
Angola
Electricity sector overview

In 2015, the installed capacity in Angola was 2,210 MW. Electricity generation was 5,613 GWh in 2014. Of the installed capacity, roughly 69 per cent is from hydropower, while coal-fired plants represent 22.3 per cent and combined cycle gas turbines represent 8.6 per cent. The remainder (0.1 per cent) consists of other renewable sources (Figure 1). According to the World Bank, the electrification rate in 2012 was 37 per cent.

In addition, the Electricity Sector Transformation Program (PTSE) proposes that power sector reform should evolve through four different phases. The Preparatory Phase (Phase 1), which involves a diagnostic and design study, was completed with the establishment of three new power entities for electricity: generation, transmission and distribution. It was also completed with the strengthening of the Regulating Institute of the Electrical Sector (IRSE). The Preparatory Phase will also lead to a review of tariffs and subsidies, including stabilization and tariff adjustments toward cost reflective value. Phase 2, which is expected to start in 2018 and continue until 2021, introduces the concept of sector-wide operational efficiency with tariffs approaching the cost of production, and includes the incentivised participation of the private sector in renewable energy (RE) in rural areas (in the form of feed-in tariffs). Partial liberalisation of distribution systems and the energy sector, including full participation of independent power producers (IPPs) and the improvement of the energy mix, is expected to be concluded by 2017 as part of Phase 3 of the PTSE.

Presidential Decree No. 256/11, National Policy and Strategy for Energy Security established a set of objectives for the electricity sector for 2025 and reinforced the
importance of electricity to the country. These goals included, amongst others, increasing the electrification rate from 30 per cent to 60 per cent, quadrupling generation capacity from the current 2.0 GW to 9.5 GW in 2025, extending more than 2,500 km of lines and substations in the transmission grid, establishing international interconnections, rehabilitating distribution networks and adding more than 1.5 million consumers.

According to the Centre of Studies and Scientific Research, the installed capacity in the north, central and southern systems was split between thermal and hydro production from 2009 to 2011. The expected capacity for 2018 is presented in Table 1. There are three main transmission systems in the country: North, Central and South, with the remaining areas currently on isolated systems. While it is currently a challenge facing the sector, there is a plan to interconnect the three independent grids by 2025. The service capacity (peak demand), considering maximum supply from all producers in operation at the end of 2011, is shown in Table 2.

<table>
<thead>
<tr>
<th>System</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>610</td>
<td>187</td>
<td></td>
</tr>
<tr>
<td>Centre</td>
<td>11</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>27</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>648</td>
<td>319</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>967</td>
<td>1,208</td>
<td>1,268</td>
</tr>
</tbody>
</table>

Source: Electric Sector Transformation Program

Actual demand is very significant and requires a large increase in the country’s production capacity. With the implementation of actual projects, it is expected that the peak demand in 2020 should be around 5,000 MW. The National Electricity Production Company (PRODEL-E.P) is currently responsible for 20 per cent of production in the country and is already operating all lines of transmission. The Office for the Management of the Middle Kwanza manages the largest production centre of the country, Capanda, until all public production assets of the country are passed to PRODEL (as planned). The Angolan electrical system is not part of the Electricity Exchange SADC SAPP.

Despite robust growth in electricity production from 2007 to 2014, on average, the sector still constituted less than 1 per cent of the country’s GDP. The electricity sector in Angola currently has one of the lowest rates in Southern and Eastern Africa. With a high rate of transmission losses and distribution, efficiency is also one of the lowest in the region. Cost recovery in the sector was estimated just over 20 per cent in 2005. Consequently, 80 per cent of the cost is remitted via government subsidies.

The IRSE is responsible for regulating the energy sector in Angola. It was established by Decree No. 4/02 on 12 March 2002 and plays the role of the regulator of the electricity sector, including the regulation of production, transport, distribution and sale of electricity in the Public Electricity System (SEP). It also regulates the commercial relationship between these different systems. The market prices for electricity are regulated by Presidential Decree No. 4/11 on 6 January 2011, which provides the basis for the calculation of the electricity tariffs. The design principles of the newly established model intend to strengthen the regulator’s (IRSE) role, to develop a competitive process for both public and private generation and to establish an Independent Transmission Operation, which will also act as a single buyer for all electricity generated in the SEP.

Small hydropower sector overview and potential

The definition of small hydropower (SHP) in Angola is up to 10 MW. Installed capacity of SHP in Angola is 12.92 MW while the potential capacity is estimated to be 861 MW, indicating that approximately 1 per cent has been developed. Between World Small Hydropower Development Report (WSHPDR) 2013 and WSHPDR 2016, installed capacity has increased slightly while potential capacity increased by 727 MW.

Angola has enormous hydropower potential. Hydropower currently provides 69 per cent of the country’s electricity (Figure 1). However, facilities were destroyed in the civil war and the government has not succeeded in keeping supply in line with expanding demand. The technical hydropower potential is around 80 TWh/year and the economically available hydropower potential is 72 TWh/
year (18 GW). SHP potential is currently being assembled into the Atlas of the Hydropower Resource. The study, conducted by the Ministry of Energy and Water, has identified 100 sites to be exploited, with a total potential capacity of 861 MW. The hydropower potential of Angola has five strands: Atlantic (41.1 per cent), Congo/Zaire (21.6 per cent), Etosha (3.8 per cent), Cubango/Cuito (11.9 per cent) and Indica (18.6 per cent).

Renewable energy policy

Angola has an evident potential to use RE, particularly from water, solar, wind and biomass. Motivated by the country’s low electrification rate, in 2009, the government invested in RE technologies to meet the electricity needs in rural areas. Using photovoltaic solar energy, 47 localities will be electrified mainly in Bié, Moxico, KuandoKubango and Malanje provinces. In terms of wind energy, the construction of a wind farm of 100 MW in Tômbwa is expected to support the development of the fishing industry in the Namibe province.

Barriers to small hydropower development

The main barriers for SHP development in Angola include:

- Limited long-term financing models and private investors to provide RE to customers at affordable prices;
- Limited access to appropriate technologies in the mini, micro and pico hydro categories;
- Limited infrastructure for manufacturing, installation and operation including maintenance of SHP plants.

References
