CHILE’s STRATEGY FOR CLEAN ENERGY AND MOBILITY

SOLAR ENERGY – LITHIUM – HYDROGEN

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Our Mission is to improve the competitiveness and the productive diversification of the country by encouraging investment, innovation and entrepreneurship, strengthening in addition the human capital and technological capabilities to achieve a sustainable and territorially balanced development.
CLIMATE CHANGE: A DRIVER FOR INNOVATION

ELECTROMOBILITY

- By 2035 there will be an annual production of 20-40 millions of electrical vehicles.
- Increasing demand of lithium.
- This will require additional 2 - 4 millions tons of low emission copper (10-20% of world production).

SOLAR ENERGY

- Last power purchase biding process in Chile (no subsidies):
  PV ~30 USD/MWh; CSP ~63 USD/MWh
- Technology development (PV for high radiation, storage with lithium/molten salts for CSP) could reduce the combined LCOE PV/CSP to 50 USD/MWh in 2025 and 40 USD/MWh in 2035.

HYDROGEN

- Currently only 5% of H2 production is based on electrolysis.
- The CAPEX for electrolyzers is foreseen to decrease to USD 5.000/kW by 2020.
- Germany, Japan and other countries are looking for overseas supply of zero-emission hydrogen.
A UNIQUE OPPORTUNITY: GLOBAL TRENDS + LOCAL SINGULARITIES

Atacama Desert singularities

- Highest solar potential
  >3.500 kWh/m²
  >3.000 sun hours/year

- Biggest metallic mining district in the world

- Strong position in non metallic mining - 1rst in lithium production and natural nitrates (energy storage)

Opportunities for Chile

- **Global trend**: exponential growth of electromobility and hydrogen-based economy
  
- At 2030 there will be 20-40 millions of electrical vehicles.
  
- It will need a production of additional 2 - 4 millions tons of low emission Copper (10-20% of world Production).
Chile: leading supplier of lithium and low-emission copper for the electric car industry

World's leading lithium producer

World's largest low emission copper producer

Long term supply of lithium carbonate/hydroxide (battery grade)

Lithium added value products (cathodes, others)

Solar energy for continuous electricity supply (mix PV/CSP) at average cost of 50 USD/MWh

Fossil fuels substitution
Hydrogen and Synthetic fuels based on circular economy approach

INNOVATION STRATEGY: VISION 2025
The Chilean government owns the lithium resources in the Atacama salt flat through Corfo, the Economic Development Agency. Albermarle and SQM are currently exploiting the mineral.

Chile is expanding the production capacity through a recently signed agreement with Albermarle (ex Rockwood Lithium).

Chile has the lowest production cost (evaporation of brines vs ore).

Chile owns more than 50% of the world reserves.

World Lithium Reserves
Source: STATISTA 2016
CALL FOR INVESTMENT IN LITHIUM ADDED VALUE PRODUCTS

Call for expression of interest for installing manufacturing capacities in Chile – closes June 30.

Roadshow: Frankfurt, Germany; May 18th

- Pre-Investment Support Program
- Incentives for technological investment IFI
- Guarantee
- R & D Tax Incentive
- Subsidies for Innovation
- Competitiveness Training Program

- Promotion
- Investor Assistance
- Aftercare

Contract CORFO - RLL:
- Preferred lithium prices
- Supply Assurance
CALL FOR INVESTMENT IN LITHIUM ADDED VALUE PRODUCTS

- Raw material processing: US$ 1b (*)
- Components Manufacturing: US$ 3,500b (**) (x 4)
- Cells Production: US$ 13,600b (***) (x 14)
- Assembly with thermal control and electric charge: US$ 19,600b (****) (x 20)
- Vehicle integration: US$ 100b (*****) (x 100)

Proyección 2020
The Chilean Government has developed a collaborative process through CORFO (Chilean Economic Development Agency) and the Ministry of Energy to draft a 2025 Roadmap called Strategic Solar Program, which included participation by over 100 government, corporate, academic and civil society entities.

A common vision and a technology roadmap was developed.

More than 170 stakeholders

1380 HH workshops

100 INSTITUTIONS

More than 50 Initiatives
This Roadmap seeks to take advantage of the Atacama Desert’s unique features to develop a national solar power industry with technological capabilities and export-oriented. To this end, an initial portfolio of 50 initiatives was identified, with a total budget of US$800 million.

**Solar Corridor “Cuenca del Salado”**

**Solar Technological District**
SOLAR TECHNOLOGICAL DISTRICT – 1 GW
Integration with Industrial-Symbiotic Park

ESQUEMA CONCEPTUAL

- Economies of scale
- Increased local content
- Technology mix, with focus on improved CSP
**AREAS OF SPECIALISATION**

- **SOLAR MINING NATIONAL TECHNOLOGY INSTITUTE**
  - Solar Technology Center
  - Mining Technology Center
  - Lithium Technology Center

- **Electrical and thermal solar energy**
- **Storage Systems**
- **Solar applications in metallurgy**
- **Fuels (H2)**
- **Desalination**

- **Metalurgia solar**
- **Hidrometalurgia de sulfuros primarios y concentrados complejos**
- **Uso de combustibles limpios/solares**

- **Technologies for sustainable lithium extraction from Chilean salt flats and increase the environmental sustainability of salt flats.**
- **Technological development in the lithium value chain, for relevant uses in energy and electromobility**

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**ROLES AND SERVICES**

- **R&D&i:** own strategic lines with technology transfer models (sale or licensing, spin offs)
- **Contract Research and Technological Development contracts with Industry**
- **Piloting and Technology validation services**
- **Specialized Technological Services**
- **Broad technological diffusion and extensionism**
- **Training of advanced human capital – in alliance with Universities**
To adapt and/or develop solar photovoltaic power technologies that respond better to the unique conditions in desert and high-radiation regions in terms of their durability and expected performance that lowers the **levelized cost of energy to a target of US$25/MWh by 2025** and placing special emphasis on the development and strengthening of local suppliers to create a sophisticated industrial network aimed at supplying goods and services in both Chile and abroad.
Chile has conditions to become a privileged site for zero-emission hydrogen production

- Solar energy prices: PV/CSP at average price of:
  - USD 50/MWh by 2025
  - USD 40/MWh by 2035

- Local consumption for mining and maritime transport

- International demand
Technology Consortium for piloting dual hydrogen-diesel combustion for mining trucks

Call will open May 2017
WELCOME EUREKA TO JOIN THIS GLOBAL OPPORTUNITY @CORFO