5. PRLCE in Peru

APERC Workshop

The 67th Meeting of APEC Energy Working Group (EWG67)

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Outline of presentation

- Introduction
- Energy overview of Peru
    - TPES and Power mix
- Highlights of the review
- Preliminary review results
    - Achievements
    - Challenges
    - Preliminary recommendations
- Way forward

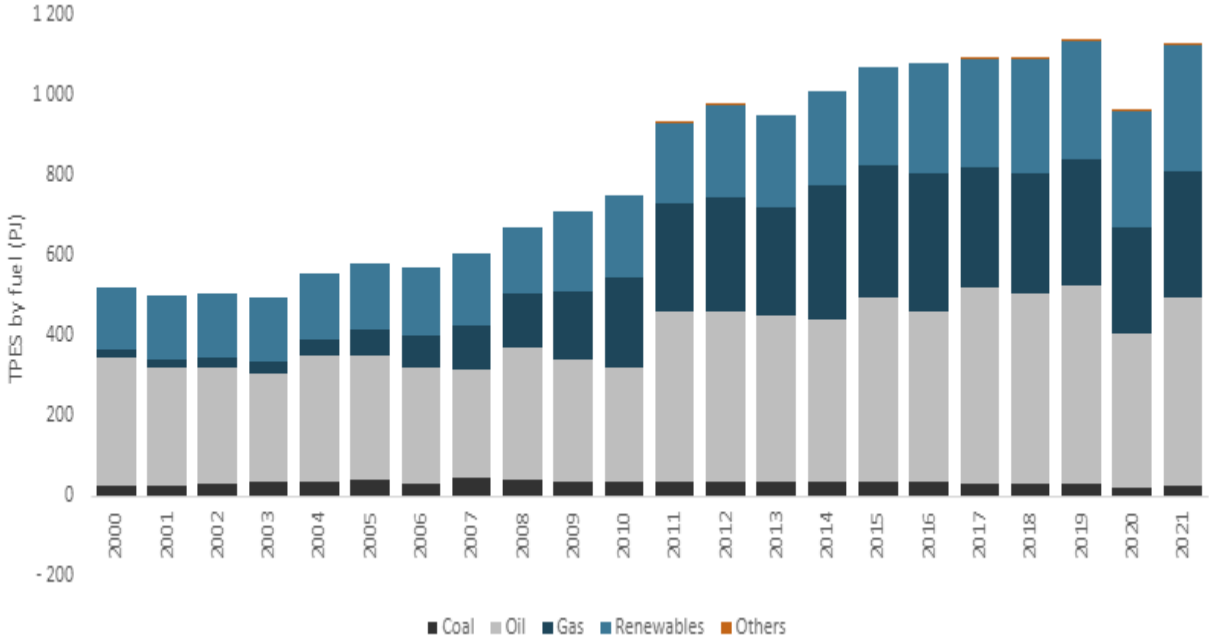
Introduction

- Duration: 5-7 December 2023
- Participants - Officials and staff of the Ministry of Energy and Mines, Ministry of the Environment, Ministry of Transport and Communications, Ministry of Housing, Construction and Sanitation, Osinergmin and Peruvian Stakeholders (COES, AEDiVE, Produce, etc.)
- Peru is the 7th economy to host the peer review since it started in 2012. The last PRLCE was hosted by Papua New Guinea in 2017.
- PRLCE was the result of the APEC Energy Ministers Fukui Declaration in June 2010 and the APEC Ministers instruction to the APEC Energy Working Group (EWG)

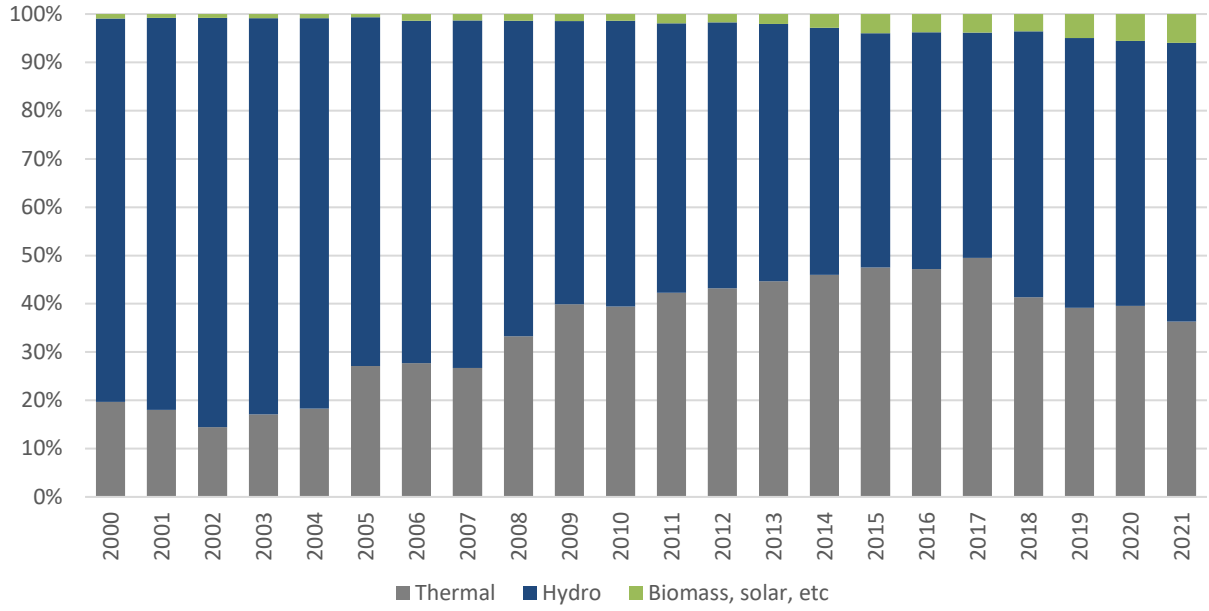
"explore mechanisms to encourage APEC economies to set individual goals and action plans for introducing low-emission power sources with assistance from APERC and relevant technology expert groups, building upon the success of the APEC Peer Review on Energy Efficiency (PREE)"

Energy overview

Total primary energy supply (PJ), 2000-21



Power generation mix (TWh), 2000-21



- Peru has diverse reserves of energy resources with renewables providing 28% of the total primary energy supply, which increased by 9.4% from 2020 to 2021;
- In 2021, power generation reached over 57 TWh an 8.9% increase from 2020; hydro provided more than 50% of total electricity generation; biomass increased by 15.4% since 2000.

Highlights of the review

- The presentations addressed
  - Low-carbon energy goals and strategy;
  - New and renewable resources;
  - Decarbonizing transport: biofuels and electricity; Advances in the electricity system in the adoption of low-carbon energy;
  - Potential use of Hydrogen to adopt low-carbon energy, decarbonisation;
  - Infrastructure gap to deliver low-carbon energy
  - Isolated Energy Systems.
- Renewable energy potential
  - Solar – 937 GW (0.1% is utilised)
  - Wind – approx 20 GW (2% is utilised)
  - Hydropower – 70 GW (7% is utilised)
  - Geothermal 2.8 GW but not used for electricity generation

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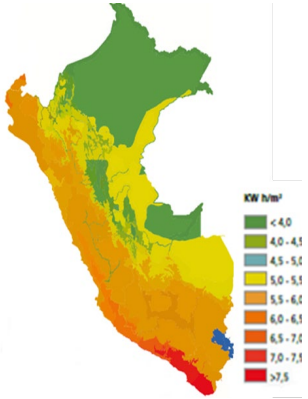
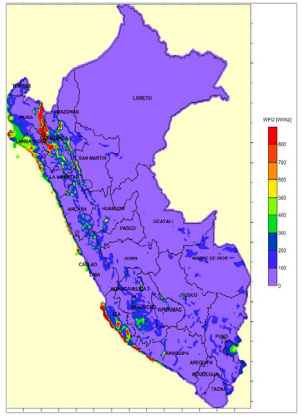
Renewable Energy Potential: Solar



Source: 2003; MINEM; Solar Energy Atlas

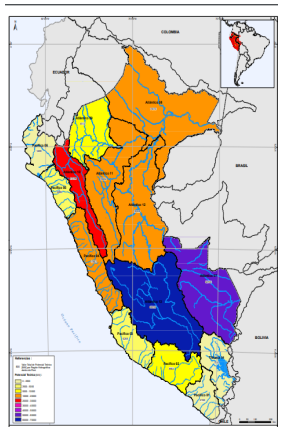
Situation: Using the NREL's DE Explorer platform, the estimated solar potential is close to 937 GW. This value considers areas within approximately 10 km of the transmission grid and in arid, open areas. The current installed capacity of solar power plants is 0.3 GW, so in relation to the first value, only 0.1% is currently utilized.

Renewable Energy Potential: Wind (onshore)



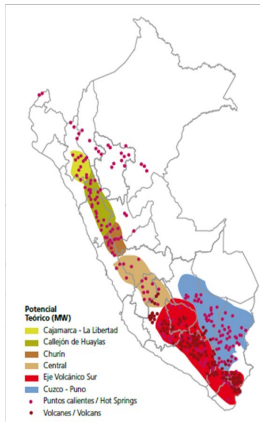
Source: 2016; MINEM, Wind Atlas of Peru

Situation: The exploitable technical potential is approximately 20 GW, and currently, wind power plants have a capacity of 0.4 GW. This means that only 2% of the potential is currently utilized. The greatest existing potential is located in the regions of Piura, Lambayeque, and Ica.



Source: 2011; MINEM, Hydroelectric Potential Atlas of Peru

Situation: The exploitable technical potential is close to 70 GW, and currently, hydroelectric power plants have a total capacity of 5 GW. This means that only 7% of the potential is currently utilized.



Source: 2012; MINEM-JICA, Master Plan for the Development of Geothermal Energy in Peru

Situation: The estimated geothermal potential is 2.8 GW, and it is currently not utilized for electricity generation. The largest existing potential is in the southern volcanic axis region, which includes the regions of Arequipa, Moquegua, Tacna, and Ayacucho.

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- *Peru has huge renewable energy potential most of which is untapped*

Peer review results

(Preliminary)

Achievements

Peru's Vision to 2050

National Energy Policy 2010-2040

- An energy system that meets the national energy demand in a reliable, regular, continuous and efficient manner, that promotes sustainable development and is supported by planning and continuous technological research and continuous technological innovation.

Climate Emergency

- includes priority actions: Increased participation of non-conventional renewable energies in electricity generation (20% by 2030 by competition) and other uses; development of technologies, use and production of green hydrogen; efficient use of energy in the public, productive, service, residential and transportation sectors; and electromobility with emphasis on urban transportation.

Strategic Plan for National Development (PEDN 2050)

- Energy activities including, Hydrogen from water for export and domestic use; Massification of natural gas for security and transition; Intensive use of electric mobility; Massive use of solar energy with distributed generation systems; Biomass for circular economy; Geothermal for electricity generation and heating in isolated areas.

Source : MINEM Presentation during PRLCE

- *Put in place plans providing the foundation for the implementation of low-carbon energy;*
- *Establish organisations and institutions with the capacity to play relevant roles in the design and implementation of effective low-carbon energy policies;*

Challenges

- Different institutions may have uncoordinated and overlapping responsibilities, conflicting goals, a mismatch of opportunities, and different understandings of some concepts, among others.
- A mismatch between a robust transmission network and fragmented sub-transmission and distribution infrastructure might threaten the integration of distributed generation.
- While there's a high interest in developing green hydrogen, it is initially focused on potential major offtakes (likely export of ammonia and synthetic fuels/chemicals).
- Technological challenges: standardisation is currently focused on solar PV.
  - Inadequate standards could lead to slow RE deployment.
- Plans for community engagement and social acceptance are missing.
  - Inadequate communication and consultation with local communities can result in resistance to renewable projects, delaying or even preventing implementation.
- Peru's diverse geography, including mountains, jungles, and coastal areas, makes assessing and harnessing renewable energy potential quite challenging.
- Low-carbon transportation plans are quite ambitious, but relevant data and information were lacking in the presentation.

Preliminary recommendations

- Strengthen the coordination and communication capability among several institutions.
  - establish clear communication channels that can be used while designing low-carbon energy policies ensuring that all the institutions involved have the same overarching goals and vision.
- Strengthen the upgrading of sub-transmission and distribution infrastructure despite the current fragmentation of asset ownership through coordinated planning. Enable the growing penetration of non-conventional renewable energy, the deployment of electric vehicles, and the production of green hydrogen.
  - Align electricity transmission, generation expansion, and natural gas infrastructure planning to maximise societal benefits and minimise environmental impact.
- Consider synergies with planning for other energy sectors.
  - e.g., synergies of green H2 production with planning of renewable power generation expansion, and potential of electrolysers to provide grid ancillary services;
  - e.g., making NG pipeline compatible with H2 for future utilisation without the need for major retrofits
- Expand the scope of the national standardisation to accommodate not only solar PV.
- Develop comprehensive community engagement strategies, including education and awareness programs.
- Develop regional mapping methodologies to account for diverse geographical features and resource availability.
- Consider detailed analyses of transportation sector e.g. type of fleets, modes; electrification of transportation planning along with grid expansion/upgrade planning.

❖ *Importance of data; invest in data collection strategies/methodologies*

Way forward

Indicative dates	Activity
31 January 2024	▪ Submission of preliminary recommendations (experts)
24-27 February 2024 – Lima Peru	▪ Presentation at EWG67
February - March 2024	▪ Continue drafting of the PRLCE in Peru report
April 2024	▪ Review of the draft report (preliminary results)
May 2024	▪ APEC approval process (including EWG endorsement)

Appreciation to the host and experts

Mr Mauricio Riveros Rodriguez

Chile

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Malaysia

Dr Amgad A. Elgowainy

The USA

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Thank you.

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