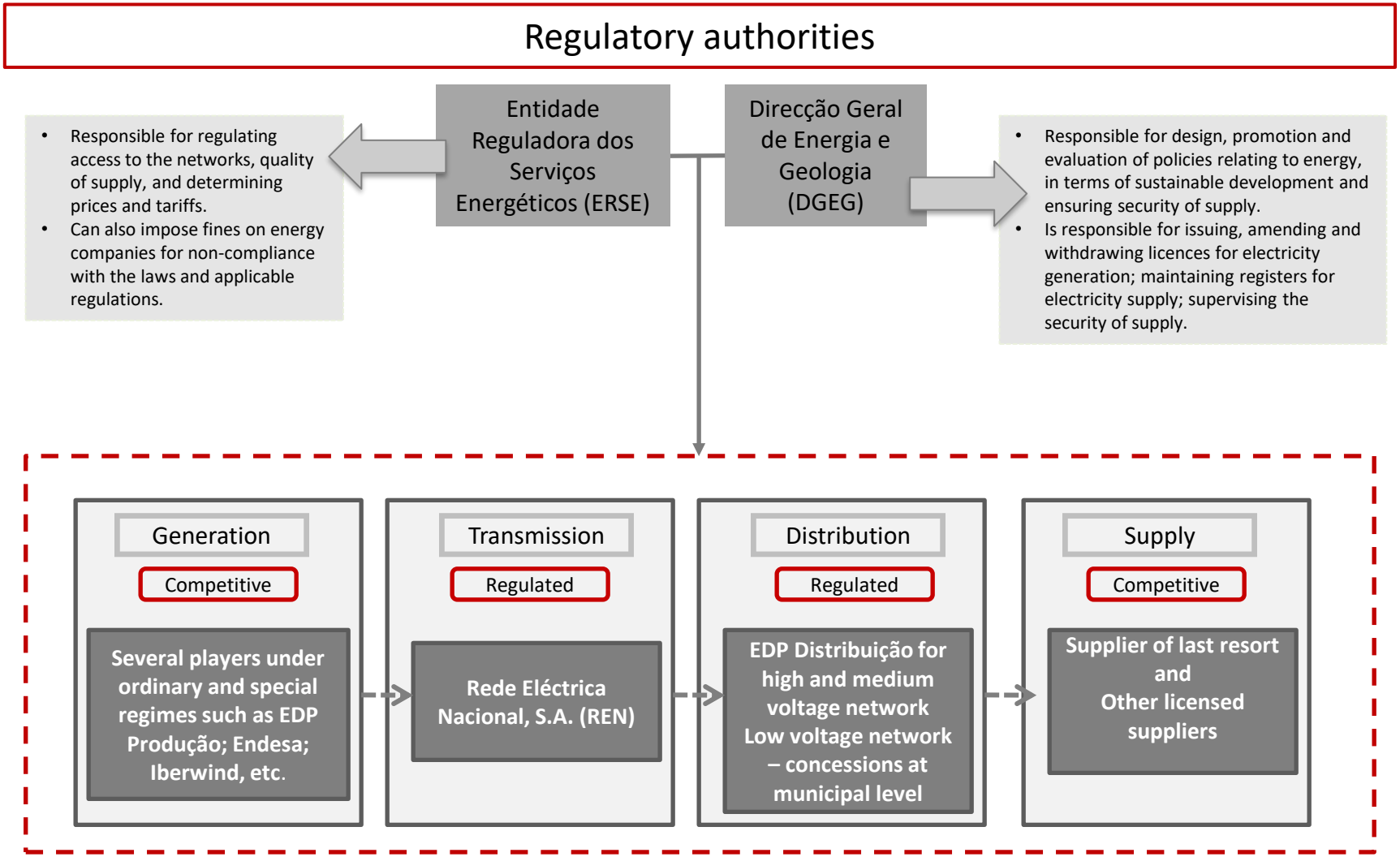
2.4.25 Portugal

- Industry structure, institutional framework and key players
- Growth in capacity, production and consumption, 2006–19
- Forecasted demand and addition to generation capacity, 2020–27
- Growth in transmission network and capacity, 2006–19
- Forecasted transmission network length and capacity, 2020–29
- Forecasted investment in the transmission network

Industry structure, institutional framework and key players (1/2)

- The production of electricity in Portugal is carried out in a competitive environment, subject to a licensing procedure which defines two categories of producers – special regime (co-generation and electricity generated from renewable energy sources) and ordinary regime (traditional, non-renewable sources and at large hydroelectric power stations). The leading generator is the EDP Group.
- EDP-Distribuição is the largest distribution company. High and medium voltage distribution network is operated under an exclusive public service concession granted to EDP. Low-voltage grid is operated mainly under concessions at a municipal level. In 2011, the government sold a 21.35% equity stake in EDP (generation and distribution) to China Three Gorges Corporation under the financial bailout package with the European Commission (EC) and the International Monetary Fund.
- Later in 2012, the state-owned transmission utility, Rede Eléctrica Nacional, S.A. (REN), a subsidiary of the state-owned energy company Redes Energéticas Nacionais (REN Group), was privatised. State Grid Corporation of China (SGCC) and Oman Oil Company bought a 25% and 15% equity stake, respectively in REN.
- Direcção Geral de Geologia e Energia (DGEG) and Entidade Reguladora dos Serviços Energéticos (ERSE) are responsible for regulating Portugal's electricity sector. DGGE is responsible for the planning and development of the power system. ERSE is the independent body responsible for the regulation of the natural gas and electricity sectors.
- The Portuguese electricity market operates largely in conjunction with the Spanish electricity market, under the Iberian Electricity Market (MIBEL), which was launched in July 2006.

Industry structure, institutional framework and key players (1/2)



Growth in capacity, production and consumption

- As of 2019, Portugal had an installed generation capacity of 20,208 MW, of which almost 36% was based on hydro electric energy. The generation of electricity from renewable sources is increasing exponentially in Portugal. In the past decade, around 2 GW of wind and solar capacity was added.
- In 2019, electricity generation declined by 11.6 per cent reaching 48 GWh from 55 GWh in 2018. Electricity consumption also declined by 1.1% from 50.9 GWh in 2018 to 50.3 GWh in 2019. In 2019, renewable production supplied 51% of consumption.

Table 1: Installed capacity, generation and consumption, 2019

Installed capacity (MW)	20,208
Generation (GWh)	48,771
Consumption (GWh)	50,345

Figure 1: Installed electricity capacity by source, 2019 (%)

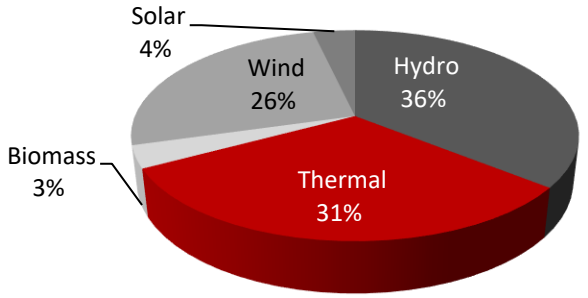


Figure 2: Growth in installed capacity, 2006–19 (MW)

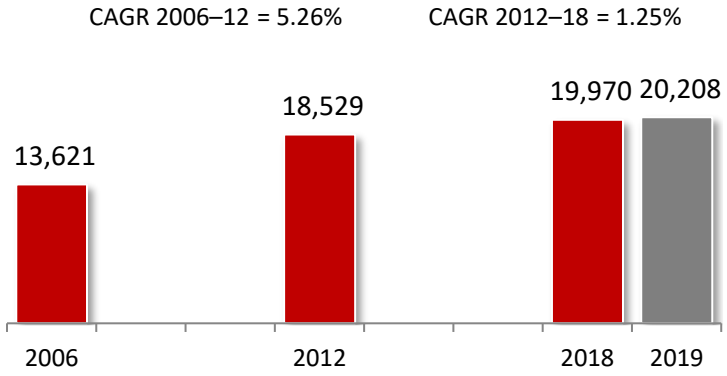
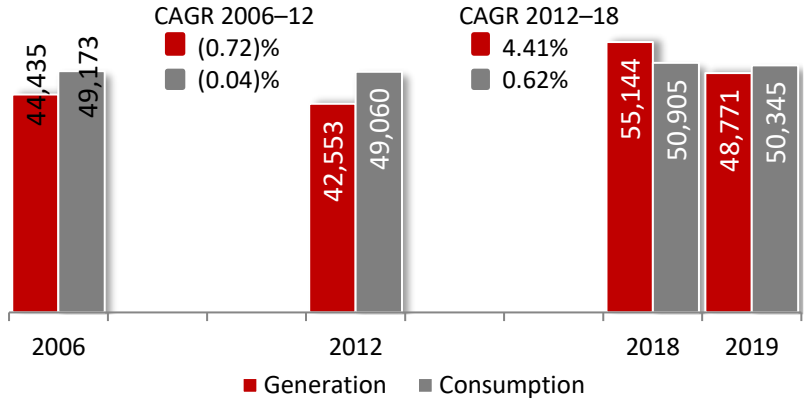


Figure 3: Growth in generation and consumption, 2006–19 (GWh)



Source: Rede Eléctrica Nacional (REN)

Forecasted demand and addition to generation capacity

Figure 4: Expected addition to generation capacity (MW)

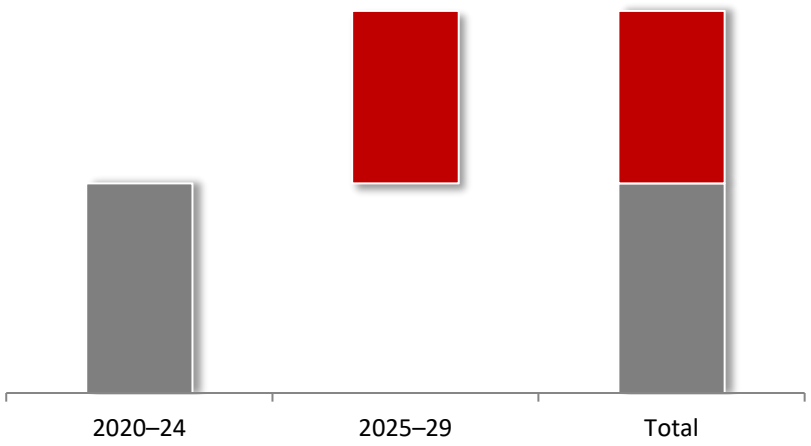
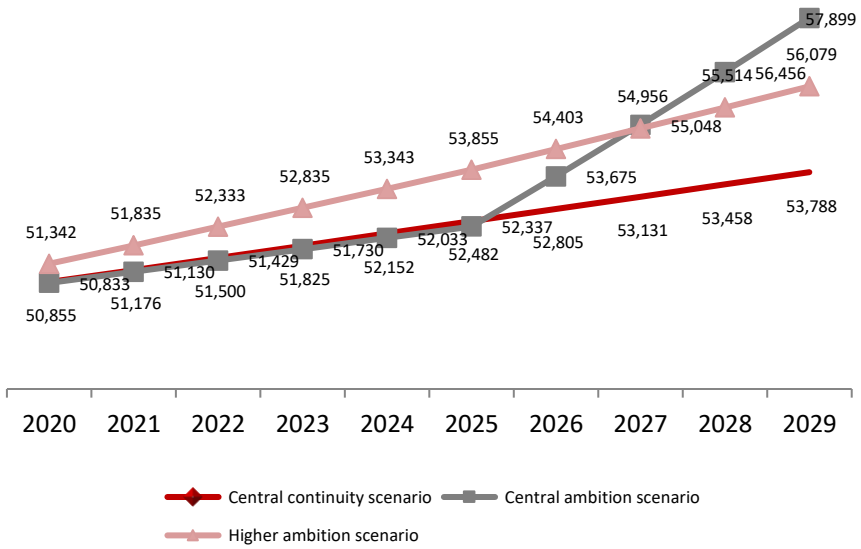


Figure 5: Expected growth in electricity demand (GWh)



Note: The expected capacity additions are based on the 'continuity scenario' mentioned in Monitoring Report of Supply Security of the National Electric System 2019–2040 released by DGEG.
Source: Directorate General of Energy and Geology (DGEG), Portugal; Rede Eléctrica Nacional (REN)

- As per DGEG's monitoring report on Supply Security of the National Electric System 2019-29, around XXXX MW of generation capacity is expected to be added in Portugal between 2020 and 2029. Of this, around XXXX MW is likely to be added from solar energy and XXXX MW from hydro. To further promote the development of solar projects, the ggovernment in July 2019 announced an auction scheme for solar PV plants to ensure price and facilitate financing and encompassed a total of 1,400 MW.
- DGEG's monitoring report has projected an increase electricity demand in Portugal under five different growth scenarios. According to these estimates the demand for electricity in the country is set to increase in the range of 0.20% and 1.57% during 2020-29.

Growth in transmission network and capacity

- As of 2019, Portugal's transmission network comprised about XXXX km of line length and about XXXXXX MVA of transformer capacity at voltage levels ranging from 150 kV to 400 kV. REN has been mainly focusing both developing assets to increase supply to the distribution grid and on modernization of end-of-life assets.
- In 2019, REN put into service the first high voltage underwater infrastructure in Portugal, of around 17 km of underwater cable, to connect renewable production off the coast of Viana do Castelo.

Table 2: Transmission line length and transformer capacity, 2019

Transmission line length (km)	**XXXX**
150 kV AC	2,544
220 kV AC	XXXX
400 kV AC	XXXX
Transformer capacity (MVA)[1]	**XXXXX**
Lower voltages	6,672
220 kV AC	XXXX
400 kV AC	XXXX

Figure 6: Transmission line length by voltage (%), 2019

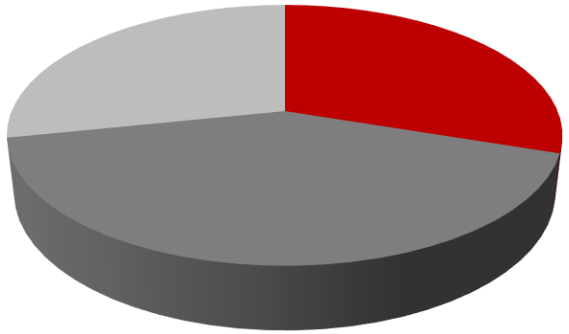


Figure 7: Growth in transmission line network, 2006–19 (km)

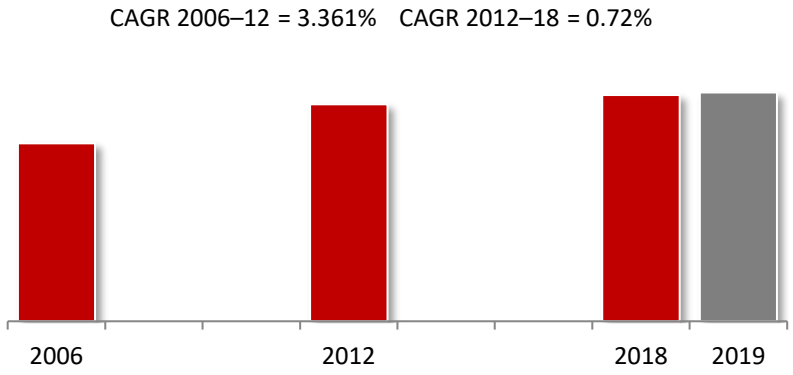
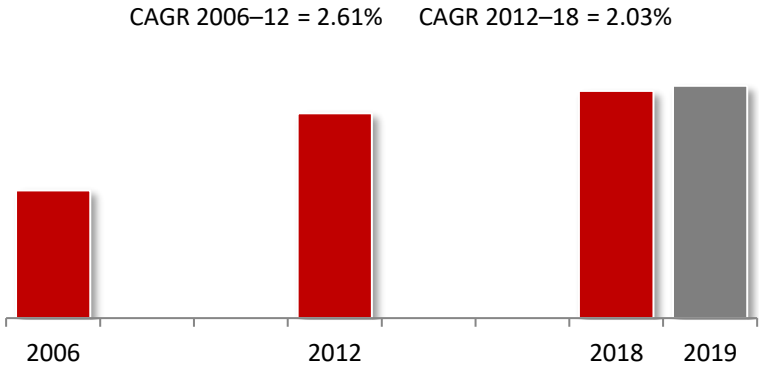


Figure 8: Growth in transformer capacity, 2006–19 (MVA)



Note: 1- Break-up estimates are based on ENTSO-E's higher voltage breakdown and REN's total figures for transformer capacity.
Source: Rede Eléctrica Nacional (REN); ENTSO-E; Global Transmission Research

Forecasted growth in transmission network and capacity

- About XXXX km of new transmission lines, XXX MVA of net transformer capacity will be added to Portugal's grid by 2029.
- Presently, the country is focusing on increasing the integration of renewable energy through development of domestic as well as cross-border projects. A 400 kV interconnection with Spain is also planned to be implemented during this period. Interconnection with other EU countries offers potentially more cost-effective options to manage system constraints and opens a wider market for Portugal's renewable potential.

Table 3: Planned transmission network additions, 2020–29

Voltage	2020–29
Line length (km)	**XXXX**
150 kV AC OHL	XXXX
220 kV AC OHL	XXXX
220 kV AC UGC	XXXX
400 kV AC OHL	XXXX
Transformer capacity (MVA)	**XXXX**
150 kV	XXXX
220 kV	XXXX
400 kV	XXXX
400 kV reactors (MVAr)	**XXXX**

Figure 9: Planned line length addition (km)

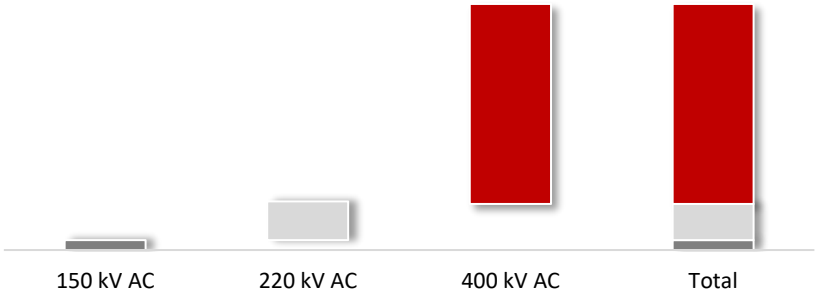
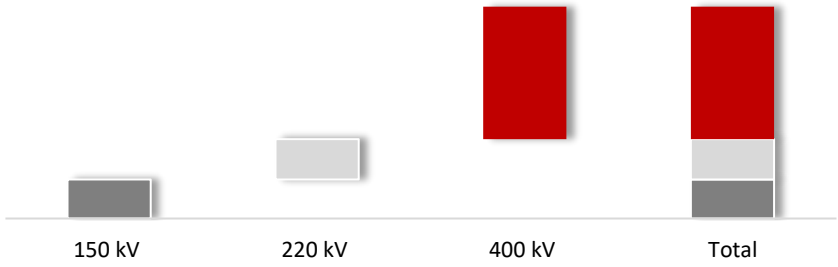


Figure 10: Planned net transformer capacity addition (MVA)



Note: Network addition data has been estimated based on projects proposed by REN in its latest Network Development Plan or Plano de Desenvolvimento e Investimento da Rede de Transporte de Electricidade (PDIRT) for 2020-29, and yet to be approved by the regulator; transformer capacity represents net additions (after deducting transformer capacity to be decommissioned)
Source: Rede Eléctrica Nacional (REN); Global Transmission Research

Forecasted investment in transmission network

- REN, in its latest Network Development Plan or Plano de Desenvolvimento e Investimento da Rede de Transporte de Electricidade (PDIRT) for 2020-29, has proposed an investment of EURXXX million for the 2020-29 period. However, REN's investment proposal is yet to be approved by the regulator.
- Of the total investment, around 40% will be on base projects, those needed to be carried out to ensure safety and security of the transmission grid as well as respond to the needs of the distribution grid, while the majority (60%) will be on complementary projects, those resulting from new needs originating outside transmission grid, such as those resulting from energy policy and promotion of socio-environmental sustainability.
- The proposed investment for 2020-29 is significantly higher the EURXXX million investment approved by the regulator for the 2018-27 period.

Figure 11: Planned investment in transmission network and capacity for 2020–29 (EUR million)

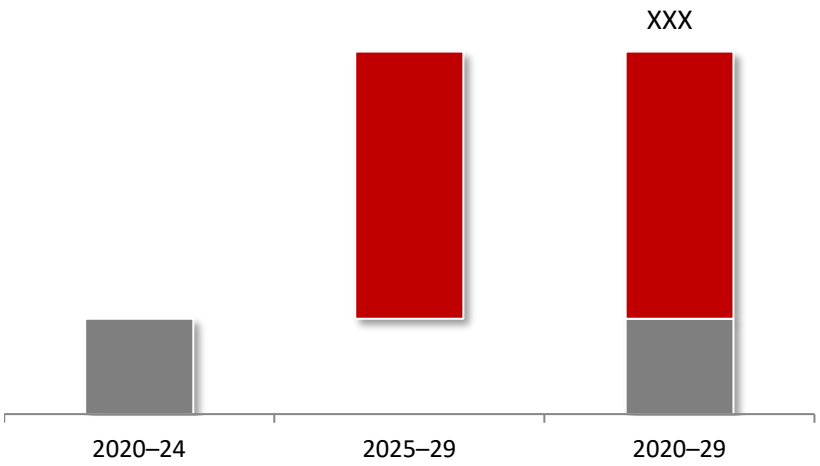
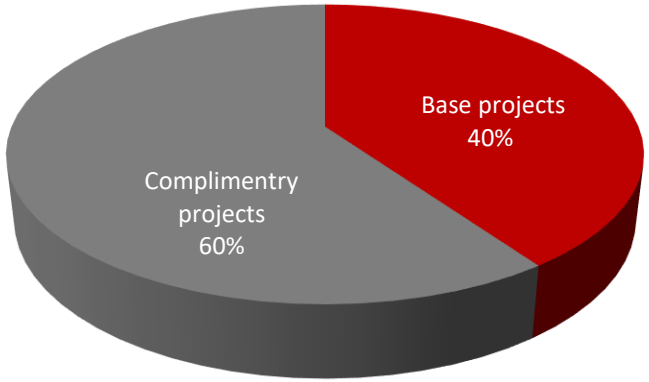


Figure 12: Planned investment in transmission network and capacity by category for 2020–29 (%)



Total investment = EURXXX million

Note: The above investment has been proposed by REN in its latest Network Development Plan or Plano de Desenvolvimento e Investimento da Rede de Transporte de Electricidade (PDIRT) for 2020-29, and yet to be approved by the regulator.
Source: REN; Global Transmission Research