



Resilience of Electricity Generation from Hydropower in Colombia: Coping with the El Niño Event and Associated Drought (2015-2016)



Sustainable Development Goals Addressed



<p>Organization, Institution or Company</p> <p>Asociación National de Empresas Generadoras (ANDEG) and Ministry of Mines and Energy of the Government of Colombia (Case study provide by World Energy Council WEC)</p> <p>ANDEG is a private non-governmental association which include 13 Colombian thermal electricity generating companies</p>
<p>Location of project site, Country</p> <p>Colombia</p>
<p>Brief narrative description of objective/project/activity/initiative</p> <p>El Niño-Southern Oscillation (ENSO) is the Earth’s most important weather-producing phenomenon. During an El Niño event, the surface waters in the central and eastern Pacific Ocean become significantly warmer. Usually dry regions of Peru, Chile, Mexico, and the southwestern United States experience rain and snow; wetter regions of the Brazilian Amazon, Colombia and the north-eastern United States plunge into months of long droughts. The 2015-2016 drought was a 1 in 50-year event and the second strongest in the history of Colombia. Rainfall dropped by 40 per cent below usual, generating severe hydrological drought which persisted until March 2016. This case study explores the context of the power shortage and the role of thermal generators in addressing dynamic system resilience in this specific situation of an extreme weather event in a country highly dependable on hydropower.</p>
<p>Economic, environmental and climate benefits, challenges and lessons learned</p> <p>The Colombian energy mix is made up of hydro-generation plants (77 per cent) and thermal-generation plants (18 per cent). In 2016, the impacts of ENSO included: water levels in dams decreased by 60-70 per cent; increased demand for cooling and refrigeration during the hot El Niño months; an unforeseen fire incident at the largest hydroelectric plant (Central Guatapé) further reduced capacity. There was a 200 MW shortage in April 2016 while at the same time electricity increased by a factor of 8.</p> <p>In order to increase resilience the Ministry launched an energy saving and demand management campaign called “Apagar paga” or “Turn off, pay off”, which resulted in a 5 per cent reduction of demand. Other short-term measures included: (a) increase in gas supply with liquefied natural gas (LNG) imported from the Caribbean; (b) imported additional energy from Ecuador via an available interconnection; (c) collaboration between the energy sector and the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) which monitors the weather in Colombia; (d) coordination between the Colombian army and Empresas Públicas de Medellín (EPM); and, (e) fast-tracked licensing to accelerate new thermal power plants. Long-</p>

term measures include two new thermal power plants (100 MW natural gas and 260 MW coal) in 2018 and further renewable energy diversification.

The experience of ENSO in 2015-2016 shows that Colombia needs to closely monitor the weather with a view to project intensity and frequency of future El Niño and La Niña events.

As a part of its resilience strategy, the Colombian grid also needs to have sufficient thermal backup capacity to supplement the low hydraulic productivity during the exceptionally dry seasons. Without these alternative resources, demand may have to be rationed, implying potentially even higher economic costs.

Additional information: website addresses and contacts

Asociación National de Empresas Generadoras (ANDEG): <http://www.andeg.org/>

Colombia Ministry of Energy and Mines, Bogota, Colombia:
<https://www.minenergia.gov.co/tips-de-ahorro-de-energia>

World Energy Council (WEC) : <https://www.worldenergy.org/transition-toolkit/dynamic-resilience-framework/extreme-weather> and
https://www.worldenergy.org/assets/downloads/El_ni%C3%B1o_Colombia_-_Extreme_weather_conditions_SEP2019.pdf

Photo by ANDEG <http://www.andeg.org/> (or WEC)