# 10. Peru

## 10.1 Overview of indicators

### Figure 10.1 Population projections, 2010–2020

| **Population (million)** | |
|---|---|
| Urban | |
| Rural | |
| **Total** | |

| **Population growth rate (%)** | |
|---|---|
| Urban population growth rate | |
| Rural population growth rate | |
| **Total population growth rate** | |

Source:

### Figure 10.2 Economic indicators

| **Economic indicator (2012)** | |
|---|---|
| **Total GDP ($ billion)** | |
| **GDP per capita ($)** | |

Source:

### Figure 10.3 Top cities

| **City** | **Population** |
|---|---|
| | |
| | |
| | |
| | |

Source:

## 10.2 Context and overview of challenges

Peru's water resources are not evenly distributed across the country. 66% of the population live in the Pacific watershed (which includes Peru's capital, Lima), which only accounts for 2.2% of the total water resources in the country, while 97.2% of Peru's water resources are found in the Amazon watershed, where only 30.7% of the population live.

2010 was an electoral year, which boosted the rate at which projects were inaugurated and also resulted in contentious projects being left behind. The government of Alan Garcia Perez (2006–2011) spent over $2 billion on water and sanitation projects. More than half of this was invested in improving the drinking water supply, particularly in the water stressed and populous capital, Lima.

2011 saw a new government take office. President Ollanta Humala came to power with "social inclusion" as a flagship in a country overridden by inequalities. Ensuring sustainable water availability as well as expanding the coverage and improving the quality of water and sanitation services across the country is key to improving people's living conditions and achieving social inclusion.

The initial left wing discourse and policies of the current government have been considerably toned down since their coming into power. The discourse has shifted to become more liberal, by promoting private investment and participation, particularly favouring public-private partnerships (PPPs). As a result, both public and private funds towards water and sanitation infrastructure projects are currently increasing, and have a high likelihood of continuing to do so. Some examples of government initiatives are mentioned in Section 10.8 on private sector participation.

The country is facing increasing conflicts around water resources. The mining industry, by far the main contributor to the country's exports, accounted for 39% of the total exports (real terms) in 2011. However, local communities are concerned about the mines' impact on water availability for other uses, and the levels of wastewater pollution produced by mines which is endangering the environment and people's health. This has put the water sector in the spotlight and it has hence been scaled up in the policy agenda, in terms of both water resources management, and water efficiency overall.

The institutional framework for water resources management, which has been growing since 2009, has a way to go in order to establish itself as a credible, transparent and efficient framework. Improvement in this area will assist in reducing conflicts around water resources and will promote the growth of the sector overall.

The water sector in Peru faces the following 7 main challenges, according to the country's 2012 version of the **National Water Resources Policy and Strategy (PENRH)**:

- **To meet the increase in water demand caused by population growth and economic development:** By 2025 Peru's population will reach 36 million, with 75% living in urban areas. On the other hand, in 2011 the country's GDP grew at 6.9% and is expected to keep growing at a similar rate. The growing water demand is increasingly leading to conflicts between different users, for example mining and agriculture in certain parts of the country.
- **To achieve equitable water resource availability throughout the country and for the different seasons**, as most of the water is available in the Atlantic watershed and there is more rainfall during the El Niño Oscillations.
- **To improve and preserve the quality of groundwater and surface water resources** in order that they are kept suitable for consumption. This will be especially challenging because of the current deteriorating water quality due to contamination by industrial activity and waste produced by the increasing population.
- **To increase the efficiency of water use** in order to expand coverage and face scarcity scenarios. Currently inefficiencies arise from leakages in water distribution and overuse of water in agriculture.
- **To diminish the impact of climate change and extreme events on water availability** for the population and the productive sectors. For example, the El Niño and La Niña phenomena are causing ever more extreme climate events such as severe floods and droughts.
- **To promote social participation in water resource management**, in order to achieve sustainable results. This is particularly relevant in situations where there is potential for conflict between water users.
- **To achieve a peaceful and tolerant approach towards water issues**, in situations where differing values are placed on the water sector by various stakeholders.

Our analysis of the current situation in the water sector indicates that there are other important challenges that must be addressed in the short to medium term. These include:

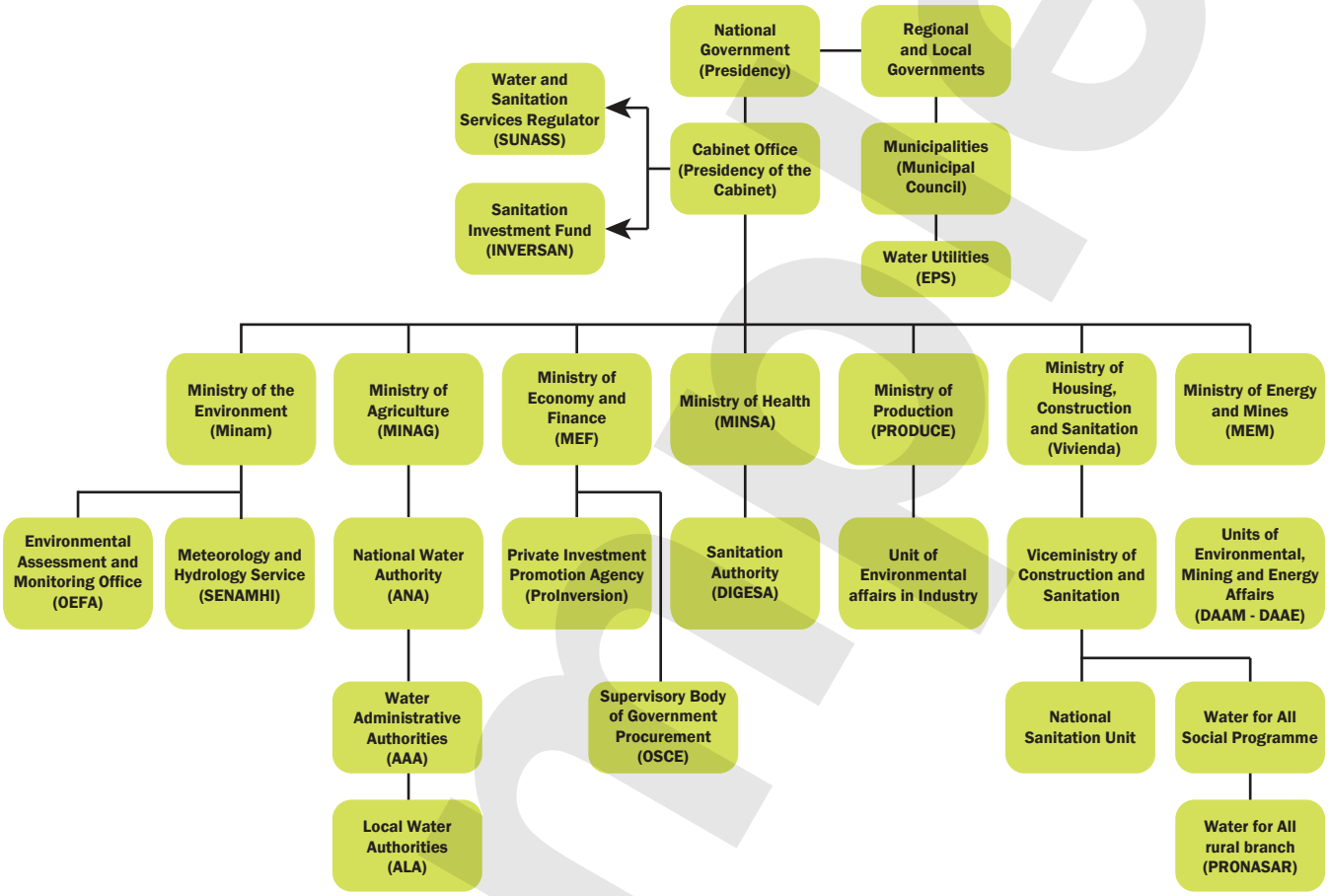
- Consolidating the environment and water institutional framework for better management of water resources, given that misunderstandings and conflicts often arise from roles and responsibilities that are not so well defined.
- Improving the regulatory system and the related enforcing measures around water use, in particular the set of standards used to preserve water quality and availability, given the increasing competition for water and the lack of enforcement of water regulations.
- Improving management of water-related social conflicts, as these are becoming increasingly frequent and heated.

## 10.3 Water sector organisation and structure

### 10.3.1 Government ministries and agencies

The following figure shows how the government ministries and agencies that are responsible for water issues are hierarchically situated within the government structure.

Figure 10.4 Government ministries and agencies involved in water management




Source: Adapted from SUNASS, 2009; ANA, 2009

Listed below are the most important government organisations and their main functions.

- **National Water Authority (ANA)**: Established in early 2009, the ANA is the governing body of the **National System for Water Resources Management (SNGRH)** (see Section 10.4). The ANA formulates policies for the management of water resources. Its decentralised offices are situated within 14 **Water Management Authorities (AAA)**. These oversee 71 administrative units known as **Local Water Authorities (ALA)**. ANA is associated with the Ministry of Agriculture.
- **Ministry of Housing, Construction and Sanitation (Vivienda)**: The governing body of the water and sanitation sector. It develops policies and plans related to the provision of water services to the population, and is in charge of social programmes aimed at providing nationwide water services to the poorest people. It also supports water provision in rural areas, and the largest water utility in Peru, Sedapal, is associated with it.
- **National Superintendence of Water and Sanitation Services (SUNASS)**: Regulates, supervises and controls the water and wastewater utilities, in order to encourage the improvement of water quality, and coverage of both water and wastewater services. SUNASS also solves conflicts arising in this area by acting as an impartial authority. Its main responsibilities are to conduct and control the tariff system, to evaluate utilities' investment plans (known as Optimised Master Plans), and to set quality service standards for utilities.
- **Private Investment Promotion Agency (ProInversion)**: A branch of the Ministry of Economy and Finance, whose purpose is to combine public projects with private participation in various sectors, promoting public-private partnerships (PPP). It promotes private investment within a portfolio of priority public projects put forward by various government bodies and regions, and also receives private agents' initiatives over public resources. Up until early 2012 ProInversion had 5 investment committees, 1 of which was the PROAGUA committee overseeing all water and wastewater projects. Afterwards they were restructured into 3 parts, 1 of which is the PRODESARROLLO

committee which covers projects in water and sanitation including infrastructure, social public services, mining, irrigation and agriculture.

In 2012 there were plans to create a new institution to promote a more technical management of water utilities (more information is provided in Section 10.4).

### 10.3.2 Water and wastewater service providers

Water utilities in Peru are known as **Empresas Prestadoras de Servicios (EPS)**, and they only serve urban areas. There are 50 EPS in total, including 48 municipal utilities, 1 private utility (Aguas de Tumbes), and 1 utility under the Vivienda supervision (Sedapal). In 2011 the EPS all together provided drinking water to 16.5 million inhabitants nationwide, which represents 88.5% of inhabitants in urban areas under EPS responsibility. This compares to 85.1% in 2010 where 84% of the country's urban population were serviced, corresponding to 62% of the total population.

Although Sedapal is under the responsibility of Vivienda, it operates like the rest of the municipal utilities with technical, administrative and financial autonomy. Sedapal is responsible for serving Peru's capital city Lima only, which is also known as "metropolitan Lima" or Lima Province. As such, it is the largest EPS in the country. In 2011 Sedapal served 8.3 million inhabitants, which represents 89.4% of inhabitants in Lima (84.3% in 2010). Inhabitants are served through 1.3 million connections, which corresponds to 42% of all EPS connections nationwide.

EPS with between 40,000 and 200,000 connections are known as "large" according to SUNASS classification. There are 13 of these large EPS. Those with more than 100,000 water connections are Sedapar, EPS Grau, Sedalib and EPSEL. The following figure shows all EPS in Peru with their respective main indicators.

### Figure 10.5 All EPS in Peru showing main indicators, 2011

| EPS name | Water connections | Wastewater connections | Urban population in EPS area of responsibility | Drinking water coverage (ratio of pop. served/urban pop. in EPS area) | Wastewater coverage (ratio of pop. served/ urban pop. in EPS area) |
|---|---|---|---|---|---|
| Sedapal | 1,344,403 | 1,277,183 | 9,256,885 | 89.4% | 84.9% |
| **Large EPS** | | | | | |
| Sedapar | 233,078 | 210,557 | 979,040 | 90.0% | 80.4% |
| EPS Grau | 177,804 | 143,827 | 1,044,724 | 90.1% | 73.9% |
| Sedalib | 158,242 | 136,326 | 899,332 | 91.3% | 78.2% |
| EPSEL | 149,582 | 133,682 | 876,243 | 86.5% | 78.2% |
| SEDAChimbote | 78,094 | 71,005 | 389,286 | 94.9% | 86.4% |
| EPS Tacna | 76,704 | 74,675 | 276,528 | 98.3% | 96.1% |
| SEDALoreto | 76,092 | 43,158 | 489,730 | 88.9% | 52.0% |
| SEDACusco | 67,533 | 63,157 | 379,091 | 97.7% | 91.2% |
| SEDAM Huancayo | 64,963 | 59,233 | 340,007 | 89.2% | 81.3% |
| EPSASA | 47,609 | 42,106 | 212,203 | 88.2% | 78.1% |
| EMAPICA | 46,973 | 43,299 | 202,412 | 81.9% | 75.2% |
| SEDAJuliaca | 44,286 | 43,852 | 245,401 | 82.1% | 81.3% |
| SEMAPACH | 41,839 | 32,115 | 178,194 | 96.0% | 73.7% |
| **Medium EPS** | | | | | |
| EMAPA San Martin | 38,615 | 31,545 | 166,674 | 96.5% | 79.4% |
| SEDA Huanuco | 38,575 | 36,263 | 229,269 | 78.5% | 74.3% |
| Aguas de Tumbes | 38,405 | 24,583 | 204,740 | 73.1% | 47.4% |
| EMSA Puno | 37,764 | 30,516 | 168,972 | 94.6% | 78.1% |
| SEDACAJ | 35,463 | 35,424 | 186,292 | 92.3% | 90.6% |
| EMAPA Cañete | 31,313 | 22,332 | 164,843 | 87.2% | 64.5% |
| EPS Chavin | 24,670 | 21,699 | 109,048 | 91.1% | 80.1% |
| EMAPA Huacho | 24,040 | 23,056 | 114,662 | 83.1% | 86.6% |
| EMAPACOP | 23,882 | 24,408 | 222,960 | 46.3% | 45.9% |
| EPS Ilo | 22,906 | 20,649 | 67,768 | 95.8% | 86.4% |
| EMAPisco | 22,026 | 19,786 | 82,716 | 96.9% | 84.5% |
| EPS Selva Central | 20,519 | 16,064 | 117,869 | 73.1% | 57.1% |
| EPS Moquegua | 19,058 | 17,089 | 50,767 | 93.6% | 83.9% |
| SEMAPA Barranca | 16,390 | 14,736 | 75,104 | 89.2% | 81.4% |
| EPS Mantaro | 16,054 | 11,066 | 68,423 | 91.0% | 63.5% |

| EPS name | Water connections | Wastewater connections | Urban population in EPS area of responsibility | Drinking water coverage (ratio of pop. served/urban pop. in EPS area) | Wastewater coverage (ratio of pop. served/ urban pop. in EPS area) |
|---|---|---|---|---|---|
| **Small EPS** | | | | | |
| EMAPA Moyobamba | 14,565 | 10,817 | 83,172 | 81.4% | 61.4% |
| EMAPA Huaral | 14,421 | 12,418 | 74,592 | 86.0% | 74.1% |
| EMPSSAPAL | 12,684 | 10,488 | 56,542 | 93.5% | 77.7% |
| EMAPAT | 12,471 | 6,496 | 65,199 | 88.4% | 46.0% |
| EMAPA Pasco | 11,766 | 11,710 | 56,188 | 82.0% | 81.6% |
| EMUSAP Abancay | 11,696 | 10,634 | 50,131 | 99.2% | 89.1% |
| EPS Marañon | 10,410 | 9,727 | 87,447 | 45.4% | 42.4% |
| EPS Sierra Central | 9,388 | 8,879 | 42,414 | 76.8% | 72.7% |
| NOR Puno | 7,976 | 6,064 | 23,501 | 81.6% | 62.0% |
| EMAPAVIGSSA | 7,702 | 8,582 | 34,808 | 78.0% | 77.2% |
| EMAPA Huancavelica | 7,438 | 6,976 | 31,098 | 87.8% | 82.3% |
| EPSSMU | 6,720 | 4,440 | 32,451 | 78.3% | 51.7% |
| EMUSAP Amazonas | 6,246 | 5,016 | 26,502 | 86.4% | 69.4% |
| EMAQ | 6,009 | 5,174 | 27,895 | 69.5% | 59.9% |
| EPS Aguas del Altiplano | 5,775 | 5,523 | 19,194 | 96.5% | 92.3% |
| Sedapar S.R.L. (Rioja) | 5,516 | 2,742 | 19,783 | 95.8% | 47.6% |
| EMAPAB | 4,694 | 4,562 | 19,438 | 85.0% | 82.6% |
| EMAPA Y | 4,312 | 3,123 | 11,947 | 89.8% | 65.1% |
| EMSAP Chanka | 4,206 | 4,777 | 23,248 | 69.3% | 68.6% |
| EMSAPA Yauli | 3,089 | 2,477 | 8,295 | 96.9% | 77.7% |
| EMSAPA Calca | 2,843 | N.A. | 11,822 | 89.4% | N.A. |

Source: SUNASS, 2012

The **National Association of EPS (ANEPSSA)** is a voluntary membership association created in 2002. By 2011, 42 EPS were members of ANEPSSA. Its objective is to contribute to strengthen EPS through training and exchange of experiences, as well as supporting its members in their relationships with stakeholders.

It is a challenge to achieve **financial sustainability** in the operations of EPS in Peru. The German cooperation has supported a few medium and small EPS to achieve this by using "certification" as a tool. Their programme has used the **International Organization for Standardization's ISO 9001** standard for quality management, used throughout industries, to improve the management and planning of these water providers with a view to achieve financial sustainability. This is a single initiative which other EPS could potentially imitate. The following four EPS are credited with ISO 9001 certification:

- EMSA Puno
- EMAPA Huancavelica
- EPS Moquegua
- EPS Chavin

SEDA Huanuco and EMAPA Moyobamba are in the process of obtaining ISO 9001 certification across all of their operations.

In rural areas water services are provided by **User Boards (JASS)** rather than EPS.

## 10.4 Government's water strategy

The government's water strategy can be divided into documents focusing on the use of water resources, some detailing more of an overall approach to water use in the country, and others focusing on municipal water.

### 10.4.1 Water resources

The **Law of Water Resources, Law 29338** from 2009, is the main law stating the principles ruling water resources management in Peru. It was fully implemented by 2010 when the Supreme Decree DS 001-2010-AG approved its regulation. This law resulted in the creation of the **National System for Water Resources Management (SNGRH)**, defined as the institutional space that combines public and private entities involved in water resources management. The purpose of the SNGRH is to co-ordinate the actions of these entities towards an integrated management system that promotes sustainable use of water resources. The SNGRH is responsible for planning and regulation, as well as promoting and implementing projects.

The ANA, as the governing body of the SNGRH, develops, implements, supervises and evaluates the **National Water Resources Policy and Strategy (PENRH)**. The current PENRH covers the period 2009–2020 (there is a new working version of PENRH dated March 2012). One of the PENRH's major contributions to water governance in Peru is its shift in focus from political departments to water basins as the main unit for addressing the management and regulation of water resources. Another very important contribution is the emphasis on **"water efficiency"**, which has been scaled up in Peru's policy agenda during the last couple of years.

In August 2012 the PENRH finally made it into the **National Agreement**, a forum established in 2002 with the aim to build up a long-term national development plan. For the first time the National Agreement has a policy about water, and has become the 33rd policy, which highlights the public nature of water resources, as well as water efficiency as the cornerstone of water management in the country. Closely linked to water efficiency is the promotion of wastewater treatment and reuse. There are some actions in place that might open investment opportunities in such areas (more details are provided in Section 10.6.4 on water reuse).

The ANA is also developing the **National Plan of Water Resources (PNRH)** to complement the PENRH. This will identify priority actions towards improving water availability and quality, as well as their implementation. The drafting of the PNRH is a participatory process involving the various members of the SNRGH. The PNRH is expected to be finished by the end of 2013 and then be a key tool for water management in the country.

### 10.4.2 Municipal water

More tangible plans are detailed in the **National Plan for Environmental Action 2011–2021 (PLANAA)**, which is under the responsibility of Minam. The PLANAA has set 7 priority goals to be achieved by 2021, 1 of which covers water. In line with water efficiency, the aim is to treat 100% of urban domestic wastewater, and to reuse 50% of this. PLANAA has set 4 strategic actions for the priority water goal, which are described in Section 10.6.3 of this chapter.

The **General Law of Water and Sanitation Services** (**Law 26338** of 1994) and its regulation (DS 023-2005-VIVIENDA) together establish the conditions of the utilities' service delivery, the responsibilities, rights and obligations of those related to the water services as well as its users, and the conditions for private sector participation. It has set Vivienda as the governing body of the water and sanitation sector and SUNASS as its regulator. The last update to the regulation occurred in June 2012 and this incorporates a stronger drive towards establishing small EPS for the supply of water services in small cities, and promoting municipal or private participation towards this.

This law has given Vivienda the responsibility of developing the **National Sanitation Plan (PNSS)**. This contains the objectives, strategies and policies for the development of the sector in the short, medium and long terms, along with the required investment and its sources. As such, it acts as a guideline to harmonise the actions of various agents involved in the sector. The PNSS 2006–2015 includes specific projects and programmes aimed at increasing the sustainability and quality of services, as well as promoting the financial viability of utilities.

One of the PNSS objectives is to promote the participation of the private sector. Following this, in September 2007 Vivienda approved the **National Strategy for the Promotion of Private Sector Participation in EPS** (Resolution 002-2007-VIVIENDA-VMCS), following the input of a loan from the German Development Bank (KfW) and the Inter-American Development Bank (IADB) to back the investments needed to ensure the increased efficiency of the water and sanitation sector. This "**National Strategy for PSP in EPS**" as it is known in Peru, sets the context for private operator participation in the overall management of EPS, or in particular projects for EPS (for further details, see Section 10.8 on private sector participation).

In November 2012 the congress approved the draft for the

Its objective is to expand coverage and improve the quality of water utility services and operations across the country. Overall the law aims to establish a technically efficient way of managing utilities, independent from political fluctuations. It also promotes the fusion of EPS (particularly small ones) to benefit economies of scale. It considers the formation of the **Technical Unit for the Management of Water Utilities (OTASS)** to address these issues. OTASS would be ascribed to Vivienda. OTASS's main responsibility would be to evaluate EPS financial solvency and technical capacity. The law sets a Temporary Support Regime for those EPS whose evaluation shows bad performance. OTASS would be in charge of ensuring best management practices for EPS subject to such a regime, by laying down mandatory protocols for the EPS operations and decision making. OTASS can promote PPPs as a way to refloat EPS under the regime, depending on each case.

## 10.5 Water availability and demand

### 10.5.1 Water availability

The following figure shows the water resource availability by watershed, according to the ANA (2012). ANA has used data from various years spanning from 1975 to 2009 to compile the current water availability figure, as data collection around water resources in the past has not been systematic. An example of this is shown in the following figure, which shows that the Atlantic watershed has the highest water availability. This is clearly inconsistent with the fact that over 60% of the population live in the Pacific watershed.

### Figure 10.6 Water resources availability in Peru by watershed, 2011

| Watershed | Total volume available (million m³) | Total volume available (%) | Surface water resources (million m³) | Groundwater resources (million m³) |
|---|---|---|---|---|
| Atlantic | 1,719,814 | 97.3 | 1,719,814 | N.A. |
| Pacific | 38,481 | 2.2 | 35,632 | 2,849 |
| Titicaca | 9,877 | 0.5 | 9,877 | N.A. |
| **Total** | **1,768,172** | **–** | **1,765,323** | **2,849** |

Source: ANA, 2012

## 10.5.2 Sectoral water demand

According to the ANA, as cited by INEI (2012c), agriculture accounts for 86.8% of surface water use nationwide, followed by domestic use (11.2%), mining (1.4%) and industry (0.6%), as shown in the following figure.

### Figure 10.7 Sectoral surface water use in Peru by watershed, 2010–2011

| Watershed | Agriculture (%) | Domestic (%) | Mining (%) | Industrial (%) |
|---|---|---|---|---|
| Atlantic | 68.7 | 25.1 | 5.4 | 0.8 |
| Pacific | 89.8 | 8.9 | 0.7 | 0.6 |
| Titicaca | 90.7 | 7.8 | 1.5 | 0.0 |
| **Total** | **86.8** | **11.2** | **1.4** | **0.6** |

Source: INEI, 2012c

# 10.6 Municipal water and wastewater

### Figure 10.8 Key performance indicators: water infrastructure

| Water supply indicators | Value | Year | Source |
|---|---|---|---|
| **No. of people connected to water supply network** | | | |
| **Percentage of people connected to water supply network** | | | |
| **No. of water connections** | | | |
| **Municipal water supply capacity** | | | |
| **Length of water distribution network** | | | |
| **Meter coverage** | | | |
| **Non-revenue water** | | | |
| **No. of WTPs** | | | |
| **Design capacity of WTPs** | | | |
| **Operational capacity of WTPs** | | | |

Sources: Given in table

### Figure 10.9 Key performance indicators: wastewater infrastructure

| Wastewater indicators | Value | Year | Source |
|---|---|---|---|
| **No. of people connected to wastewater network** | | | |
| **No. of wastewater connections** | | | |
| **Percentage of people connected to wastewater network** | | | |
| **Volume of wastewater produced** | | | |
| **Wastewater collected** | | | |
| **Wastewater treated to secondary level** | | | |
| **Wastewater treated to tertiary level** | | | |
| **Length of wastewater collection network** | | | |
| **No. of WWTPs** | | | |
| **Design capacity of WWTPs** | | | |
| **Operational capacity of WWTPs** | | | |

Sources: Given in table

### 10.6.1 Water treatment

In 2011, 76.2% of Peru's households had access to drinking water through a public network, either by individual connections inside households, shared connections in buildings, or shared standpipes. The following figure shows the other ways of accessing drinking water in the country.

### Figure 10.10 Types of access to drinking water (percentage of total households), 2011

| | Public network | | | | | | |
|---|---|---|---|---|---|---|---|
| Area | Individual connections (%) | Shared connections in buildings (%) | Shared standpipes (%) | Water tanker or similar (%) | Well (%) | River, stream, spring or similar (%) | Other (%) |
| Lima | 85.6 | 5.1 | 2.5 | 3.5 | 0.7 | 0.7 | 1.9 |
| Rest of country | 60.2 | 7.7 | 1.4 | 1.2 | 4.5 | 20.9 | 4.1 |
| **Country total** | **67.5** | **7.0** | **1.7** | **1.8** | **3.4** | **15.1** | **3.5** |

Source: INEI, 2012c

All of the EPS combined produced a total of 1.3 billion m³/yr of drinking water in 2011. Sedapal in Lima produced 52% of this total, which averages at 242 m³/yr per inhabitant, equivalent to 663 lcd.

The following figure shows the major WTPs in Peru, according to their design capacity.

### Figure 10.11 Major WTPs in Peru by design capacity

| Utility | Province | WTP | Design capacity (m³/d) |
|---|---|---|---|
| Sedapal | Lima | Huachipa | 864,000 |
| Sedapal | Lima | Atarjea - Planta N° 1 | 648,000 |
| Sedapal | Lima | Atarjea - Planta N° 2 - Sector 1 | 432,000 |
| Sedapal | Lima | Atarjea - Planta N° 2 - Sector 2 | 432,000 |
| Sedapal | Lima | Planta Chillon (Carabayllo) | 216,000 |
| Sedapar | Arequipa | Planta la Tomilla | 155,520 |
| Sedalib | La Libertad | Planta Alto Salaverry (Chavimochic property) | 108,000 |
| EPS Grau | Piura | Planta Arenal (Eje Paita - Talara) | 67,392 |
| EPSEL | Lambayeque | Planta N° 1 (Chiclayo) | 64,800 |
| EPSEL | Lambayeque | Planta N° 2 (Chiclayo) | 64,800 |
| EPS Grau | Piura | Planta Curumuy | 57,024 |

Source: Adapted from SUNASS, 2009

The latest and most important addition is the Huachipa WTP, owned by Sedapal. The WTP was inaugurated on July 2011 and benefits 2.4 million people. Its design capacity is 864,000 m³/d, although during the first phase it operated at half of this value. The plant required a total investment of $284 million.

### 10.6.2 Desalination

Although Peru has 3,080 km of coastline, desalination has not yet been widely exploited. Desalination could therefore provide a great opportunity for the country when dealing with potential water shortages in the future. Recognising this opportunity, the **Legislative Decree DL 1007** was enacted in May 2008 to "promote the use of desalinated water for irrigation of the state's freely available wasteland, intended for agricultural and agro-industrial purposes".

However, the PENRH Working Document from March 2012 points out that, whilst desalination could be beneficial to solve water scarcity problems on the coast, its high capital costs and its potential pollution levels pose considerable disadvantages. Therefore the PENRH favours wastewater treatment for water reuse over desalination.

During 2010–2012, four desalination projects reached the headlines. Only one of them was related to the provision of drinking water. The remaining three plants were related to the mining industry.

#### 10.6.2.1 Desalination for municipal purposes

It is still early days for the use of desalination for drinking water purposes in Peru. The period 2010–2012 witnessed the rise and decline of a desalination project to provide drinking water to the population of 7 coastal districts south of Lima. **Aguas de Lima Sur II**, originally proposed by Biwater in 2008, was a $155 million project for a 100,000 m³/d desalination plant that was to be awarded as a 23-year BOT concession.

ProInversion declared in January 2011 that the project was of public interest, attracting the attention of 14 local and foreign companies. However, in early 2012 it halted the process, based on the fact that the project was over-estimating the water demand, according to studies from Sedapal. SUNASS agreed with such claims. The project was not considered as a priority because of

its focus on one particular area and the fact that it did not tend to the population across Lima, who are in the greatest need of drinking water access, as outlined in Sedapal's master plan. Off the record, the project was also accused of being influenced by the interests of real estate companies who were building beach houses in the area in question at the time, and hence whose profits would benefit from the installation of the new desalination plant. In June 2012 the project was officially cancelled. Later the project was downsized, resulting in a reduced desalination plant capacity of 12,960 m³/d. The project also includes expanding and improving water and wastewater services. The project's total cost is $110 million. This downscaled project was named **Provisur** and its tender was launched on 21 December 2012.

### 10.6.2.2 Desalination for industrial purposes

Desalination has become increasingly popular as an alternative water source for the mining industry. At country level, the main driver for this is the environmental conflicts around water use and wastewater discharge by mines. The mining industry in Peru has had a history of environmental mismanagement in the past. The ANA identified that, up to August 2011, more than 21 rivers in the country were contaminated by domestic and industrial wastewater, with a large proportion of this produced by mines. Given this record, local communities tend to have misgivings about mining activities, and as a result, conflicts between communities and mines around water resources have been common during the recent years in Peru.

In the south of the country there is another driver for increasing the use of desalination, which is water scarcity. The north of Chile and the south of Peru are arid regions that both face similar water shortage challenges. The cost of transporting desalinated water from the coast to the mine sites, which are usually in the Andean region, plays an important role in the feasibility of desalination as an option.

In any case, the combination of high metal prices, the increasing conflicts around water use, and water scarcity are making desalination a cost-efficient water source alternative for the mining industry.

The following list details the three current plans for desalination in the Peruvian mining industry:

- The **Tia Maria** mine, situated in the Islay province of the Arequipa region, is property of the **Southern Copper Corporation (SCC)** and plans to export 120,000 tonnes of copper annually. Having their own desalination plant for water supply seems the most viable option, as the local communities are concerned that the mine will deplete their water resources. The plant was planned to be built by the end of 2010. However, activities have been on hold since April 2010 due to local opposition to the mine and also the fact that its environmental impact assessment (EIA) was not approved. In February 2012, the SCC started to develop a new EIA. It is expected that the desalination plant remains as part of the plans to address water use concerns. Experts estimate that the new EIA could take approximately one year to be presented, evaluated and approved.
- Another SCC mine is facing local opposition due to fears of water resource depletion. According to the local communities, the **Toquepala** copper mine, situated in the Tacna region, is causing desertification in the area, arguing that the SCC should contemplate building a desalination plant, as is planned for the Tia Maria mine. Studies will have to be conducted to determine if this claim is accurate. In February 2012, the SCC promised that if this was in fact the case, it would build a desalination plant for the provision of drinking water to the city of Tacna. This option would be the most cost-efficient approach to dealing with the issue, as opposed to desalinating water and transporting it a long distance for use at the mine. Communities are predominantly opposed to the mine using the water resources that they rely heavily upon, and have even planned to request a revocation of the mine's rights to use water from rivers and aquifers.
- An Australian company **Metminco** is in control of the **Los Calatos** copper-molybdenum project, situated in the desert area of the Moquegua region, in the vicinity of Tacna and Arequipa. In mid 2011, Metminco announced that Los Calatos had great potential, comparable to that of the Escondida mine in Chile. Given the general concern in Peru for water resources, Metminco announced that Los Calatos plans to meet its water needs using desalination. The pre-feasibility study for the mine starts in 2013, and the mine is expected to be in operation by 2018.

The reverse osmosis (RO) desalination plant owned by the company Milpo for use by the Cerro Lindo mine (Ica region) is considered a successful example of efficiently using desalination for mining purposes. With a capacity of 7,776 m³/d, the plant was built in order to prevent any conflict with the surrounding communities. It was opened at the end of 2007 and has been highly cost efficient.

### 10.6.3 Wastewater treatment

In 2011, 65.9% of Peru's households had access to a public sewer network. The following figure shows a breakdown of the different methods of sewage disposal in the country.

## Figure 10.12 Methods of sewage disposal in Peru, 2011

| | % of total households | | |
|---|---|---|---|
| **Method of sewage disposal** | **Lima** | **Rest of the country** | **Total** |
| Public network, inside the house | 86.1 | 47.4 | 59.3 |
| Public network, outside the house, shared with the rest of building | 5.3 | 7.2 | 6.6 |
| Septic pit | 2.3 | 15.1 | 11.1 |
| Cesspit or latrine | 4.4 | 14.0 | 11.1 |
| River or canals | 0.4 | 1.9 | 1.4 |
| Other | 1.5 | 14.4 | 10.5 |

Source: INEI, 2012c

The following figure shows the major municipal WWTPs in Peru, according to their treatment design capacity.

## Figure 10.13 Major municipal WWTPs in Peru by design capacity

| **Utility** | **Province** | **Plant** | **Technology** | **Design capacity ($m^3/d$)** |
|---|---|---|---|---|
| Sedapal | Lima | San Bartolo | Aerated pond | 146,880 |
| Sedalib | La Libertad | Covicorti | Aerated pond | 76,032 |
| Sedapal | Lima | San Juan | Aerated pond | 69,120 |
| EPSEL | Lambayeque | PTAR 2 - Chiclayo (San Jose) | Anaerobic- aerobic system | 53,395 |
| EPSASA | Ayacucho | La Totora | Trickling filters | 46,310 |
| Sedapal | Lima | Carapongo | Anaerobic-aerobic system | 43,200 |
| Sedapal | Lima | Puente Piedra | Activated sludge | 36,461 |
| EMAPICA | Ica | Cachiche | Facultative pond | 35,510 |
| EPS Grau | Piura | El Cucho | Facultative pond | 32,832 |
| SEDACusco | Cusco | San Jeronimo | Trickling filter | 27,648 |

Source: GTZ – SUNASS, 2008

WWTPs situated in Lima altogether were treating 242,784 $m^3/d$ of wastewater in 2011. Aerated ponds were responsible for treating 44.2% of the total volume, making them the most widely used wastewater treatment method in Lima, followed by activated sludge treatment. The following figure gives an overview of the different treatment technologies employed by Sedapal's WWTPs in Lima.

## Figure 10.14 Sedapal WWTPs in Lima – operating capacities and treatment technologies employed, 2011

| Treatment type and WWTP name | Location | Volume treated (m³/d) | % of total volume treated by technology |
|---|---|---|---|
| **Aerated pond** | | **107,481.6** | **44.2%** |
| San Bartolo | Lurín | 66,528.0 | |
| San Juan de Miraflores | San Juan de Miraflores | 34,214.4 | |
| Huáscar - Parque 26 a/ | Villa El Salvador | 6,739.2 | |
| **Activated sludge** | | **53,136.0** | **21.9%** |
| Puente Piedra | San Martín de Porres | 44,064.0 | |
| Cieneguilla | Cieneguilla | 7,430.4 | |
| San Antonio de Carapongo | Lurigancho | 1,555.2 | |
| La Atarjea (Nueva sede) | El Agustino | 86.4 | |
| **Anaerobic - aerobic system** | | **48,038.4** | **19.8%** |
| Carapongo | Ate - Vitarte | 38,707.2 | |
| José Gálvez | Lurín | 7,171.2 | |
| San Pedro de Lurín | Villa El Salvador | 2,160.0 | |
| **Oxidation pond** | | **33,436.8** | **13.8%** |
| Ventanilla | Ventanilla | 19,008.0 | |
| Nuevo Lurín | Pachacámac | 6,220.8 | |
| Julio C. Tello | Lurín | 2,246.4 | |
| Pucusana | Pucusana | 2,246.4 | |
| Ancón | Ancón | 2,160.0 | |
| Punta Hermosa 1/ | Punta Hermosa | 1,555.2 | |
| **Trickling filter** | | **691.2** | **0.3%** |
| Santa Rosa | Santa Rosa | 691.2 | |
| **Total volume** | | **242,784.0** | **–** |

Source: INEI, 2012c

In 2011, over 798 million m³ of raw wastewater was collected by EPS around the country. Only 32.7% of this wastewater received treatment before final disposal. Over half of the raw wastewater was discharged to Sedapal's network, where only 20.7% of it (about 88 million m³) was treated before final disposal. This contravenes the **Law of Water Resources (Law 29338)** and its regulation, which states that all wastewater must be treated prior to final discharge to the environment. Two new WWTPs, Taboada and La Chira, are expected to resolve this situation in Lima (for more details see Section 10.11 on current and future key projects).

The ANA must charge fees for and authorise all final wastewater discharges. The authorisation depends mainly on the treated wastewater complying with the discharge quality standards (Maximum Allowed Limit - LMP) and environmental quality standards (ECA) of the receiving water bodies, both set by the Ministry of the Environment.

Discharges and reuses that do not have authorisation from the ANA can be regarded by the **Wastewater Discharge and Reuse Adaptation Programme (PAVER)**. If the discharge/reuse does not comply with LMPs or water ECAs, the discharging entity must present an **Adaptation Plan for Environmental Management (PAMA)**. The plan should outline the investments required to improve the quality of the given discharge/reuse.

In situations where Law 29338 is infringed, the associated fines can range from 0.5 to 10,000 UIT, depending on the magnitude of environmental damage inflicted. 1 UIT is a tax unit equivalent to PEN 3,650 in 2012. The offender must ensure thereafter that environmental conditions will return back to their original state.

The proper enforcement of wastewater discharge standards can bring about important investment in upgrading treatment, particularly from within the industrial sector.

The main issues with wastewater management in Peru are the [redacted]. The following causes need to be addressed to improve this situation:

- [redacted]
- [redacted]
- [redacted]

Such causes will need to be addressed, particularly if the country is to achieve its goal by 2021 which states that 100% of urban domestic wastewater will be treated, and that 50% of this treated wastewater will be reused, as set by the PLANAA, mentioned previously.

A positive step is the overhaul of the legal and institutional framework around environmental and water resources management. This is setting the country on a new pathway towards a more efficient wastewater management.

The following figure shows the two strategic actions of PLANAA related to wastewater treatment and reuse.

### Figure 10.15 PLANAA strategic actions and goals relating to wastewater treatment and reuse, 2012–2021

| Strategic action | 2012 goal | 2017 goal | 2021 goal |
|---|---|---|---|
| To ensure that 100% of the urban wastewater produced is treated, to increase the amount treated in the rural areas, and to increase wastewater reuse | 30% of urban wastewater is treated and 15% of this is reused | 50% of urban wastewater is treated and 30% of this is reused.<br>10% of rural wastewater is treated and reused. | 100% of urban wastewater is treated and 50% of this is reused.<br>30% of rural wastewater is treated and reused. |
| | Responsible: Vivienda, SUNASS<br>Co-Responsible: ANA, Minsa, EPS, regional and local governments | | |
| To ensure the supervision of final wastewater discharges to water bodies | Technical guidelines and mechanisms to coordinate ECA and LMPs are in place.<br>ECA and LMPs for effluents from various economic activities are approved | 30% of discharge authorisation holders comply with LMPs | 100% discharge authorisation holders comply with LMPs<br>Water bodies comply with ECA for water |
| | Responsible: ANA, Minsa, Minem, Minag, Produce, Vivienda, OEFA<br>Co-Responsible: Minam, EPS, discharge authorisation holders | | |

Source: Minam, 2011

## 10.6.4 Water reuse

66% of the total wastewater treated by WWTPs in 2007 was reused. The remainder of the treated wastewater was discharged into water bodies, and only 0.1% filtered into the soil. Agriculture uses the effluent streams from 43% of all WWTPs in Peru, while the effluent streams from 8% of the WWTPs (all belonging to Sedapal) are used to irrigate recreational areas.

The PENRH Working Document of March 2012 highlights the great potential that treated wastewater has, to replace the use of drinking water in activities that do not require such a high quality of water. There is scope for this, as a volume of 3.5 million $m^3/d$ untreated wastewater is released into surface waters, and around 4,000 hectares of cultivable land are irrigated with untreated wastewater. Another motive for this wastewater reuse is the intention of PENRH to minimise the negative impacts on the health of the population and to maintain the quality of water resources.

The subject of the reuse of treated wastewater is currently regarded with a distinct lack of formality. This attitude is due to the fact that there is neither a sanitation authorisation nor a PAMA in place for the majority of some 61 WWTPs whose effluent streams serve agriculture. While only three of these WWTPs had sanitation authorisation/PAMA by 2007, only one of them actually complied with the respective ECAs. However, the new institutional and legal framework set up in the last few years has a good chance of changing this situation.

Wastewater treatment and reuse regulations are closely related. Some regulations, programmes and plans affecting reuse have already been shown in this section. The Law 29338 and its regulation have established that only treated wastewater can be reused. All reuse of treated wastewater must be authorised by the ANA, with such authorisations lasting from 2 to 6 years. An authorisation mainly depends on whether the treated wastewater complies with the quality requirements for its further use, ensuring that there is no risk to public health and other living organisms, and ensuring that it does not affect water intended for other uses. Reusing wastewater with no authorisation is subject to fines. A reuse that does not have authorisation from the ANA can be considered by the PAVER under the conditions mentioned in the previous subsection on wastewater.

In terms of future plans, the most prominent reuse goal for Peru is set as the priority target in the PLANAA: treating 100% of urban domestic wastewater and reusing 50% of this by 2021 , as detailed previously.

Reuse is an effective way of achieving high **water efficiency**, which has become a higher priority in Peru's policy agenda over the last couple of years. There are already some country-wide initiatives in place that could potentially open investment opportunities in the near future. For example, SUNASS has taken the lead down the route towards achieving more efficient use of municipal water in Peru; in February 2012, resolution N° 008-2012-SUNASS-CD approved a modification to the Quality of Water and Sanitation Services Regulation. This changed the classification of the water used to irrigate public green areas, to the commercial category, which approximately doubled the tariff for the use of water for this purpose. This measure aims to discourage municipalities from using potable water for irrigating gardens, and hence encourage them to instead provide it to people who currently do not have access to the drinking water supply. By achieving this, it is expected that wastewater reuse will become a

much more economically viable option for meeting the needs of irrigation of public green areas. According to the resolution, this will be implemented in January 2013, and will open opportunities for investment in WWTPs if correctly implemented.

## 10.7 Water finance

**The National Sanitation Plan 2006–2015** requires an investment of about $4 billion for works related to drinking water networks and treatment, wastewater networks, and wastewater treatment, as shown in the following figure.

### Figure 10.16 Investment required to meet objectives of the National Sanitation Plan 2006–2015

| Destination of investment | Drinking water (network and treatment) ($ million) | | | | Wastewater network ($ million) | | | Wastewater treatment ($ million) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Expansion | Rehab | Metering | Subtotal | Expansion | Rehab | Subtotal | Expansion | Rehab | Subtotal |
| Urban | 757 | 395 | 88 | **1,240** | 1,165 | 223 | **1,388** | 1,100 | 32 | **1,132** |
| SEDAPAL | 433 | 145 | – | **578** | 489 | 145 | **634** | 367 | – | **367** |
| Other EPS | 251 | 207 | 71 | **529** | 509 | 68 | **577** | 581 | 31 | **612** |
| Others | 73 | 43 | 17 | **133** | 167 | 10 | **177** | 152 | 1 | **153** |
| Rural | 94 | 125 | – | **219** | 66 | – | **66** | – | – | **–** |
| **Total** | **851** | **520** | **88** | **1,459** | **1,231** | **223** | **1,454** | **1,100** | **32** | **1,132** |

Source: Vivienda, 2005

The following figure shows the funding scheme for the period 2009–2015 (the figures may vary according to the resources available).

### Figure 10.17 Funding scheme for the period 2009–2015

| Funding source | $ million | % |
|---|---|---|
| Private sector | 872 | 31 |
| International Debt | 700 | 25 |
| Government (national or regional) | 350 | 13 |
| Donations | 300 | 11 |
| SEDAPAL | 280 | 10 |
| National counterpart (for international debt) | 165 | 6 |
| EPS own resources | 105 | 4 |
| **Total** | **2,772** | **100** |

Source: Vivienda, 2005

Besides the regional governments' own budgets, the national government leads the **Water for All** social programme, which aims to improve the water and sanitation conditions for marginalised communities in both urban and rural areas. Water for All aims to halve the percentage of people lacking un-interrupted access to water and sanitation services by 2015.

### 10.7.1 Funding sources

#### 10.7.1.1 Tariffs

SUNASS redefines the tariff structure for each EPS every five years. During each five-year period, the EPS are required to improve the quality of their services. It is mandatory for them to present an **Optimised Master Plan (PMO)** to SUNASS, which includes the EPS investment plans and activities. After evaluating this, SUNASS conducts a tariff study that defines tariffs, ensuring that they cover the costs of operation, maintenance of infrastructure, and the re-payment of any debts. Utilities may request an update to their tariff structure before the end of the five years if there are any changes in their investment plans that they wish to include in their PMO's.

SUNASS last updated Sedapal's tariffs in May 2012. The tariff is composed of a fixed charge of PEN 4.886 /month and a variable charge depending on the volume.

The following figure shows the Sedapal tariff structure in Lima.

### Figure 10.18 Sedapal tariffs (variable charge), May 2012

| Category | Consumption range (m³/month) | Drinking water tariff (PEN/m³) | Wastewater collection and treatment tariff (PEN/m³) |
|---|---|---|---|
| **Residential** | | | |
| Social | 0 or more | 0.969 | 0.424 |
| Domestic | 0–10 | 0.969 | 0.424 |
| | 10–25 | 1.125 | 0.492 |
| | 25–50 | 2.488 | 1.088 |
| | 50 or more | 4.221 | 1.844 |
| **Non-residential** | | | |
| Commercial | 0–1,000 | 4.221 | 1.844 |
| | 1,000 or more | 4.527 | 1.978 |
| Industrial | 0–1,000 | 4.221 | 1.844 |
| | 1,000 or more | 4.527 | 1.978 |
| Government | 0 or more | 2.365 | 1.033 |

Source: SUNASS, 2012a

Water tariffs in Peru were frozen for about 30 years up to the year 2007. By the end of 2010, they were the lowest in South America. There are many reasons for this, including political interests, and the high quality of water resources available in some cities, which require relatively minimal treatment before distribution. Over the last 5 years SUNASS has been pushing for the increase in water tariffs, and as a result, they have increased by an amount between 40% and 70% in all Peruvian cities in recent years.

The objective of the tariff increase is to reflect the costs of providing services and to cover further investments for improving coverage and service quality. Tariffs will have to increase further in order to increase the amount and quality of sanitation infrastructure. For example, Sedapal in Lima increased the number of water and sewerage connections by 1.2 million between 2007 and 2011, which was reflected in a 40% tariff increase during that period.

Connected to the hike in tariffs was the concern of how it would affect the poorer communities in Peru. In March 2010, the **Ministers Council (PCM)** proposed a new drinking water tariff scheme that would take into account this concern. In August 2011 SUNASS approved the inclusion of a mandatory cross subsidy scheme in the drinking water and wastewater tariff systems of all EPS across the country (resolution RCD 030-2011-SUNASS-CD). As part of this scheme, richer households subsidise poorer ones in a way so that the costs of service provision at utility level are still covered. Sedapal has been the first utility to include such subsidies in 2012 as a trial (see previous figure). The scheme is expected to be employed by utilities in the rest of the country progressively.

Another potential way of funding utilities works has been proposed in congress. In June 2012, congress approved a draft proposal for providing tax breaks for sanitation service providers. The aim of this proposal is to allow utilities to properly invest in improving and expanding their services. If the proposal is approved, then there will be a three-year income tax exemption for utilities from 2013.

## 10.7.2 Capital expenditure

In 2011, EPS altogether invested a total of PEN 1,500 million. Sedapal accounted for 87% of this investment. During the period 2007–2011, Sedapal planned that 72% of their investment would go towards augmenting its infrastructure. The rest of Sedapal's investment would be used to renovate and improve existing infrastructure and services.

Sedalib had the second highest investment in 2011, reaching PEN 131 million, or 9% of the total investment by EPS.

Regarding the Water for All programme, between August 2011 and June 2012, more than 84% of water and sanitation projects were focused on regions with poverty rates of above 30%. This is equivalent to an investment of over PEN 1,070 million.

In urban areas, the programme will not only promote private investment, but will also optimise the use of installed capacity, secure investment for utilities, and prioritise investment for rehabilitation.

The following figure shows the government's investment in urban water and sanitation works between 2005 and 2010 according to funding sources.

### Figure 10.19 Government's investment in urban water and sanitation works, 2005–2010

| | $ thousand | | | | |
|---|---|---|---|---|---|
| Year | Ordinary resources | Resources collected directly | Loans, external resources | Donations | Total |
| 2005 | | | | | |
| 2006 | | | | | |
| 2007 | | | | | |
| 2008 | | | | | |
| 2009 | | | | | |
| 2010 | | | | | |
| **Total** | | | | | |

Source: Vivienda, 2011

## 10.7.3 Operating expenditure

In 2011 EPS in Peru altogether incurred a total operating expenditure of . Sedapal EPS accounted for the largest fraction of this at 61%, followed by EPS Grau at 6% (PEN 98 million). Sedalib and Sedapar then followed this at 5% each.

## 10.8 Private sector participation

In Peru, as in other Latin American countries, the general public remains wary of the private control of water resources and services. This is evidenced by the fact that there is only 1 concessioned EPS and attempts to privatise or concession Sedapal were always met by public outcry. Therefore, full privatisation in the water industry is not an option for the public sector. Instead, various voices within the government are in favour of PPPs to help close the water and sanitation infrastructure gap, which in Peru is around $6 billion (half of this is from Lima) according to SUNASS. In fact, the economic growth prospects of Peru, followed by the rising living standards of the population, should make PPPs in the water and sanitation sector attractive to private investors, both foreign and national.

In 2007 Vivienda approved the **National Strategy for PSP in EPS**, which provided the groundwork for the government to grant concessions of public water utilities (also known as EPS) to the private sector. Various government bodies were involved, from local authorities to EPS themselves, with ProInversion being given a lead role. The strategy set the tone for the participation of private operators in 2 areas: EPS management (involving the utility as a whole) and EPS specific projects (such as treatment plants). The result was that the public sector could, on a temporary basis, grant the ownership of the assets to the private sector (concession) or not (non-concession). The following figure summarises the modalities of PSP in EPS.

### Figure 10.20 Modalities of PSP according to the National Strategy for PSP in EPS

Source: Adapted from Vivienda, 2007

From 2007 onwards private companies started presenting their initiatives for concessions in water and wastewater treatment plants to ProInversion. However, all of these fell into the category of "concession of EPS specific projects" (see further details in Section 10.9, on procurement). This was somewhat foreseeable due to public opinion which made it unfeasible to grant EPS in concession or lease to the private sector.

By late 2011 ProInversion and the Ministry of Housing re-started a **discussion around using PPPs to manage EPS's** that are not demonstrating an acceptable performance (this would not include Lima). The aim was to improve the service and the finances of the utilities. Two utilities, EPS Grau and EPS Pucallpa in the Piura and Ucayali regions, respectively, prompted this discussion. So far management contracts for both utilities are being considered, rather than full concessions. The only EPS operating under a PPP (at the time of writing) is Aguas de Tumbes, which was concessioned in 2005 for 30 years.

The discussion progressed and in November 2012 the congress approved the **Law for the Modernization of Water and Sanitation Services**. The President is expected to pass the law during the first half of 2013. The law considers the formation of the Technical Unit for the Management of Water Utilities (OTASS) and sets a **Temporary Support Regime** for those EPS whose evaluation shows bad performance (more details of the law provided in Section 10.4.2). OTASS can promote PPPs or a fusion with other EPS as ways to refloat EPS that are performing below standards. PPPs can be related to either specific projects (such as treatment plants) or services (opening a window for EPS concession). An EPS could be under such a support regime for up to 15 years, and PPPs should take place only within that period. PPPs should abide by the Legislative Decree 1012 Legal Framework of PPPs (see Section 10.9.3). This initiative shows that involving the private sector is an important part of the government efforts to try to improve overall efficiency and management of the water sector.

A new observed trend is that
Investors include private
This is in part due to government efforts to promote local private investment.

**Projects for Taxes** or **PfT** (*Obras por Impuestos*, Law N° 29230 from 2008 and its regulation Supreme Decree DS 133-2012-EF from 2012) is a government scheme to promote private investment in priority public infrastructure projects. Of the 11 investment areas, 1 is the construction, improvement and expansion of drinking water and sanitation systems. The scheme allows private companies to fund and carry out a project in exchange for a discount on the income tax equivalent to their funding of the project. There are plans to change the involvement of the local government and expand the number of participating municipalities in order to improve the scheme. According to ProInversion, by June 2012, 8 projects had been completed, 15 were being carried out and 812 were still available to be taken up by a private company. A recent example of such a project is

AFPs have a legal cap of 30% for their investments abroad,
. In 2009 the Association of AFPs set up a trust fund of, initially, to finance infrastructure projects. Its first investment was in May 2010 when
In the first half of 2012 the fund made another notable investment of .

**The new structure of ProInversion should be a step towards meeting certain challenges.** With the relatively recent developments discussed above, great responsibility lies with ProInversion to promote infrastructure projects and seize funding opportunities. It will have to coordinate more closely and dynamically with local and regional governments to identify their infrastructure priorities. Likewise, it will have to further engage with the private sector working in the water and sanitation industry to facilitate their participation in realising infrastructure projects.

## 10.9 Procurement process for water and wastewater infrastructure

The particular features of Peru's procurement process for water and wastewater plants are:

- There are tenders involving concession of assets for a certain period, and others which do not require concessions.
- The procurement models are varied and range all the way from those involving broad specifications (
  to those requiring very detailed specifications depending on
- The private sector can propose a concession project, which could later be openly tendered and won by a competitor.
- The wins the bid.

### 10.9.1 Summary

The 2 broad categories of procurement models for public water and wastewater projects are:

- Concession of assets
- Non-concession

ProInversion is the only body in charge of **concession** of public assets to the private sector. Therefore, these types of contracts involve the operation and transfer of assets back to the public sector after a period in the range of, usually, 20–25 years. The procurement model is a BOT or variations of it. A particular feature here is that the private sector can also propose projects to ProInversion, and so there is potential for the private sector to have an active role. However, if ProInversion decides that the project is of interest, the tender process will be open to other competitors as well, making private companies careful and strategic about what project to propose and when. On the other hand, remaining public bodies can tender **non-concession** projects themselves. The procurement models vary from DB or DBO to Design-Bid-Build (DBB) and DBO's tend to be for a short period (usually in the range of 1–4 years).

The following figure gives a summary of the type of procurement model according to the size of the project and the broad procurement category.

### Figure 10.21 Procurement models according to project size and broad procurement category

| | Public body in charge of procurement | Project proponent | Project size | |
|---|---|---|---|---|
| | | | Large | Small |
| **Concession of assets** | | | | |
| **Non-concession** | | | | |

Source: GWI research

Procurement processes of treatment plants in Peru share common characteristics regarding the following categories:

- Level of openness
- Private companies' way of participation
- Prequalification stage
- Criteria for awarding contracts and ensuring quality
- Speed of procurement processes

These characteristics are unpacked in greater detail below.

## 10.9.2 Common characteristics to all procurement processes

### 10.9.2.1 Level of openness

In all cases tenders are **public and are open to national as well as international bidders**. International companies are welcomed, with the only requirement
The client might send invitations to certain companies but that does not necessarily give them an advantage or preclude others from participating. In any case large companies usually have a specific unit in charge of scanning public sector websites and newspapers for business opportunities.

### 10.9.2.2 Private companies' way of participation

It is common for international companies
. According to industry experts this is not because of government requirements or preferences, but because of s
Consulting engineers can j
However, consulting engineers who
contractors.

### 10.9.2.3 Prequalification stage

Procurement processes include a prequalification stage. In the case of large projects, prequalification criteria are such
The criteria are basically structured to investigate
Therefore, prequalification should not be a problem for
.

### 10.9.2.4 Criteria for awarding contracts and ensuring quality

In Peru, the norm for both concession of assets and non-concessions is for the bid **to win**.

Each bidder presents both a technical and a financial bid. Typically, both are presented at the same time, but in separate envelopes. The evaluating committee first reviews
. Next, it opens the envelope with
and also scores it. Finally it ranks the bidders according to the full score.

In theory both technical and financial aspects are evaluated. However, resulting in .

In terms of ensuring , there seem to be a few underlying assumptions in the public sector:

- If the project is This is the premise behind If the contract is a BOT, it is understood that .
- If the project is small it will . Bidders will be (there are no national companies with expertise exclusively in the water sector). Therefore in order to ensure , the public body will first select .

According to industry experts, the criterion of awarding contracts , is due to:

- .
- 

This situation is not in the country's best interest. In the long term, however, the result will be . International EPC contractor-developers with operations capabilities are in the process of

### 10.9.2.5 Speed of procurement processes

According to industry experts, ProInversion concession processes are usually slow (taking, on average, 2 years) and yet whilst delays to the tender schedule are expected, the concession is still certain to happen. In 2012 players saw 2 large ongoing concession processes in water and wastewater projects come to a standstill, which understandably worried the private sector. However, this is likely to be only temporary as the reasons for the halt are to do with internal disagreements rather than a lack of political support at governmental level. In fact, the administration in office is supportive of PPPs and is expected to continue being so. The projects are:

- **Aguas de Lima Sur II** (initially proposed by Biwater in 2008): The tender for its concession came to a halt in early 2012 after a long battle between Sedapal and SUNASS. The size of the project and the beneficiaries were questioned and deemed to be biased in favour of certain interests, according to our sources. The project was downsized, resulting in a desalination plant of 12,960 m³/d capacity and new total costs of $110 million. The downscaled project was named Provisur and its tender was launched on 21 December 2012.
- **Operation, maintenance, reinstatement and upgrading of Sedapal's 16 WWTPs** (initially proposed by Proactiva Medioambiente in 2008): The tender for its concession came to a halt in August 2012. However, by October 2012 Sedapal revealed that they were reviewing the concession to launch a new tender.

Non-concession projects, on the other hand, are generally perceived because :

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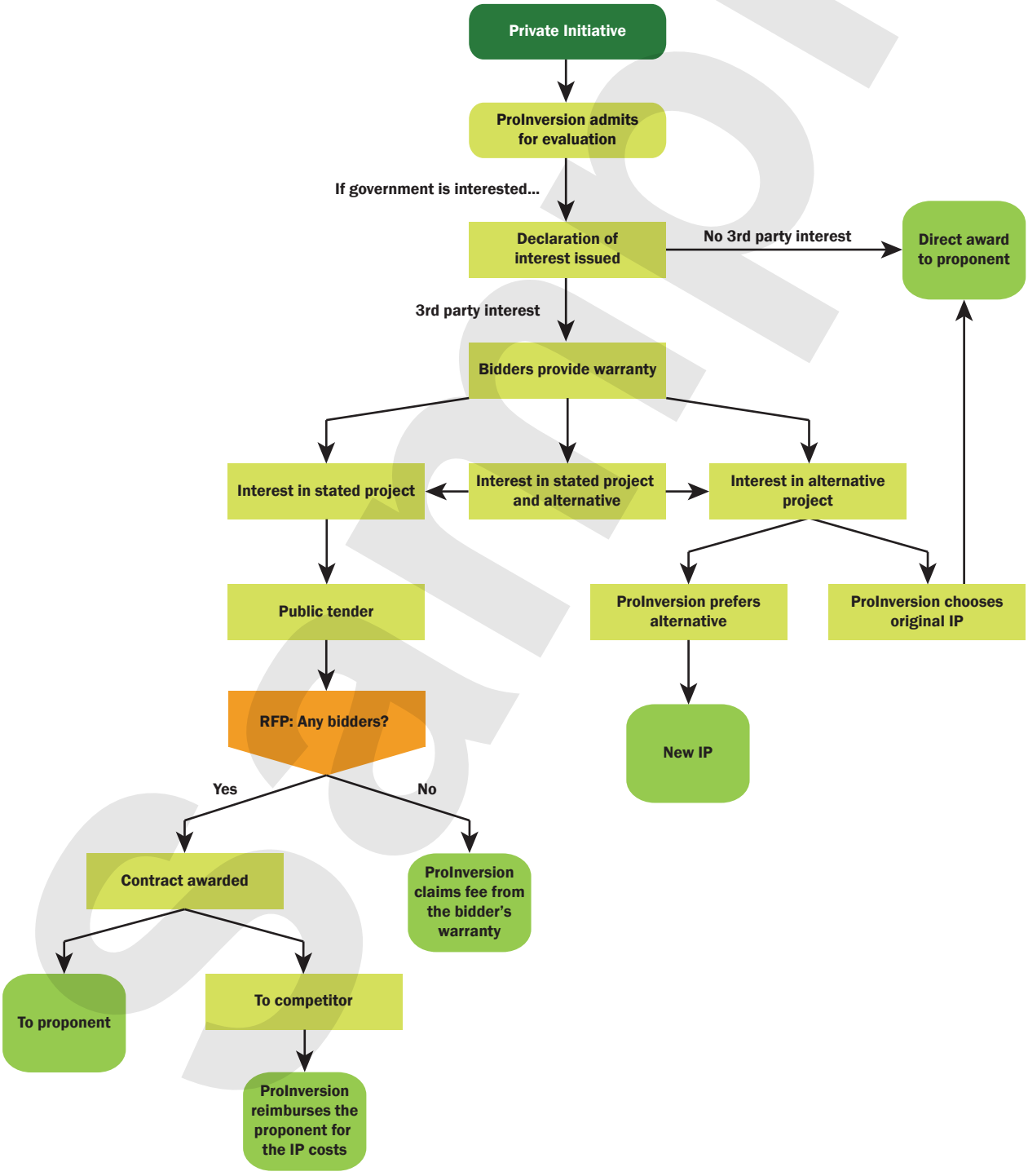
The following subsections identify and explain the procurement models for both concession and non-concession categories.

### 10.9.3 Concessions

ProInversion grants concession projects that are either public or private sector initiatives. Once a project is found to be of interest it undergoes the same type of public tender towards a BOT (or variations) regardless of whether it originally emerged from a public or private source. The specific details of the public tender are presented in the request for proposals (RFP).

ProInversion has the **Private Initiative (IP)** system in place for when the private sector presents concession project proposals (also known as "Swiss challenge" in international jargon). This presents the market with dynamic prospects as it allows the private sector to have a more active role. At the same time, the way the IP mechanism is set up also requires strategic planning regarding what to include in the IP and when to present it. The following figure shows how the mechanism works all the way from the presentation of the IP until its award.

### Figure 10.22 Private Initiative flow diagram




Source: Adapted from ProInversion, 2010

In summary, a public tender arising from an IP starts with a company making a speculative bid proposing a project to ProInversion, who can then issue a declaration of interest on behalf of the government. If no other companies are interested in the project, then it is granted to the proposing company. Otherwise a public tender is issued.

The tender contains **very broad specifications** which could be, for example, the expected outcomes of the project ("performance specifications"). They can include, for instance (in the case of a WWTP): compliance with discharge standards, improved quality of the receiving water body and reuse activities, amongst others. At this stage consulting engineers are involved to support studies and pre-design in order to estimate the costs and broad specifications. It is then the bidders' responsibility to generate the best technical option for the tender reference value. Bidders will provide the funding for development of the IP which they will recover from tariffs charged to users.

, which in most cases has been specifically worded . The concession period is usually in the range .

The legal framework for IPs is arranged by:

- **Legislative Decree DL1012 Legal Framework of Public-Private Partnerships**, passed in 2008 with the purpose of reducing the investment deficit on public infrastructure and services. It states that IPs must be financially self-sustained.
- **Directive 004-2009-PROINVERSION**, which laid the requirements for the Processing and Assessment of Private Initiatives in Investment Projects.

So far, the concession of water (including desalination) and wastewater plants has arisen from IPs. Taboada WWTP was the first IP presented under this framework. The following figure shows the concession projects granted or just tendered.

### Figure 10.23 Water and wastewater plant concession projects up until 2012

| Project | Concession period | Origin of proposal | Status |
|---|---|---|---|
| Taboada WWTP | | | |
| La Chira WWTP | | | |
| Aguas de Lima Sur II (renamed as "Provisur") (desal) | | | |
| Sedapal's 16 WWTPs | | | |

Source: GWI research

It is worth noting that the "National Strategy for PSP in EPS" sets 4 types of concession for specific projects within an EPS. However, . This reflects the preference of

Still, the legal framework around IPs implementation has space for improvement. A study carried out by SUNASS staff in 2012 states that the **main problems with the IP mechanism** for water and sanitation projects are as follows:

- The IP mechanism does not, with precision, establish the minimum level of technical information or preliminary engineering for a project proposal by private players. This results in a lack of resources to correctly evaluate such initiatives. Therefore, the tariff studies based on these proposals will be subject to variations and will not have a definitive answer regarding the economic viability of the initiative.
- The previous problem could pose a high risk to proposals involving costly technologies that are not necessary for achieving the desired results (and so are not cost-efficient). This could translate into higher tariffs for consumers. By introducing bidding for the design stage, this risk could be reduced.
- The IP mechanism is too long and complex, particularly because there are a lot of government entities involved in the evaluation of private initiatives. This problem is further compounded by the fact that there are no clear delimitations around each entity's sphere of responsibility. (This is particularly true of the recently created Minam and ANA).

## 10.9.4 Non-concession projects

The procurement models used for non-concession projects depend on This will determine how attractive the project is as a business opportunity.

Only to attract international companies.
If there are experienced international companies in the pool of bidders, then the government

. This results in . In these cases the specifications given by the client are .

However, if the project is . This is significant because there are . Local companies that bid for water projects . As such, great responsibility lies . They have to . This results in a .

The specificities of the procurement process are laid out in a legal framework for government procurement. The same legal framework applies to all large and small projects, as long as they are non-concession.

The following 3 subsections provide further details of the legal framework and procurement models according to .

### 10.9.4.1 Common framework

Public bodies other than ProInversion, such as EPS, municipalities, regional governments and central government through the Ministry of Housing, can tender their projects themselves. Which one puts forward the tender will vary, depending on certain factors such as:

- Who comes up with the project.
- Who provides the most or full financing of the plant.
- Scale and impact of the project.

Public bodies carry out their own tenders subscribing to the following laws: the Law for Government Procurement (Law 29873) and its regulation (Supreme Decree DS 138-2012-EF), both passed in 2012. The **Supervisory Body of Government Procurement (OSCE)**, under the Ministry of Economy and Finance, monitors the implementation of this legal framework.

All such tenders have to be published in . There is also a government service . Further, public bodies also publish t .

Under Peruvian law, there are 3 so-called "contracting systems" (*sistemas de contratacion*) that apply either to consulting services for the design of specifications or to infrastructure works. These are important both for public bodies and for bidders; they enable public bodies to calculate the reference value of the tender and evaluate bids, and help bidders to devise economic proposals. The contracting systems are:

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For example, tenders for consulting engineers to develop the technical designs fall under would be calculated under a .

The legal framework also provides the following options for the "mode of contract implementation" (*modalidades de ejecucion contractual*):

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- 

The mode of contract implementation is specified in the terms of reference of the bid.

### 10.9.4.2

with the aim of training the EPS that will be in charge of operating the plant and ensuring a smooth transition. The client finances the work and the assets remain the property of the client at all times. The **Projects for Taxes (PfT)** scheme, mentioned earlier in the chapter, for water and wastewater treatment plants. Regional and local governments (including municipalities) are responsible for prioritising projects and selecting the private company that will fund, and in some cases also carry out, a project. ProInversion supports the PfT scheme by compiling the national list of priority projects. ProInversion can also support the company selection processes by providing advice or even managing this process if local governments request it.

Private companies enter this scheme as part of their CSR efforts. They can propose a project to the regional government or offer to fund and carry out a listed project themselves. If the company only finances a project then the local government will be in charge of the plant tender, in which case it will have to be published in SEACE and be subject to the legal framework described above. If the project is carried out by the company, then they will tender the plant.

The PfT only applies to , where the client manages the project (local governments or the PfT selected company, respectively).

Examples of this scheme are:

- In July 2011
- In September 2009, a consortium made up of

### 10.9.4.3

In order to ensure quality on this type of project the public body will first of all select . Once the work has started the public body, together with will supervise the construction very closely.

The technical specifications provided by ), according to industry experts. If the public sector body has had a negative experience with a certain type of equipment in a previous project, then t . In general the companies are free to choose the equipment.

## 10.10 The supply chain

Procurement models in Peru have shaped the players and their importance in the market.

The non-concessions model has resulted in the existence of:

- , who are mostly although there are also some . They advise the public sector on initial plans, as well as .
- are . are particularly interested if the size of the project is considerable or if there is an operations element involved ). The latter would occur in the case of a .

In both concession and non-concession cases it is worth noting that:

- The technical specifications
- Consulting engineers

Local players are important in the development and implementation of water and wastewater plants in Peru. Local

A few of these local companies have expanded operations to other Latin American countries.

The following subsections detail the players in the Peruvian market.

### 10.10.1 Consulting engineers

Consulting engineers in Peru

In both cases
Usually the firms that supported the development of the specifications are
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The most active consulting engineers in water and wastewater treatment in Peru are:

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Consulting engineers are selected via public tenders according to their experience. They participate
For example,

### 10.10.2 Contractors

In Peru the contractors are usually e

Lately, the most active foreign EPC contractor-developers with operations capabilities in Peru have been European and Brazilian.

European companies:

- 

- [redacted]
- [redacted]
- [redacted]
- [redacted]

Brazilian companies have taken Latin America as their ground for expansion, which has certainly worked for them. The main companies in the water and wastewater field in Peru are as follows:

- [redacted]
- [redacted]
- [redacted]

In Peru the local [redacted]. They are companies that deal with water treatment as part of their project portfolios, which also tend to include transport infrastructure. There are no local water and wastewater specialist construction companies. Industry experts say that this is due to the size of the market: the 3 largest cities (Lima, Arequipa and Trujillo) represent most of the business opportunities, as these are where the majority of the population are and where any significant economic growth will take place. Therefore, the market is not large enough to sustain a company which works exclusively on water projects. Another major source of business opportunities in water and wastewater treatment in Peru is the mining industry.

The two main Peruvian construction companies that have taken part in water and wastewater treatment projects are:

- [redacted]
- [redacted]

2 further possible local competitors are **JJC Contratistas Generales** and **Constructora MPM**. JJC Contratistas Generales (https://www.jjc.com.pe/) is one of the largest construction companies in Peru, with offices in Chile and Colombia. It has experience in concessions and large infrastructure projects, which it could draw upon if it plans on entering the water and wastewater treatment sector. Likewise, Constructora MPM (http://www.constructorampm.com.pe/) has experience in water and wastewater networks but no experience, as yet, in treatment plants. Its experience might make it a candidate to enter such a market.

[redacted] a Peruvian holding of 6 engineering and infrastructure services companies, is one of the largest conglomerates in the country. One of its companies is [redacted] dedicated to engineering and construction, as well as managing concessions of large-scale infrastructure such as transport and, recently, wastewater. It operates in 7 countries, including Peru. The other 6 are: Brazil, Chile, Colombia, Dominican Republic, Mexico and Panama. Some of its recent projects in Peru include:

- **Pachacutec-Ventanilla WTP** in the province of Callao, under Sedapal supervision. [redacted]

- **La Chira WWTP** in Lima, under Sedapal supervision. The ACCIONA Agua – GyM consortium won this 25-year BOT in November 2010. The project cost around $165 million. The WWTP will treat around 25% of Lima's wastewater. The expected average operational capacity is 544,320 m³/d and the design capacity is 976,320 m³/d.
- **Tomilla II WTP** in Arequipa.

actively looks to associate with leading international companies in order to build their own expertise in water and wastewater plants and a portfolio of references. The company participates on its own in various other water-related projects.

### 10.10.3 Private operators

In Peru there are no private operators per se. This relates to the fact that the general public in Peru, like in many other Latin American countries (with Chile being the exception) is wary of the private sector controlling water and wastewater services.

The private sector is slowly entering the operations arena through EPC contractor-developers with operations capabilities. This is evidenced by La Chira and Taboada WWTPs. In both cases the private companies do not have direct relations to the users but only to the client, Sedapal.

### 10.10.4 Equipment suppliers

According to industry experts, the choice of equipment for both foreign and local players depends on the experience they have had with equipment and brands in the past.

At local level, basic types of input are available (such as pipes) but anything with more technological content (such as membranes and pumps) will be imported from the U.S. or Europe.

Foreign EPC contractor-developers with operations capabilities present in Peru work with international brands with which they have experience on other projects. Contracts will be decided at head-office level before being appointed to country representatives.

Local EPC contractors/construction companies will deal with equipment distributors who recommend equipment that meet their specifications. There are also country representatives of certain brands who engage with local companies, advising them on their equipment needs and providing post-purchase support.

## 10.11 Current and future key projects

### 10.11.1 Current projects

In mid 2012 there were 4 main wastewater projects taking place in Peru. They are all related to the Sedapal EPS, which indicates the recent push towards improved wastewater treatment, as required by law and national policy goals.

- **Taboada WWTP** will be the largest WWTP in the country. It will have a design capacity of 1,209,600 m³/d and will benefit 4 million people. The 25-year contract with ACS Group was signed in August 2009, with an investment of $212.5 million. By May 2012 the plant was 70% complete, and is expected to be finished by July 2013.
- La Chira WWTP has a preliminary average capacity of 518,400 m³/d and is expected to treat 25% of Lima's wastewater. It will benefit 3 million people. The plant is expected to be completed by mid 2014.
- Santa Clara WWTP was 85% complete by May 2012. The plant will work with activated sludge technology and its design capacity is 36,806 m³/d. It will benefit 64,000 people around the Ate Vitarte area, and the treated water will be used for irrigation. The consortium "La Gloria", formed by Abengoa (through Abeima), and GyM are responsible for the construction of the plant. The current investment for this project is $45 million.
- Pachacutec WWTP: This is part of the "Expansion and improvement of drinking water and wastewater services Pachacutec Macro-project" which also considers the surrounding pipeworks, connections and reservoirs. This project is the largest project under the Water for All programme. It will benefit over 150,000 people, and was awarded to the Abengoa and GyM consortium. The contract was signed in March 2011 for PEN 326,346,782. Works were due to commence by August 2011, but by April 2012 not even the technical study was completed. In May 2012 a large protest against the delays from the population set to benefit from the project in future prompted Vivienda and Sedapal to sign an agreement to start the works in November 2012.

Once these and the 16 other Sedapal WWTPs are completed, Lima will have 100% wastewater treatment.

### 10.11.2 Future projects

The tender for the Provisur project was launched in December 2012 (more information on this can be found in Section 10.6.2 on desalination). However, the tender for the operation, maintenance, reinstatement and upgrading of Sedapal's WWTPs was cancelled in 2012. It may or may not be reopened.

## 10.12 Future market directions

Peru's water market presents growing opportunities for private sector participation. Such opportunities have been opened by the following initiatives:

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However, the effectiveness of both these initiatives will depend on a stronger institutional system, and enforcing measures that translate such plans into actual market opportunities.

## 10.13 Market forecast