewable freshwater resources as well as the possible over-abstraction of renewable groundwater or withdrawal of fossil groundwater and use of desalinated water or treated wastewater. It is usually computed as the total water withdrawn by the public distribution network, plus domestic self-abstraction. It can include that part of the industries, which is connected to the municipal network. **Industrial** water withdrawal includes withdrawal of renewable water resources as well as the possible over-abstraction of renewable groundwater or withdrawal of fossil groundwater and use of desalinated water or treated wastewater. This sector refers to self-supplied industries not connected to the public distribution network, including thermoelectric cooling, but not including hydropower.

		Agricultural water withdrawal is the annual quantity of water withdrawn for irrigation, livestock watering and aquaculture purposes. It includes withdrawal of renewable freshwater resources as well as the possible over-abstraction of renewable groundwater or withdrawal of fossil groundwater, direct re-use of return water and desalinated water.
Percent of population with access to improved water sources	%	The proportion of the population (total, urban and rural) with sustainable access to an "improved" water source. It is the percentage of the population who use any of the following types of water supply for drinking: piped water, public tap, borehole or pump, protected well, protected spring or rainwater. Improved water sources do not include vendor-provided water, bottled water, tanker trucks or unprotected wells and springs.
Percent of population with access to improved sanitation	%	Proportion of the urban and rural population with access to improved sanitation refers to the percentage of the population with access to facilities that hygienically separate human excreta from human, animal and insect contact.
Rural vs total population	%	The rural population as a percent of the total population.
Rural population with access to improved sanitation facilities	%	Percentage of rural population with access to improved sanitation facilities. The data is compared with the global average.
Not treated vs total treated municipal wastewater	m3/yr	Average value of the total not treated municipal wastewater in conparision with the total amount of municipal wastewater produced in one year.
Direct usage of not treated municipal wastewater as for irrigation purpose	m3/yr	Average value of the total not treated municipal wastewater used for irrigation purpose.
Investments in water and sanitation with private participation	€/yr	Average value in € of the total amount of investments (public and private) in water and sanitation in one year.
Number of sales of on-site sanitation systems per year	Number	Average value of the on-site sanitation systems sold in one year in each country.
National on-site sanitation systems market	€/yr	Average value in € of the on-site sanitation market in each country.