

Energy Just Transition: Chile as a Case Study



Pablo A. Baraño D.; Soledad Llamazales A.

*Mejores Prácticas consultant company
Chile*

pbaranao@mejores-practicas.com

www.mejores-practicas.com



Following Chilean energy sector

2017

2019

2024

IMPACT ASSESSMENT IN CHILE:
MAKING THE ENERGY MATRIX
RENEWABLE

Presenting author: Sara Grez C.
Pablo Barafiao D.
César Rivas V.



ENVIRONMENTAL IMPACTS OF LACK OF
HYDROPOWER PLANNING IN CHILE: 110
YEARS



Pablo Barafiao D.
pbarafiao@mejores-practicas.com
www.mejores-practicas.com

May, 2019

Energy Just Transition: Chile as a Case Study



IAIA24
DUBLIN IRELAND

Pablo A. Barafiao D., Soledad Llamazales A.
Mejores Prácticas consultant company
Chile
pbarafiao@mejores-practicas.com
www.mejores-practicas.com





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

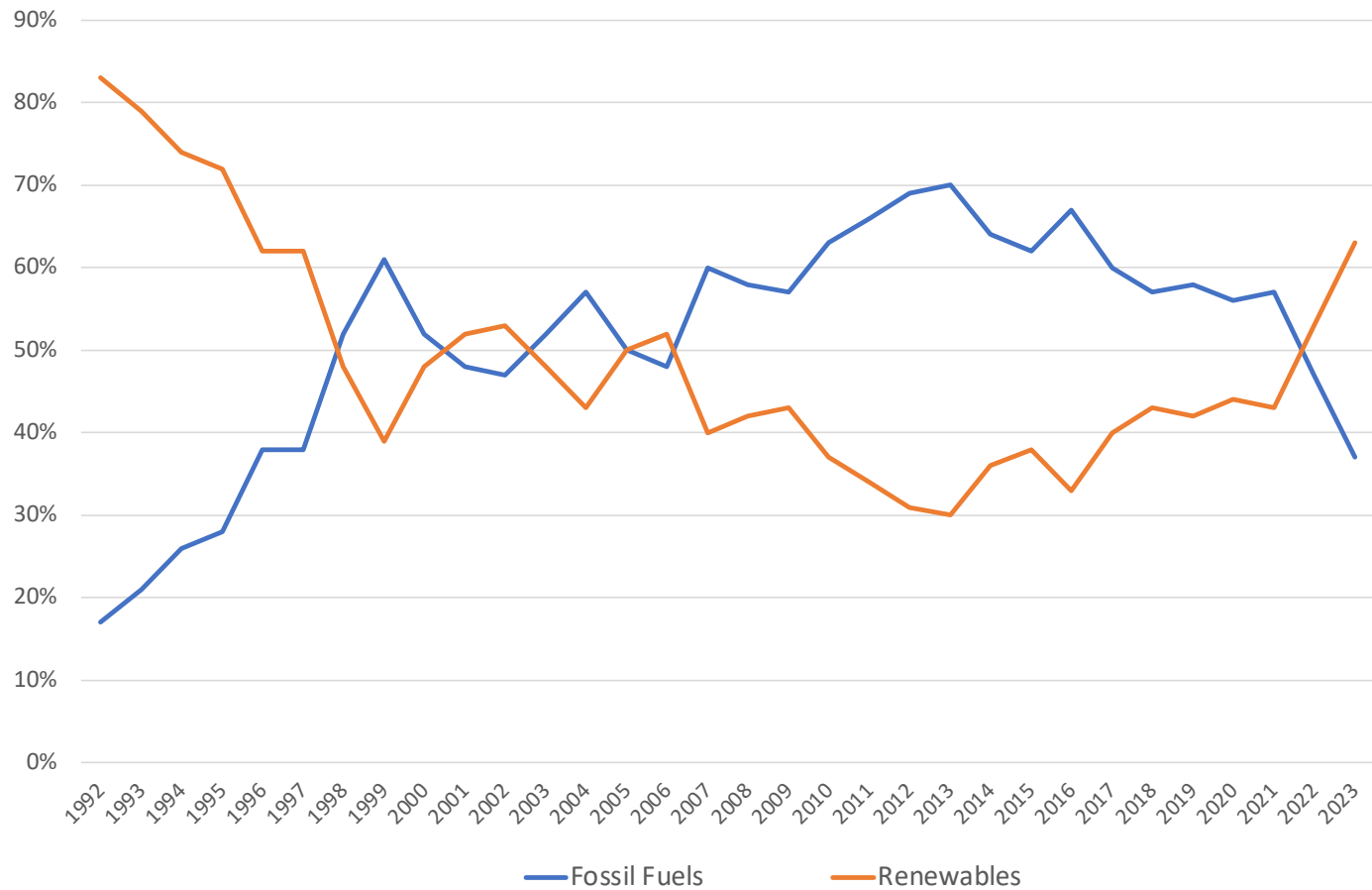
- Interview to nine managers of energy companies and academics.
- Review of public information.
- Projects developed by Mejores Practicas to Chilean energy industry.

1st transition: From Hydro to Fossil Fuels

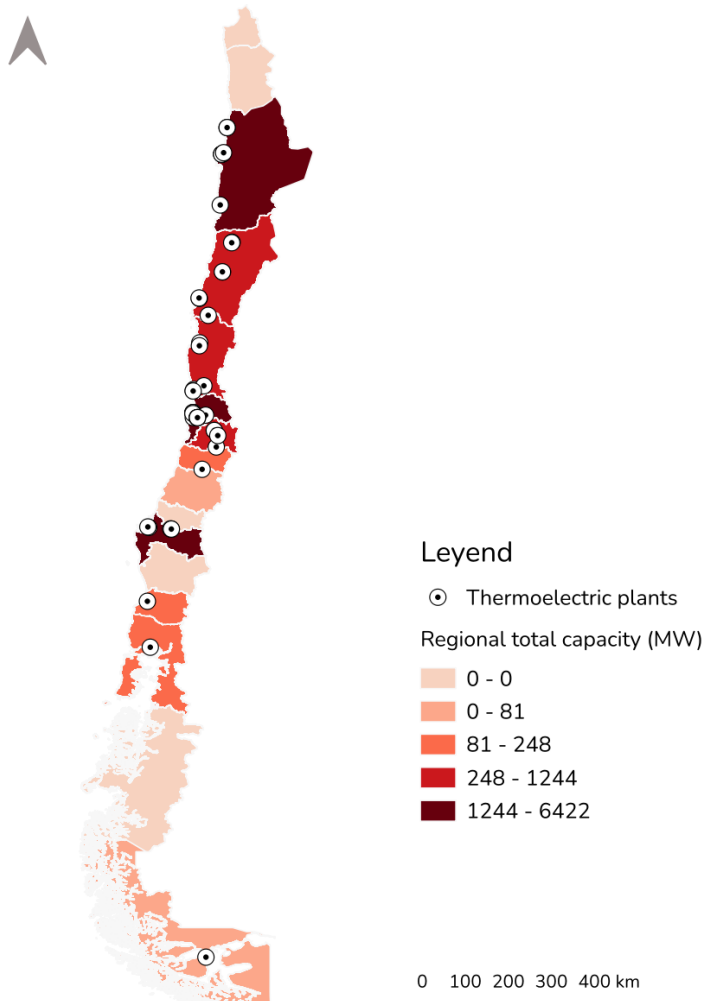
- Chile has plenty of renewable energies, mainly hydropower, which was developed until 1980s.
- First hydro plant in Chile was designed by T. A. Edison in 1896 (0.4 MW), for coal mining.
- Between 1980s and 2010, fossil fuel generation increased significantly, along with associated transmission lines.




Share of electricity generation from fossil fuels and renewables
Chile, 1992 - 2023




Location of Coal Fired Power Plants in Chile



Main Drivers of Transition to Renewables

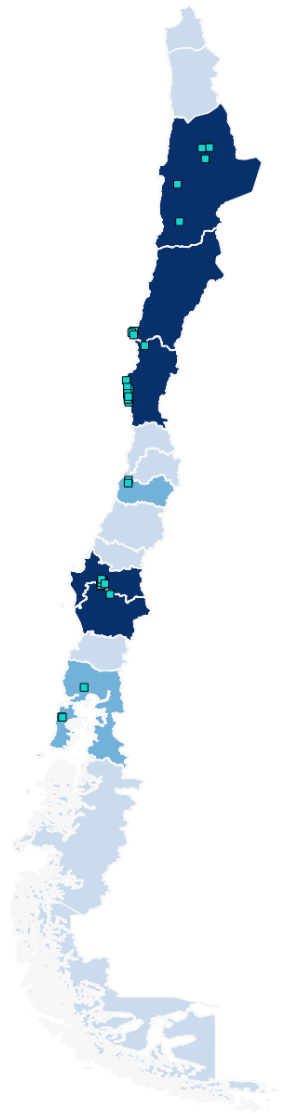
- Market forces (lower prices of equipment and others).
 - Global trends and carbon market (Kyoto and EU).
 - Natural conditions, favorable to renewable generation.
 - Clear and stable energy regulation.
 - No differences among technologies.
 - New local regulation (2008) required 20% of non-conventional 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.

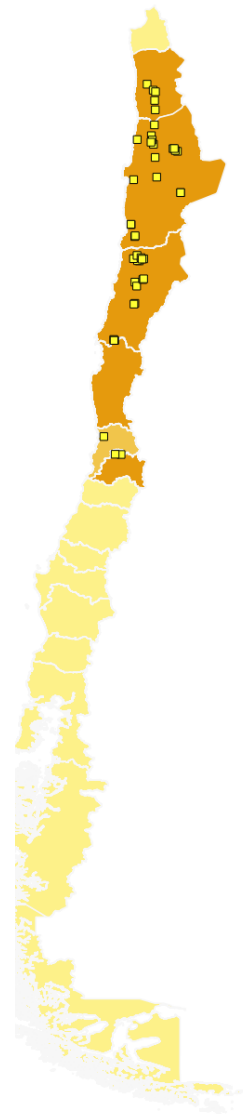
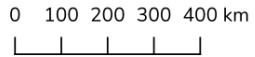


Legend

- Eolic parks

Regional total capacity (MW)

- 0 - 0
- 0 - 228
- 228 - 932

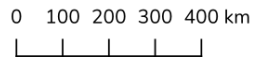


Legend

- Photovoltaic Parks

Regional total capacity (MW)

- 0 - 0
- 0 - 35
- 35 - 1761



Location of Renewable Plants in Chile





Cerro dominador (110 MW)

Cerro Pabellon (82 MW)



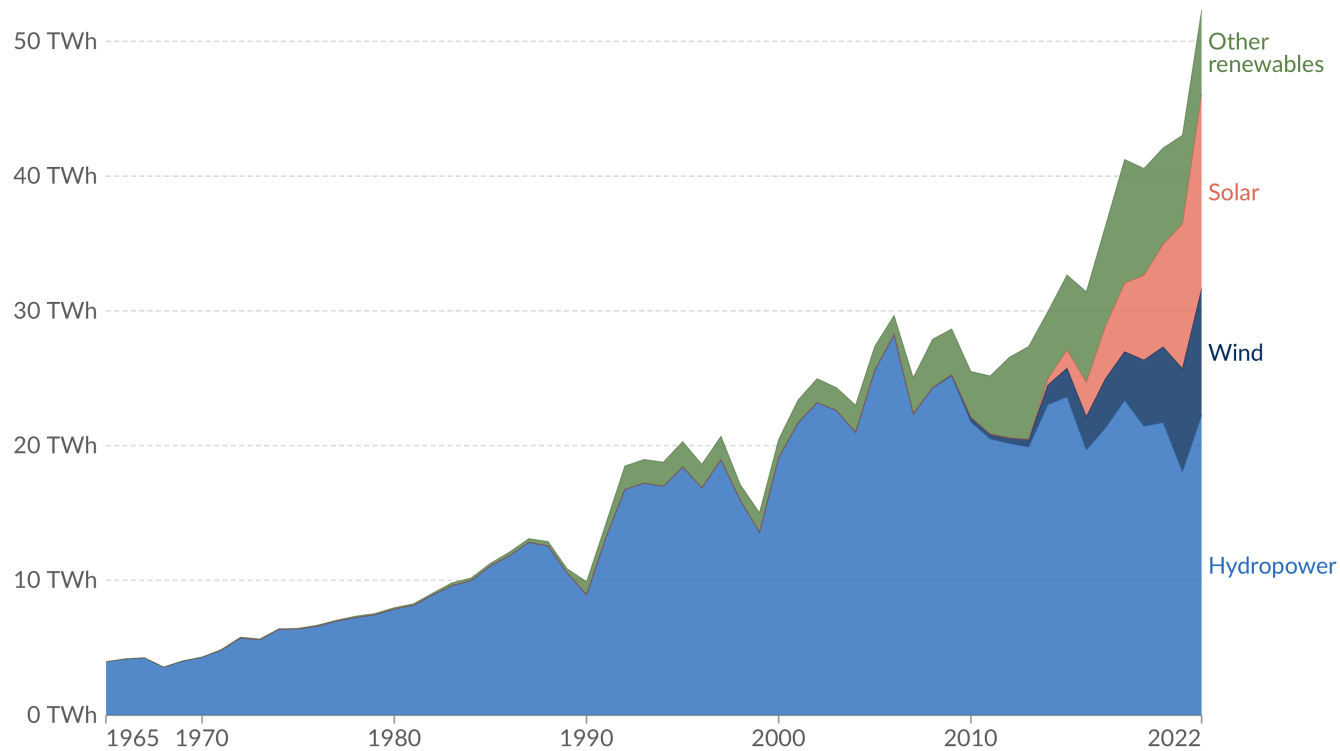
Horizonte Project (996 MW)

Guanchoi Project (398 MW)



Renewable electricity generation, Chile

Our World
in Data




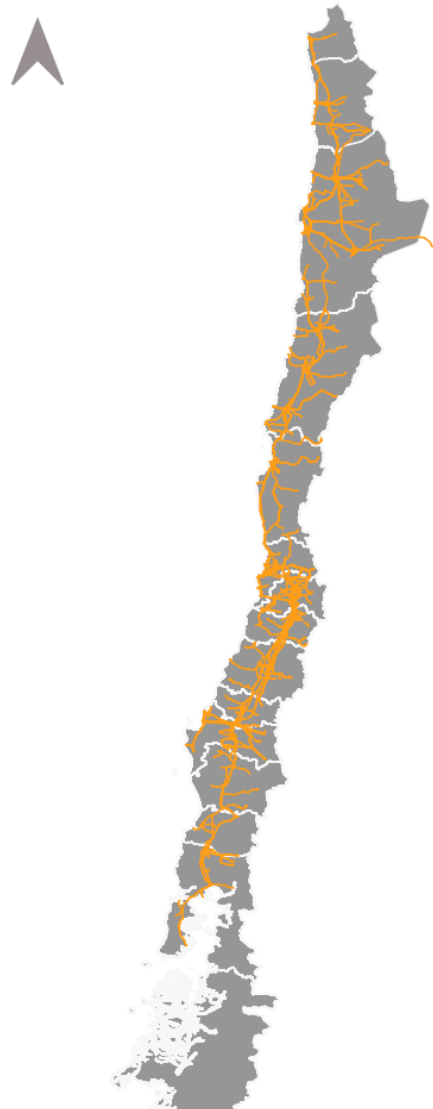
Data source: Energy Institute - Statistical Review of World Energy (2023)

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.
- 



Legend

National Electrical System

— Electrical Transmission Lines


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.



#iaia24



Pablo A. Baraño D.

Mejores Prácticas consultant company

Chile

pbaranao@mejores-practicas.com

www.mejores-practicas.com