GLOBAL WATER MARKET 2017

VOLUME 1: COMPANIES AND MARKETS

WATER IS OUR CONCERN

1. WATER MARKET OVERVIEW

1.1 WHAT IS THE WATER MARKET?

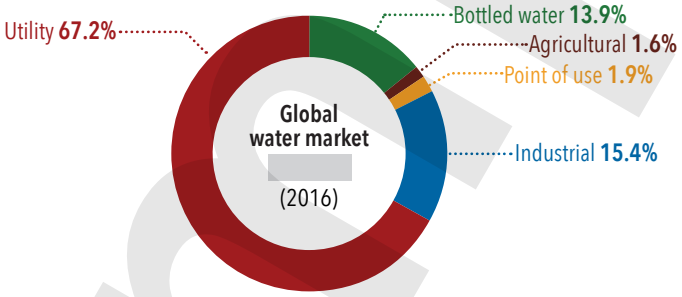
1.1.1 Defining the water market

Almost every human activity involves water. In that sense everything we do is part of the water market. This report, however, aims to focus on the treatment and transport of water by municipal and industrial water users. This is the largest and richest area of water-specific spending, and there is a strong overlap between companies selling into the municipal market and those selling into the industrial market. The second largest area of water spending is for bottled water, followed by the point of use market which includes domestic water softeners and filters, commercial water treatment machines for the food-service industry, and other water systems which are fitted on the customer side of the water meter. This represents a distinct and separate market with its own supply chain. The next largest area of spending is within agriculture, on irrigation. This market is fragmented and with the exception of drip irrigation and hydroponics, generally low-tech. With the exception of pumps, pipes and valves, the supply chain is very different. Beyond these areas there are a wide range of domestic and industrial cooling, heating, washing, and transport processes which rely on water but which are more properly categorised in other industry sectors.

1.1.2 By end-user type: utility/industrial/commercial/agricultural

Total capital and operating expenditure on water infrastructure, equipment and services divides up between the main user categories as follows:

Figure 1.1 The global water market, 2016

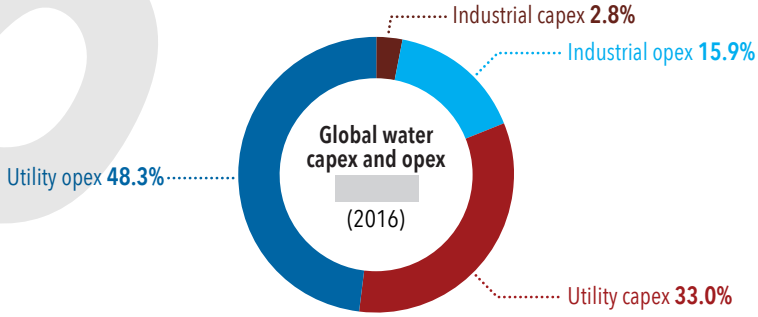


Source: GWI

1.1.3 By spending type: capex/opex

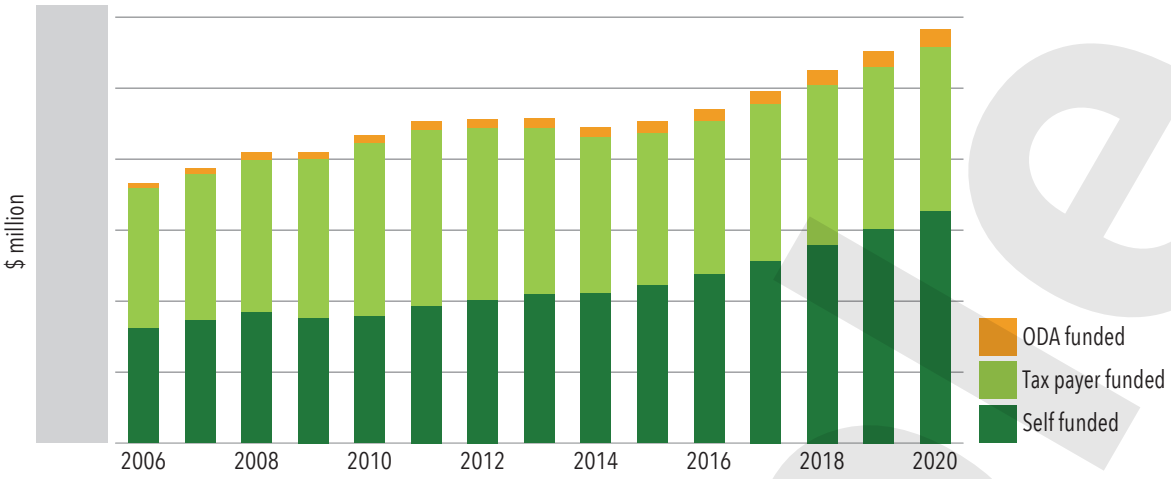
This report divides spending between operating expenditure and capital expenditure, although the division between the two is less clear cut in practice. On the utility side there are different ways in which maintenance spending is accounted for. For example, some utilities will record pipe repair as a capital item, whereas others will record it as an operating item. Our approach to calculating capex and opex is based on grossing up the data reported by utilities rather than attempting to apply a single global distinction between what represents an operating cost and what represents a capital cost. In the industrial market there is a grey area between expenditure on water and expenditure on processes which involve water. We focus more narrowly on expenditures relating to treating and transporting water up until the stage at which it becomes involved in the industrial process, and thereafter once that use is complete and it becomes wastewater. Some grey areas remain. For example, we would consider an anti-scalant used to condition boiler feedwater to be an item under water opex, but a polymer used to increase the viscosity of frac' water in the unconventional oil and gas market to be a process expenditure.

Figure 1.2 The global water market: opex and capex, 2016



Source: GWI

Figure 1.23 Sources of finance for water and wastewater infrastructure 2006–2020



Source: GWI

Shrinking government surpluses and increased budget deficits have also had the impact of opening out the market for private finance in water. Since 2012, governments including the US, Nigeria, Rwanda, Kenya, Saudi Arabia, Iran, Mexico, and Indonesia have been looking for ways to encourage private finance in water. In most cases this means looking at ways of attracting private investors to own and operate water assets on a BOT basis rather than selling water utilities to the private sector. This reflects the fact that outright water sector privatisation is still politically sensitive, but asset finance is less controversial.

The outlook for private finance in water in discussed in more detail in section 1.5.

1.3.5 Reaching the market

The global water market is driven by growing water scarcity, urbanisation, and regulation. The most significant restraint on growth is finance, but this issue is steadily being addressed. At a time when the rest of the global economy looks weak, the prospects for the water sector look good. However, the challenge of accessing the market remains. There are three main obstacles:

1. **The customer basis is highly fragmented:** Every country has different regulations, standards and approaches to water management. A successful sale in one country does not mean that customers in other countries will accept the sale as a valid reference. Within countries the market is fragmented still further. The utility sector is often divided up according to local government divisions and lacks a national outlook, while the industrial market is divided by industry and by company. It means that scaling success can be difficult.

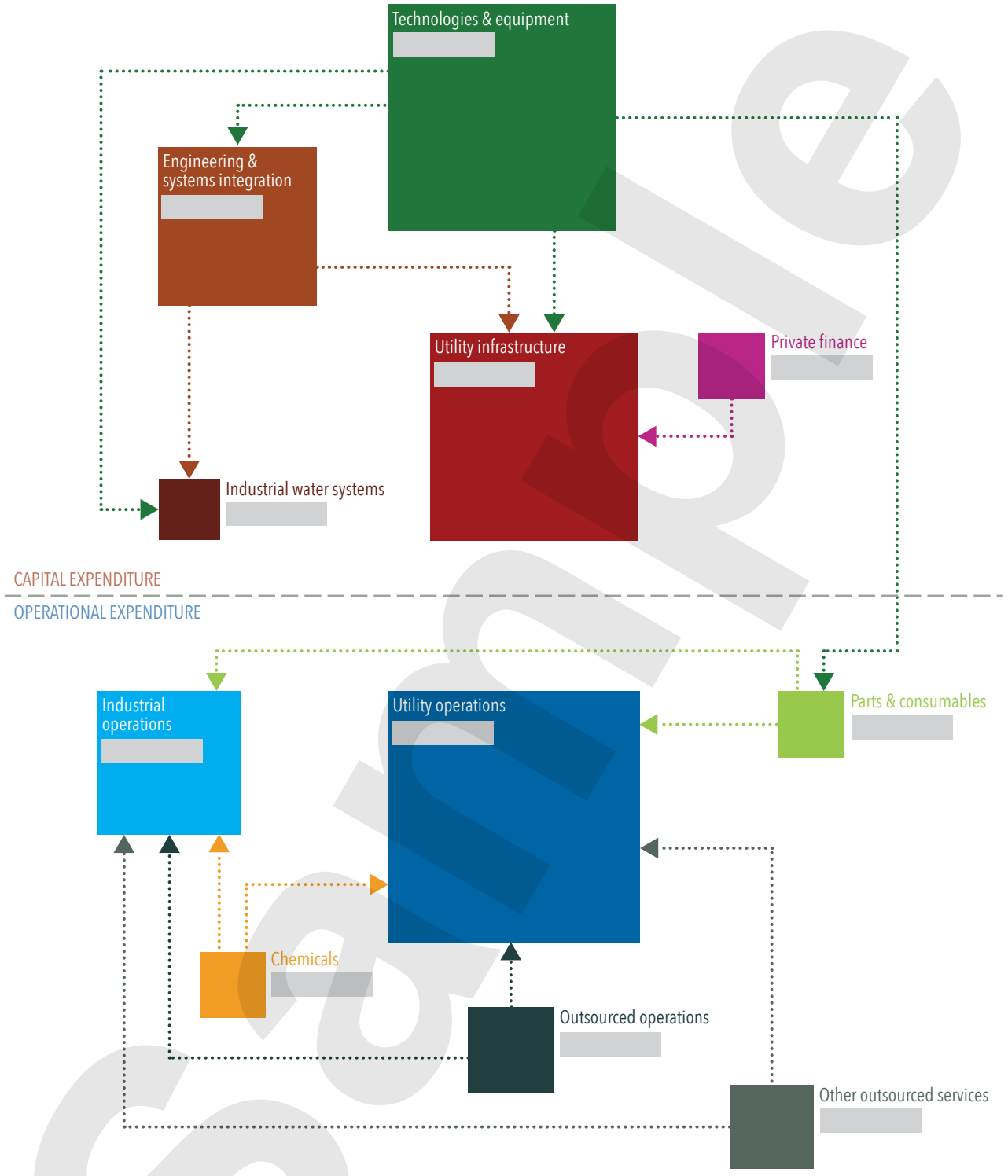
2. **Customers tend to be risk averse:** Public utilities tend not to be motivated by profit in the way that normal businesses are. Instead they are primarily concerned with the safety of the public. It means that they have few incentives to take risks on new ways of doing things, which makes it difficult for new entrants to crack the market. On the industrial side of the market, customers are responsive to strong value propositions, but water remains a relatively low cost input for most industrial processes, so it can be difficult to gain the customer's attention.

3. **The supply chain is difficult to penetrate:** Selling into the water sector is not straightforward. There are established local supply chains which are inhospitable to outsiders. This is particularly the case where engineers play a large role in specifying equipment as they do in the US under the design-bid-build (DBB) model, and in emerging markets where a lack of expertise on both the client side and the contractor side gives the engineering consultants a strong role in deciding which equipment is used. These engineers tend to have good local connections both politically and within the local contractor community, and they have little incentive to promote solutions that benefit outsiders at the expense of other locals. Furthermore, public sector regulations against sole-source contracts often make it difficult for companies with new technologies or new business models to bid on projects unless they fit the procurement template.

Despite these challenges the water market is steadily becoming more global. This reflects the fact that although water resources and water customers are local, technology and money are fundamentally global, and as the challenge of managing water becomes more acute, so technology and money are needed more by utilities and industrial water users.

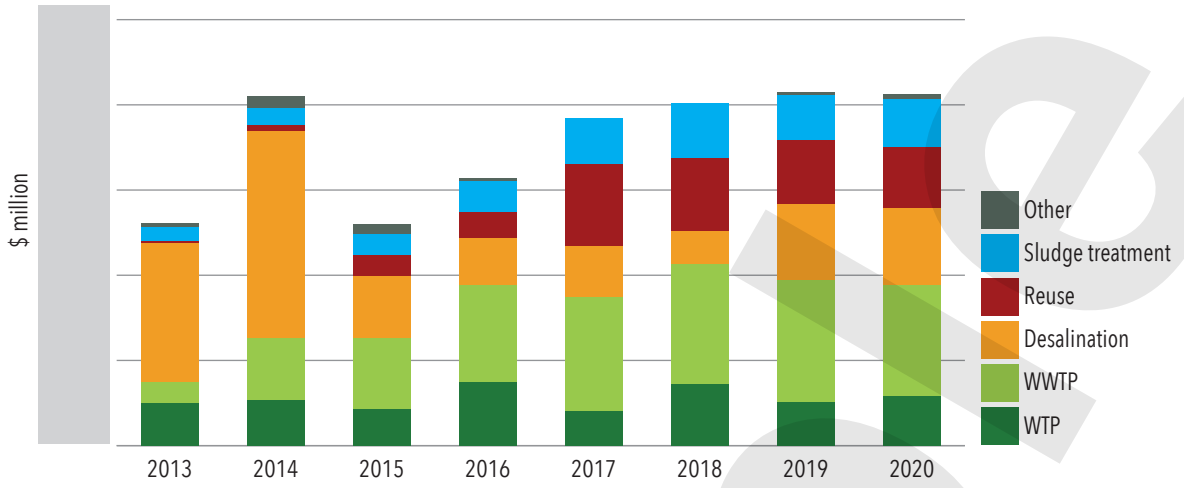
There are two trends in the market that reflect the growing focus on the challenge of reaching the market. In very large companies we have seen a trend towards regionally focused group structures (rather than group structures arranged by product line). For example, since 2014 both Veolia and Suez have chosen to restructure themselves along cross-disciplinary regional lines.

Figure 1.34 The water sector supply chain



Source: GWI

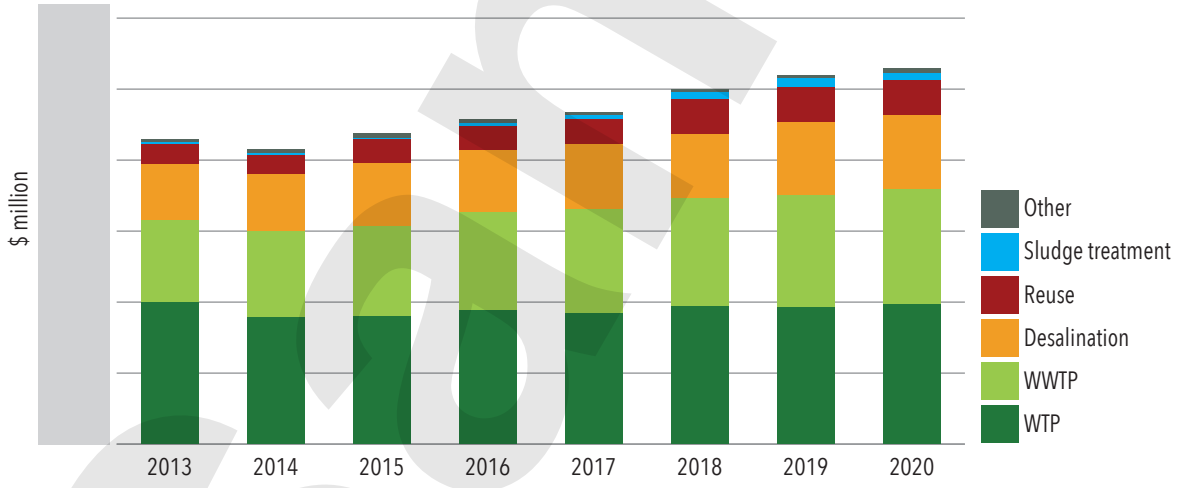
Figure 1.40 DBO market forecast: Capital expenditure by asset type, 2013–2020



Asset type ($m)	2013	2014	2015	2016	2017	2018	2019	2020
WTP								
WWTP								
Desalination								
Reuse								
Sludge treatment								
Other								
Total								

Source: GWI

Figure 1.41 DBO market forecast: Operating expenditure by asset type, 2013–2020



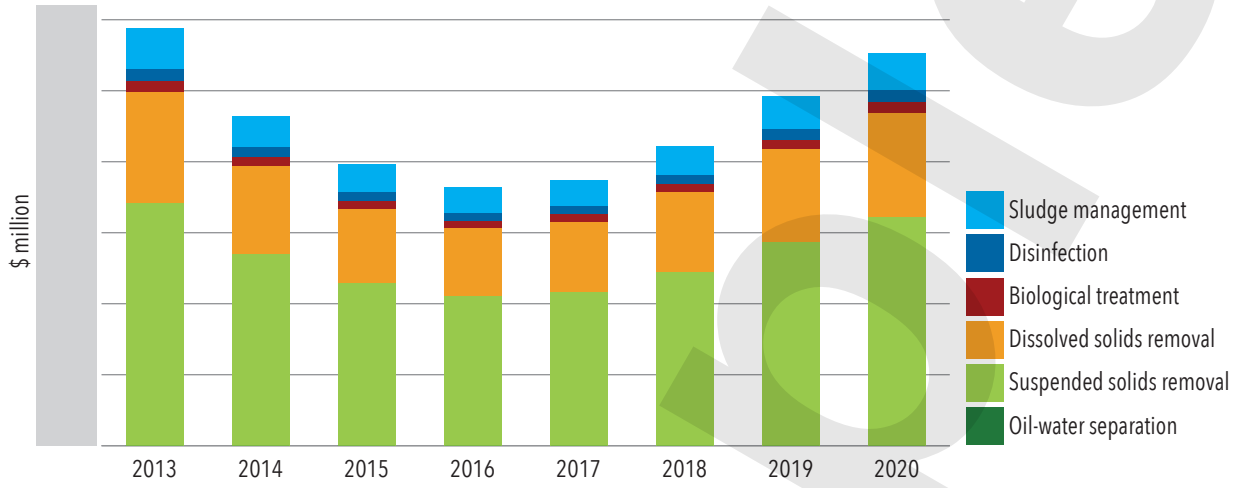
Asset type ($m)	2013	2014	2015	2016	2017	2018	2019	2020
WTP								
WWTP								
Desalination								
Reuse								
Sludge treatment								
Other								
Total								

Source: GWI

2.1.4.2 Technology systems

Suspended solids removal forms the bulk of spending for water and wastewater treatment, accounting for nearly of total expenditure in 2016, with clarifiers as the primary method for that purpose. This relates to the fact that Technologies for the removal of dissolved solids and biological treatment for the removal of certain elements from wastewater will see good growth, particularly for , which are becoming the primary technology for

Figure 2.32 Mining: Capital expenditure by technology, 2013–2020



Technology ($m)	2013	2014	2015	2016	2017	2018	2019	2020
Oil-water separation								
Suspended solids removal								
Dissolved solids removal								
Biological treatment								
Disinfection								
Sludge management								
Total technologies								
Intakes / outfalls								
General construction / other								
Total								

Source: GWI

The value from waste proposition is also increasingly attractive to F&B companies as a way to benefit their bottom line. Biogas recovery from wastewater has become particularly pertinent, with anaerobic treatments increasingly popular in recent years. The energy that can be generated from biogas can ensure that investments in treatment technologies can pay for themselves.

2.1.5.1 Water treatment needs

Process water production in the F&B industry usually just requires suspended solids removal and some disinfection. High quality water is required for boiler feedwater, or in beverage production – namely breweries – where maintaining the same taste requires the removal of salts before a remineralisation process. Characteristics of the wastewater differ depending on the type and volume of products that a plant is producing.

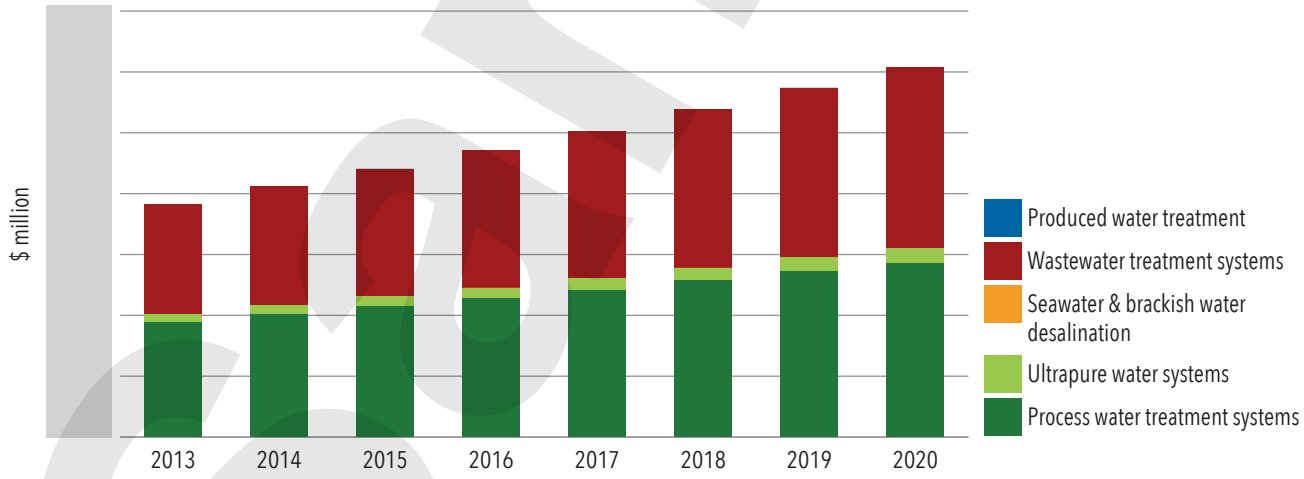
As well as the macro trend of increasing competition for water resources, several specific factors play an important role regarding water treatment in the F&B market:

- **Proximity to conurbations:** Limited footprint of treatment units is important in the F&B industry, because plants are often located close to cities, meaning that land prices are high and expanding a treatment plant is not easy.
- **Concentrated wastewater and high carbon load:** A characteristic of wastewater generated from the industry is the high carbon load, which can prove challenging for some methods of wastewater treatment. Therefore greater expertise surrounding the selection of technologies suitable for dealing with this high carbon load effectively is essential.
- **Sludge production:** Aerobic treatment of wastewater from food and beverage production generates significant volumes of sludge. When an anaerobic digester is employed to treat this sludge, it generates another wastewater stream with high levels of nitrogen, which subsequently needs to be managed effectively.

2.1.5.2 Applications

Spending for water treatment in the F&B industry is split fairly evenly between and However, given the greater levels of water reuse that are being undertaken for non-product applications, such as make-up or cooling, as well as some high carbon or nitrogen wastewater streams that need to be treated to comply with regulations, wastewater treatment is expected to exhibit greater growth in the future, overtaking spending on process water by the end of our forecast period. The fastest growing segment of spending is expected to be on high-purity water systems for boiler feedwater and beverage production, increasing from in 2016 to in 2020. This is a result of

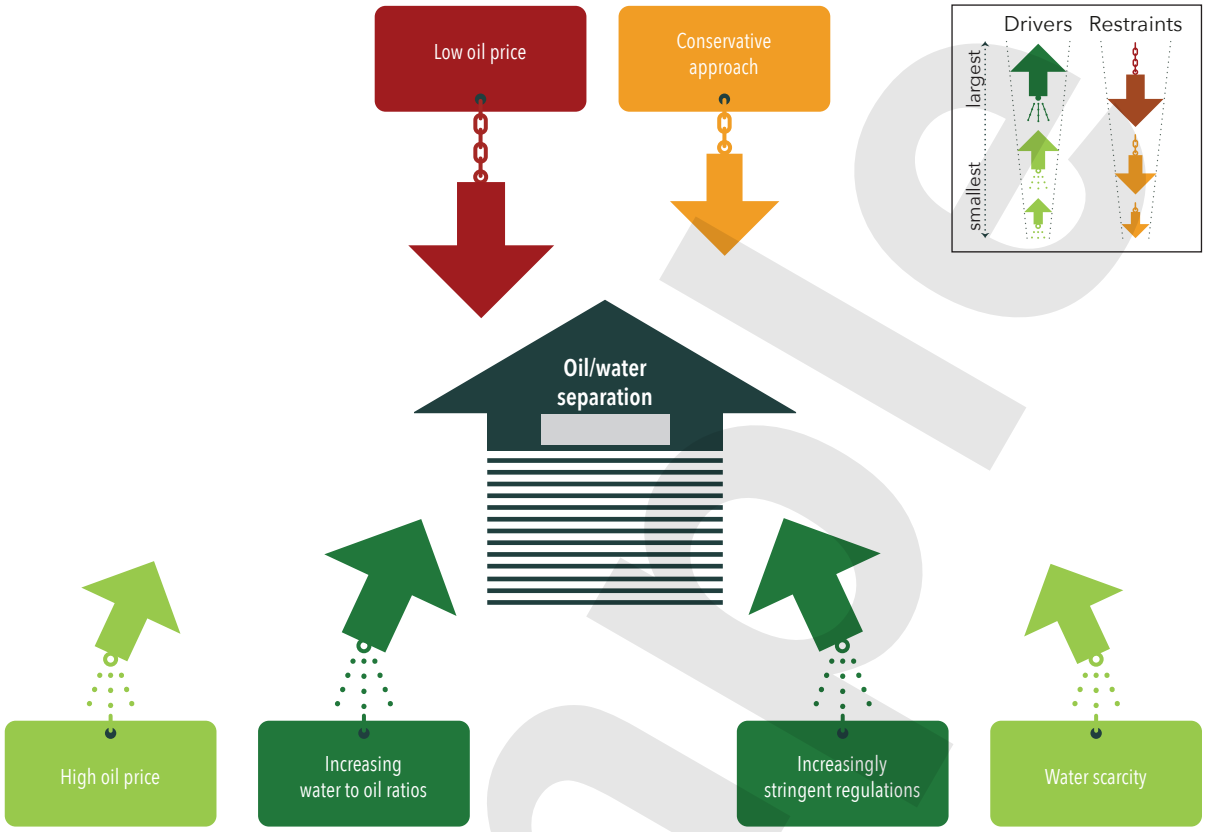
Figure 2.37 Food and beverage: Capital expenditure by application, 2013–2020



Application ($m)	2013	2014	2015	2016	2017	2018	2019	2020
Process water treatment systems								
Ultrapure water systems								
Seawater and brackish water desalination								
Wastewater treatment systems								
Produced water treatment								
Total								

Source: GWI

Figure 2.89 Market forces for oil/water separation



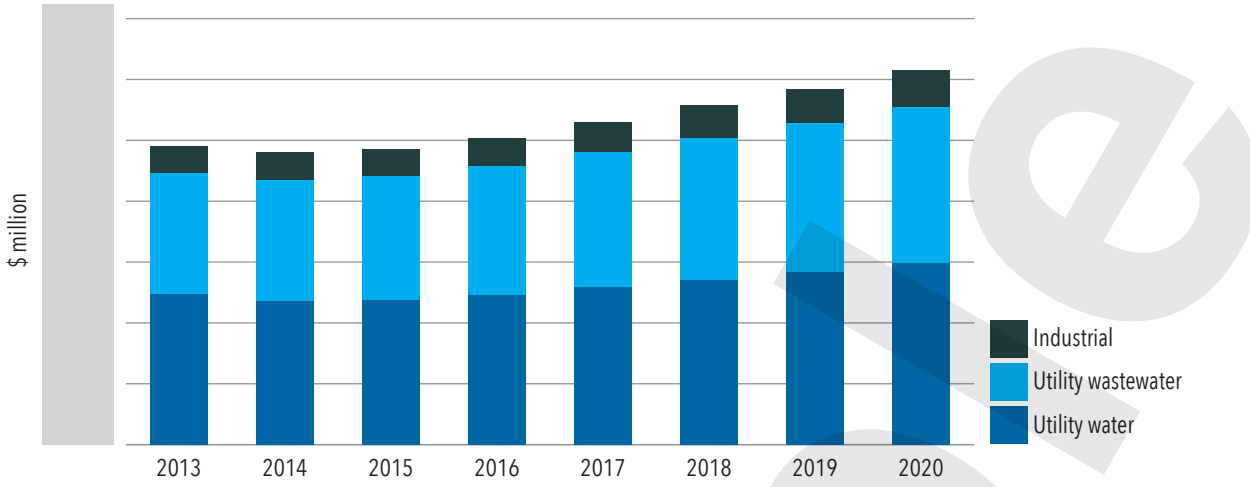
Source: GWI

2.2.1.2 Sectors

Spending on oil/water separation technologies will be dominated by the upstream oil & gas industry. The oversupply of oil stocks caused crude prices to plummet in 2015, and as a response, oil and gas production immediately began to decrease in many countries. Because of this lower production and thus reduced levels of produced water being generated from operations, as well as the lower financial stability of oil and gas companies, spending on water treatment followed the decline. Although 2016 is not expected to bring about significant improvements in oil prices, with members of the Organisation of the Petroleum Exporting Countries (OPEC) continuing to expand their oil and gas stocks, the market is nonetheless starting to adjust to the low-price environment. E&P companies are looking to improve their situations as best they can, and as produced water is an inevitable outcome of oil and gas operations that must be dealt with, they are increasingly exploring new ways to improve their water management and reduce costs. Therefore spending on technologies such as for EOR techniques could actually increase.

Some spending will also take place within the refining & petrochemical sector as regions such as [redacted] and [redacted] increase activity in this industry. However, the separation of hydrocarbons from water is not as important to downstream facility operations as it is to the upstream industry as oil that reaches a refinery will have much less water than that which has been extracted straight from a well in the upstream sector, so spending in the refining & petrochemical sector will not be as high.

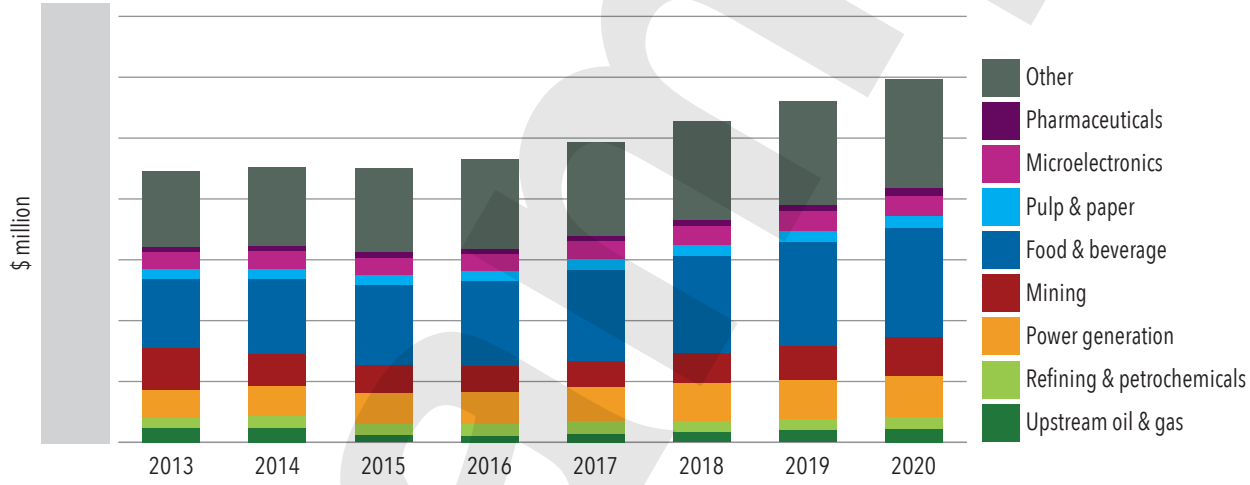
Figure 2.97 Capital expenditure on suspended solids removal by sector, 2013–2020



Sector ($m)	2013	2014	2015	2016	2017	2018	2019	2020
Utility water								
Utility wastewater								
Industrial								
Total								

Source: GWI

Figure 2.98 Capital expenditure on suspended solids removal by industry, 2013–2020



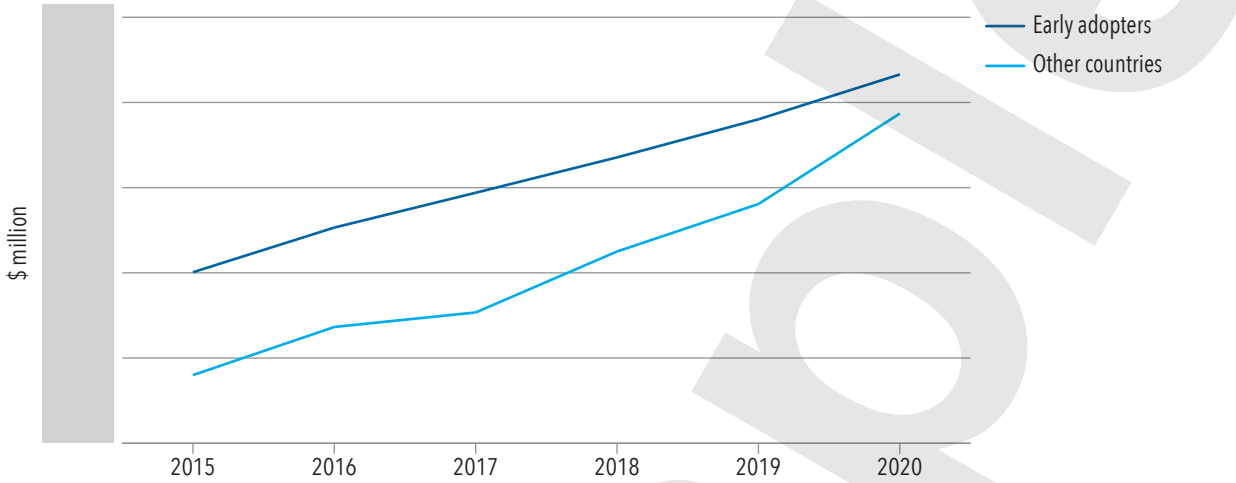
Industry ($m)	2013	2014	2015	2016	2017	2018	2019	2020
Upstream oil & gas								
Refining & petrochemicals								
Power generation								
Mining								
Food & beverage								
Pulp & paper								
Microelectronics								
Pharmaceuticals								
Other								
Total								

Source: GWI

3.1.4.3 Regional trends

The SWN market is roughly divided into countries that have begun implementing smart solutions, coined 'early adopters', and those that are emerging. The 11 countries identified in the former category are: the US, Canada, the UK, the Netherlands, Germany, France, Israel, Japan, Republic of Korea, Australia, and Singapore. As solutions are implemented and become mainstream and clear success stories emerge, it is expected that the share of spending on SWN in non-early adopting countries will increase, as detailed in the following figure.

Figure 3.17 Split of the SWN market between early adopters and other countries, 2015 and 2020



Countries ($m)	2015	2016	2017	2018	2019	2020
Early adopters						
Other countries						
Total						

Source: GWI

Trends in early-adopting countries include:

- **United States**: The US continues to be the largest market for SWNs worldwide, and is dominated by smart meter installation, customer services, and leak detection. As drought continues to grip the western part of the country and water prices increase, particularly in large urban areas, customers and utilities are growing more concerned with usage and leak detection. These drivers, together with concerns over ageing infrastructure will continue to propel the market. Fragmentation and a conservative outlook are still major hurdles, and there has been some pushback on utilities from concerned customers about drastic bill increases and possible (but unfounded) health detriments. As more meters and sensors are installed, demand for insight should spur growth in the data analysis and handling sector.
- **Western Europe**: Like the US, ageing infrastructure is of particular concern and many Western European countries are increasingly focused on smart leak detection and flow and energy efficiency. Notable countries include the UK, France, and Germany.
- **Israel and Asia Pacific**: These regions continue to be centres for innovation in and avid adopters of SWN technology, particularly Singapore and Israel. Australia has studied and implemented SWNs on a regional basis, but utilities there are conservative and very return-on-investment-conscious, and other schemes, such as conservation or increased utilisation of its desalination capacity, are seen as more attractive.

Emerging markets show a great deal of potential to adopt SWN solutions in short periods of time. Markets to watch include:

-

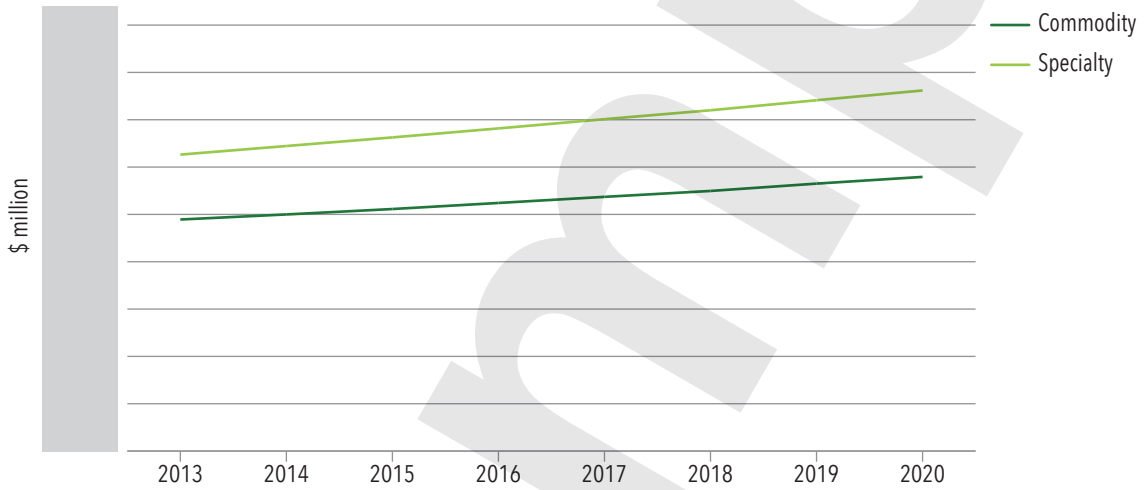
Commodity chemicals are defined as those that are produced in bulk volumes, are widely available in the market and are typically composed of relatively simple, inexpensive chemistries. **Specialty chemicals,** conversely, are designed and blended for a specific purpose or to perform a certain task, and thus have a much higher cost and added-value. The market for commodity types is therefore very much price-oriented as the products manufactured by different players are the same, so suppliers can only compete on price, whilst the specialty sector is very much product based.

Comparing the use of chemicals within the utility market and industrial applications, both sectors demand the use of commodity and specialty types. The industrial side of the market tends to employ greater volumes of specialty chemicals than utilities, due to the range of specific water qualities that different industrial processes demand, and the more complex waste streams that are generated by industrial plants. Although the commodity market will continue to grow, the specialty market is increasing more rapidly, as can be seen in the following figure.

For this reason, as well as the fact that

Many service companies supply specialty chemicals, meaning that the market for these the commodity sector, with the specialty market estimated to be worth in 2016 growing to in 2020 compared to in 2016 for commodity chemicals, growing to

Figure 4.2 Global spending on commodity and specialty chemicals, 2013-2020



Category ($m)	2013	2014	2015	2016	2017	2018	2019	2020
Commodity								
Specialty								
Total								

Source: GWI

GLOBAL WATER MARKET 2017

VOLUME 5: ASIA PACIFIC

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98. PHILIPPINES

98.1 TOP MARKET OPPORTUNITIES

Opportunities within the Philippine water market are marked by steady diversification. Despite the changeable character of a market throughout the country, growing municipal and industrial sectors, increasing private sector participation and environmental challenges such as saline intrusion, pollution, and intensified El Niño effect are all acting as drivers for development.

- **Water supply**: Great disparities between urban and rural demands, together with varied scale and quality are striking features of water services in the Philippine archipelago. Nonetheless, the 2025 policy target for universal access coupled with rapid population growth, urbanisation, water stress, and increased competition within the market are driving the extension of efficient service coverage. Though this is still primarily centred on high-growth urban areas, the emphasis of coverage extension is shifting through and beyond the established focus of Metro Manila. Water concessions and bulk water supply schemes involving opportunities for the development of auxiliary storage, treatment, and reticulation infrastructure are flourishing. Prominent examples include the New Centennial Water Supply Source Project and Bulacan Bulk Water Supply Project.
- **Advanced water treatment infrastructure**: As bulk transfer schemes emphasise surface water use, introduction of advanced water treatment technology is necessary given its vulnerability to saline intrusion and pollution. Additionally, energy-efficient treatments are key due to high energy costs. Outside the capital region, however, costly treatment processes like desalination are increasingly competitive with water vendor service charges. This should continue to encourage development of modularised treatment solutions farther afield, catering to commercial, industrial and rural consumers alike. Examples are already evident in the developments of companies such as Mactan Rock Industries Inc., like the RO 22,000 m³/d South Reclamation Projects in Cebu City.
- **Extension of wastewater infrastructure**: As Metro Manila is the prototype for national development, significant wastewater infrastructure expansion is chiefly focused there, with Maynilad Water Services Inc. (MWSI) planning a rollout of 40 wastewater treatment plants (WWTPs) within the next 20 years and Manila Water Company Inc. (MWCI) planning at least 5 major WWTPs, each with an estimated capacity of 100,000 m³/d. With time, other urban and commercial centres are likely to follow suit as construction of wastewater treatment infrastructure generally follows the implementation of water treatment infrastructure in target regions.
- **Increased private sector participation**: As the Philippine government lessens its financial reliance on multilaterals, private sector finance is becoming imperative for large-scale water supply projects and service concessions. The lack of financing options available to water districts offers further opportunities for public-private partnerships (PPP). Coupled with the forthcoming introduction of encouraging new legislation – the so called "PPP Act" – and fiercer market competition, private sector participation (PSP) in both the forms of private finance and operations models is set to become more prevalent in both water and wastewater service extension.

98.2 SECTOR STRUCTURE AND REGULATION

Figure 98.1 Water sector structure

Entity	Level	Description	Roles
Department of Environment and Natural Resources (DENR)	Federal/National	A national government agency that monitors the status of water resources (i.e. surface water and aquifers) through the EMB.	-
Department of Finance (DOF)	Federal/National		
Department of Health (DOH)	Federal/National		
Department of Interior and Local Government (DILG)	Federal/National		-

Entity	Level	Description	Roles
Department of Public Works and Highways (DPWH)	Federal/National	National government agency responsible for implementing government policy at a local level through supervising bulk water infrastructure projects, as well as serving the LWUA.	
Department of Science and Technology (DOST)	Federal/National		
Environmental Management Bureau (EMB)	Federal/National		
Local Water Utilities Administration (LWUA)	Federal/National		
National Economic Development Authority (NEDA)	Federal/National		
National Water Resource Board (NWRB)	Federal/National		
Philippine Coast Guard (PCG)	Federal/National		
Public-Private Partnership Center (PPP Center)	Federal/National		
River Basin Control Office	Federal/National		
Sub-Committee on Water Resources (SCWR)	Federal/National		
Water and Sanitation Coordination Office (WASCO)	Federal/National		
Metropolitan Waterworks and Sewerage Systems (MWSS)	Regional		
River/lake basin authorities	Regional		
Community-based organisations (CBOs)	Local or Municipal		
Large-scale private operators (LSPOs)	Local or Municipal		

Entity	Level	Description	Roles
Local government units (LGUs)	Local or Municipal		
Small-scale water providers (SSWPs)	Local or Municipal		–
Water districts (WDs)	Local or Municipal		

Source: GWI

Figure 98.2 Water sector funding organisations

Entity	Description	Finance type	Funding applications
Development Bank of the Philippines (DBP)	Provides funds in the form of loans to multiple stakeholders in the Philippine water sector, including private corporations, WDs, LGUs, other water service providers, and Private Financial Institutions/Micro Finance Institutions under the WATER umbrella programme, as well as various environmental initiatives encompassing water supply and sanitation projects.	Loans only	
Land Bank of the Philippines (LBP)		Loans only	
Local Water Utilities Administration (LWUA)		Loans only	
Municipal Development Funds Office (MDFO) of the Department of Finance		Revolving fund	

Source: GWI

Figure 98.3 Regulations applicable to the water sector

Document	Description	Policy areas	Industries targeted
NEDA Joint Venture Guidelines Revised 2013	Amending Executive Order (EO) No. 423 of 2005, the Revised NEDA JV Guidelines lay down the framework and procedures for agreements between public and private entites under the Joint Venture model.	–	–
Administrative Order No. 2007-0012 – Philippines National Standards for Drinking Water (2007)			
The Philippine Clean Water Act or Republic Act No. 9275 (2004)			
The Government Procurement Reform Act and Implementing Rules and Regulations, or Republic Act No. 9184 (2002)		–	
The Water Crisis Act or Executive Order No. 286, s. 1995 (1995)		–	
The Philippine BOT Law and Implementing Rules and Regulations or Republic Act No. 7718 (1994)		–	–
The Local Government Code of the Philippines or Republic Act No. 7160 (1991)		–	–
Revised Effluent Standard or DENR Administrative Order No. 35 (1990)			
The Philippine Constitution (1987)		–	–

Document	Description	Policy areas	Industries targeted
The Environmental Code of the Philippines or Presidential Decree No. 1152, s. 1977 (1977)			
The Water Code of the Philippines or Presidential Decree No. 1067 (1976)			
Sanitation Code of the Philippines or Presidential Decree No. 856 (1975)			

Source: GWI

The Philippines water sector is highly decentralised, with around 30 entities participating in various – and sometimes overlapping – roles and responsibilities. The Philippine water market is unevenly developed, with few clearly defined or enforced unified regulations and strategies. The most recent policies are represented in the **Philippine Water Supply Sector Roadmap 2nd Ed.** (2010) and the **Philippine Sustainable Sanitation Roadmap** (2010), both formulated in line with the **Medium Term Philippine Development Plan 2011-16 (MTPDP)** and the **Medium Term Public Investment Program 2011-16 (MTPIP)**. Respective outstanding service delivery targets remain:

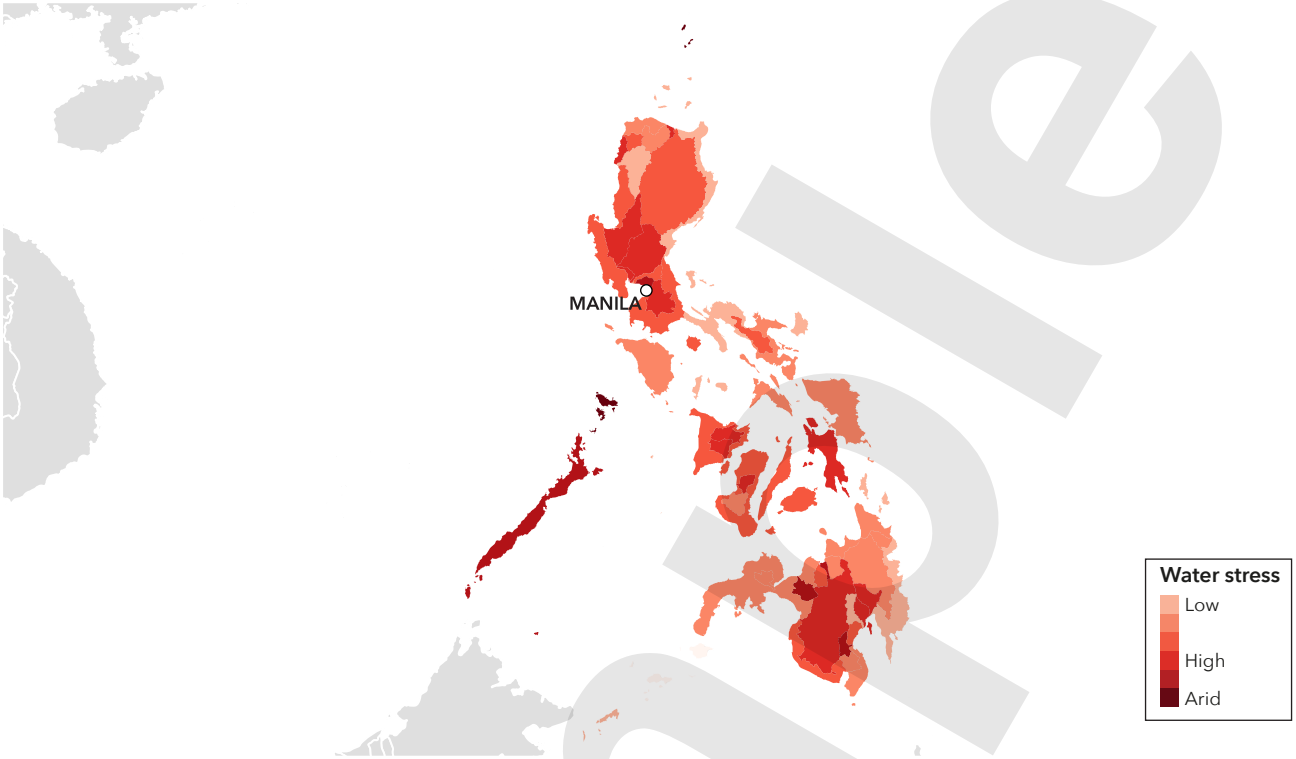
- Universal access to adequate water supply and universal regulation of all supply services by 2025.
- Definition of clear policy, planning, and programmes concerning sanitation by 2028.

Together, two new legislative developments are set to strengthen investment in the Philippine water sector, a much needed step if these are to be accomplished. Through streamlining the procurement process and conferring an unprecedented level of authority on the PPP Center, these regulatory initiatives should facilitate increased PPP and market development within not only the traditional focus of Metro Manila, but also through to second-tier cities and beyond. These are:

- **Public-Partnership Act (House Bill 6331)**: This act was recently passed in the Philippine House of Representatives and is awaiting review by the Senate in May 2016. Combining and amending previous legislation, namely Republic Act No. 7718 and the Revised National Economic Development Authority (NEDA) JV Guidelines, the PPP Act primarily aims to institutionalise the role of the PPP Center.
- **Memorandum of Understanding (MOU)**: This MOU was signed between the PPP Center and the World Bank's Water and Sanitation Program for PPP in water projects on 22 September 2015. The MOU makes provision for a Technical Working Group comprised of members from key stakeholders in the water sector, including those from the Local Water Utilities Administration (LWUA), National Water Resource Board (NWRB), Philippine Association of Water Districts (PAWD), Department of Interior and Local Government (DILG) and the PPP Center to provide assistance to both water districts (WDs) and local government units (LGUs) in the implementation of PPP water projects.

98.3 WATER RESOURCES

Figure 98.4 Projected change in water stress by 2020



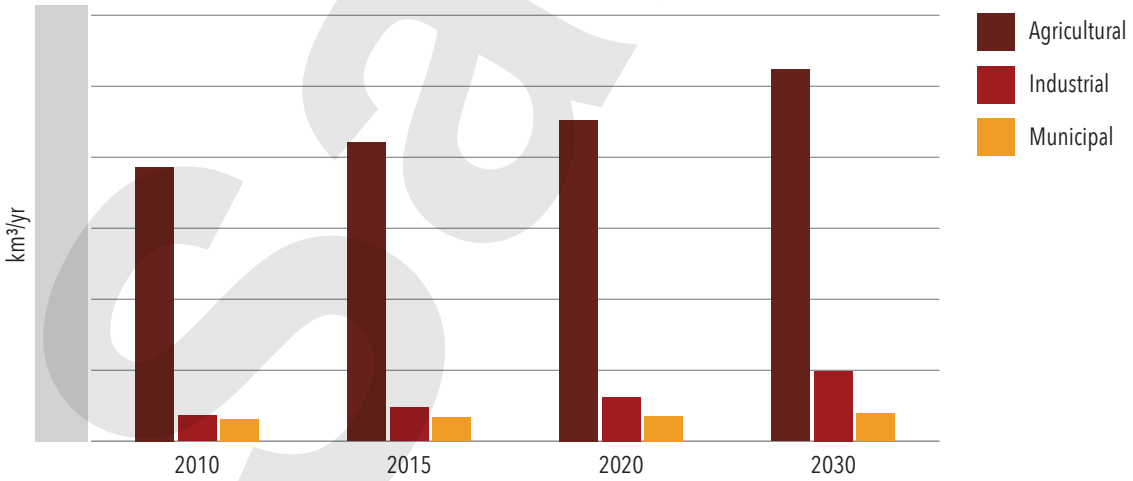
Source: Adapted from WRI, 2015b

Figure 98.5 Water resources

Water resource	Volume (km³/yr)	Year
Groundwater (renewable, actual)	180.0	2014
Surface water (renewable, actual)	444.0	2014
Total water resources (renewable, actual)	**624.0**	**-**

Source: AQUASTAT Main Database, Food and Agriculture Organization of the United Nations, 2015

Figure 98.6 Water withdrawals by sector, 2010–2030



Sector (km³/yr)	2010	2015	2020	2030
Agricultural				
Industrial				
Municipal				
Total				

Source: GWI

98.3.1 Desalination

The Philippines has a total online desalination capacity of 221,461 m³/d, with industrial sectors including electronics, food & beverage, refining, chemicals and power generation being major consumers. With the exception of around five large desalination plants, medium to small plants are the norm and reflect the geographic fragmentation of the water network and limited consumer demand of specific regions. Despite the expense of desalination technology due to high Philippine energy prices, containerised desalination solutions are increasingly seen as competitive with the price of established municipal small-scale water service providers such as water vendors. While promising as an alternative water supply source in rural and isolated regions in particular, if water scarcity worsens large-scale urban desalination is likely.

98.3.2 Water reuse

In urban areas, water reuse is mainly centred on industrial and commercial clients. Examples include the implementation of reuse by major mall developers including SM Group, whose wastewater is treated using energy-efficient sequential batch reactors (SBR) to processes effluent for use in cooling towers and irrigation purposes. The low priority of wastewater treatment in the Philippines has meant that water reuse is an uncommon and isolated occurrence in the municipal sector. The few examples of water reuse in this sector include:

- Manila Water reuses wastewater from the Diliman WWTP in Quezon City for irrigation, toilet flushing and lawn watering in the commercial complex of Ayala Land Techno Hub.
- Maynilad reuses 500 m³/d from the Luneta lift station to water parks in the vicinity.
- The Muntinlupa City Market in Metro Manila uses a hybrid anaerobic/aerobic coco peat filtration system to process its wastewater. The effluent from the market is used to clean streets, water plants, and flush toilets, and has helped to reduce water pollution and municipality costs.

With the worsening of drought conditions, informal water reuse is emphasised in water conservation plans of entities such as LUWA and the NWRB targeting rural areas. While momentarily a short-term solution, the emergence of long-term reuse solutions is a distinct possibility as wastewater treatment is gradually more widely implemented.

98.3.3 Water transfer

Concerns over water security have spurred the move to diversify and supplement existing water sources to urban centres such as Metro Manila. Major water transfer projects concerned with the supply of Metro Manila include the PHP774 million ($16.5 million), 188,000 m³/d Sumag River Diversion Project.

98.3.4 Groundwater protection

The municipal sector is heavily reliant on groundwater for its water supply, which contributes just 4% to the country's renewable water resources. As a result, supply/demand deficits are forecast for urban centres such as Metro Manila and Cebu within 10 years. Despite this there is no coherent strategy for groundwater management, which tends to exist piecemeal by region as exemplified by the NWRB's development of Groundwater Management Plans in recent years, ranging in focus from rural to highly urbanised areas.

98.3.5 Reservoirs and storage

Reservoirs used for urban supply are best exemplified by those supplying Metro Manila – specifically the Agnat, Ipo, and La Mesa dams, which comprise part of the Angat-Ipo-La Mesa reservoir system. The $133.98 million Agnat Water Transmission Improvement Project aims to supplement this supply along with water sourced from Laguna de Bay, a natural lake situated in southeast Manila. The construction of new water storage facilities is also associated with the numerous water supply schemes, such as the dams associated with the New Centennial Project — i.e. the 600,000 m³ capacity Kaliwa Dam and the 1,800,000 m³ capacity Laiban Dam.

98.3.6 Demand management

Demand management and water conservation efforts are implemented through a highly decentralised approach at both national and regional levels. For example, national regulatory responses include the NWRB's reported amendment of the Water Code of the Philippines, which regulates water use. This took into account the changing context of the Philippine water sector with a specific focus on Integrated Water Resource Management principles, and the compilation of the **Roadmap to Address the Impact of El Niño (RAIN)** targeting agricultural water conservation. Meanwhile, at a regional level the Metropolitan Waterworks and Sewerage System (MWSS) adopted the **Water Security Legacy Plan** in 2011 for Metro Manila and its suburbs, and NEDA has tendered a PHP6 million ($130,000) value analysis study for water security in Metro Manila. Various water sector stakeholders have engaged in awareness initiatives and programmes such as:

- **Buhay Kyut**: A LWUA-headed initiative involving WDs, LGUs, the Department of Health (DOH) and the Department of Education (DepEd). Targeting water use by the family unit, relevant water-related components include water conservation and wastewater management.
- **Water Security for Resilient Economic Growth and Stability (Be Secure) Program**: Co-ordinated between the Department of Environment and Natural Resources (DENR) and the United States Agency for International Development (USAID), this project promotes sustainable development of water and wastewater services in a variety of areas including Basilan, Iloilo, Leyte, Maguindanao, Misamis Oriental Province and Tuguegarao City.

98.4 UTILITY SECTOR

98.4.1 Utility sector strategies and investment planning

With the involvement of over 30 water-related institutions in the regulation of the Philippine water sector, several strategies and various agencies govern different aspects of utility sector investment and planning.

98.4.1.1 Water service extension

Water service extension is a fundamental water policy target laid out in the **Philippine Water Supply Sector Roadmap**, with universal access to adequate water supply and regulation of supply services planned for 2025. Concerns over water security have led to the propagation of bulk water supply schemes throughout the country. These schemes are alternately aimed at diversifying the water resources supplying urban centres such as Metro Manila or improving the quantity and quality of water available outside the capital region. Major projects concerned with the supply of Metro Manila and surrounding provinces include the New Centennial Water Supply Source Project, and the Bulacan Bulk Water Supply Project involving the construction of 475,000 m³/d of water treatment capacity. Notable bulk water supply projects to second tier cities include the Iloilo bulk water supply and distribution project, of which the supply aspect is expected to cost $65 million.

As illustrated by supply schemes, the highly decentralised Philippine water sector relies heavily on private sector participation for investment and development of both water reticulation and water treatment infrastructure. This reliance is likely to intensify as surface water sources become the focus of water withdrawal and the need for more advanced water treatment to manage salinity and pollutants. Private finance is supplemented by Grassroots Participatory Planning and Budgeting, or the "Bottom-Up-Budgeting" strategy of water sector development, where the local water supply providers are the focus. Other government initiatives such as the SALINTUBIG Program (Sagana at Ligtas na Tubig sa Lahat) involve the provision of basic water services to waterless communities.

98.4.1.2 Wastewater treatment facilities and network extension

The remaining development target of the **Philippine Sustainable Sanitation Roadmap** for 2028 involves the realisation of clear policy, planning, and programmes relating to sanitation in various government regulating bodies involved in sanitation. It has been estimated that at least 95% of all wastewater is discharged directly into drainage networks and raw water bodies with minimal or no treatment. In highly urbanised areas the stricter enforcement of environmental regulations monitoring water pollution are driving the rollout of wastewater collection and treatment infrastructure. Metro Manila leads the way in the rollout of wastewater infrastructure, with around 15% wastewater coverage of the capital region, and a planned wastewater investment programme in excess of $2.5 billion. Second tier cities such as Baguio, Vigan, and Zamboagna have wastewater service systems, though these are reported to serve only 3–5% of the service area populations. Several second tier cities have also initiated septage or sewage outfall treatment programmes, such as Calbayog, Cebu, Davao, Iloilo, Laguna, San Fernando (La Union), and Zamboanga.

Traditionally, sanitation services in the Philippines are provided by septic tanks, and there is interest in developing wastewater treatment and network infrastructure to complement and augment existing infrastructure in conjunction with a combined sewer system. Both MWSS concessionaries, MWCI and MWSI, have committed to the development of treatment infrastructure and network extension. According to the MWSS, 100% sewer connection is planned for Manila Water by 2025 and Maynilad by 2036.

98.4.1.3 Non-revenue water

With water conservation becoming an increasing concern, improving the efficiency of water reticulation networks is a major focus of interest for water service providers. Non-revenue water (NRW) reduction is also a crucial aspect in the implementation of water service extension, as WDs are thought to be more credit worthy and therefore more likely to attract bulk water suppliers – if NRW management can be improved. The national percentage of NRW has reduced from 36% in 2010 to 23% in 2016. While this does suggest general progress in decreasing NRW, the accuracy of this figure is questionable as it is based on the results gathered from an average of 559 WDs and two MWSS concessionaires, while excluding the performance of LGUs as well as other private operators. NRW reduction also features in the MWSS Water Security Legacy Plan which aims to maintain Manila Water's existing goal of 2% NRW and reduce that of Maynilad to 6% by 2017. It is likely that this will be accomplished through continued pipe replacement, leak repair, management of water levels, and monitoring of water pumping schedules. With the propagation of water concessions and supply schemes outside the capital region, similar standards of NRW reduction are likely to gain national emphasis as environmental challenges worsen.

98.4.2 Utility sector structure and performance

Figure 98.7 Utility market structure

Entity	No. of entities	No. of entities serving more than 100,000 people	No. of people served	Volume of water supplied/treated (m³/yr)	Ownership types
Water supply utilities	1,500 (estimate)	–	11,897,599	–	Government owned
Combined water/ wastewater utilities					

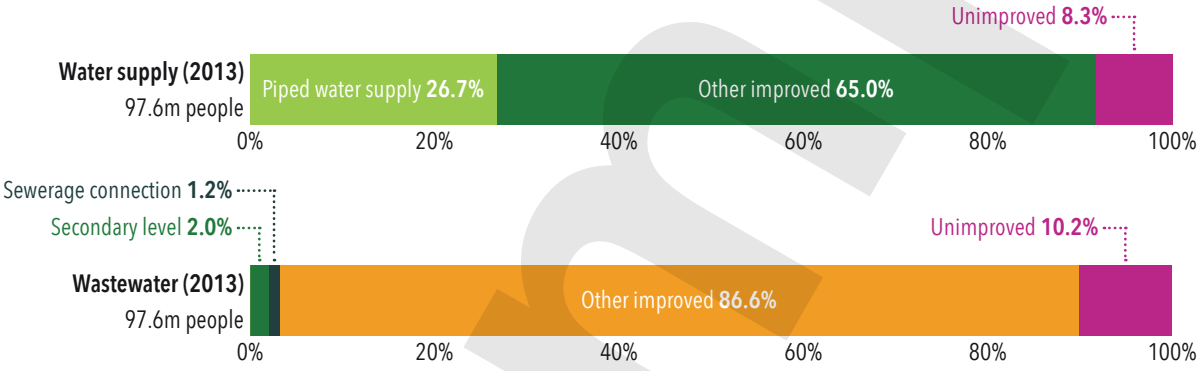
Source: GWI

Figure 98.8 Water and wastewater utilities serving greater than 300,000 people

Utility name	Region	Population served – water	Population served – wastewater	No. of water connections	No. of sewerage connections
Manila Water (East zone)	Metro Manila	5,627,124	Unavailable	896,100	109,700
Maynilad Water Services (West zone)					
Boracay Island Water Company					

Source: GWI Global Utility Data, 2013

Figure 98.9 Utility service performance



Source: GWI

Figure 98.10 Water supply indicators

Water supply indicator	Value	Year	Source
No. of people connected to water network			
% of people connected to water network			
No. of water connections			
Utility water supply capacity (m³/yr)			
Length of water network (km)			
Meter coverage (%)			
Non-revenue water (%)			
No. of WTPs			
Design capacity of WTPs (m³/d)			
Operational capacity of WTPs (m³/d)			

Source: Given in table

Figure 98.11 Wastewater service indicators

Wastewater indicators	Value	Year	Source
No. of people connected to sewerage network			
% of people connected to sewerage network			
No. of wastewater connections			
Volume of wastewater produced (m³/yr)			
Wastewater collected (%)			
Wastewater treated to secondary level (%)			
Wastewater treated to tertiary level (%)			
Length of wastewater network (km)			
No. of WWTPs			
Design capacity of WWTPs (m³/d)			
Operational capacity of WWTPs (m³/d)			

Source: Given in table

98.4.3 Utility infrastructure

Figure 98.12 Major water treatment plants

City	Plant name	Owner	Operator	Design capacity
Quezon City (Metro Manila)	La Mesa Treatment Plant 1	Maynilad Water Services Inc.	Maynilad Water Services Inc.	1,500,000 m³/d

Source: GWI

Figure 98.13 Major wastewater treatment plants

City	Plant name	Owner	Operator	Design capacity	Technology
Manila (Metro Manila)	Central Manila Wastewater System	Maynilad Water Services Inc.	Maynilad Water Services Inc.	132,000 m³/d	Fibre media rapid filtration

Source: GWI

Figure 98.14 Major desalination plants

City	Plant name	Owner	Operator	Design capacity	Technology
Manila (Metro Manila)	Putatan	Maynilad Water Services Inc.	Maynilad Water Services Inc.	100,000 m³/d 1,200,000 PE	Reverse osmosis

Source: GWI

98.4.4 Utility funding

Figure 98.15 Water and wastewater charges for a benchmark user in selected major cities, 2015

City	Utility	Fixed charges ($/m³)	Variable water charges ($/m³)	Variable wastewater charges ($/m³)	Sales tax ($/m³)	Total benchmark price ($/m³)
Manila (Maynilad)	Maynilad Water Services Inc	0.28	0.13	0.00	0.05	0.46

Note: Calculated on a benchmark consumption of 15 m³/month

Source: GWI

Figure 98.16 Sources of utility funding

Sources of utility funding	Utility capex	Utility opex
Utility billings		
Grants from other government bodies		
International aid		

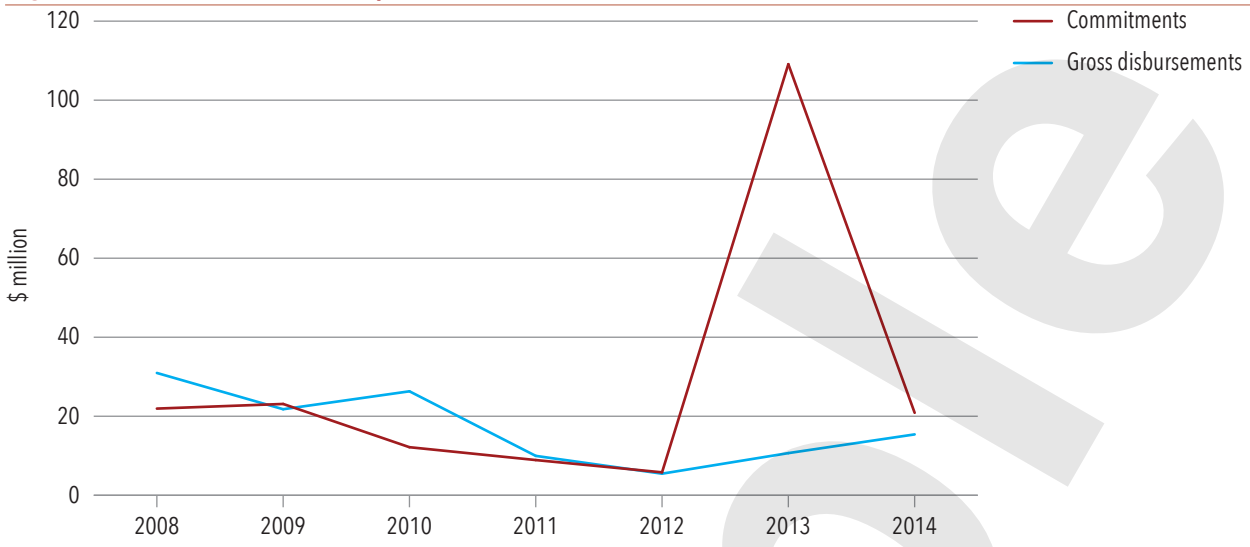
Source: GWI

Figure 98.17 Sources of debt used to fund utility investments

Sources of debt/equity	Water	Wastewater
International concessionary loans	●●○	●●○
Concessionary loans from federal government bodies	●●○	●○○
Concessionary loans from state/regional government bodies		
Loans from municipal owner		
Utility bond issuance		
Commercial bank loans to utility		
Private finance		

Source: GWI

Figure 98.18 Overseas development assistance for the water and sanitation sector, 2008-2014



Parameter ($ million)	2008	2009	2010	2011	2012	2013	2014
Commitments	21.94	23.11	12.17	8.91	5.81	109.11	20.88
Gross disbursements	30.96	21.78	26.31	9.97	5.46	10.67	15.41

Source: OECD, 2015

Utility funding is derived from a combination of sources. Customer tariffs make only a marginal contribution to utility water finances. The rest of utility water investment is financed by government funds – exemplified by the SALINTUBIG Program – or is reliant on capital from international lending agencies such as the World Bank and Asian Development Bank, through mechanisms such as the Philippines Water Revolving Fund (PWRF), the Land Bank of the Philippines and the Philippine Development Bank loans.

98.4.5 Utility procurement

Figure 98.19 Procurement models used

Procurement model	Prevalence	Infrastructure
Design-Bid-Build		
EPC/Design-Build		
Design-Build-Operate		
Design-Build-Finance-Operate		
Joint Venture		

Source: GWI

Figure 98.20 Criteria for comparing bids on construction contracts

	Prequalification criteria		
Bid evaluation criteria	Minimal	Improved	Restrictive
Low bid only			
Low bid + Lifecycle costs			
Low bid + Technical bid weighting <50%			
Low bid + Technical weighting >50%			
Low bid + Technical weighting + Lifecycle costs			

Source: GWI

Despite minor differences in criteria dependent on legislative prescriptions, several technical prequalification criteria are common to all Philippine procurement models. These involve the licensing, evaluation, technical experience, financing capability, and autonomy of the bidder. Foreign-funded procurement requirements may alternately be agreed by the Government of the Philippines, and are generally more open to international bidders. An essential criterion for all infrastructure developments, however, stipulates that the individual, corporation, firm, or partnership participating as a bidder is at least 60% Filipino owned. Although the precise division of Filipino/non-Filipino ownership is absent in the latest "PPP Act", the 60-40 rule as it is commonly known is a feature of the Philippine constitution. As stipulated in the revised JV NEDA Guidelines, the joint venture is generally around 25% Filipino owned. A further consideration in government procurement is the fact that local contractors are given preference and so international participation is more limited. Additional post-qualification criteria are also implemented before the bid is awarded to ensure that the bidder is legally, financially, and technically able to comply with their bid.

In both bid evaluation models used for the procurement of goods and infrastructural projects, i.e. quality based and quality cost based models, the technical aspect takes precedence in deciding the bidder with the lowest calculated bid/highest rated bid. While solicited bids seem to be the norm, in some cases unsolicited bids serve to drive water service extension beyond the capital region, such as the landmark joint venture between Metro Iloilo Water District and MetroPac Water Investments for Iloilo bulk water supply and distribution project.

The build-operate-transfer (BOT) and joint venture procurement models are predominantly used for water supply concessions and bulk water supply schemes, typically for 25-year and 15-20 year periods respectively. The design-build (DB)/design-build-operate (DBO) and engineering, procurement and construction (EPC) models are used for the implementation of new or refurbishment of existing water and wastewater treatment infrastructure. The short operating periods following the DB aspect of these projects serves as a concessionary proving period.

98.4.6 Private sector participation

Figure 98.21 Models of private sector participation

Contract type	Applicable sectors	Estimated population served
Utility concessions/lease contracts		
Utility contract operations/O&M		
Build-own-operate/Build-operate-transfer		

Source: GWI

The PPP-friendly climate of the Philippine market was fostered by a series of historic developments, from the implementation of the **Water Crisis Act of 1995** which laid the groundwork for PSP in the provision of water services and infrastructure within Metro Manila, through to the efforts of the Aquino Administration initiated in 2010 which made PPP fundamental to its economic policy. PPP, in the form of both private finance and private operators, has been encouraged with a prevalence of 25-year concession BOT models in water supply concessions and bulk water transfer arrangements such as those governing Metro Manila.

Under the auspices of the NEDA, the **PPP Center** plays an important supporting role in issuing guidance and providing funding for business cases, pre-feasibility and feasibility studies, as well as contributing to the development of policy relating to PPPs. The PPP Center has recently been involved in both the New Centennial Water Supply Source Project and the Bulacan Bulk Water Supply Project, which constitute major PPP projects related to water. Recent legislative developments and the approval of the "PPP Act" (see section 98.2) should strengthen its role. Additionally, its institutionalisation may aid the co-ordination of various water sector stakeholders in further market developments through the implementation of further PPP projects.

98.4.7 Current and future projects

Figure 98.22 Future utility investment projects

Project name	Tracked by GWI	Project type	Estimated cost	Description
New Centennial Water Supply Project	✓	WTP	PHP18.72 billion ($398.7 million)	The project will involve the development of two dams, the Laiban Dam and the Kaliwa Dam in Rizal Province, as well as a water treatment plant, conveyance infrastructure and a hydroelectric facility. The project is expected to provide an extra 1.8 million m³/d of water to Metro Manila. The scope of the Kaliwa Dam sub-project, the cost of which is estimated at PHP18 billion ($380 million), includes the design, construction and financing of a dam and raw water conveyance infrastructure. **Client:** Metropolitan Waterworks and Sewerage System (MWSS) **Current status:** Planned (pre-RFP) **Structure:** Build-transfer (BT) with payback over 25 years with a fixed annual amortisation

Project name	Tracked by GWI	Project type	Estimated cost	Description
Davao River WTP		WTP	Undetermined	To build a bulk water treatment plant on the Davao River to supply Davao City. **Client:** Davao City Water District (DCWD) **Current status:** Conceptual stage **Structure:** Possible BOT

Source: GWI

98.5 INDUSTRIAL WATER

Figure 98.23 Industrial water market significance

Industry	Market significance
Upstream oil & gas	●○○
Refining & petrochemicals	●○○
Power generation	●●○
Mining	●○○
Food & beverage	●●○
Pulp & paper	●○○

Industry	Market significance
Textiles & tanneries	●○○
Pharmaceuticals	●○○
Microelectronics	○○○
Metals processing	○○○
General manufacturing/other*	●●○

*Other includes chemicals manufacturing, automotive, shipbuilding, etc.

Source: GWI

Water-intensive industries in the Philippines include food & beverage, textiles, and general manufacturing. Nickel mining is also a substantial industry within the country and presents opportunities for the development of measures to tackle the spread of associated waterborne environmental pollutants. Ill management of toxic wastewater has recently adversely affected the agricultural sector in provinces such as Sta. Cruz, resulting in protests which took place recently against Zambales nickel mine due to silt spills. The government's stricter enforcement of the Clean Water Act will open up the industrial market to wastewater management opportunities.

98.6 MARKET PARTICIPANTS

Figure 98.24 Major companies active in the water sector

Company name	Parent company	Ownership of parent	Main role	Description	Main sectors active
Abeima	Abengoa	Private company	EPC contractor	An international player with a global presence in 20 countries, Abeima specialises in environmental technology specifically through construction, concessions and products such as desalination and water treatment. Abeima's contemporary history in the Philippines includes its prequalification for the Kaliwa Dam project, a component of the New Centennial Water Supply Project through a Datem/ Abeima consortium.	

Company name	Parent company	Ownership of parent	Main role	Description	Main sectors active
Biwater	Biwater Holdings Ltd.	Private company	EPC contractor	An EPC contractor/system integrator based in the United Kingdom that specialises in services such as water and wastewater treatment. An example of its involvement in the Philippine water sector includes the design and construction of the Rodriguez WTP with a design capacity of 150,000 m³/d for Manila Water Company Inc.	

Company name	Parent company	Ownership of parent	Main role	Description	Main sectors active
JFE Engineering Corp.	JFE Holdings, Inc.	Publicly traded	EPC contractor	JFE Engineering Corp is a Japanese firm active internationally and specialising in a variety of business fields, from energy and the environment to industrial machinery. Its involvement in the Philippine water sector is characterised by recently-awarded projects such as the design and construction of Parañaque Water Reclamation Facility 1 for Manylaid Water Services Inc., which will use activated sludge treatment technology and have a design capacity of 76,000 m³/d. Previous projects for Manylaid also include the Talayan Sewage Treatment Plant and the South Septage Treatment Plant.	

Company name	Parent company	Ownership of parent	Main role	Description	Main sectors active
Sta. Clara International Corp.	Sta. Clara International Corp.	Private company	EPC contractor	A Philippine engineering and construction company whose recent projects include the the Marikina City Sewage Treatment Plant secured through a joint venture with Veolia Water Solutions & Technologies (Philippines) Inc.	

Source: GWI

98.7 MARKET FORECAST

98.7.1 Future market directions

Opportunities in the Philippine water market look set to grow and diversify. Commitment to private sector participation for both the finance and operation of water projects will secure much-needed investment in extending water and wastewater coverage to meet national service delivery targets. Major developments are in the pipeline for the rollout of wastewater networks and treatment infrastructure in particular.

98.7.2 Notes on market forecast

Figure 98.25 Market forecast, 2013–2020

Source: GWI

Figure 98.26 Market forecast breakdown, 2016

Source: GWI

Figure 98.27 Market forecast data, 2013–2020

Source: GWI