

# Chile Facts




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## **Building a Brighter Future: Realizing Chile's Potential to Become a Leader in Renewable Energy and Energy Efficiency**

Chile's energy sector is at a turning point. It has enormous potential to develop renewable energy and energy efficiency to become a global leader. The country can take advantage of its remarkable and varied natural resources, as well as its expanding economy to foster growth in its renewable energy and energy efficiency sectors. Or Chile can continue to rely on conventional energy sources—dirty fossil fuels and destructive large hydropower—to meet the growing electricity requirements of its residents and industries. With the government projecting the national energy demand to double from 2010 to 2020 and triple from 2010 to 2030, the decisions Chile makes now will either unlock its potential for a diversified clean energy portfolio, or lock the country into a risky and polluting future.



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## Building a Brighter Future: Realizing Chile's Potential to Become a Leader in Renewable Energy and Energy Efficiency

### EXPLORING CHILE'S ENERGY SECTOR TODAY

Presently, 41 percent of Chile's electricity generation comes from hydropower, 58 percent from fossil fuels (coal, natural gas, diesel, pet coke, and petroleum), and 1 percent from non-conventional renewable sources.<sup>1</sup> That 1 percent is comprised of small-hydro, wind, and biomass projects, and has grown rapidly in just the past few years. At the end of 2009, the total installed capacity of the non-conventional renewable sector was 520 MW.<sup>2</sup> At the same time, 1714 MW—or more than 300 percent of the existing capacity—from 55 different new projects, were already in the approval process.<sup>3</sup> Today, there are 3408 MW of non-conventional renewable projects in construction, approved, or awaiting approval. Wind projects alone compose 2185 MW of the total.<sup>4</sup>



The government currently estimates that Chile's energy demand will double from 2010 to 2020, and triple from 2010 to 2030. Much of this is due to expected growth in the energy-intensive mining sector. Chile is the world's largest copper producer and the mining industry is the country's biggest consumer of energy. Most of the power for the copper, gold, and lithium mines is produced from coal-fired power plants, so any discussion about a clean energy future for Chile must include the mining companies increasing their reliance on renewable resources, especially in the arid, sunny northern regions where much of the mining is concentrated.

Some experts argue that the government's energy demand figures are too high, since they fail to take into account the advances in energy efficiency and the country's lower energy demand rates since 2009.<sup>5</sup> Chile has great potential for environmentally sustainable clean energy, and many reasons to avoid further investment in fossil fuels. Chile has few fossil fuel sources in its territory; more than 80 percent must be imported, meaning that domestic clean energy sources provide more energy security than coal, natural gas, and diesel. In addition, greenhouse gas emissions are on the rise, growing from 36 million to 95 million tons of carbon dioxide equivalent—a rise of 166 percent—from 1984 to 2008.<sup>6</sup> And the Chilean National Energy Commission has predicted a doubling of greenhouse gas emissions from 2008 to 2025.<sup>7</sup>

### Nuclear is Not a Viable Option

Chile is increasingly considering nuclear energy to meet its growing demand for power. But there are some important considerations that must be taken into account. Given the huge size (1100 MW and larger) of nuclear power plants currently on offer around the world, these units would represent a large percentage of Chile's current generating capacity, posing a threat to the stability of Chile's entire electric power grid. Reducing this threat would require the maintenance of costly excess fossil-fuel-powered reserve capacity to back up the reactor if it goes off line. Other concerns are the very high cost of such units, especially the first one since Chile has no existing nuclear infrastructure to support it; the need for careful siting and additional seismic hardening of the unit and other measures to withstand earthquakes and other disasters; the lengthy project development and construction timelines involved, and the legacy of radioactive waste produced.

Given Chile's abundant and cost-effective non-conventional renewable energy resources available for short-term development today, a better strategy for the present would be to depend on renewable energy and energy efficiency for long-term energy security in Chile.



## LARGE HYDRO IN PATAGONIA IS NOT THE ANSWER

Several large hydroelectric power plants are proposed in Chile's Patagonia. Foremost among them is HidroAysén, a joint venture between the two largest energy companies in Chile that plans to build five dams on two of the region's wildest rivers. The complex would also require a 1300 mile-long transmission line to carry the dams' 2750 MW to the main electric grid. If constructed, the dams would flood over 12,000 acres of untouched habitat—more than 1.5 times the size of Manhattan—and the high-voltage power line would clear-cut a path for 6,000 towers running through seismically active terrain, around volcanoes, and even underwater. HidroAysén's power would equal 20 percent of Chile's current installed capacity, so any failure of the line would cripple the main grid, which serves 93 percent of the population.

Recent studies have shown that Chile has more than enough power in proposed projects to exceed the country's energy needs through 2025 without HidroAysén. In fact, if the country pursues modest advances in non-conventional renewables and energy efficiency, it can also avoid 40 percent of the coal-fired power plants in the pipeline. Instead of building massive, destructive conventional energy plants, Chile should do all it can to foster non-conventional renewable energy and energy efficiency to create a diversified, distributed, modern, and stable grid.



## Chile Can Save Thousands of Megawatts with Efficiency and Improved Data

The government's projections do not account for advances in energy efficiency or the drop in energy demand rates that resulted from the economic crisis in 2008 and the earthquake in 2010. Experts have revised those forecasts, incorporating modest advances in efficiency and using newer demand rate data. When the two scenarios are compared, the revised version shows that Chile can save over 3000 MW by 2020 and over 5500 MW by 2025, or two of the proposed HidroAysén hydropower project.<sup>8</sup>

### Doing More with Less: Efficiency Can Save Chile Thousands of Megawatts

| Year | Power in MW Government | Growth Rate Government | Power in MW Revised | Growth Rate Revised |
|------|------------------------|------------------------|---------------------|---------------------|
| 2010 | 9483                   | 4.2%                   | 9483                | 4.5%                |
| 2015 | 12870                  | 5.8%                   | 11818               | 4.5%                |
| 2020 | 16981                  | 5.6%                   | 14727               | 4.5%                |
| 2025 | 22299                  | 5.6%                   | 18796               | 5.0%                |

## GETTING ON A CLEAN ENERGY PATH

To become a regional leader in clean, sustainable energy development, Chile should pursue the following strategies:

### Create a Strategic National Energy Policy

Chile's energy sector has grown at the hand of private companies, without a long-term strategy or a broad perspective. When reviewing Chile's energy sector, the International Energy Association noted that "While investment decisions should continue to be made by the private sector, the government needs to take a more proactive position with regard to monitoring energy developments..."<sup>9</sup> A national energy policy formed with participation from all sectors would enable the government to give coherency, strategy and long-term stability to its growing energy sector, resulting in energy security and independence.

## Building a Brighter Future: Realizing Chile’s Potential to Become a Leader in Renewable Energy and Energy Efficiency

### Prioritize Energy Efficiency

Chile can help meet new energy demand by aggressively promoting efficiency in the industrial, commercial and residential sectors. This could be achieved if the government adopted energy efficiency related building codes, appliance standards, utility demand-side management programs and if the government put in place decoupling, in which distribution companies’ profits are separated from the quantity of electricity sold.

### Create Secure, Long-term Markets for Renewable Energy Projects

The Chilean renewable energy law could create stable and long-term markets for renewable energy if it required that 20 percent of total power generation come from non-conventional renewable

energy sources. In addition, Chile could address other roadblocks that prevent new companies from entering the market, notably in the transmission sector. Policies to incentivize direct procurement of both distributed and utility-scale non-conventional renewable energy projects by distribution companies as well as industrial players would also help build a secure marketplace that would allow a free market for non-conventional renewable energy to thrive.

### Consider the Full Environmental Impacts of Major Energy Proposals

It is crucial that environmental and public health concerns are thoroughly evaluated during the approval process for energy generation projects especially for large-scale hydropower, fossil fuel facilities and transmission lines.

### Chile’s Main Energy Resources

| Type of Power   | Solar   | Wind   | Geothermal  | Small Hydro  | Biomass  | Ocean/Wave   |
|---|---|--|---|--|--|--|
| <b>Description</b>                                    | Northern Chile is among the highest, clearest, and driest places on earth. Calama’s solar radiation, or intensity of the sun’s energy, is 23 percent higher than Albuquerque, New Mexico and 44 percent higher than Almería, Spain. <sup>11</sup> | With wind farms already operating from the northern deserts to the Patagonia region, wind power in Chile is on the rise. Sixty-four percent of all new non-conventional renewable projects in the pipeline are wind. <sup>12</sup> | Chile’s earthquakes and volcanic eruptions are evidence of the unharnessed power beneath the country’s surface. The government expects US \$200 million in geothermal investment between 2010 and 2012. | Hundreds of small rivers run down the Andean cord toward the Pacific, and if done right, these can provide local, environmentally sustainable energy to the towns and small cities nearby. There are 454 MW of new small hydro projects planned. | Most biomass plants in Chile are built by pulp and cellulose companies in the central and southern regions, who use the waste from their industrial processes to power their own plants. | Along Chile’s 4270 km coastline, the raw offshore wave energy potential has been measured at 164.9 GW. With research and investment, wave technology could be the next frontier in renewable energy development. |
| <b>Total Estimated Resource Capacity<sup>10</sup></b> | 100,000 MW  | 40,000 MW  | 58,000 MW   | 20,000 MW  | 14,000 MW  | 160,000 MW   |

<sup>1</sup> “Non-Conventional Renewable Energy” (NCRE) is the Chilean term to refer to renewable energy technologies excluding large hydro, or hydro-electric power plants over 20MW.

<sup>2</sup> Ministry of Energy; [http://www.minenergia.cl/minwww/opencms/03\\_Energias/Otros\\_Niveles/Electricidad/Mercado\\_electricidad/generacion.html](http://www.minenergia.cl/minwww/opencms/03_Energias/Otros_Niveles/Electricidad/Mercado_electricidad/generacion.html)

<sup>3</sup> “Non-Conventional Renewable Energy in the Chilean Electricity Market;” CNE/GTZ; October 2009.

<sup>4</sup> CentralEnergía.cl; March 2011.

<sup>5</sup> *La Economía del Cambio Climático en Chile – Síntesis*; United Nations, CEPAL and the Government of Chile; November 2009.

<sup>6</sup> *Projections of Greenhouse Gas Emissions in the Energy Sector*, POCH Consultores, July 2009.

<sup>7</sup> National Energy Commission, 2008; Román and Hall, *Are Dams Necessary in the Patagonia?* Ocho Libros, June 2009.

<sup>8</sup> Hall, Stephen and Román, Roberto; “HidroAysén y Mucho Carbón: el Camino Equivocado: El Futuro Energético de Chile Está en la Eficiencia Energética y las Energías Renovables;” April 2011; available at [www.futurorenovable.cl](http://www.futurorenovable.cl).

<sup>9</sup> Chile: Energy Policy Review 2009; OECD/IEA; October 2009.

<sup>10</sup> Ministry of Energy, “Generación Bruta SIC-SING,” December 2009, via Center for Renewable Energy, “Resources for Renewables: Data and Statistics.”

<sup>11</sup> Román, Roberto and Cuevas, Felipe; “Solar Energy Systems in Northern Chile: Application Potential;” 2010.

<sup>12</sup> CentralEnergía.cl; March 2011.