CLIMATE POLICY LAB

POLICY BRIEF | OCTOBER 2023

CHILE'S ENERGY INNOVATION LANDSCAPE

Zdenka Myslikova
Nathaniel Dolton-Thornton

Current Policy and Emissions Context

With a population of 19.21 million and total greenhouse gas emissions of 55.33 MtCO2e, Chile's per capita emissions are 2.92 tCO2e/person[1] – six times smaller than the U.S.[2] and nearly three times smaller than China.[3] Chile's energy sector is dominated by fossil fuels (57.3%), particularly coal (33.95%) and gas (17.78%), though clean energy sources such as hydroelectric (20.22%), solar (13.24%), and wind (8.85%) are also prominent.

In Chile's deregulated energy sector with a competitive market orientation, there are no incentives specific to clean energy. The country maintains a technology-neutral power generation auction system.[4] Unregulated energy prices have helped to create a level playing field for renewables to compete with fossil fuels, and renewable auctions have not yet been required. The Chilean government aims to close down all operating coal-fired power plants by 2040 at the latest, which means replacing 34% of their current generation capacity.[5]

In 2022, the government updated its National Energy Policy, which includes roughly 60 targets related to transportation, power generation, industry, and green job creation. Key objectives include:

1. 80% renewable energy in electricity generation by 2030,
2. 100% zero-emission energies in electricity generation by 2050, and
3. Chile will export green hydrogen and derivatives by 2030.[6]

Green hydrogen plays a major role in Chile's energy ambitions. In 2020, the Ministry of Energy published a National Green Hydrogen Strategy, which predicts that Chile will have potentially the cheapest green hydrogen in the world by 2030.[7] In 2021, Chile signed an agreement with the Belgian ports of Antwerp and Zeebrugge to facilitate green hydrogen export to the EU.[8] Later that year, the Chilean government committed US$50 million in grants to support six green hydrogen projects.[9] In the transportation sector, a central policy is Chile's National Electromobility Strategy. Announced in October 2021, the strategy aims for 100% passenger and public transportation vehicle sales to be electric by 2035.

Foreign Investment

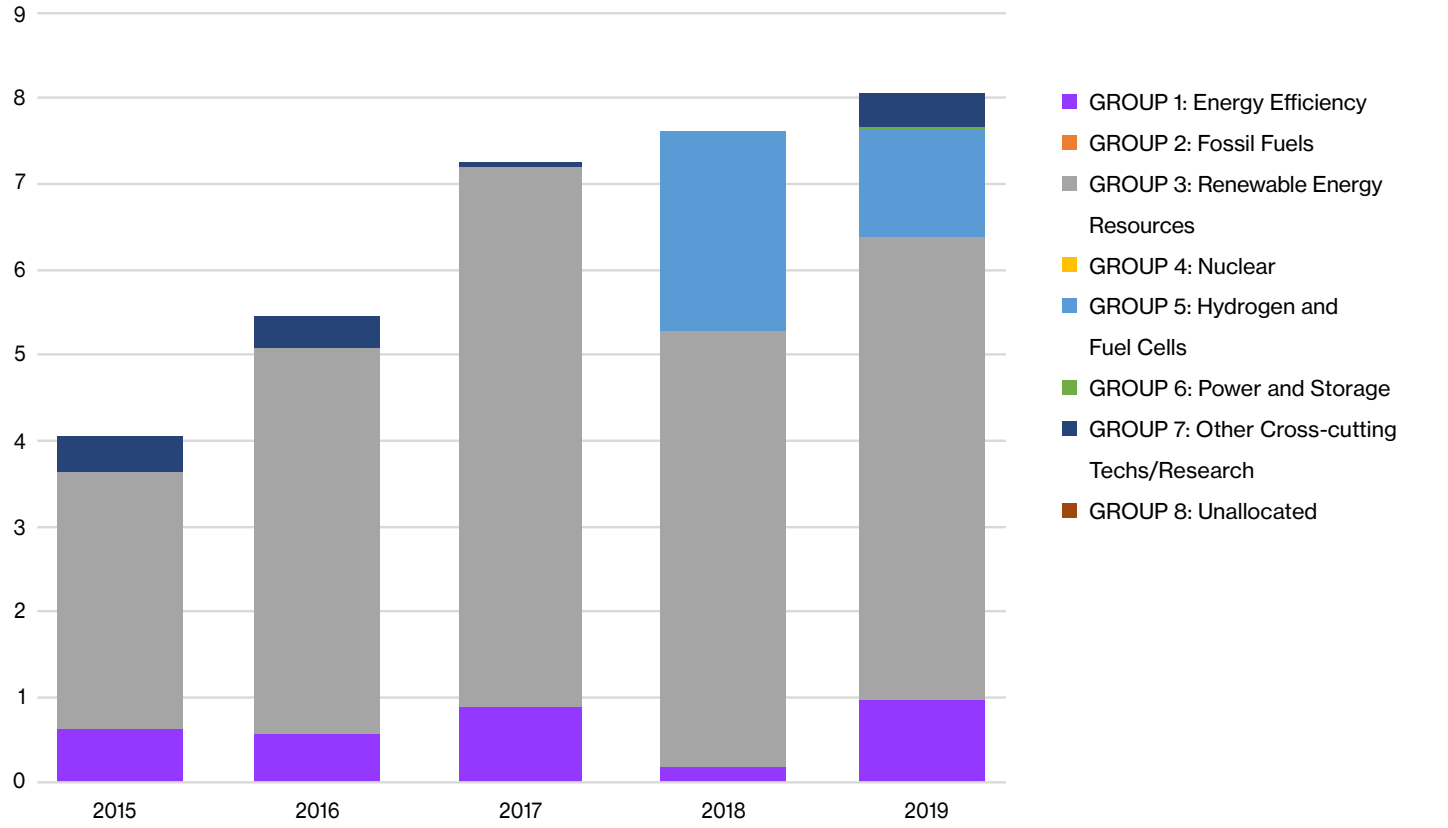
Energy was the largest sector for foreign direct investment (FDI) in 2021. It comprised 53 projects valued at US$12.6 billion. In 2020, foreign investors announced 32 renewable energy projects in Chile, more than any other Latin American country.[10] Foreign companies

FLETCHER *The graduate school of global affairs at Tufts University*

are responsible for 62% (US$6.92 billion) of the energy investments projected for 2021–25. Investments center on Antofagasta, a city north of Santiago known for copper production. Most of the investment in the energy sector is from companies with foreign capital (65% as of the second quarter of 2022).[11]

China is a major player in Chile's energy sector and broader investment landscape. In 2005, Chile became one of the first Latin American countries to sign a free trade agreement (FTA) with China, though the FTA did not include any special considerations for Chinese investments in renewable energy. In 2021, China was Chile's largest overall foreign investor (energy and other projects), with 30 projects worth US$7.73 billion, followed by the U.S. (110 projects, US$5.49 billion), and Canada (18 projects, US$2.63 billion).[12] Among other activities, Chinese companies are heavily involved in the extraction of Chile's critical minerals necessary for the clean energy transition, particularly lithium and copper. Chile produces 22% of the world's lithium and 28% of its copper.[13] In 2018, the Chinese company Tianqi Lithium bought a 23% share in Chile's largest lithium producer, Sociedad Química y Minera.[14] In 2021, the mining sector accounted for 84% of Chile's exports to China, 89.7% of which was copper, copper minerals, and copper concentrates.[15] The Global Energy Interconnection Development and Cooperation Organization (GEIDCO) – a Chinese initiative proposed in 2015 that promotes establishing the global energy interconnection system for clean energy – has one regional office in Chile, which is the only participating country in Latin America.[16]

Figure 1: Chile's public expenditures in clean energy R&D (in million USD 2021 purchasing-power-parity).



Source: Myslikova, Z., Gallagher, K. S., Zhang, F., Narassimhan, E., & Oh S. (2023). "Global Public Energy RD&D Expenditures Database." Climate Policy Lab, The Fletcher School, Tufts University. https://www.climatepolicylab.org/rddmap. Accessed April 2023. Note: data is based on Chile's submissions to Mission Innovation.

FOR ACADEMIC CITATION:

Myslikova, Z. & Dolton-Thornton, N. "Brazil's Energy Innovation Landscape." Policy Brief, Climate Policy Lab, The Fletcher School at Tufts University, October 2023.

ABOUT THE AUTHORS:

Zdenka Myslikova is a Postdoctoral Scholar specializing in clean energy technology innovation at Climate Policy Lab, having earned her PhD from The Fletcher School.

Nathaniel Dolton-Thornton is a PhD candidate in the Energy and Resources Group at the University of California, Berkeley and Nonresident Junior Research Fellow at Climate Policy Lab.

FUNDING FOR THIS RESEARCH:

This policy brief was supported by funding from the William and Flora Hewlett Foundation and the Rockefeller Brothers Fund. Any errors or misrepresentations are the sole responsibility of the authors.

Energy Innovation Landscape

Since 2009, the Chilean government has focused on setting up national and international centers of excellence (Centros de Excelencia (Internacional)) for research in strategic fields.[17] It has so far established 18 centers. The government invited and co-financed renowned foreign research institutes (e.g., the Fraunhofer Institute and ENGIE Lab) to establish branches in Chile to conduct applied research. The most recently established is the center for the development of lithium with solar energy, as exporting hydrogen has become one of the Chilean government's key energy goals. This is a public-private partnership of an unprecedented scale in Chile – the government committed 30% of the total US$193 million over ten years. Some concerns surround the partnership, including the lack of precedent in Chile to run and administer such large R&D projects and, if academia were to lead the project, that the results might lack commercial applications.[18]

The government expected that the research centers would conduct applied research, develop knowledge and, through joint work with local businesses and research centers, diffuse and transfer knowledge that would feed into the local innovation ecosystem. The reality hasn't yet matched the expectations. The foreign institutions brought their own trained personnel, whose engagement with local actors has been limited. Except for the case of the recently established institute for lithium, low financing has constrained these Centers of Excellence from conducting ambitious projects.

Chile is also home to the public incubator and seed accelerator StartUp Chile. This is a renowned institution in Latin America. Since its founding in 2010, it has grown into a vibrant hub for technological innovation (2,000+ startups), including in the energy sector. •

References

1 https://www.climatewatchdata.org/countries/CHL

2 https://www.climatewatchdata.org/countries/USA?end_year=2019&start_year=1990

3 https://www.climatewatchdata.org/countries/CHN?end_year=2019&start_year=1990

4 The 20/25 Law requires installed capacity to reach 20% renewables by 2025, but the government is permitted to organize renewable energy focused auctions only if the targets are not met.

5 https://www.gob.cl/en/news/chile-announces-it-will-work-put-end-coal-use-2030-after-joining-powering-past-coal-alliance/

6 https://energia.gob.cl/sites/default/files/documentos/pen_2050_-_actualizado_marzo_2022_0.pdf

7 https://energia.gob.cl/sites/default/files/national_green_hydrogen_strategy_-_chile.pdf

8 https://www.riotimesonline.com/brazil-news/mercosur/chile/chile-signs-agreements-with-world-bank-and-idb-to-promote-green-hydrogen/

9 https://foreignpolicy.com/2022/04/22/chile-green-hydrogen-clean-energy-industry-investment-climate-change/; https://www.imf.org/en/Publications/fandd/issues/2022/12/country-case-chile-bet-on-green-hydrogen-Bartlett

10 https://www.fdiintelligence.com/content/data-trends/chile-tops-renewable-energy-projects-in-latin-america-79568

11 https://investchile.gob.cl/wp-content/uploads/2022/12/informe-ied-eng-2021.pdf

12 https://investchile.gob.cl/wp-content/uploads/2022/12/informe-ied-eng-2021.pdf

13 https://www.trade.gov/country-commercial-guides/chile-mining

14 https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

15 https://www.gob.cl/en/news/solid-trade-between-chile-and-china-exports-grew-395-and-imports-616/

16 https://en.geidco.org.cn/overview/intro/

17 Solar energy, geothermal energy, and climate change and resilience.

18 Fieldwork by Zdenka Myslikova.