

HOW CAN THE MINING SECTOR DRIVE GROWTH IN GRID-CONNECTED RENEWABLE ENERGY IN CHILE?

Framework Step:

STEP 3 – Unlocking opportunities for in-country shared value creation

3.2 Shared infrastructure

3.2.1 Shared power

3.2.1.B *What can extractives industries do?*

- Enable a sustainable strategy for leveraging extractives sector energy generation, by assessing the feasibility of renewable energy power generation options.
- In consultation with donors, governments, and utilities, assess the feasibility of installing a renewable energy-based mini grid instead of isolated generators and explore implementation and cost-sharing arrangements.

3.2.1.C. *Host governments and extractives industries can work together to:*

- Undertake early discussions regarding power infrastructure needs and plans to determine if there are synergies, efficiencies and other opportunities for shared value creation with respect to power generation and distribution. This includes developing strategies for situations where there is no ready access to the electricity grid.

STEP 4 – Support and contribute to innovation leading to new products and services

4. B *What can extractives industries do?*

- Leverage extractives sector operations to increase use of renewable energy, as appropriate. This could be done for example by either linking production to renewable energy (e.g. making use of solar and wind power to reduce the contribution of fossil fuels and green-house gases to mineral and oil & gas production, while reducing high electricity costs associated with the use of decentralised diesel generators) or by developing green supply chains (e.g. mining rare earths and supporting local manufacturing of magnets for wind turbines to provide clean energy or mining lithium to manufacture electric batteries for incorporation into green products).

Tags: *In addition to the Framework step(s) that they fall under, examples will also be tagged by crosscutting issues. Please select all applicable tags.*

- local employment
- local supplier participation and development, including SMEs
- marginalised groups (women, indigenous people)
- skills development and upgrading
- access to credit
- shared infrastructure (transport, water, power)
- technology transfer
- innovation
- economic diversification
- Other: _____

Problem Statement:

Due to a reliance on imported fuel, Chile's electricity generation is expensive relative to neighbouring countries, negatively impacting the competitiveness of the mining industry and national economy as a whole.

Parties Involved:

- Chilean Ministry of Energy
- Chilean Ministry of Mining
- Collahuasi (Chile-based mining company owned by Anglo American plc (44%), Glencore (44%) and Japan Collahuasi Resources B.V. (12%))
- SolarPack (Spain-based solar energy company)

Common ground:

Collahuasi wanted to reduce its dependence on expensive electricity generated from coal, oil and gas and test the market to see if renewable energy was capable of supporting their mining operations in northern Chile. The government of Chile wanted to bring more renewable energy to the grid and take advantage of the country's solar potential to reduce dependency on fuel imports.

Actions taken:

Copper mining is a major industry in Chile and it requires substantial amounts of energy. However, electricity rates in Chile are relatively high - over the past decade prices have doubled, hitting \$100 per megawatt hour in August 2015, twice as much as in neighbouring copper producer Peru. While Peru has the advantage of domestic hydropower and natural gas reserves, Chile has had to rely on imported fuel for its power sector.

The confluence of high energy prices, declining costs for solar photovoltaic (PV) technology and wind turbines, and high wind levels as well as world-leading levels of solar irradiation in northern Atacama Desert have created rich potential for renewable energy in Chile for both industrial and consumer use. Although the north is relatively sparsely populated compared to the south, it is the centre of Chile's mining activity, including the Collahuasi copper mine.

In 2012, Collahuasi put out a power tender specifically for renewable energy to test the economic potential of renewables in its mining operations. As Collahuasi's copper mine is grid-connected, renewables would be competing in terms of price against conventional fossil fuel powered sources. Mining poses special challenges for the use of renewable energy, as it requires consistent (flat) power supply, while renewable energy tends to vary in production rates throughout the day. However, Collahuasi's leadership was attracted by the price stability it offered compared to power that depended on imported fuel. It also had environmental benefits in terms of lowered overall carbon emissions.

Collahuasi signed a 20-year power purchasing agreement with SolarPack, a Spanish renewable energy developer. Power is provided by the Pozo Almonte II and III plants, which Codelco uses as well. SolarPack built the plants and is responsible for their operation and maintenance, while the government coordinator, formally the Centre for Economic Dispatching of the Interconnected System of the North, is responsible for managing dispatch. The development of the plants was supported by loans (equity) provided by the Inter-American Development Bank (IDB), and financing was provided by the Canadian Climate Fund for the Private Sector in the Americas (established by the Canadian government and managed by IDB). The loans were provided at market rates, which at the time were

quite high; the economics for solar projects in Chile have subsequently become much better as prices and interest rates have declined. The plants were built without subsidies from the government. The solar PV plants have been operating since early 2014. They have a total power generation capacity of 25 MW, sufficient to meet 13% of Collahuasi's power demand.

Obstacles:

- Collahuasi was one of the first mining companies in Chile to try to source some of its energy from renewable generation. At the time, the Chilean market was not yet mature, and there was unfamiliarity with renewable energy technology, as well as uncertainty in terms of costs and the capacity of supply.
- Solar energy costs were also relatively high compared to current costs – over time, the technology has become cheaper, and there is greater expertise around installation.

Enabling factors:

- Collahuasi's leadership were strongly supportive of moving towards renewable energy, and took the challenge of implementing it seriously by bringing in engineers with expertise in renewable energy.
- There was a strong business case for it, with relatively high energy costs (due to Chile's reliance on imported fuel) and Chile's strong environmental potential for renewable energy (world-leading levels of solar irradiation).

Unlike many countries who are looking to support the growth of the renewable energy sector, Chile does not provide any price subsidisation for solar or wind power. Instead, the Chilean government created an enabling policy environment for renewable energy:

- In 2004 the Chilean government introduced Short Law 1, which stipulated non-discriminatory grid access for renewable power generation. It also removed transmission fees for generators under 9 MW and reduced them significantly for those between 9 and 20 MW. In 2008, the government introduced the Non-Conventional Renewable Energy Law, which set a 5% quota to be met by 2014, increasing annually by 0.5% until 2024. This applied to all electrical power sales and had price penalties if it was not achieved. This was later revised with Law 20/25, which increased the targets to 20% renewable energy by 2025, with 1% annual increases until 2020, and 1.5% annual increases from 2020 until 2025.
- The Chilean government has also assisted the development of renewable energy projects by providing financial support for pre-investment and feasibility studies through a series of programs, the most recent being the Support for Non-Conventional Renewable Energy Development Programme, introduced in 2012 with a USD 85 million budget. This has since been replaced with a new study called PRAP (Programa de Apoyo a Proyectos Estrategicos en Etapa de Pre Inversion) whose objective is to support pre-investment studies.
- The approach taken by the Chilean government means that renewable energy projects are encouraged to develop, but they are not subsidised, and must be competitive with conventional power sources.

Lessons Learned:

- When Collahuasi contracted SolarPack to construct the Pozo Almonte plant, it was an early adopter of renewable energy in the Chilean mining sector. The prices for development were relatively high, as is the price paid for power. With the more mature market today, prices have come down significantly. This is also supported by improvements in the transmission system. In October 2016, Collahuasi issued a significant new tender for 150 megawatts of renewable energy.
- The confluence of natural potential for renewable energy, government policies that support its adoption in the electrical grid, rising cost pressures on the commodity sector and declining costs of solar PV technology have helped drive the growth in industry.
- Renewables and the extractive sector can have a virtuous relationship, with efficiency gains in the extractive sector spurring spending on renewable energy projects, and the growth in renewable energy production contributing to a higher availability of renewable energy on the grid as a whole.
- Coordination between mining companies and the public sector is also essential to help ensure that opportunities for power development with excess capacity that can be sold back to the grid are taken advantage of.
- By using a Power Purchasing Agreement with SolarPack, Collahuasi outsourced the most technologically challenging aspects of using renewable energy in its operations, simplifying its deployment. Despite declining prices, in their current technology level, renewables are not sufficient to entirely replace baseload generation capacity. However, they have capacity to augment existing power use and reduce the need for fossil fuels or added generation capacity. At a power procurement auction held by the Chilean government in October 2015, all 1,200 GWh of the available contracts went to wind and solar projects, outcompeting proposals for coal plants based on price alone. In part, this was because the government allowed companies to bid in specific time slots. Solar power has a significant advantage if it is only considered on the merits of daytime generation.
- The existing electrical grid infrastructure in Chile is inadequate and strained. It has bottlenecks at certain points that prevent the free flow of power. This means that mining companies and other industrial users in the North are not necessarily able to take advantage of excess power generated by renewables on the grids, thus preventing the power generating companies from recouping their costs and leaving power unused. However, work is underway to unify the two main grids.