Energy Just Transition: Chile as a Case Study

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Following Chilean energy sector
About Chile and its Energy Sector

- Chile has a population of 20 million, and 34.700 MW of power capacity.
- Its main energy system covers 68% of the country and supply 99% of population.
- All companies are private (generation, transmission and distribution).
- In 2019, there were 28 coal-fired power plants (5.500 MW).
Methodology

• Interview to nine managers of energy companies and academics.
• Review of public information.
• Projects developed by Mejores Practicas to Chilean energy industry.
1st transition: From Hydro to Fossil Fuels

- Chile has plenty of renewable energies, mainly hydropower, which was developed until 1980s.
- First hydro plant in Chile was designed by T. A. Edison in 1896 (0.4 MW), for coal mining.
- Between 1980s and 2010, fossil fuel generation increased significantly, along with associated transmission lines.
Share of electricity generation from fossil fuels and renewables
Chile, 1992 - 2023

- Fossil Fuels
- Renewables
Location of Coal Fired Power Plants in Chile
Main Drivers of Transition to Renewables

• Market forces (lower prices of equipment and others).
• Global trends and carbon market (Kyoto and EU).
• Natural conditions, favorable to renewable generation.
• Clear and stable energy regulation.
• No differences among technologies.
• New local regulation (2008) required 20% of non-conventional renewable energy by year 2025.
• Decarbonization plan (2019).
Decarbonization Plan: Main Characteristics

• Voluntary agreement between the State and the companies.
• A "Coal Unit Withdrawal and/or Conversion Roundtable" was established.
• Three main axes:
  • Oldest plants retired by 2024 (31% of capacity)
  • Total retirement by 2040.
  • Carbon neutrality by 2050.
• No subsidies considered.
Decarbonization Results

• Main actions taken by companies:
  • Develop renewables.
  • Conversion of newer units (gas, green hydrogen / ammonia)
  • Use existing actives (transmission lines, ports, etc).
  • Not significant effect on local employment.

• Results regarding renewable generation:
  • 2025 goal of 20% of NCRE will be exceeded up to 62%.
  • Today Chile has more than 21,600 MW of renewables.
Location of Renewable Plants in Chile

Legend
- Eolic parks
- Photovoltaic Parks

Regional total capacity (MW)
- 0 - 0
- 0 - 228
- 228 - 932
- 0 - 35
- 35 - 1761
Renewable electricity generation, Chile

Data source: Energy Institute - Statistical Review of World Energy (2023)  OurWorldInData.org/renewable-energy | CC BY
Note: ‘Other renewables’ refers to renewable sources including geothermal, biomass, waste, wave and tidal. Traditional biomass is not included.
Challenges

- Loss of renewable energy (2,600 GWh during 2023).
- Low prices in some areas (USD 0 during daytime).
- Technological development (reconversion of units and energy storage).
- Transmission lines: congestion and delays in their construction due to negotiations with local communities.
- Permitting: delay and uncertainty.
- Continuation with good policies and favorable market conditions.
Transmission Lines

- Many of them were developed for fossil fuels plants.
- The grid requires a new design.
Opportunities

• Carbon neutrality before 2050.
• Energy independence, by clean, safe, reliable, and local energy sources.
• Chile as a net exporter of clean energy: integration with neighbors and/or in the form exportation of green hydrogen/ammonia.
Global Perspective

- Fossil fuels represent more than 60% of world’s total electricity supply (29,000 TWh), and growing.
- Final energy transition has been diverse among different countries.
- A wide agreement among different players can make this transition to happen.
- Global challenges may be similar to Chilean ones, so early actions can facilitate the transition.
Conclusions

- Chile’s final energy transition to renewables started in the 2010’s.
- The process was driven mainly by market forces and cost reductions.
- 2019 decarbonization plan was a definitive milestone in this process.
- The role of solar and wind is fundamental.
- Main challenges are technology (conversion and storage), transmission systems, permits, and community relationships.
- This transition is not just climate change mitigation, but also energy independence.
Let’s continue the conversation!
Post questions and comments in the IAIA24 app.

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