

# ENERGY AGENDA

A CHALLENGE FOR THE COUNTRY, PROGRESS FOR EVERYONE



Ministerio de  
Energía

Gobierno de Chile



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## SETTING OF AN AGENDA

President Michelle Bachelet has promoted important transformations for our country's advance towards more social equity and progress. To achieve this, we need to develop a new phase of competitiveness, innovation and productivity.

As one of the 50 measures for the first 100 days of Government, the Ministry of Energy was entrusted with the preparation of an agenda to be used as a road map to devise and implement a long-term Energy Policy with social, political and technical validation.

Since the beginning, this agenda was intended to be prepared in an open and participative manner. Therefore, as a ministry team, we held meetings and exchanged ideas with different social, political, parliamentary, municipal, business, NGO, and academic actors that have thought about, and assessed the country's energy situation.

It would have been impossible to set a really useful, guiding, and executive agenda without this dialogue. The high attendance and the tone of the energy workshop that we organized with the Future Commission of the Senate in the former National Congress, with more than one hundred prominent people in the sector ready to attentively and respectfully listen to each other, account for the need that we have, as a country, to seriously incorporate involvement mechanisms to favor the exchange of ideas, opinions and proposals.

In this process, the concerns and requests posed from our regions, where we shared and became acquainted with the existing energy problems and challenges from the first sources of information, were also essential.

The document that you are holding in your hands is the action plan and the navigation chart to walk together in the decision-making path that will allow us to overcome the problems in the energy sector and to reduce the infrastructure deficit that has been growing during the last years.

This is a task where all the Chileans have to participate with the generosity and enthusiasm required by this type of challenges.

**Máximo Pacheco M.**  
Minister of Energy







## CHILE'S ENERGY CHALLENGES

The availability of energy is a necessary condition for the growth, economic development, and the achievement of greater social inclusion. However, we do not wish any kind of energy. We wish reliable, sustainable, inclusive, and reasonably priced energy, with a diversified and balanced electricity matrix that will secure that our country has a higher degree of sovereignty over its energy needs.

To reach an energy matrix appropriately meeting these characteristics is a challenge that we have as country and that requires a broad social legitimacy and sense of urgency. Chile cannot avoid this challenge. The decisions that we make or fail to make today will be reflected in our capacity of future growth, in the country's competitiveness, and in the prices that our families and companies will pay in the next decade.

The diagnosis, the bases that structure this Energy Agenda, and the specific proposed measures reconcile the long-term goals and the essential decisions that we must make to face short-term urgencies.

### A SHARED DIAGNOSIS ON ENERGY

The energy sector is strategic and fundamental for the running of our society and **the life of people. The energy is an essential source for the use of electric, heating and kitchen appliances, and for the transportation and operation of the production sector.**

**The international and national contexts of the last three decades are radically different from the scenario projected for the following thirty years.** The hydrocarbons (coal, oil and gas) were until a few years ago an abundant and cheap source of energy, and the preferential answer to the challenges posed by the international economic development. Nevertheless, the growing worldwide urbanization and the apparition of new countries as large

users of energy are likely to bring about a more complex scenario of **scarcity and increased competition for the use of certain fuels, greater volatility and higher energy prices**. The emission of local and global hydrocarbon pollutants are an additional reason for diminishing the dependence on fossil hydrocarbons, and for pursuing new locally-available and cleaner energy sources at accessible prices.

**Chile imports 60% of its primary energy** (National Energy Balance (Balance Nacional de Energía, BNE) 2012). For that reason, we are subject to the instability and volatility of international market prices and the supply restrictions owing to political, weather, or market phenomena.

The last ten years in Chile were marked by the gas supply disruption from Argentina, serious and long drought periods, difficulties in the granting of environmental permits, little input of projects and new companies in the generation area, and scarce investment in infrastructure both in the generation and power transmission areas. This contributed to sustain throughout the last decade conditions of power supply shortage, with high marginal costs and prices passed on to the end users that reflect an inefficient development of the grid, which became worse during the last years.

**Actually, the prices of electric power rose considerably during the last decade.** In 2006, the electric supply for our families, businesses and small-sized companies (regulated customers) was awarded at average values of US\$ 65 per MWh; but in the last bid called on December 2013, for the same end users, the electricity supply was awarded at twice the amount of 2006 (average value of US\$ 128 per MWh). **This means a 20% increase in the electricity bill paid today by the Chilean families as compared with 2010. Should the scenario of prices awarded in 2013 remain unchanged, the electricity cost would increase another 34% during the next decade.**

Furthermore, during the last ten years, **the industries (unregulated customers) have doubled the prices due to their electricity consumption.** This causes our economy to be less competitive and directly impacts on the GDP growth. In 2013, the average market prices in the Central Interconnected Grid (*Sistema Interconectado Central, SIC*) amounted to approximately US\$ 112/MWh, and in the Great Northern Interconnected Grid (*Sistema Interconectado Central del Norte Grande, SING*), US\$ 108/MWh. The Chilean Industry is currently facing one of the highest prices for electricity in Latin America. As far as mining is concerned, the sector is facing the second highest price, as compared with other mining countries worldwide, and twice the price of its direct competitors, such as Peru.

**We understand that this problem is due to many causes, and that it has been existing during several years.** On the one hand, the substantive issue discussed by our courts when they hear cases concerning energy projects is how compatible is the use of the territory with different human activities, local priorities, and electric development. This is a growing concern posed by the citizens with respect to certain sources of generation because they cause great social and environmental impacts, and none of the benefits resulting from these initiatives are shared with the communities where the projects are located. On the other hand, the State has not been active in the long-term planning of the sector or in the setting of conditions towards a safe, sustainable, equitable, and cost-effective energy development. Additionally, we have an electricity market with competition problems at a generation level, where the number of investments is lower than needed by Chile.

Furthermore, the SIC trunk transmission grid has shown faults and restrictions that put at risk the supply to certain areas of the country, and increase the final prices of electricity. Experience has shown that the expansion restricted to transmission with short-term economic criteria

brings about an inefficient electric system that hinders both the exploitation of the country's energy potential and the transfer of lower costs among different areas.

**This problem should be approached from the perspective of energy supply and demand** through a State that must develop the orientations, policies, regulations, and actions required to reduce the prices of electricity intended for our families and companies, by promoting a matrix that privileges our own clean resources, by efficiently using the energy it produces, and by respecting its communities and the environment.

**Firewood is an essential and widely used source of energy, both for heating and cooking purposes, in the residential areas of different regions in the country. It is the second component of higher relevance in the primary energy matrix after petroleum.** Nevertheless, for being informally traded and widely used in inefficient heaters, firewood causes acute pollution and health problems. This brought about that several cities in the central-southern area of the country were declared to be saturated areas. Its low commercial value and the ancient tradition involved in its use are factors that explain why firewood is one of the few relevant national production sources of energy with no accessible and competitive substitute. Therefore, this is an urgent issue that has to be faced in an inter-sectorial manner and with a systemic view.

**With regard to fuels, each week the international volatility of prices** impacts on our families, and exposes them to sudden changes in the prices of benzene. This way, their purchase power is significantly affected.

**In the meanwhile, in spite of the fact that the distribution of domiciliary gas through networks** has had a significant development during the last 20 years, reaching today approximately one million customers and covering almost 25% of the inhabitants, we can see today that if fails to

operate with regulations that sufficiently protect users, and that there are low levels of competition. Furthermore, we are worried about the high prices of gas in Chile, as compared with the rest of the world.

In effect, **Chile needs that the energy be a pillar for the country's economic development and that it boost our efforts toward social inclusion.** This is a great national challenge that we need to handle by seeking agreements and fostering new spaces for dialogue between the different actors of the country in order to build an energy policy that will have the social legitimacy required to be fully validated by the society.

## **TOWARDS A CHANGE OF PARADIGM IN ENERGY**

The "Electric Development Policy" defined by our laws was devised in the early eighties, and gave the total conduct of the electric development to the private sector. From this milestone, the decisions of the companies to invest in generation were based on the signals sent by the market, thus defining, also in this way, the structure of our electric generation matrix. The idea that growth requires energy is top priority. We want to be categorical: with no energy there is no growth.

In spite of the fact that the model, weighing supply and demand, was effective in the past, it is obvious that today it is **insufficient to face new challenges: to reduce risks as compared with fossil fuels (access and price volatility); to develop energy sources at accessible prices; to diminish and manage the sector's environmental impacts, increasing the involvement of local communities in the benefits of the energy developments; to use the energy efficiently, both**

**at homes and industries; to cause the investments of the sector to be more dynamic and to promote competition.**

**To approach these problems, the State should have a more active role** in the long-term strategic planning of the sector, reconciling economic, environmental and social goals toward the common good of all the Chilean people.

At the same time, we should acknowledge that this transition will involve not only immediate changes but also a process of political, technological, and sociocultural transformations intended to achieve a long-term overview. Given the temporality of the energy sector, the decisions taken today are those that define the energy sector with which we will live during the next decades.

Therefore, **our view aims at a reliable, sustainable, and inclusive energy development at reasonable prices.** This Government, through the Ministry of Energy will boost policies and actions intended to achieve substantial progress during the following ten years in the different areas of this energy transition. This will be reflected in an energy sector that will pursue the following aims and purposes:

## GOALS AND PURPOSES OF THE ENERGY AGENDA

- To reduce the electricity marginal costs during this governmental period by 30% in the Central Interconnected Grid (SIC), so that the average marginal cost for year 2013 of US\$ 151.36/MWh is lower than US\$ 105.96/MWh in the year 2017.
- To reduce by 25% the prices of the electricity supply bids of the following decade for homes, businesses and small-sized companies, as compared with the prices tendered in the last bid of year 2013 (which were US\$128.2/MWh). To that end, we will develop the hydroelectric and thermoelectric projects mentioned in the Plan of Works of the Comisión Nacional de Energía (National Energy Commission, CNE).
- To lift the existing barriers for Non-Conventional Renewable Energy (Energías Renovables No Convencionales, ERNC) in the country, **and to undertake to cause that 45% of the electric generation capacity to be installed in the country from 2014 through 2025 come from this type of source.** This way, the goal of 20% ERNC injection in our electric grid for the year 2025 will be met, as set forth by the current law.
- **To foster the efficient use of energy as an energy resource, establishing a 20% savings goal by year 2025,** considering the expected energy consumption growth in the country as of that date. The implementation of the Energy Efficiency (EE) Agenda will make it possible to save by 2025 a total of 20,000 GWh/year, i.e. a coal-fired installed capacity of 2,000 MW.
- **To set up a fuel price stabilization system** to effectively reduce the volatility of the fuel prices to which the homes are exposed.
- **To turn ENAP (National Oil Company owned by the Chilean Government ) into a strong company so that it becomes a solid actor with a prominent role in the energy challenges of the country.** With that purpose, it will be provided with a corporate government system intended to improve its business management -including its occupational safety indexes and its efficiency, productivity, new undertakings, and business model- and its balance sheet will be strengthened with a capital contribution.
- To develop by 2015 a long-term **Energy Policy** that will be validated by the Chilean citizens through a participatory and regional process.



# 01

A NEW ROLE FOR  
THE STATE



## ISSUE 1:

# A NEW ROLE FOR THE STATE

The challenges for the next decades need a State that, in order to secure the common good of the Chilean citizens, will organize the different actors around a shared view, and will guide the energy development. We will have to be capable of generating policies and regulations meeting the intended goals, monitor the appropriate operation of the markets, and contribute to lower the barriers so that new undertakings and investors -both national and foreign- may commit themselves to the country's energy development.

One of the priorities of this agenda is to **build a common long-term view to support an Energy Policy for the next decades, based on a social, political and technical dialogue** that incorporates the realities and views of the different regions and actors of the society.

**The Chilean society has the right and duty to analyze, discuss, and establish the relative weight of the safety, cost and sustainability goals to be requested from its energy matrix,** in accordance with the different views and interests living together in our Nation. The mission of the Government will be to channel this discussion, and to take the relevant regulating and policy definitions that will guide the private decisions according to set goals.

Furthermore, **the State will look after the protection of users and an effective competition in the market, and will ensure a dynamic development of the investments required by the country** to have enough energy at reasonable prices, based on the social, environmental and economic goals already set. Any distortion will be corrected with public policies, regulations, and even with a direct action from the State through ENAP, as required by the country.

Moreover, the applied innovation and the technological development will be the engines of a more efficient and sustainable energy development. It is essential to link the energy sector to the national innovation system with a State that **focuses and coordinates its efforts between investigational sites, universities and industry through the creation of "Energy Clusters"** that will approach the resolution of the sector challenges.

We also need to improve the **reliability, coverage, disaggregation and analysis of statistical data from the energy sector** in order to reduce the asymmetry of information, to grant transparency to the markets and device public policies.

Finally, **we need to permanently improve the handling of energy emergencies and contingencies**. Our approach will be proactive: we will establish an organizational and operative structure for ex-ante preparation to face energy emergency situations, both at a regional and national level.

## **ACTION LINES AND GOALS**

### **1. We will strengthen the institutional nature of the Ministry of Energy**

- 1.1 We will strengthen the territorial display of the Ministry.** We will send a bill during 2014 so that each region has a Ministerial Regional Secretary of Energy (Secretario Regional Ministerial de Energía, SEREMI). There are only six SEREMI's in all the national territory.
- 1.2 We will modernize the *Superintendencia de Electricidad y Combustibles (Superintendency of Electricity and Fuels, SEC)*,** in order to have an organization that will answer as well as possible to the purposes of the country, and that will be able accompany the development of new energy sources, and the Energy Efficiency in terms of safety, quality, and supervisory regulations.
- 1.3 We will continue developing the human capital of the Nacional Energy Commission** in order to be able to exercise its monitoring and regulatory role in the hydrocarbons and electricity markets, as set forth in the law.

**1.4 We will create an advisory committee as a formal and permanent body for the design of the policies of the Ministry of Energy.** It will be called by the Ministry of Energy and composed of key actors from the public, private, academic and civil society sectors. There will be a relevant number of members coming from the different regions of the country.

**1.5 We have created the new Unidad de Participación y Diálogo (Involvement and Dialogue Unit) within the Ministry of Energy.** Its purpose is to promote and strengthen the citizen dialogue on energy matters, considering that there is no space to become acquainted with the concerns and demands of the citizens.

**1.6 We have created the Unidad de Coordinación Regulatoria (Regulatory Coordination Unit) within the Legal Affairs Division of the Ministry.** Its purpose is to issue, within no longer than 18 months, all the regulations demanded by the electricity law for its full implementation.

**1.7 We will strengthen the different Ministry divisions.**

The **División de Prospectiva y Política Energética** (Foresight and Energy Policy Division) will be reinforced in order to implement a Unidad de Estadísticas Energéticas y Seguimiento de Mercados (Energy Statistics and Market Follow-up Unit).

The work of the **División de Acceso y Equidad** (Access and Equity Division) will be deepened to be able to carry out the duties suggested by this agenda together with the *Subsecretaría de Desarrollo Regional y Administrativo* (Undersecretary of Regional and Management Development, SUBDERE) and the Corporación Nacional de Desarrollo Indígena (National Indigenous Development Corporation, CONADI).

A **Unidad de Agregación de Demanda** (Demand Aggregation Unit) within the División de Seguridad y Mercado Eléctrico (Safety and Electric Market Division) in order to develop a negotiating capacity to support Municipalities and other actors that need to improve their energy prices.

## **2. We will turn ENAP into an actor of the Chilean energy strategy.**

### **2.1 We will strengthen ENAP by improving the operational safety of the company.**

- The role of the ENAP as a hydrocarbons company will be strengthened in the country, deepening its involvement in the exploration and exploitation of oil and natural gas, with a special effort in the Magallanes basin, in non conventional gas and oil. Furthermore, the promotion of other basins in the country will be boosted to attract investments from international companies.
- We will reduce the accident index. In 2018, we will have to reach the level of safe oil companies worldwide. To that end, we will also establish a corporate social responsibility that will assess the action of the companies in the areas where they do business.
- We will cause ENAP to have an active role for the security of liquid fuels and natural gas supply for the country. We will enhance the logistics for the supply of fuels to the country, we will boost the development of natural gas in the national energy matrix (see axis 2, LNG-related measures), and we will promote its analysis and study capacity to develop and implement strategic projects intended to meet the energy needs of the country.
- We will develop a discussion in the framework of the long-term energy policy, together with the workers of the company and other key actors, in relation to the institutional nature of the company vis-a-vis the future challenges. As a result of this work, we will send, no later than during the first quarter of 2016, the bill to establish the corporate governance that will enable ENAP to comply with the new duties, mission and established regulations.

- In the same corporate governance bill for ENAP, the capitalization of the company will be established. This will improve its balance sheet and will allow it to make the investments required to enhance its efficiency and economic results. ENAP will have the capital, financing, human resources and technology required to comply with its mission as the public energy company of the country.
- The new projects started by ENAP will have a private positive profitability, so that the value of the company is not destroyed by them. Otherwise, these projects should have the previously established explicit tax benefit (according to OECD criteria).
- As regards the Region of Magallanes, although it is an area of strategic exploration, the new projects will be implemented by sharing the risks with private persons, and considering the need to review the existing pricing policy in the region, in order to prevent the capitalization from becoming a disguised benefit in addition to the one already existing.

### **3. We will prepare a State Energy Policy with social, political and technical validation**

#### **3.1 We will conduct a broad dialogue process on key issues arising from this Energy Agenda, which are defined in the sector planning:**

- **Short-term horizon (2025):** The action lines will be discussed in terms of standards, policies and regulations securing the technical feasibility and sustainability of the energy matrix with a horizon to year 2025.
- **Medium- and long-term horizon:** The strategic and technological aspects defining the energy matrix to be boosted toward 2050 will be submitted for discussion, identifying the medium-term horizons for the previous decades.

The discussion process will invite the relevant actors of the public sector, industry, academy, civil society, regions and citizens in general, and its final outcome will be our country's long-term "Energy Policy". This policy will identify the matrix, standards, guidelines, and regulations required to guarantee its sustainability and feasibility in the different time periods, as well as the emphasis and actions plans for the strategic aspects that will define the policy through year 2050.

The dialogue process will legitimate the definitions to be adopted, thus making easier the adoption of the specific policies required by the country.

#### **4. We will boost human capital, science and energy innovation.**

##### **4.1 Energy Innovation Plan**

- The Centro de Energías Renovables (Renewable Energy Center) will be entrusted with new duties and converted into Centro Nacional de Fomento e Innovación en Energía Sustentable (National Center of Promotion and Innovation on Sustainable Energy). Its purpose will be to boost Energy Strategic Innovation Programs and to promote Renewable Energies, together with Corporación de Fomento a la Producción (Production Promotion Corporation, CORFO). Public-private cooperation programs, among others, will be implemented to develop distributed generation applications and intelligent networks incorporating different technologies, including a strategic solar power industrial innovation and development program.
- We will invite and actively involve the Universities so that they make contributions with a holistic and interdisciplinary view from science to discussion and resolution of the energy challenge. We are already negotiating working agreements with the University of Chile, Pontificia Universidad Católica de Chile, University of Concepción and University of Magallanes.

- We will spur the development of an “Energy Efficiency Cluster”, with companies developing solutions focused on those segments of the value chain where more impact is involved. One of the focuses of attention will be to convert the ESCO’s in world-class suppliers.

#### **4.2 Plan to strengthen human capital in energy.**

- We will reactivate the energy program between the Comisión Nacional de Investigación Científica y Tecnológica (National Scientific and Technological Research Commission, Conicyt) and the Ministry of Energy for the training of advanced human capital in order to answer to the priorities defined by the policy and market needs.
- We will extend the Scholarship Plan to foreign universities so that the future professionals of the Ministry of Energy may attend post-graduate courses in energy areas.

#### **4.3 R&D Program in Solar Energy**

- We will foster the industrial innovation and progress in solar energy through the consolidation of the investigational sites in solar energy already under implementation in the country; the promotion of partnerships between the industry and the investigational sites, and a cluster focused on the development of goods and services providers.

### **5. We will strengthen the system to approach energy safety and emergency events with planning at a regional and national level.**

#### **5.1 We will strengthen preventive and operating work in emergencies.**

- As regards sectorial regulation, we will formally create the Comité Operativo Sectorial de Emergencia (Emergency Sectorial Operating Committee, COSE). This body will inform and coordinate the early sector actions to be taken in case of emergency, incorporating the private sector.

- To regional, metropolitan and communal level, we will develop programs of preparedness and recovery post-emergence and crisis management, based on the analysis of structural risk scenarios with different types of threat.
- At a regional, metropolitan and municipal level, we will develop post-emergency recovery and preparation and crisis handling programs, based on the analysis of structural risk scenarios against different kinds of threats.
- We will impose the obligation of incorporating electric generation support technology and investments to other basic utilities: drinking water, service stations, hospitals, and emergency lighting.
- We will add technologies to the transmission grids and system operation in order to enhance the capacity of response to serious contingencies.

## **6. We will foster more transparency of the energy information for the citizens and sector actors.**

### **6.1 Simple and clear accounts of electricity and gas.**

- We will develop a transparency plan in the information provided in electricity and gas bills. It will be applicable from the second half-year of 2014

**6.2 We will improve the transparency, reliability, gathering and statistical analysis of the relevant data of the energy sector.**

- We will increase the human and information technology resources in the Ministry of Energy, the National Energy Commission, and the Superintendency of Electricity and Fuels, increasing their powers so that the disclosure of information by companies and users is efficiently and timely made.

**6.3 The Ministry of Energy will collect and make available the relevant information of the energy sector.**

- A public access database will be kept and updated including statistics and indicators shared by the OCDE countries.
- Creation of an Energy Portal during the year 2015 addressed to the educational community, interested actors and general public. This Portal will be the official source of information about the national energy sector.
- Development of online information that can be accessed through the Internet and intelligent phones for the information of prices of benzine and gas (year 2014) and electricity (year 2015).

**7. We will require increased commitment from the energy sector to environmental and social protection in the construction and operation areas of energy projects, including their implications at a global level.**

**7.1 We will make use of the Evaluación Ambiental Estratégica (Strategic Environmental Assessment, EAE) for the stages prior to the development of energy projects.**

- We will use the EAE in the territorial management processes to be applied to the energy sector.
- We will apply the EAE to other strategic plans and policies in the Ministry. During the first two years of Government, we will implement at least one pilot experiment.

**7.2 We will support the Ministry of Environment in the enhancement of the environmental regulation to be applied to the energy projects.**

- We will support the development of regulations and instruments specific to the sector in order to improve the environmental behavior of the energy projects.
- One of the initiatives in this line will be the generation of background information to regulate the intake and discharge of cooling waters by thermoelectric plants. In the case of hydroelectricity, one of the issues to be reviewed is the intra-daily flow oscillation resulting from peak generation.

**7.3 We will support the Ministry of Environment in the enhancement of the minimum conditions for the environmental assessment and performance through:**

- The development of specific guides or regulations relating to the improvement of the information of energy projects entering the Environment Impact Assessment System.
- The development of good practices guides for risk and uncertainty identification and management, as well as the mitigation and compensation of environmental impacts resulting from energy projects in any unregulated matters.
- Information about the environmental performance. To that end, we will develop specific environmental indicators and international and national benchmarks for the energy industry in order to measure environmental performance.



# 02

REDUCTION OF  
ENERGY PRICES,  
WITH HIGHER  
COMPETITION,  
EFFICIENCY AND  
DIVERSIFICATION  
OF THE ENERGY  
MARKET

## ISSUE 2:

# REDUCTION OF ENERGY PRICES, WITH HIGHER COMPETITION, EFFICIENCY AND DIVERSIFICATION OF THE ENERGY MARKET.

Throughout the last decade we have had high electricity marginal costs and prices for end users that fail to reflect an efficient development of the system.

Different studies show that one of the problems of the electric market would be linked to the lack of competition in the generation market. A recent study requested by the *Fiscalía Nacional Económica* (National Economic Prosecutor's Office) states that competition in the market of unregulated customers is even weaker than the competition in the bids for supplies to regulated customers. This report notices that the increased prices are already making the Chilean industry less competitive, and are gradually being passed on to the families. **In the SIC, the three largest electric generation companies and affiliates have more than 76% installed capacity, which the SING reaches 98%.**

Chile is facing the risk of awarding contracts for homes, small companies and businesses (regulated customers) that will have an impact throughout the next decade at prices far above the long-term competitive costs. Should the trend of the last bidding processes of 2013 continue, **the cost of electricity would rise 34% during the next decade as compared with year 2014. For that reason, one of the objectives set by this Government is to generate the conditions to allow and promote increased competition in the electricity market and to achieve in this manner reasonable prices for unregulated and regulated customers.** This will be conducted through the 2014-2015 bidding processes for the supply to regulated customers that represent about 50% of the electric consumption demand of the SIC and SING. These bids will lay the foundations of the prices for the next decade. The contribution of the hydroelectric and thermoelectric energies will be essential to meet our price-reduction goals, since these electric energy sources will be 80% of the matrix as at 2025.



**To ensure more participation of the LNG in the national energy matrix is another core element to reduce the current prices of electricity.** The country's infrastructure for receipt and re-gasification of LNG (terminals), gas transportation (gas pipelines) and use of gas in the electric generation (plants) will be used to the full. In practice, today there are gas-fired plants using more expensive fuels (diesel) or in partial operation, with the ensuing increase of prices at the electric generation spot market. The generating companies have refrained from entering into LNG supply take or pay agreements, due to, among others, the risk inherent in the hydrology over the marginal price of energy. Another reason could be the business models of both LNG terminals, in relation to their access terms together with the ownership structure, where generating companies are involved. This could be hindering the access of the other competitors to the use of terminals in spot mode, and also to have reserved capacity for permanent use and new investment projects, especially in generation.

**Finally, we must perfect the regulation of the market of gas distribution through networks,** which has had an important development in the last 20 years, currently reaching about one million customers and covering almost 25% of the inhabitants. In this market, there coexist concessionaires of the natural gas distribution public utility (two third parts of the market), subject to quality and service continuity standards, and companies under no concession that distribute gasified liquefied gas in condominiums and buildings under asymmetric regulatory conditions with respect to the concessionaires. The regulation of the market is minimal: the companies can freely decide their tariffs, except for the concessionaire of Magallanes Region, and in spite of the fact that the distribution concessions fail to recognize an exclusive exploitation right, there would exist discharge barriers once the home customers have opted for one distributor, thus hindering the competition.

In the case of concessionaires, the Tribunal de Defensa de la Libre Competencia (Free Competition Defense Tribunal, TDLC) may fix the tariffs in case that it is proved that there has been an excessive profitability in one calendar year according to the parameters defined by the law. The regulatory framework, however, has a legal gap since 25 years ago in this regard, since the procedure and method for tariff-fixing has not been regulated. With respect to non-concessionaire distributing companies, certain specific legal modifications are required to impose similar quality and service continuity standards as those imposed on concessionaires, and a procedure to facilitate the change of supplier and other provisions to make the market more transparent. In all these cases, the residential/business customer depends almost exclusively on the regulation to safeguard its rights.

## **ACTION LINES AND GOALS**

### **1. With regard to bids for supply to regulated customers**

**1.1 Redesign of the long-term bidding conditions:** In order to improve the competition of the processes and reduce the current award prices by 25%, we will extend the terms of the bids (tenders and beginning of supply) in order to enable the involvement of new actors. Furthermore, we will include the participation of the ERNC, redesigning the structure of the supply blocks.

**1.2 Redesign of the short-term bidding conditions:** In order to ensure the contracted supply to regulated customers, we will design one or more “short-term products”, that can be attractive for generators existing in the market, specially the ERNC. This procedure should mitigate the risk of supplies under no contracts, and avoid the long-term projection of the current high prices.

**1.3 Regulation of supply under no contracts:** This exceptional situation fails to have an explicit treatment in the law. For that reason, it is of the utmost importance to define who will assume the supplies and the transaction price in these cases. A proper resolution of this issue diminishes the risks for newcomers in the generation market.

**1.4 Improvement of the negotiation power of “small unregulated customers”,** defined as those with an installed capacity of up to 10 MW. A legal modification will be analyzed to allow these customers to opt for the regulated or unregulated tariff. The notion of “demand commercialization” will be installed to make it possible to add the demand of “unregulated small customers” to improve the negotiation power.

**1.5 Bidding of lands for public interest generation projects.** As the energy policy defines a generation matrix structure and there is a territorial regulation available, new bids for state-owned lands intended to generation projects for supply tenders to regulated customers, at places where a community involvement process has been previously developed, could be implemented.

**1.6 Changes to the Bidding Process Regulations.** Certain regulatory changes will be analyzed, that could include increases in the advance time periods for the bidding processes; flexibility in the purchase points and referencing of prices between purchase points; Reserve Price, among other issues.

## **2. We will promote the use of LNG in electricity generation as a substitute for diesel, together with its industrial and residential use.**

**2.1 Short-term measures (2015-2019)** intended to maximize the use of the current electric generation infrastructure and LNG terminals:

- **ENAP will offer a natural gas contract and regasification capacity in 1.1 MM3/year to electric generators for ten years.** The ENAP volume would be sufficient for 66% of the requirements in a plant basis of 350 MW, i.e. for a yearly average of 240 MW or for the maximum power during eight months. The impact in the Marginal Cost, under an average hydrology scenario, is a 10% reduction in 2015, and an average 5% reduction between 2016 and 2019.
- **Development of a self-regulation agenda and issuance of legal and regulating provisions for existing terminals designed to release capacity (temporarily and/or permanently) that is not being used, and transparent reporting provisions.** In Quintero, the capacity of 15 MMm3/day is 100% contracted by the incumbents, however 7.0 MMm3/day are estimated to remain available as at 2015. In Mejillones, 2.0 MMm3/day in the terminal are available as at 2015 and zero as at 2018.
- The convenience of developing technical provisions will be analyzed in order to adapt the CDEC procedures for the dispatch of LNG plants and fixing of the effective cost of take or pay LNG contracts.

**2.2 Measures with effect in the medium-long term (2020 onwards)** that make it possible to increase the capacity in LNG and install new natural gas-fired combined cycle plants in the energy matrix, if possible through new actors:

- The **extension of Quintero terminal to 20 MMm3/day** will be promoted together with the offering of new LNG contracts at 3 MMm3/day, which would make possible the operation of **2 additional combined cycles**.

- The construction of a third LNG terminal will be fostered in the central-southern area of the country. To that end ENAP will become involved in the development of an economically feasible project to carry it out.



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### **3. Measures for Efficiency in the Market of Gas Distribution through Networks**

**3.1 In the second semester of 2014, we will send a legal proposal to regulate the tariff- fixing process for the market of Gas Distribution through Networks.** The legal gap will be resolved in order fix the gas tariffs of the concessionaires that exceed the maximum allowed profitability limit through a tariff-fixing methodology at an average costs, based on an efficient company similar to other public utilities, based on external studies, with opportunities for citizen involvement and arbitration procedure for dispute resolution.

**3.2 In the second semester of 2014, we will send a legal proposal to carry out the tariff-fixing process for the market of Gas Distribution where no concession has been granted.**

The notion of "permits", which is widely used in private condominiums and buildings will be developed; obligations of registration and quality of service similar to those required from concessionaires, transparent reporting to the regulating agency and users, procedure for the conveyance of ownership of ponds to promote competition through the possibility of changing the supplier observing safety standards, among other issues.



# 03

DEVELOPMENT OF  
OUR OWN ENERGY  
RESOURCES



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### ISSUE 3:

## DEVELOPMENT OF OUR OWN ENERGY RESOURCES

Chile is a poor country in terms of fossil resources as compared with the rest of Latin America, except for the reserves existing in the area of Magallanes that ENAP is currently exploring and exploiting. Nevertheless, our country has plentiful renewable resources considering the great hydroelectric potential that has not been fully exploited yet, the exceptional solar radiation conditions, particularly in the northern area of the country, the availability of winds in different geographical locations, the huge geothermal potential existing throughout the Andes mountain range, and the opportunity offered by the energy of tides, currents, and waves throughout our coasts. It is a challenge for our country **to make an appropriate, intelligent and innovative use of its rich bases of renewable resources.**

According to the studies entrusted by the Ministry of Energy, in an unchanging scenario, the hydroelectric potential between the basins of Aconcagua and Puelo is expected to exceed 10,000 MW of capacity. According to the report of the Advisory Commission for the Electric Development there would exist another additional 6,000 MW in the Region of Aysén. Acknowledging not only this great hydroelectric potential of our country, but also the existence of alternative uses and the need for protection of the natural and cultural heritage, **it is necessary to conduct a energy territorial planning process for the future hydroelectric development** in close coordination with the Ministry of Public Works and other relevant Ministries. This process will begin with a basin mapping and analysis, based on hydrological and geological, environmental, economic and socio-cultural technical criteria.

**With regard to ERNC, Chile has made clear decisions. From 2010, the electric system is required to inject a minimum quota of ERNC in their electricity grids.** This requirement was increased in 2013 by Law 20,698, which demands that, in the year 2025, 20% of the injections for the contracts subject to the law should come from ERNC. Today ERNCs are a reality in Chile.

This year, at least 1,000 MW will be added to our electricity matrix, with a diversified portfolio of wind, photovoltaic, biomass, and small hydroelectric plant projects, reaching by year-end 10% of the installed capacity. Furthermore, they have been a source of diversification of the actors that participate in the electric market: almost 90% of the ERNC projects carried out since 2007 belong to companies that are not traditional actors in the sector.

We trust that the maturity that the sector is reaching in the country will make it possible to comply with the provisions of Law 20/25. The barriers affecting the conduct of new generation projects, however, also affect the expansion of ERNC. The actions set forth in this Agenda related to the expansion of the transmission grids, improvement of competition, increased flexibility in the operation of the electric grids, and application for permits, among other actions, will be essential to make good use, in a socially and economically efficient manner, of the great ERNC potential available to the country.

In turn, the generation of energy intended for self-consumption is more and more feasible in Chile. Considering also that a transversal axis of the government program is to face inequity, the instruments intended for the development of ERNC for self-consumption will be a preferred focus of attention of this Agenda.

At the same time, the ERNC represent an opportunity for promoting the access to clean and efficient energy in extreme and isolated areas. There still are several extreme and isolated areas, that are not connected to the electricity grid, and whose electricity supply critically depends on diesel-fired generators, with the ensuing increased costs of energy. We need **to foster the development of the energy resources available at those extreme and isolated areas, through the use of renewable energy sources and the introduction of better technologies that make it possible to reduce dependence on diesel.**

At the same time, the wide use of firewood in our country, which represents 18% of our secondary energy consumption, brings about pollution and impacts of the safety of people. This caused several cities in our country to be declared as saturated areas. This is an urgent problem that has to be handled with a systemic view. We need to improve the knowledge base concerning firewood in order to have sufficient information to advance on and develop a wood energy policy.

## **ACTION LINES AND GOALS**

### **1. We will support the hydroelectric development with sustainability criteria**

- We will work together with the Ministry of Public Works (MOP, for its acronym in Spanish) on the strengthening of the Dirección General de Aguas (General Water Board, DGA) in energy related matters, such as public information, sectorial permits, supervision and regulation, in order to give an appropriate answer to the increased demand assumed by this body, caused by the growing development of hydroelectric projects, particularly of small plants. We will improve the institutional capacities of the DGA on the management, granting and assignment of new water rights intended for hydroelectric production, including the speeding up of the administrative handling of the sector permit established in Article 294 of the Water Code, and the guidance and support to water user organizations with potential for including hydroelectric plants in their irrigation works so that they meet the requirements to be eligible to opt for the benefits for the development of “multiple use global projects”, as established in the last amendment to the Irrigation Promotion Law.
- In the second half-year of 2014, the Ministry of Energy together with the Ministries of Public Works and Environment will identify the main barriers that hinder the exploitation of the country's hydroelectric potential and, particularly, the development of the projects in the

Works Plan of the National Energy Commission of April 2014. Furthermore, we will propose legal and regulating adjustments to facilitate an exploitation consistent with the proposals, initiatives and actions of the Territorial Regulation set forth below.

- The Ministry of Energy and the DGA will develop collective actions to maintain a platform of updated and georeferenced information on “non-consuming”<sup>1</sup> water rights, both already granted and pending, to be used for hydroelectricity purposes at the priority SIC basins.
- The Ministry of Energy will participate in the Inter-sectorial Table on Hydric Resources, headed by the MOP and the Presidential Delegate for Hydric Resources. This table will draft a **legislative proposal for the regulatory framework applied to non-consuming water rights**, which support hydroelectric generation.
- We will advance on combining storage, irrigation water management, and hydroelectric generation at irrigation reservoirs, promotion a better use of water resources in the southern-central area. We will analyze the legal, administrative and economic feasibility of implementing the scheme currently developed by the MOP -through the Dirección de Obras Hidráulicas (Hydraulic Works Board, DOH)- for the construction of multi-purpose irrigation reservoirs. This scheme involves additional income for the concessionaire due to the sale of energy through the construction of plants at the toe of dams, and reduced grants for the construction and operation of the reservoir, adjusting their operation to the requirements of the irrigators, i.e. the owners of the consuming water rights.

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1 Translator’s Note: The holder of a non-consuming water right is authorized to take a certain volume of water at a point of the natural watercourse, but it is required to return such volume at another point

## 2. We will foster the integration of ENRCs pursuant to the ENRC Promotion Law (20/25)

### 2.1 We will face the barriers restricting an increased participation of the ENRCs in the electricity market.

- During the implementation of the actions contained in this Agenda related to the expansion of the transmission grids, improvement of competition in the generation segment, making the operation of the electric grids and the application for permits more flexible, the particularities of the ENRC will always be considered.
- We will relaunch the instruments of support to pre-investment and access to financing for ENRC projects directed at generation integrated to the electricity market, and we will focus them on projects that usually run into more difficulties in those stages.

## 3. We will promote the development of an ENRC market for self-consumption that is socially efficient and transversal to all the economic actors.

### 3.1 Promotion of solar thermal collectors.

During the second half-year of this year, we will send to the Congress a bill to **renew and enhance the validity of the tax exemption** for the installation of solar thermal systems for sanitary hot water in new homes, and also to ensure its effectiveness in funding social dwellings. This measure complements the subsidies granted for the installation of this technology in social dwelling already existing through the Program to Protect Family Property of the Ministerio de Vivienda y Urbanismo (Ministry of Housing and Urban Development, MINVU).

- We will implement a subsidy for the installation of solar thermal systems in the reconstruction of the dwellings affected by the recent catastrophes of Arica, Iquique and Valparaíso.

### **3.2 Promotion of photovoltaic energy**

- During this year, we will start with the Public Solar Roofs Program, which will contribute to the development of the self-consumption oriented photovoltaic market. The program will result in a four-year demand of photovoltaic solutions for public buildings. These buildings will be prioritized in order to ensure efficiency in the use of the resources that the State will invest. This will be complementary to other initiatives with social or demonstrative purposes.
- During 2015, we will implement mechanisms to support the funding of companies that facilitate access to the opportunities offered by energy self-generation to reduce supply costs. We will design mechanisms specially oriented to the implementation of photovoltaic systems in micro and small companies.
- We will implement information and guidance systems to support the micro and small companies and the community in general in the evaluation of the technical and economic feasibility of photovoltaic applications.
- Calama will be the priority city for the implementation of the previous measures, given that its exceptional radiation levels ensure an appropriate return on the investments made there. We wish to encourage its transformation into a "solar city". We will take any such steps as may be necessary to strengthen these measures with the public and private initiatives aiming at the development of the city.

- During this year, we will create within the Superintendency of Electricity and Fuels a unit specialized in the supervision and follow-up of the thermal and electric self-generation alternatives that we are fostering in order to ensure the quality of the solutions offered by the market. This measure is essential for the successful development of a self-consumption application market considering the existing disparities among the actors involved.

#### **4. We will promote the development of geothermal energy for the local development**

**4.1 During 2015 we will send a Bill to the Congress to enhance the geothermal concession system** in order to ensure compliance with the exploration programs committed by the concessionaires in accordance with the reality of the national geothermal industry, to avoid the speculation with the geothermal development in Chile, to simplify the procedures for the procurement of concessions for low enthalpy geothermal energy oriented to self-consumption and to make possible the integration of the territorial realities and conditions related to local communities and areas protected with the rights granted under the concessions.

**4.2 We will implement schemes to reduce the risk in the perforation of deep wells in the geothermal exploration stage.** Furthermore, will foster the measures required for the development of a local supply specialized in geothermal drilling, the absence of which resulted in increased initial costs for this industry in Chile.

**4.3 We will initiate a program for the direct thermal use of geothermal energy in low and medium enthalpy applications.** As part of this program, the alternatives of costs and efficient technologies will be analyzed, their applicability to the local economic and social activities will be assessed, and their closeness to the communities by means of an education and diffusion program.

## **5. We will develop, together with the regions and municipalities, special plans for extreme or isolated areas**

### **5.1 We will reduce by 50% the number of Chilean families that have no electricity supply.**

Together with the Subsecretaría de Desarrollo Regional (Undersecretary of Regional Development) and the Ministerio de Desarrollo Social (Ministry of Social Development), we will develop during this Government's term the energy projects that are needed so that by 2018 we have provided energy to ten thousand out of the twenty thousand homes that have not yet received electricity supply. This will be conducted by collectively working on the solutions to be implemented.

### **5.2 We will ensure that 100% of the country's rural and isolated schools and public accident and emergency centers have a permanent electricity supply by 2017.**

**5.3 We will develop a renewable energy program to resolve the electricity supply of indigenous communities throughout the country.** This project will have a special participatory process to identify the most proper solution, taking into account priorities and world view.

### **5.4 We will encourage the development of a diesel replacement program.**

To improve the energy supply to the families living in the insular territory whose energy supply is based on diesel, we will introduce renewable energy technologies to reduce the use of this fuel for the electricity generation, thus improving their life conditions.

### **5.5 We will support the development of an Energy Policy for Aysén and an Energy Policy for Magallanes.**

There are key issues that must be approached in this area: to improve the existing regulations governing the electricity grids of each of these areas, to regulate the natural gas tariffs, and to suggest solutions for the energy used in transportation and industry.

Therefore, we will include a process of technical and participatory discussion in each of these areas for the design of a long- and short- term Energy Policy to ensure a safe energy supply at reasonable costs and making best use of the country's own resources (wind power and mini-hydraulic energy) and the Energy Efficiency. This process will be drafted with the relevant Regional Government, the University of Magallanes, ENAP, and any other organizations relevant to the location at issue. This process will derive from the proposed legislative change to the regulatory framework existing for the Medium Grids in the Electricity Law.

#### **5.6 Subsidy to Gas in Magallanes.**

We will continue with the mechanism of tax compensatory contribution to gas, maintaining the transfer at the current levels to Empresa Nacional del Petroleo, ENAP, corresponding to the lower value obtained from the sales made to the gas distributing company in the Region of Magallanes and Antártica Chilena.

#### **5.7 Coal Gasification Project in Magallanes.**

We will continue with the work already started by this Ministry with the University of Magallanes so that the Region of Magallanes and Antártica Chilena may have, among their energy options, a coal gasification project for the supply of gas to its inhabitants and for electricity generation.

## **6. We will improve the use of firewood**

### **6.1 We will create the “Heating and Firewood Table”, at a national and regional level, from Libertador Bernardo O’Higgins to Aysén.**

These tables will be focused on the development of a National and Regional Heating and Firewood Policy together with the Ministry of Environment and the relevant Regional Governments. These tables will approach safety concerns and equitable access to heating, internalizing the social, economic and environmental impacts of firewood. Furthermore, we will analyze the social, technical, economic, and environmental feasibility to promote other heating technologies with emphasis on cities with pollution problems.



**6.2 Study for the use of firewood** to improve the knowledge base with respect to firewood and other wood energy products in order to have sufficient information to formulate public policies.

In this sense, we will measure national consumption of firewood and by-products; we will gather information about the supply of firewood; we will review the relevant international experience in firewood management; and we will analyze the social, technical, economic and environmental feasibility of promoting other heating technologies.



# 04

CONNECTIVITY  
FOR ENERGY  
DEVELOPMENT

#### ISSUE 4:

## CONNECTIVITY FOR THE ENERGY DEVELOPMENT

Our country's electricity transmission constitutes the backbone of electricity development. A safe and diversified generation matrix ensuring reasonable prices and environmental and social sustainability needs a transmission grid consistent with these purposes.

Before 2004, the electricity transmission grid was developed under a free agreement between a generator and the transmission company, with no State planning at all. In that year, Law 19,940 (Ley Corta 1 - Short Law I) regulated the transmission market and incorporated the development of a "Systemic Planning" through a mechanism where the regulator, the owner and the grid users «collectively» study the future extensions that need to be made. Once this process has been developed, the National Energy Commission and the Ministry of Energy will define the extensions, and the system actors will be allowed to object to such definition before a Panel of Experts.

In spite of this reforms, the trunk transmission grid of the SIC has shown faults and restrictions that put at risk the supply of certain areas of the country, and raise the final prices of electricity. The restricted expansion of transmission, with short-term economic criteria, has resulted in electricity systems that hindered both the exploitation of the country's energy potential and the transfer of lower costs among different areas, contributing at the same time to erect a barrier for the entry of new companies.

**Therefore, regarding transmission, the overall and future transmission of the grid should be guaranteed,** which is not always the same goal sought by the each of the participating actors. The compulsory planning developed by the authority should allow the development of transmission projects to generate a national benefit that goes beyond the mere reduction of the grid's short-term operational costs, allowing the reduction of entrance barriers, eliminating economic disconnections among the different areas of the country, and facilitating a greater incorporation of the renewable energies available in the country.



In this scenario, new criteria should be defined for the extension of the grid in order to ensure a long-term robust transmission, with ongoing reviews of the expansion plans and the promotion of strategic transmission projects binding on the country, to allow the exploitation of generation poles according to the country's Energy and Territorial Regulation Policy. Furthermore, the current method for remuneration and payment of the transmission facilities needs to be enhanced in order to ensure the efficiency and safety of the system, give appropriate signals to the short- and long-term operation; as well as clear costs enabling new actors to enter the electricity market.

**Likewise, we consider that it is essential to bring our Great Northern and Central Area electricity markets together.** The trunk interconnection between the systems will generate great advantages, including without limitation the efficient use of generation and transmission infrastructure; the distribution of use of operation reserves among the systems; the optimization of the joint development of generation and transmission works; greater security of global demand supply in case of contingencies such as delays or failures in the plants, unavailability of LNG or price shock; the promotion of the introduction of ERNC technologies due to a high degree of complementarity with conventional technologies between the systems; a larger unified electricity market; and intensified competition in the supply agreements that will result in more competitive prices both regulated and non-regulated.

Under the scope of international connectivity, we are living in an area that is rich in fossil energy resources, however, we import a large part of these resources from faraway countries at higher prices. Therefore, we need to explore new possible energy import agreements with our neighboring countries. Furthermore, given our huge clean generation potential through

renewable non-conventional sources, we should not rule out that, in the medium term, we will be in a position to export energy. Therefore, there are signs that we will obtain significant benefits if we advance toward a more integrated regional energy market.

## **ACTION LINES AND GOALS**

### **1. New regulatory framework for energy transportation (Trunk Transmission, Sub-transmission and Additional Transmission)**

**During 2014, we will draft a transmission bill that will be put forward during the first half-year of 2015.**

For this purpose, the Ministry of Energy, under the scope of the planning process of the Energy Policy mentioned in axis 1 of this Agenda, has entered into an agreement with the Pontificia Universidad Católica de Chile, so that this university and the National Energy Commission may jointly develop a participative technical process to show the regulatory changes required by the country's transmission grid.

The working agenda includes a thorough discussion about "The Future of the Transmission Grid", where the following issues will be discussed: new transmission and sub-transmission paradigms; intelligent grids; reuse of the grid; and long-term planning and tariff-fixing criteria, both with regard to the remuneration procedure and cost allocation. Moreover, the main difficulties of and changes required by the regulatory framework of the Chilean transmission grid will be defined in matters such as planning; tariff-fixing in an interconnected system;

safety and operation in an interconnected system; open access and use of additional lines; development of transversal grids; generation poles and ERNC; sub-transmission; and regional interconnection.

## **2. SIC-SING Interconnection**

We will consider the interconnection of the SIC-SING grids in the Trunk Transmission System Expansion Plan. Without prejudice of the above, should the private development of a line interconnecting both systems come true, the Government will cause its prompt materialization.

## **3. Regulatory suitability of the operation of the Interconnected Systems for the efficient and safe inclusion of ERNC**

**Issuance of a technical regulation of the National Energy Commission that will set forth the suitability of the operational schemes of the SING and SIC.** The purpose is to cause them to be more flexible for the efficient and safe incorporation of ERNC into the electricity grids. Among the matters to be reviewed, we can find the parameters defined for the dispatch of thermal plants, the automatic generation control and the ERNC generation forecast.

## **4. Amendment to the Load Economic Dispatch Center (Centro de Despacho Económico de Carga - CDEC)**

The legal and governance nature of the CDECs will be reviewed in accordance with the new reality of the projected national interconnected grid and the best practices of the OECD countries.

## 5. Strengthening of the regional interconnection

### Preparation of a Strategic Plan concerning regional interconnection and integration.

During this year we will devise a Strategic Plan with the Foreign Office in order to clearly define Chile's position, so that the discussions on energy matters are included in the global dialogue and negotiations between the parties. Among the main working lines in this area, we can find the electric interconnection with Peru; electric and gas exchange mechanisms with Argentina; the purchase and sale of energy with Ecuador; and the regulatory complementarity with the members of the Andean Interconnected Grid (SINEA, for its acronym in Spanish).



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# 05

AN EFFICIENT  
SECTOR MANAGING  
CONSUMPTION



## ISSUE 5

# AN EFFICIENT SECTOR MANAGING CONSUMPTION

Since 30 years ago, the industrialized nations have been putting the focus of attention in promoting the Energy Efficiency (EE) as the cleanest and most economic and accessible energy source. According to the data of the International Energy Agency (IEA) between 1974 and 2010, the Energy Efficiency was the major energy source in a subset of 11 IEA countries, avoiding the consumption of 32 million tons of oil equivalent (TOE).

Given our country's context in energy matters, our priority is to ensure that Chile will not waste energy. We need to take a quantitative leap to the development of EE from the current illustrative project generation model towards **the creation of a legal framework converting the EE into a long-term State policy.**

Considering the maturity gained by this market, it is essential for the country to advance in the following four years to an **Energy Efficiency Project Extension Stage**, with ambitious and attainable purposes promoting a sustainable long-term development. We consider that in 2025 the set of measures mentioned in the Agenda will allow us to reduce by 20% our energy consumption as compared with the expected consumption that would have existed without the measures mentioned above.

## ACTION LINES AND GOALS

### 1. Energy Efficiency as a State Policy: Energy Efficiency Law

During 2014 and 2015 we will draft a bill that will be brought before the Parliament. For this purpose, the Ministry of Energy, under the scope of the participative discussion of the Energy Policy mentioned in Axis 1, has entered into an agreement with the University of Chile so that, together with the Ministry of Energy, they develop a participative technical process to show the regulatory changes required by the energy consumption to exploit all the EE potential of the country.

The bill will include at least the following three components: (a) Energy Efficiency in the Industry and Mining sector; (b) Energy Efficiency for homes, small industries and businesses; (c) Energy Efficiency in the public sector.



- a. **Energy Efficiency in the Industry and Mining Sector, both private and governmental:** each year the companies with the best international energy management practices conduct energy audits and prepare Energy Efficiency plans and goals. To enhance the competitiveness of our industries and bring them closer to the best international practices, we have established that the first component of this law will consider the large energy users in the country that have a person responsible for energy; that develop an energy management system with energy independent audits, conducted by specialized consulting companies and medium- and long-term plans for energy conservation, which are reported to and verified by the authority.
- b. **Energy Efficiency for homes, small industries and businesses:** it is intended to uncouple the income of the distribution companies and their electricity sales, and to cause these companies to implement Energy Efficiency programs with their customers.
- c. **Energy Efficiency in the public sector and Armed Forces:** the public sector and the Armed Forces also have to make efforts toward the efficient consumption of energy. Therefore, they will have a person responsible for energy and, according to the type of facilities, they will also have to develop energy management systems and plans and/or energy audits, and their ensuing implementation.

**2. We will introduce measures to spread the development of Energy Efficiency projects.**

**2.1 We will continue carrying out the Energy Efficiency Action Plan until year 2020.**

This is the updated Energy Efficiency National Plan developed during the previous term of President Bachelet.

**2.2 We will include, during the following 12 months, the definition of “efficient cogeneration” to the relevant regulations.**

With respect to the efficient cogeneration, which is the generation of electrical energy and heat in a single high energy efficiency process, we will include during the following 12 months the definition of “efficient cogeneration” in the relevant regulations.2.3 New labeled Energy Efficiency during 2014 and 2015.

Furthermore, during 2015, we will co-finance some small-scale illustrative pilot projects.

**2.3 New Energy Efficiency labeling during 2014 and 2015**

- a. During this year we will generate Energy Efficiency labels for kitchens, water heaters, dishwashers, washing machines and firewood heater, the use of which will be obligatory since the first half-year of 2015.
- b. During the next year we will include televisions in on mode and driers. Moreover, we will conduct studies to evaluate new labeling to be developed during the following years. With respect to the Minimum Energy Efficiency Standards, the resolution setting the standard for fridges will be published this year to be effective as from 2015; and the standard for electric engines will be set afterwards and will become effective before the end of the term of this Government.

### **3. Housing and Construction**

#### **3.1 Subsidy for the thermal conditioning of existing dwellings.**

With respect to the subsidy programs, the Ministerio de la Vivienda y Urbanismo (Ministry of Housing and Urban Affairs, MINVU) will deliver, each year, at least the equivalent of 1,000,000 Development Units (Unidades de Fomento or UF) as a subsidy for the thermal conditioning of an existing dwelling.

#### **3.2 Energy-efficient public buildings and dwellings.**

Under the scope of the public infrastructure we will strengthen and deepen the savings program in public and Armed Forces buildings, and will accelerate the intervention of health establishments to cover, during the following four years, 100% of the identified high-complexity facilities, which means that the current efforts will be multiplied by ten.

We will progress, together with the MINVU, with the amendment of the Ordenanza General de Urbanismo y Construcciones (General Ordinance of Urban Affairs and Constructions, OGUC) in the area of habitability, specially through the addition of the new technical rule, in a public consultation, that increases the current thermal demands of the dwellings, and adds other requirements, which are extended to educational and welfare buildings. This proposal is estimated to improve the efficiency of constructions by 30% as compared with the current regulations.

#### **4. We will support the energy management of the municipalities with emphasis on street lighting**

##### **4.1 During this term, we will replace 200,000 street lighting devices, placing special emphasis on those using more inefficient technologies.**

Together with the SUBDERE and the Regional Governments, we will put in a great deal of effort throughout the country to modernize the street lighting of the municipalities that have not yet invested in Energy Efficiency and savings in their lighting bills.

##### **4.2 New street lighting regulations**

- a. We will publish during this year the regulations of street lighting for vehicle traffic ways, and we will launch a program including the preparation of guidelines, manuals, technical specifications, issues concerning the technical evaluation of tenders, etc.
- b. Furthermore, we are making a survey of street lighting at a national level to gather the information required so that the municipalities may, with the support of public funds, modernize their lighting systems.
- c. Additionally, we are preparing a set of regulations for roadways and pedestrian areas, such as walks, squares, parks, etc. The above is necessary because there is no current specific regulation. The regulations currently applied date from the 70s. We are expecting to send the regulations to the comptroller's office during the next 12 months.

##### **4.3 Support to municipalities in energy management plans and advice on the determination of the most convenient tariff options.**

## **5. Massive campaigns and educational programs in Energy Efficiency (EE)**

**5.1 Since June of this year, we will be conducting an EE campaign that will place emphasis on the specific benefits that EE yields both for the families and the society as a whole.**

**5.2 During the following years we will continue with massive campaigns to educate people about how to make a good use of energy.**

**5.3 We will increase the coverage of the implementation of an educational Energy Efficiency program.**

It will be adapted to each formal teaching level, from preschoolers to fourth year of secondary education, including the technical and professional training, advice for the conduct of activities in classrooms, training in, creation and provision of educational resources, as contained in the curriculum, and incentives and monitoring in the implementation of EE management measures at each educational site.



# 06

**BOOST FOR  
INVESTMENT  
IN ENERGY  
INFRASTRUCTURE**

**ISSUE 6:**

## **BOOST FOR INVESTMENT IN ENERGY INFRASTRUCTURE**

To meet the goals proposed by this Agenda, we need to revitalize investments in the energy sector, particularly as far as electricity generation and transmission are concerned. As a Government, we have a strong will to promote the projected investments in the area, as well as the addition of new actors. We need to move towards a more reliable and sustainable supply at lower prices for our homes and industries. If there is no energy development, we will not succeed in making progress in social equity or productive development.

The rhythm with which we progress in terms of electricity investments does make a difference. Less investment brings about more concentration, higher prices and greater profitability for the market actors, which are paid by the Chilean people. We consider it socially and economically imperative to agree on an agenda to get up to date with the development of the electric infrastructure required by our country, and to move towards the goals we have set regarding prices and introduction of clean energy from our own resources.

This agenda proposes to deliver a clear signal to all the actors of the Government's commitment to boost energy investments. This implies a permanent monitoring on the growth and development strategies of the main companies of the sector; the progress status of the Generation and Transmission projects declared to be "under construction" in accordance to the Works Plan prepared semiannually by the National Energy Commission, and the development of initiatives to ensure maximum efficiency and effectiveness in the process of investment materialization.

We further believe it is necessary to ensure that association strategies are planned between local development and national energy development, according to involvement, social inclusion and long-term work criteria.



## **ACTION PLANS AND GOALS**

### **1. Development of capacities for the follow-up and management of energy projects**

#### **1.1 We will create the Project Management Unit in the Ministry of Energy with the following duties**

- Monitoring of the growth strategy and the investment plans of the main sector companies.
- Monitoring of the energy investment projects declared to be “under construction” (see Annex 6, Works Plan, April 2014).
- Monitoring of procedures for the application of sectorial permits for investment projects; identification of administrative bottlenecks and development of inter-sectorial coordination actions for the progress of the investment agenda.
- Early identification of possible issues in the implementation of regulations applicable to the sector.

The development of capacities in the Ministry of Energy for the follow-up of energy projects not change or replace either the obligation of the project owners to follow the entry and processing procedure under the scope of the Environment Impact Assessment System (SEIA, for its acronym in Spanish) or the obligations concerning compliance with the relevant Resolutions of Environmental Qualification (RCA, for its acronym in Spanish).

## **2. Calls for Bids to purchase Government Lands**

### **2.1 2013 Bidding Procedures for Government Lands.**

A few days ago we completed the execution of the concession decrees related to the call for bids made by the Ministerio de Bienes Nacionales (Ministry of National Properties) during 2013 for the settlement of electric generation plants.

In addition, we propose to complement this process with the voluntary incorporation of an Early Citizen Participation stage, where the Ministry of Environment, the Ministry of National Properties and the Ministry of Energy will participate as process coordinators and collaborators.

This participatory process will be conducted as set forth in the "Guideline for Early Participation of the Community in Projects submitted to the Environmental Impact Assessment System."

### **2.2 We will conduct new government land bidding/concession processes during 2015.**

We will advance with the Ministry of National Properties, through the Inter-ministerial Agreement, on the definition of the places where these tendered electric generation projects will be located, taking specially into account the Renewable Energy projects in accordance with the planning of the matrix projected as at 2025.

Through these tenders we will promote the conditioned development of the government land concessions, integrating Strategic Environmental Evaluation and Early Participation processes that will make it possible to deal with guidance on issues such as: selection of sites to be offered for tenders, scale, local dynamics, labor, technologies, among others.

### **3. We will support the sustainable development of thermoelectric base generation projects providing safe and cheap energy to the country.**

The Ministry of Energy will support, through the Unidad de Gestión de Proyectos (Project Management Unit) and the Participation and Dialogue Unit, the materialization of all the projects under the CNE Works Plan, provided that they meet all the environmental regulations and standards, specially the regulations relating to maximum emissions established by Supreme Decree 13/2011, of the Ministry of Environment. This way, the new generation plants, provided that they comply with these environmental obligations, will make a contribution to the country's energy development.



#### 4. Incorporation of Local Association to energy project development

Energy development is useful for all the country, and we wish to ensure that the municipalities and communities feel that they share the social progress and the benefits related to these projects, which must translate into long-term local development strategies.

**We will study the mechanisms for the community to receive part of the benefits from energy projects to be implemented in its territory.** These mechanisms will be analyzed under the scope of the Comisión Asesora Presidencial para la Descentralización y el Desarrollo Regional (Presidential Advisory Commission for De-centralization and Regional Development).





07

CITIZEN  
INVOLVEMENT  
AND TERRITORIAL  
REGULATION



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## ISSUE 7:

# CITIZEN INVOLVEMENT AND TERRITORIAL REGULATION

The territorial, environmental and social disputes arising in energy projects are tangible. Our country's new context, marked by a growing and positive empowerment of the citizens, forces us to encourage a deeper dialogue with the society with regard to the use of lands and strategic planning.

The current territorial regulation instruments are divided into plentiful documents -from laws to plans, as well as strategies, protected areas, among others- that are effective at different territorial and administrative levels. This wide variety of instruments sometimes lead to contradictions and conflicts as to territorial jurisdiction, that hinder their application, generate uncertainty in different actors, and make any and all decisions and investments sought to be carried out more complex.

Chile needs Territorial Regulations that are consistent, clear and legitimated by the citizens. This is the only way in which we will make use of territory to aid the development of Chile, where productive activities may help to make the regions more dynamic and where people may live and grow.

The issue of Territorial Regulations goes beyond this Energy Agenda. As a Government, we will make progress on a close inter-sectorial dialogue headed by the Ministerio del Interior (Ministry of Domestic Affairs) with an active involvement of the Ministries of Economy, Environment, National Property, Agriculture, Housing, Public Works, Mining, Finance, and Energy. The purpose of this dialogue will be to establish univocal rules for the efficient, sustainable and socially responsible exploitation of the different territories that make up our country. The convergence of the different provisions of the Territorial Regulations will make it possible to better protect the environment, while at the same time it will foster the participation of the different groups of citizens in the local, regional and national development. This is a chance for a really democratic appropriation of the territory, and to resolve conflicts of interest with respect to its possible uses.

**We are convinced that an inclusive energy development is to take place in alignment with the receiving communities.** To that end, it is essential to know the current potentials, visions, and orientations of the territory. Furthermore, we must generate certain spaces for community involvement in the regulation, planning, and development of energy development strategies in order to ensure social validation. Another means of support for social certainty and private investments is to achieve **Regional Energy Territorial Regulations** to identify in an indicative manner the suitability of the areas for the installation of projects for each type of technology, under strict environmental rules and standards. These regulations should be validated through a Strategic Environmental Assessment.

Together with the above, we need to boost the best practices of associative and participatory work between companies and communities so that the latter may value and validate the projects.

From the standpoint of **education and cultural change**, we will seek to contribute to the acquisition of public knowledge about energy issues, so that people are allowed to participate in an open and informed debate under the scope of the long-term energy policy, and that we are led to look beyond the current contingency of the projects.

## **ACTION LINES AND GOALS**

### **1. Territorial Regulations Agenda for hydroelectricity**

Together with the Ministry of Public Works, Ministry of Economy, Ministry of Environment, and the Presidential Delegate for Hydric Resources, we will prepare an hydroelectricity agenda with the following guidelines:

- During the Government term, we will conduct a basin mapping and global analysis, based on hydrological and geological, environmental, economic, and socio-cultural technical criteria.
- As at 2015, we would have defined a detailed zoning of six prioritized basins. For that purpose, we will conduct a participatory process and the required studies will be requested.
- Considering that this is a process that may take a long time, the hydroelectric projects currently conducted in the different processing phases will not become compulsorily affected by this process; i.e. that any possible regulatory changes arising from this process will not be retrospective.

## **2. We will make progress in overall Territorial Regulations with focus on efficiency and sustainability.**

### **2.1 We will foster the inter-ministerial coordination for the Territorial Regulations.**

- We will participate in the Territorial Regulations Inter-ministerial Table, including the particular view of energy development.
- We will enhance and work the energy component in Territorial Planning Instruments.

### **2.2 We will exert regional efforts for the Energy Territorial Regulations.**

- We will establish a specific instrument for the Energy Territorial Regulations at a regional level. This instrument will be prepared in 2014, both by the Ministry of Domestic Affairs and the Ministry of Environment in order to rapidly contribute to the certainties required by the progress of the projects that make up the medium-term development in the system. This instrument will balance the regional view with the national energy policy guidelines.

- We will start with the implementation of three pilot experiments during 2014 for the design and adjustment of the instrument. Then, we will continue with each of the country's regions. The instrument, and its contents in each of the regions, reinforce the Regional Plans of Territorial Regulations, as well as the standard-setting instruments of the Territorial Regulations.
- We will create Energy Development Regional Commissions to accompany the development of the national energy policy and the regional management and regulating processes.

### **3. Design of standards and institutional nature for the participatory development of projects**

**3.1 Design of energy development participatory standards.** We will organize a multi- sectorial working table to devise, within the term of one year, the project development participatory standards, where we will consider the incorporation of previous involvement notions, dispute resolution, degree of involvement link, promotion of best practices, and prevention of bad practices.

**3.2 We will implement a pilot program of social progress** coordination. We will launch a pilot program of social coordination in projects subject to conflict situations in order to generate favorable discussion spaces where the parties may meet in environments characterized by the balance of information and mutual respect, provided that the initiatives are consistent with the goals proposed by the Energy Policy. The above will be conducted insofar as the parties agree that the Ministry may act as mediator and/or dialogue coordinator.

The experience resulting from the practices mentioned above will be used as an input for the possible development of a public policy to promote dialogue and conflict mediation in the energy sector.

**3.3 Education and sensitization towards a cultural change in energy.** We will implement an energy educational portal to be accessed by teachers in our country, and we will develop, together with the Ministry of Education, a strategy incorporating energy in the education curricula.

We will carry out energy short-term positioning activities through campaigns, actions in educational, and other sites.

We will promote the incorporation of Energy Efficiency criteria and the use of Non-conventional Renewable Energy in national public education establishments in order to turn them into educational experiential elements.





# 08

## ANNEXES

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## **ANNEX 1:**

# **LEGISLATIVE AGENDA OF THE MINISTRY OF ENERGY**

This Energy Agenda considers a series of legislative initiatives to materialize the proposed goals. Please find below subject and initial date of submission:

1. Subject: **Amendments to the Legal Framework for Calls for Bids to Supply Electricity to Regulated Customers**
  - » Date of submission: Third quarter 2014
2. Subject: **Creation of nine Energy SEREMI's in the regions of the country where they are inexistent**
  - » Date of submission: Third quarter 2014
3. Subject: **Renewal of Tax Exemption for Solar Collectors (Law 20,365)**
  - » Date of submission: Third quarter 2014
4. Subject: **"Incentive to promote local development related to energy projects"**
  - » Date of submission: Date in 2014 to be set with the Ministry of Domestic Affairs and Public Safety and the Presidential Advisory Commission for De-centralization and Regional Development
5. Subject: **Increased Efficiency in the Market of Gas Distribution through Networks**
  - » Date of submission: First quarter 2015

6. Subject: **Amendments to the legal frameworks of the electric transmission system**
  - » Date of submission: Second quarter 2015
7. Subject: **Energy Efficiency Law**
  - » Date of submission: Fourth quarter 2015
8. Subject: **Geothermal Promotion Law**
  - » Date of submission: Fourth quarter 2015
9. Subject: **Amendment to ENAP Organic Law (corporate governance and capitalization)**
  - » Date of submission: No later than the first quarter of 2016
10. Subject: **Modernization and Strengthening of the Superintendency of Electricity and Fuels (SEC, for its acronym in Spanish)**
  - » Date of submission: First quarter 2016
11. Subject: Amendment of the regulatory framework of the Medium Grids of Magallanes and Aysén
  - » Date of submission: First quarter 2016

**ANNEX 2:**

**REGULATIONS  
PENDING AGENDA**

1. **Amendment of the Regulations of Electricity Law** concerning Concessions
  - » Re-entered in Comptroller's Office in the Second Quarter of 2014
2. **Appraising Commissions Regulations**
  - » Entered in Comptroller's Office in the Second Quarter of 2014
3. **Amendment of Bidding Regulations**
  - » Re-entered in Comptroller's Office in the Second Quarter of 2014
4. **LPG Safety Regulations**
  - » Re-entered in Comptroller's Office in the Second Quarter of 2014
5. **Vehicular Street Lighting Regulations**
  - » Re-entered in Comptroller's Office in the Second Quarter of 2014
6. **Regulation of Law 20,571 (NetMetering)**
  - » Re-entered in Comptroller's Office in the Second Quarter of 2014
7. **Regulation of Law 20,698 (20/25)**
  - » Re-entered in Comptroller's Office in the Second Quarter of 2014

8. **Amendment to the Regulations of Small Distributed Generation Media (PMGD, for its acronym in Spanish)**
  - » Re-entered in Comptroller's Office in the Third Quarter of 2014
9. **Sub-transmission Regulations**
  - » Re-entered in Comptroller's Office in the Third Quarter of 2014
10. **Additional Transmission Regulations**
  - » Re-entered in Comptroller's Office in the Fourth Quarter of 2014
11. **Regulations of other ERNC means (art. 225 aa) 7)**
  - » Entered in Comptroller's Office in the First Quarter of 2015
12. **Amendment of Median System Regulations**
  - » Entered in Comptroller's Office in the First Quarter of 2015
13. **Pedestrian Street Lighting Regulations**
  - » Entered in Comptroller's Office in the Second Quarter of 2015
14. **Trunk Transmission Regulations**
  - » Entered in Comptroller's Office in the Third Quarter of 2015

### **ANNEX 3:**

## **SING-SIC ELECTRICAL MATRIX DIAGNOSIS: CURRENT AND FUTURE SITUATION**

This document provides an outlook of the current and future situation of the Chilean interconnected grids (electricity grids with an installed capacity exceeding 200 MW), specifically the Great Northern Interconnected Grid (SING) and the Central Interconnected Grid (SIC). The information used to prepare this documents derives from mainly two sources. The first of them is the National Energy Commission (CNE) with the data obtained from the Load Economic Dispatch Centers (CDEC) of each system. The second source is the information contained in the short-term node pricing processes prepared by the CNE in April 2014, including the long-term view as to supply and demand balance, together with a possible development of the electricity generation matrix until the beginning of 2025.

### **CURRENT SITUATION:**

The electricity generation matrix of the SING and SIC Chilean interconnected grids is the result of the private investment decisions in answer to both the regulatory signals and the market events arisen in the last years. Moreover, we should not forget the decisive participation of the Chilean Government through ENAP and CODELCO in the development of the regasification terminals of Quintero and Mejillones.

### a. Installed Power per Technology as at December 2013:

#### SIC:

90% of the national population is connected to the Central Interconnected Grid. According to the information provided by the Load Economic Dispatch Centers (CDEC) to the National Energy Commission, the installed capacity as at December 2013 is as follows:

| SIC INSTALLED CAPACITY, DECEMBER 2013 |                 |               |
|---------------------------------------|-----------------|---------------|
| TYPE OF TECHNOLOGY                    | TOTAL NET POWER |               |
|                                       | mW              | %             |
| Reservoir Hydraulic                   | 3,393.4         | 24.5%         |
| Natural Gas                           | 2,560.7         | 18.5%         |
| Diesel oil                            | 2,335.1         | 16.9%         |
| Run-of-the-river Hydraulic            | 2,299.6         | 16.6%         |
| Coal                                  | 1,608.6         | 11.6%         |
| Coal - petcoke                        | 561.9           | 4.1%          |
| Biomass                               | 306.8           | 2.2%          |
| Wind                                  | 292.7           | 2.1%          |
| Mini Run-of-the-river Hydraulic       | 280.7           | 2.0%          |
| Biomass-oil # 6                       | 88.0            | 0.6%          |
| Petcoke                               | 63.0            | 0.5%          |
| BioGas                                | 27.3            | 0.2%          |
| Solar                                 | 8.4             | 0.1%          |
| Fuel oil # 6                          | 0.0             | 0.0%          |
| Geothermal                            | 0.0             | 0.0%          |
| Others                                | 0.0             | 0.0%          |
| <b>Total Installed Power</b>          | <b>13,826.4</b> | <b>100.0%</b> |

Source: CNE.

This electric grid is mainly hydro-thermal, with an hydroelectric component exceeding 40% and an efficient thermoelectric component (coal-natural gas) of more than 33%. Furthermore, the installed capacity reflects an important thermoelectric component intended to contribute energy at the peak hour of the grid or in the event of water shortage. Particularly, the units operating with diesel oil account for 17% of the installed capacity. The remaining 10% includes a growing component of Non-conventional Renewable Energy.

**SING:**

8% of the national population is connected to the Great Northern Interconnected Grid. According to the information provided by the Load Economic Dispatch Centers (CDEC) to the National Energy Commission, the installed capacity as at December 2013 is as follows:

| SING INSTALLED CAPACITY, DECEMBER 2013 |                 |               |
|--|-----------------|---------------|
| TYPE OF TECHNOLOGY                     | TOTAL NET POWER |               |
|  | mW              | %             |
| Reservoir Hydraulic                    | -               | -             |
| Natural Gas                            | 1,441.2         | 38.3%         |
| Diesel oil                             | 174.2           | 4.6%          |
| Run-of-the-river Hydraulic             | -               | -             |
| Coal                                   | 1,932.6         | 51.4%         |
| Coal - petcoke                         | -               | -             |
| Biomass                                | -               | -             |
| Wind                                   | -               | -             |
| Mini Run-of-the-river Hydraulic        | 14.9            | 0.4%          |
| Biomass-oil # 6                        | -               | -             |
| Petcoke                                | -               | -             |
| BioGas                                 | -               | -             |
| Solar                                  | 1.4             | 0.0%          |
| Fuel oil # 6                           | 177.6           | 4.7%          |
| Geothermal                             | -               | -             |
| Others                                 | 17.5            | 0.5%          |
| <b>Total Installed Power</b>           | <b>3,759.4</b>  | <b>100.0%</b> |

Source: CNE.

This electric grid is mainly thermal, with a minimum hydroelectric component not exceeding 1% and an efficient thermo-electric component (coal-natural gas) of around 90%. Nevertheless, this system is affected by contingent raises in marginal costs due to lack of LNG and burning of diesel or “expensive” LNG in the existing dual plants. The introduction of ERNC is just beginning in spite of the high potential existing in the geographical areas where the SING is located.

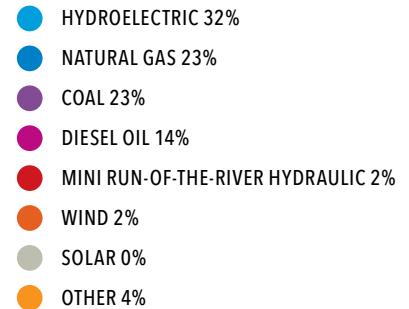
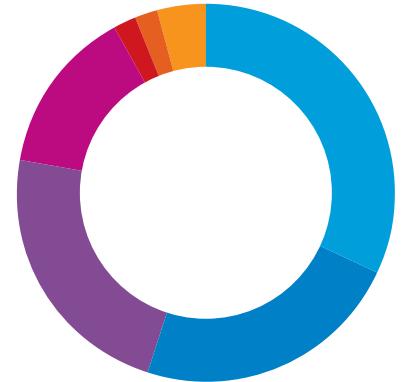
#### **b. Installed power per technology january- march 2014**

The node pricing for April 2014 considers the generation park from that date onwards, therefore the plants that entered during the period January-March 2014 should be considered.

#### **SIC:**

The installed capacity of the Central Interconnected Grid rose during January-March 2014 due to the entry of the Hydroelectric Plant Angostura and biomass plants and wind farms.

**SIC-SING MATRIX 2013  
(17,586[MW])**



Source: CNE.

| ADDITIONAL INSTALLED CAPACITY TO SIC, JANUARY-MARCH 2014 |                 |             |
|--|-----------------|-------------|
| TYPE OF TECHNOLOGY                                       | TOTAL NET POWER |             |
|  | mW              | %           |
| Reservoir Hydraulic                                      | 315.9           | 78.94%      |
| Natural Gas  | -               | -           |
| Diesel oil   | -               | -           |
| Run-of-the-river Hydraulic                               | -               | -           |
| Coal   | -               | -           |
| Coal - petcoke   | -               | -           |
| Biomass  | 35.6            | 8.90%       |
| Wind   | 33              | 8.25%       |
| Mini Run-of-the-river Hydraulic                          | -               | -           |
| Biomass-oil # 6  | -               | -           |
| Petcoke  | -               | -           |
| BioGas   | 15.7            | 3.92%       |
| Solar  | -               | -           |
| Fuel oil # 6   | -               | -           |
| Geothermal   | -               | -           |
| Others   | -               | -           |
| <b>Total Installed Power</b>                             | <b>400.2</b>    | <b>100%</b> |

Source: CNE.

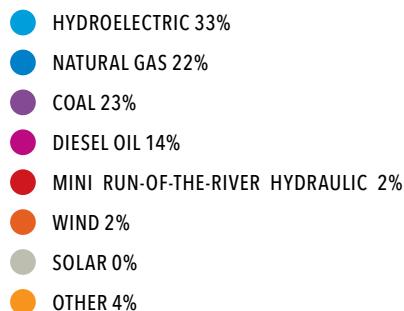
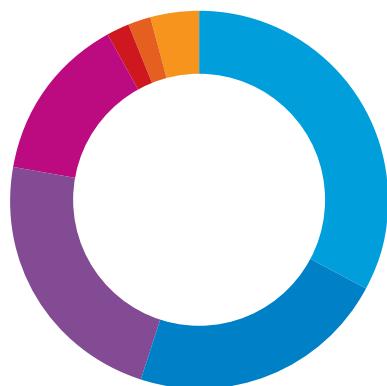
**SING:**

The installed capacity of the Great Northern Interconnected Grid rose in January-March 2014 with the incorporation of "Valle de los Vientos" wind farm and "Poza Almonte Solar 2" solar plant.

| ADDITIONAL INSTALLED CAPACITY TO SING, JANUARY-MARCH 2014 |                |                     |
|---|----------------|---------------------|
| TYPE OF TECHNOLOGY  | TOTAL NET [mW] | TOTAL NET POWER [%] |
| Reservoir Hydraulic                                       | -              | -                   |
| Natural Gas   | -              | -                   |
| Diesel oil  | -              | -                   |
| Run-of-the-river Hydraulic                                | -              | -                   |
| Coal  | -              | -                   |
| Coal - petcoke  | -              | -                   |
| Biomass   | -              | -                   |
| Wind  | 90             | 92.31%              |
| Mini Run-of-the-river Hydraulic                           | -              | -                   |
| Biomass-oil # 6   | -              | -                   |
| Petcoke   | -              | -                   |
| BioGas  | -              | -                   |
| Solar   | 7.5            | 7.69%               |
| Fuel oil # 6  | -              | -                   |
| Geothermal  | -              | -                   |
| Others  | -              | -                   |
| <b>Total Installed Power</b>                              | <b>97.5</b>    | <b>100%</b>         |

Source: CNE.

**SIC-SING MATRIX MARCH 2014  
(18,084[mW])**



Source: CNE.

**c. Energy generated per technology year 2013:**

**SIC:**

The production of energy is fully related to the matrix or existing capacity, and to the availability of primary resources for the production of electricity. Particularly in the SIC (hydro-thermal system), the availability of the hydric resource depending on hydrology is essential to set the dispatch levels of the remaining technologies. Likewise, the prices of fuels establish the placement relation of the thermal plants. In 2013, a hydroelectric generation that reached 38% was observed in the Central Interconnected Grid. This low placement is due to the drought withstood during the last seven years, and that has become the longest drought in the history of Chile. The base thermal generation (coal and natural gas) exceeded 53%, completing 91% of the generation; the remaining 9% was completed with almost 3% of diesel-based generation and 6% of ERNC-based generation.

According to the information provided by the Load Economic Dispatch Centers (CDEC) to the National Energy Commission, the detail of the 2013 generation is as follows:

| 2013 ANNUAL GENERATION - SIC |                   |               |
|------------------------------|-------------------|---------------|
| TYPE OF TECHNOLOGY           | ANNUAL GENERATION |               |
|                              | gWH               | %             |
| Reservoir Hydraulic          | 9,545             | 18.78%        |
| LNG-Natural Gas              | 9,649             | 18.99%        |
| Diesel oil                   | 1,445             | 2.84%         |
| Run-of-the-river Hydraulic   | 9,898             | 19.48%        |
| Coal                         | 11,837            | 23.29%        |
| Coal + petcoke               | 5.61              | 11.04%        |
| Biomass                      | 2,257             | 4.44%         |
| Wind                         | 539               | 1.06%         |
| Fuel oil                     | 38                | 0.07%         |
| Petcoke                      | -                 | 0.00%         |
| Cogeneration                 | -                 | 0.00%         |
| Solar                        | 3                 | 0.01%         |
| Diesel oil + fuel oil        | -                 | 0.00%         |
| <b>TOTAL</b>                 | <b>50,820</b>     | <b>100.0%</b> |

Source: CNE.

**SING:**

Almost 82% of the production of electrical energy in the Great Northern Interconnected Grid is based on coal-fired plants; 9% on natural-gas fired plants; 7.5% on diesel-based generation; and it is completed with 1.5 % of ERNC. According to the information provided by the Load Economic Dispatch Centers (CDEC) to the National Energy Commission, the detail of electrical energy production for 2013 is as follows:

| 2013 ANNUAL GENERATION - SING |                   |                   |
|-------------------------------|-------------------|-------------------|
| TYPE OF TECHNOLOGY            | ANNUAL GENERATION | ANNUAL GENERATION |
|                               | [gWH]             | [%]               |
| Reservoir Hydraulic           | -                 | 0.00%             |
| LNG-Natural Gas               | 1,609             | 9.34%             |
| Diesel oil                    | 992               | 5.76%             |
| Run-of-the-river Hydraulic    | 71                | 0.41%             |
| Coal                          | 14,101            | 81.84%            |
| Coal + petcoke                | -                 | 0.00%             |
| Biomass                       | -                 | 0.00%             |
| Wind                          | -                 | 0.00%             |
| Fuel oil                      | 312               | 1.81%             |
| Petcoke                       | -                 | 0.00%             |
| Cogeneration                  | 121               | 0.70%             |
| Solar                         | 4                 | 0.02%             |
| Diesel oil + fuel oil         | 21                | 0.12%             |
| <b>TOTAL</b>                  | <b>17,230</b>     | <b>100.0%</b>     |

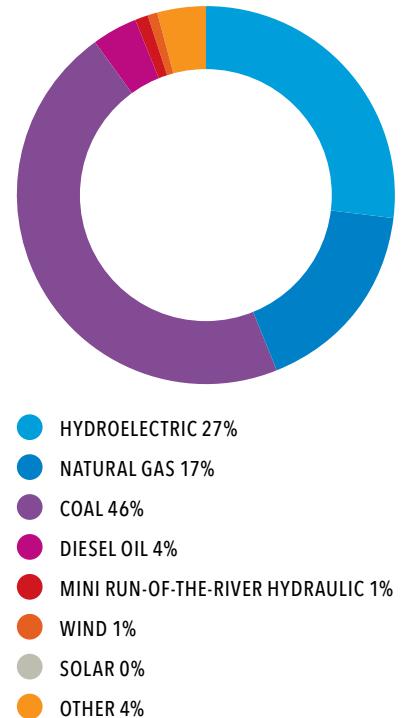
Source: CNE.

#### d. Effective demand 2013

The demand ratios in the interconnected systems between regulated and non-regulated customers are completely different. The Great Northern Interconnected Grid provides electricity to non-regulated customers at a 90% ratio. The remaining 10% are sales of energy to regulated customers.

In turn, the Central Interconnected Grid, to which 90% of the population is connected, the ratio of energy sales allocated to non-regulated customers, as compared with the SING, is significantly lower, reaching only 38% in 2013. This represents a decrease in the figures observed in previous years. This change of ratio in the SIC can be attributed to the decreased consumption of non-regulated customers, related to a lower growth of the economy during 2013, the introduction of energy efficiency measures or a transfer of small non-regulated customers to the option of becoming regulated customers.

#### SIC-SING 2013 GENERATION MATRIX 68,050 [GWH]



Source: CNE.

In 2013, the aggregate physical sales of energy for both grids are as follows:

### Sales of energy reported by CDEC-SIC and CDEC-SING in 2013

| YEAR 2013 | SIC [GWH] | SING [GWH] |
|-----------|-----------|------------|
| January   | 4,109     | 1,319      |
| February  | 3,768     | 1,173      |
| March     | 4,078     | 1,311      |
| April     | 3,862     | 1,203      |
| May       | 3,986     | 1,291      |
| June      | 3,974     | 1,269      |
| July      | 4,162     | 1,272      |
| August    | 4,094     | 1,309      |
| September | 3,733     | 1,278      |
| October   | 4,014     | 1,329      |
| November  | 3,889     | 1,340      |
| December  | 4,108     | 1,319      |
|           | 47,778    | 15,414     |

Source: CNE.

The figures of sales of energy can be compared with the gross yearly energy production of each grid. With respect to the SIC, the 47,778[GWh] sold, as compared with the 50,820[GWh] produced, results in a difference of 3,000[GWh] (6%), that can be attributed to transmission losses. With respect to the SING, the difference is even greater if we compare the sales of energy of 15,414[GWh] with the yearly production of 17,230[GWh]. The difference of 1,800[GWh] (11%) is very large to be exclusively attributed to efficient transmission losses.

Another figure that we must take into account is the maximum demand faced by each electricity system. The best approach that we can have with respect to this figure is the maximum hourly generation observed in each grid, i.e. the hour of the year where the units of each system had, in the aggregate, their maximum generation demand.

The maximum hourly generation of each system for 2013 was as follows:

| HOURLY MAXIMUM GENERATION |           |
|---------------------------|-----------|
| SIC [mW]                  | SING [mW] |
| 7.283                     | 2.243     |

Source: CNE.

To see the degree of industrialization of the country, we can observe the relationship between maximum demand of power and annual energy production, which is known as "load factor". While we approximate to 1, we can see a more even demand curve related to continuous and massive production processes. In 2013, a load factor equivalent to  $LF SIC^2=0.797[-]$ , and  $LF SING=0.877[-]$  was observed. The lower load factor of the SIC shows a strong regulated component of the demand.

<sup>2</sup>  $LF=(\text{Annual Generation})/(\text{Maximum Hourly Generation} \times 8760 \text{ hours})$

#### **ANNEX 4:**

## **ELECTRICAL GRID COSTS AND PRICES**

The marginal costs are not the production costs of a grid, but the valuation of the last energy unit output delivered to the grid or the savings resulting from ceasing to deliver the last energy unit to the grid. At the same time, it is the price at which the electrical energy is paid between the generators showing a deficit and the generators showing a surplus.

The development model of the interconnected grids in Chile recognizes the right of the generating companies to sell their output at the instantaneous marginal cost of the system. In turn, the obligation to purchase energy under the same assumption is established, thus giving rise to the "Wholesale Spot Market". This market is the correlate of the market of contracts, which is the basis for the long-term calls for tenders, established both for non-regulated customers and regulated customers.

The risk of mismatches between the contracts executed by the generators and their own production capacity are reflected in a higher or lower exposure to the spot market. If the costs of the spot market are far above the contract costs, in addition to a low production of their own, the companies are exposed to a difficult event of financial risk. To prevent marginal costs from being high is equivalent to say "the system must be adapted at an efficient production point," which is achieved with higher supply or availability of production inputs at relatively low prices.

The situation of the spot market in both interconnected systems during the last year in two reference bars is as follows:

### 2013 Electricity Marginal Costs

| YEAR 2013 | SIC<br>QUILLOTA | SING-<br>CRUCERO |
|-----------|-----------------|------------------|
| MONTH     | [Us\$ / mWH]    | [Us\$ / mWH]     |
| January   | 119,1           | 99.2             |
| February  | 124,0           | 68.8             |
| March     | 172,8           | 65.8             |
| April     | 166,1           | 82.1             |
| May       | 242,4           | 73.6             |
| June      | 242,7           | 74.5             |
| July      | 233,0           | 81.9             |
| August    | 202,6           | 80,0             |
| September | 93.3            | 64.4             |
| October   | 69.6            | 90.1             |
| November  | 69.3            | 88.3             |
| December  | 81.5            | 95.0             |

Source: CNE.

The data contained in the previous table are the monthly averages considering the actual system operation. Nevertheless, there is a relevant hourly variability in each system, resulting from the behavior of the demand and the availability of the generation resources.

### a. Expected marginal costs 2014

The expected marginal costs for 2014 are calculated by the National Energy Commission out of the simulations made for the 2014 short-term node pricing, including demand projection; existing generating park, transmission system in its current status; and the generation and transportation works plan, where both construction and recommended works are considered. This simulation also considers the values of fuels declared to the CDEC during the first year of simulation, the levels of the reservoirs having associated hydroelectric generation, and the maintenance and other works schedules both for the plants and transmission lines.

Below there are the expected marginal costs for 2014 in two hydrological conditions for the Central Interconnected Grid in four bars of the grid Cardones 220kV to the north of the SIC, Quillota 220 kV and Alto Jahuel 220 kV to the center, and Charrúa 220 kV to the south.

| EXPECTED MARGINAL COSTS [US\$/MWH], DRY HYDROLOGY, SIC |                 |          |             |          |
|--|-----------------|----------|-------------|----------|
| 2014   | ALTO JAHUEL 220 | CARDONES | CHARRÚA 220 | QUILLOTA |
| May  | 229.3           | 201.4    | 217.0       | 217.5    |
| June   | 238.3           | 205.6    | 224.2       | 227.8    |
| July   | 209.6           | 195.0    | 199.0       | 200.3    |
| August   | 194.6           | 190.7    | 184.6       | 187.9    |
| September  | 195.6           | 193.5    | 188.2       | 187.3    |
| October  | 216.2           | 193.7    | 204.4       | 208.5    |
| November   | 215.2           | 200.7    | 204.2       | 207.9    |
| December   | 185.1           | 178.5    | 178.8       | 178.1    |

Source: CNE.

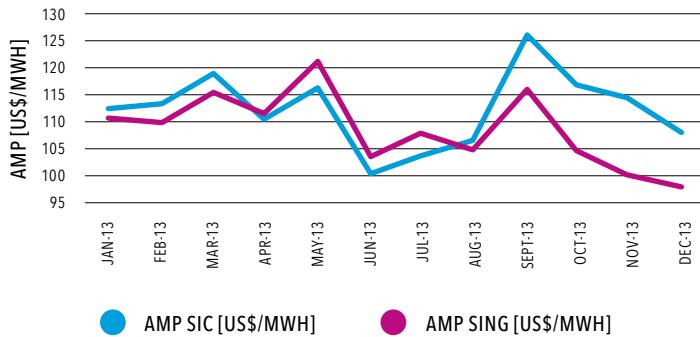
| EXPECTED MARGINAL COSTS [US\$/MWH], NORMAL HYDROLOGY, SIC |                 |              |             |              |
|---|-----------------|--------------|-------------|--------------|
| 2014  | ALTO JAHUEL 220 | CARDONES 220 | CHARRÚA 220 | QUILLOTA 220 |
| May   | 172.4           | 179.9        | 163.0       | 168.2        |
| June  | 65.0            | 67.7         | 45.9        | 63.6         |
| July  | 104.8           | 104.8        | 90.9        | 100.6        |
| August  | 131.3           | 130.4        | 46.2        | 124.7        |
| September   | 87.7            | 93.9         | 60.7        | 86.1         |
| October   | 57.8            | 55.9         | 47.9        | 56.9         |
| November  | 38.9            | 42.9         | 35.2        | 38.7         |
| December  | 42.8            | 42.5         | 38.6        | 42.0         |

Source: CNE.

## b. Average Market Price 2013

The average market price (AMP) is the quotient between the price paid by the non-regulated customers to generators for the supply and the energy demanded during the same period. An "equivalent supply price" is regarded as the price paid by non-regulated customers. Since 2010, the calls for tenders to supply energy of the distributors are also considered to fix the average market prices. The AMP is a monomial price including both energy and power, and other items related to the supply, such as the transmission. The items that are not included in its calculations are fines, taxes, and interest, among others.

**AVERAGE MARKET PRICE  
(AMP) 2013**



**Market Prices 2013**

| YEAR 2013<br>MONTH | AMP SIC [\$/KWH] | AMP SIC [US\$/KWH] | AMP SING [\$/KWH] | AMP SING [US\$/KWH] |
|--------------------|------------------|--------------------|-------------------|---------------------|
| January            | 53.04            | 112.21             | 52.32             | 110.69              |
| February           | 53.54            | 113.35             | 51.87             | 109.81              |
| March              | 53.35            | 118.56             | 51.99             | 115.54              |
| April              | 52.13            | 110.41             | 52.59             | 111.39              |
| May                | 50.97            | 116.40             | 53.07             | 121.20              |
| June               | 50.28            | 99.98              | 51.83             | 103.07              |
| July               | 49.98            | 103.48             | 51.96             | 107.58              |
| August             | 52.11            | 106.50             | 51.27             | 104.78              |
| September          | 54.54            | 126.11             | 50.35             | 116.42              |
| October            | 55.87            | 116.63             | 50.05             | 104.48              |
| November           | 56.54            | 114.33             | 49.35             | 99.79               |
| December           | 54.49            | 108.06             | 49.18             | 97.53               |

\* Total bill power / energy invoiced.

Source: CNE.

## **ANNEX 5:**

# **FUTURE PROJECTION OF THE ELECTRICAL GRID**

The electricity generation matrix of the SING and SIC Chilean interconnected grids is the result of the private investment decisions in answer to both the regulatory signals and the observed market events.

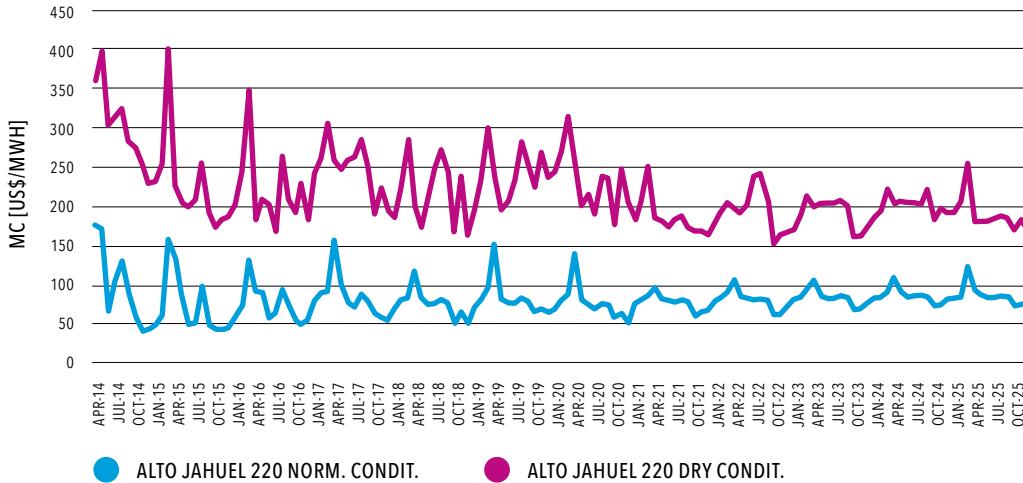
### **a. Marginal Costs Profile**

The marginal costs expected for the 2014-2025 period per month for dry year and normal year (Alto Jahuel, Cardones, Charrúa, and Quillota 220 kV), are shown in the following graphs: It can be noticed from them that the variability and differences between dry and normal hydrological conditions are diminishing in line with the new available generator park for the economic dispatch. We can still notice the effect of the SIC-SING interconnection as from 2020, showing a marked reduction of the effects of the seasonality caused by the hydroelectric supply.

The differences of 200 [US\$/MWh] between the dry and normal condition observed at the beginning of the period are reduced by half in the end of the period.

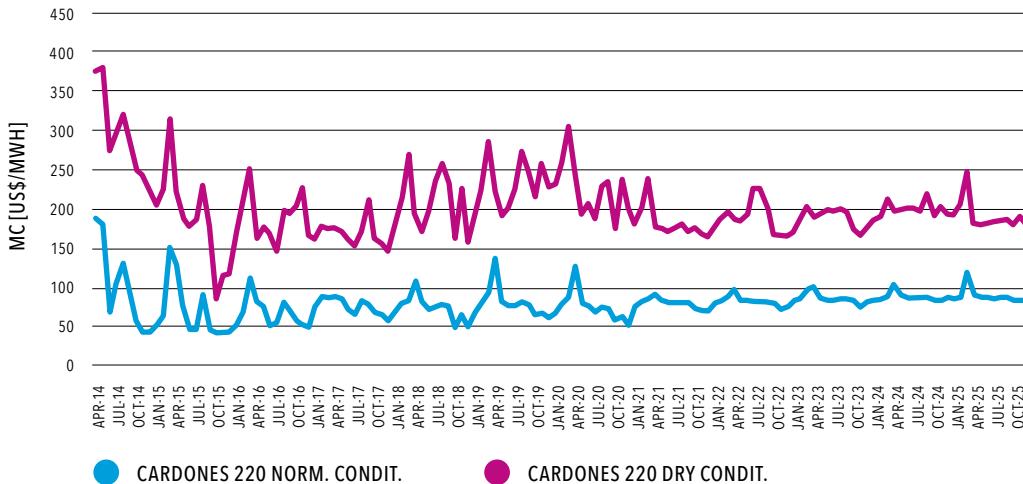
We can also observe in the series of marginal costs in normal hydrological conditions, that the level of marginal cost in an adapted system is under 100 [US\$/MWh] and around 82 [US\$/MWh].

**EXPECTED MARGINAL COSTS  
NORMAL AND DRY CONDITION - ALTO JAHUEL 220 KV**



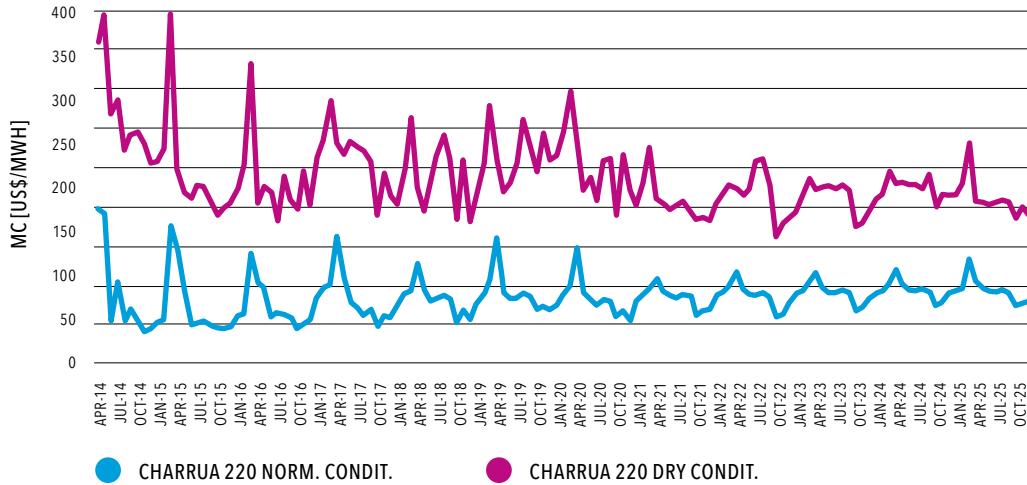
Source: CNE.

**EXPECTED MARGINAL COSTS  
NORMAL AND DRY CONDITION - CARDONES 220 KV**



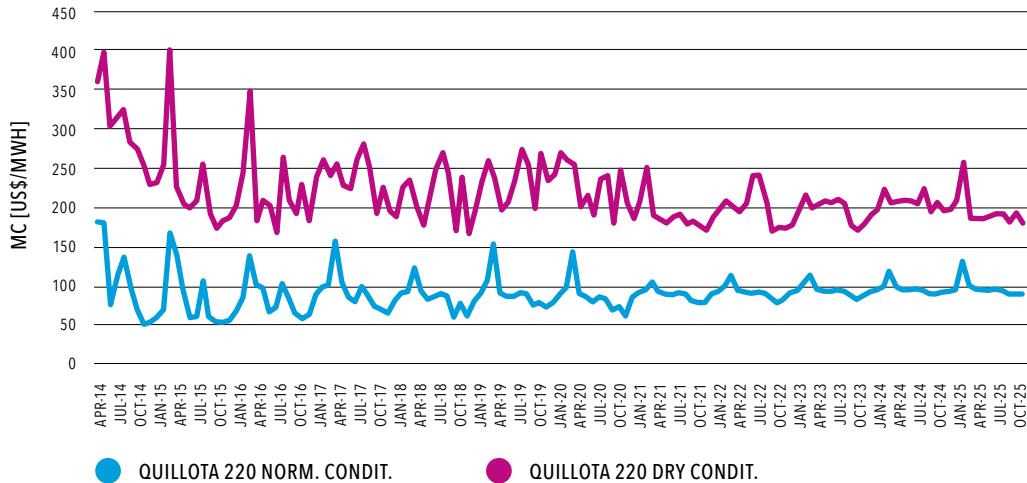
Source: CNE.

**EXPECTED MARGINAL COSTS  
NORMAL AND DRY CONDITION - CHARRUA 220 KV**



Source: CNE.

**EXPECTED MARGINAL COSTS  
NORMAL AND DRY CONDITION - QUILLOTA 220 KV**



Source: CNE.

### **b. Incorporation of New Installed Capacity to the Generating Park per technology period 2014- 2025**

The CNE prepares an Annual Generation and Transmission Works Program, considering the existing facilities, the works under construction (generation and transmission), "future" projects of generic nature (based on information of projects provided by the system agents), which seeks to establish the set of efficient generation works adapted by the system, meeting with all the different requirements, both from legal obligations and Law 20/25 of ERNC, and the offer and supply balances, both temporal and geographical. This program, indicative and dynamic in nature, is used to determine the Short-term Node Prices for the pricing of October of the relevant year and April of the following year. Without prejudice to the above, and as result of those tariff processes, the CNE may update the program if the hypothesis and/or variables supporting them suffer relevant changes that render it necessary.

In the simulations made to set the short-term node prices for April 2014, the works plan at the beginning of 2025 containing such pricing results in the following incorporation of new supply to the SIC and SING generating parks. These results can be divided in to plants declared to be "under construction" and the "recommended" plants (future projects without certain date of materialization).

| INCORPORATION OF NEW GENERATION CAPACITY IN CONSTRUCTION |                     |              |               |                    |             |             |
|--|---------------------|--------------|---------------|--------------------|-------------|-------------|
| TECHNOLOGY   | NEW GENERATION [MW] |              |               | NEW GENERATION [%] |             |             |
|  | SIC                 | SING         | TOTAL         | SIC                | SING        | TOTAL       |
| Hydro - Run-of-the-River                                 | 1014,4              | 0            | 1014,4        | 49.62%             | 0.00%       | 29.61%      |
| Coal   | 152                 | 472          | 624           | 7.43%              | 34.15%      | 18.21%      |
| L NG(NG)   | 50                  | 517          | 567           | 2.45%              | 37,41%      | 16.55%      |
| Wind   | 363                 | 0            | 363           | 17.76%             | 0.00%       | 10.59%      |
| Solar  | 443                 | 390          | 833           | 21.67%             | 28.22%      | 24.31%      |
| Geothermic   | 0                   | 0            | 0             | 0.00%              | 0.00%       | 0.00%       |
| Biomass  | 22                  | 0            | 22            | 1.08%              | 0.00%       | 0.64%       |
| Diesel   | 0                   | 3            | 3             | 0.00%              | 0.22%       | 0.09%       |
| <b>Total</b>   | <b>2044,4</b>       | <b>1382</b>  | <b>3426,4</b> | <b>100%</b>        | <b>100%</b> | <b>100%</b> |
| <b>% NCRE</b>  | <b>43.9%</b>        | <b>28.2%</b> | <b>37.6%</b>  |                    |             |             |

Source: CNE.

| NEW INCREMENTAL CAPACITY OF RECOMMENDED GENERATION |              |               |              |             |             |             |
|--|--------------|---------------|--------------|-------------|-------------|-------------|
| TECHNOLOGY   | mW           |               |              | %           |             |             |
|  | SIC          | SING          | TOTAL        | SIC         | SING        | TOTAL       |
| Hydro - Run-of-the-River                           | 460          | 0             | 460          | 20.68%      | 0.00%       | 16.06%      |
| Coal   | 685          | 0             | 685          | 30.80%      | 0.00%       | 23.92%      |
| LNG (NG)   | 275          | 0             | 275          | 12.37%      | 0.00%       | 9.60%       |
| Wind   | 600          | 250           | 850          | 26.98%      | 39.06%      | 29.68%      |
| Solar  | 0            | 300           | 300          | 0.00%       | 46.88%      | 10.47%      |
| Geothermal   | 160          | 90            | 250          | 7.19%       | 14.06%      | 8.73%       |
| Biomass  | 44           | 0             | 44           | 1.98%       | 0.00%       | 1.54%       |
| Diesel   | 0            | 0             | 0            | 0.00%       | 0.00%       | 0.00%       |
| <b>TOTAL</b>                                       | <b>2224</b>  | <b>640</b>    | <b>2864</b>  | <b>100%</b> | <b>100%</b> | <b>100%</b> |
| <b>% ERNC</b>                                      | <b>40.6%</b> | <b>100.0%</b> | <b>53.9%</b> |             |             |             |

Source: CNE.

| NEW INCREMENTAL CAPACITY OF TOTAL GENERATION |               |              |               |             |             |             |
|--|---------------|--------------|---------------|-------------|-------------|-------------|
| TECHNOLOGY                                   | mW            |              |               | %           |             |             |
|  | SIC           | SING         | TOTAL         | SIC         | SING        | TOTAL       |
| Hydro - Run-of-the-River                     | 1474.4        | 0            | 1474.4        | 34.54%      | 0.00%       | 23.44%      |
| Coal   | 837           | 472          | 1309          | 19.61%      | 23.34%      | 20.81%      |
| LNG (NG)                                     | 325           | 517          | 842           | 7.61%       | 25.57%      | 13.39%      |
| Wind   | 963           | 250          | 1213          | 22.56%      | 12.36%      | 19.28%      |
| Solar  | 443           | 690          | 1133          | 10.38%      | 34.12%      | 18.01%      |
| Geothermal                                   | 160           | 90           | 250           | 3.75%       | 4.45%       | 3.97%       |
| Biomass                                      | 66            | 0            | 66            | 1.55%       | 0.00%       | 1.05%       |
| Diesel                                       | 0             | 3            | 3             | 0.00%       | 0.15%       | 0.05%       |
| <b>TOTAL</b>                                 | <b>4268.4</b> | <b>2022</b>  | <b>6290.4</b> | <b>100%</b> | <b>100%</b> | <b>100%</b> |
| <b>% ERNC</b>                                | <b>42.2%</b>  | <b>50.9%</b> | <b>45.0%</b>  |             |             |             |

Source: CNE.

| GENERATION PARK EXPECTED AS AT JANUARY 2025 |                      |              |               |                     |               |               |
|---|----------------------|--------------|---------------|---------------------|---------------|---------------|
| TECHNOLOGY                                  | INSTALLED POWER [MW] |              |               | INSTALLED POWER [%] |               |               |
|   | SIC                  | SING         | TOTAL         | SIC                 | SING          | TOTAL         |
| Reservoir Hydraulic                         | 3,709                | 0            | 3,709         | 20.1%               | 0.0%          | 15.2%         |
| Natural Gas                                 | 2,886                | 1,958        | 4,844         | 15.6%               | 33.3%         | 19.9%         |
| Diesel oil                                  | 2,335                | 177          | 2,512         | 12.6%               | 3.0%          | 10.3%         |
| Run-of-the-river Hydraulic                  | 3,605                | 0            | 3,605         | 19.5%               | 0.0%          | 14.8%         |
| Coal  | 2,446                | 2,405        | 4,850         | 13.2%               | 40.9%         | 19.9%         |
| Coal - petcoke                              | 562                  | 0            | 562           | 3.0%                | 0.0%          | 2.3%          |
| Biomass                                     | 408                  | 0            | 408           | 2.2%                | 0.0%          | 1.7%          |
| Wind  | 1,289                | 340          | 1,629         | 7.0%                | 5.8%          | 6.7%          |
| Mini Run-of-the-river Hydraulic             | 450                  | 15           | 465           | 2.4%                | 0.3%          | 1.9%          |
| Biomass-oil # 6                             | 88                   | 0            | 88            | 0.5%                | 0.0%          | 0.4%          |
| Petcoke                                     | 63                   | 0            | 63            | 0.3%                | 0.0%          | 0.3%          |
| BioGas                                      | 43                   | 0            | 43            | 0.2%                | 0.0%          | 0.2%          |
| Solar                                       | 451                  | 699          | 1,150         | 2.4%                | 11.9%         | 4.7%          |
| Fuel oil # 6                                | 0                    | 178          | 178           | 0.0%                | 3.0%          | 0.7%          |
| Geothermal                                  | 160                  | 90           | 250           | 0.9%                | 1.5%          | 1.0%          |
| Others                                      | 0                    | 18           | 18            | 0.0%                | 0.3%          | 0.1%          |
| <b>TOTAL</b>                                | <b>18,495</b>        | <b>5,879</b> | <b>24,374</b> | <b>100.0%</b>       | <b>100.0%</b> | <b>100.0%</b> |
| <b>% ERNC</b>                               | <b>18.7%</b>         | <b>19.8%</b> | <b>18.9%</b>  |                     |               |               |

Source: CNE.

Note: This generation park includes the generation plants existing as at March 2014, the works under construction and the works recommended in the previous tables.

The addition of new supply considers both the works declared to be under construction and the works recommended by the CNE, and that the ERNC component with respect to the total of the new supply exceeds 40%.

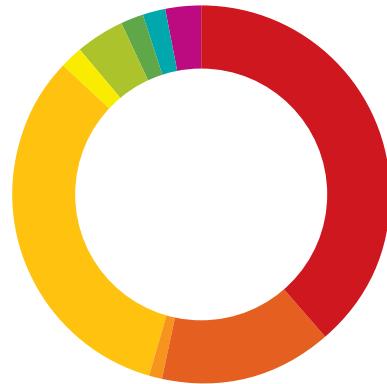
**SIC-SING MATRIX BEGINNING 2025  
(25,374[MW])**



- HYDROELECTRIC 29%
- NATURAL GAS 19%
- COAL 21%
- DIESEL OIL 10%
- MINI RUN-OF-THE-RIVER HYDRAULIC 2%
- WIND 9%
- SOLAR 6%
- OTHER 4%

Source: CNE.

**SIC-SING GENERATION  
MATRIX 2024**



- COAL 39%
- LNG 15%
- DIESEL OIL 1%
- OTHER 0%
- HYDROELECTRIC 33%
- BIOMASS 2%
- WIND 4%
- GEOTHERMAL 2%
- HYDROELECTRIC ERNC 2%
- SOLAR 3%

Source: CNE.

From the point of view of the expected generation, the change in the composition of system production is more significant than the installed capacity. Year 2025 will begin with a reference to an expected production from the previous year that reduces almost by 10% the coal generation projection with respect of 2013. Likewise, in expected terms, the diesel would virtually disappear. By contrast, the placement in production of ERNC will go from 6% in 2013 to almost 13% in 2024.

### **c. Contract prices that may support the system and different calls for tenders for supplies.**

With the works plan established each year and the development costs related to each technology, it is feasible to establish the costs of an equivalent grid contract. This means to establish at which contract price it is feasible to lease a generation mix, which would be the composition of the park existing in each year.

The great simplification of this exercise is to consider a null effect of the spot market or marginal grid cost, which would be reasonable if it were established that the tenderer of the contract will offer an amount of energy that will never be mismatched with its production, and that therefore would never be subject to the spot risk. Another less credible hypothesis of this exercise is to consider that the tender will be submitted at its development cost, except for the base technologies where a margin of 25 and 10 [US\$/MWh] is added for run-of-the river hydropower and coal, respectively.

With the exercises so made, **the resulting price would be 98 [US\$/MWh] for the energy.**

**ANNEX 6:****WORKS PLAN AS AT APRIL 2014****a. Works under construction:**

The detail is shown in the following table and include all those projects declared to be under construction by its owners in accordance with the current regulatory framework.

| DATE OF ENTRY |      | GENERATION WORKS IN CONSTRUCTION     |            |                          |     |
|---------------|------|--------------------------------------|------------|--------------------------|-----|
| MONTH         | YEAR | POWER mW                             | TECHNOLOGY | SYSTEM                   |     |
| April         | 2014 | San Andrés                           | 40         | Hydro - Run-of-the-River | SIC |
| April         | 2014 | San Andrés Photovoltaic Project      | 50         | Photovoltaic Solar       | SIC |
| April         | 2014 | Llano de Campos Photovoltaic Project | 93         | Photovoltaic Solar       | SIC |
| May           | 2014 | Pulelfu                              | 9          | Hydro - Run-of-the-River | SIC |
| May           | 2014 | Ucuquer II Wind                      | 9          | Wind                     | SIC |
| May           | 2014 | Lautaro II Project                   | 22         | Biomass                  | SIC |
| May           | 2014 | Laja I Hydroelectric Plant           | 34.4       | Hydro - Run-of-the-River | SIC |
| May           | 2014 | El Arrayán Windfarm                  | 100        | Wind                     | SIC |
| May           | 2014 | Los Cururos Windfarm                 | 110        | Wind                     | SIC |
| August        | 2014 | Diego de Almagro Photovoltaic        | 36         | Photovoltaic Solar       | SIC |
| October       | 2014 | Salvador Photovoltaic                | 68         | Photovoltaic Solar       | SIC |
| October       | 2014 | Picoiquén                            | 19         | Hydro - Run-of-the-River | SIC |
| October       | 2014 | Punta Palmeras                       | 45         | Wind                     | SIC |
| October       | 2014 | Tal Tal Windfarm                     | 99         | Wind                     | SIC |
| November      | 2014 | El Paso                              | 60         | Hydro - Run-of-the-River | SIC |
| December      | 2014 | Los Hierros 02                       | 6          | Hydro - Run-of-the-River | SIC |
| December      | 2014 | Lalackama                            | 55         | Photovoltaic Solar       | SIC |
| April         | 2015 | Río Colorado                         | 15         | Hydro - Run-of-the-River | SIC |

Continued

| DATE OF ENTRY |      | GENERATION WORKS IN CONSTRUCTION |     |                          |        |
|---------------|------|----------------------------------|-----|--------------------------|--------|
| MONTH         | YEAR | POWER mW                         |     | TECHNOLOGY               | SYSTEM |
| May           | 2015 | Luz del Norte Photovoltaic       | 141 | Photovoltaic Solar       | SIC    |
| July          | 2015 | Itata                            | 20  | Hydro - Run-of-the-River | SIC    |
| July          | 2015 | Cordillera                       | 50  | LNG                      | SIC    |
| October       | 2015 | Guacolda 05                      | 152 | Coal                     | SIC    |
| July          | 2017 | Ñuble                            | 136 | Hydro - Run-of-the-River | SIC    |
| December      | 2017 | Las Lajas                        | 267 | Hydro - Run-of-the-River | SIC    |
| June          | 2018 | Alfalfa 02                       | 264 | Hydro - Run-of-the-River | SIC    |
| January       | 2019 | San Pedro                        | 144 | Hydro - Run-of-the-River | SIC    |
| April         | 2014 | El Águila I (*)                  | 2   | Photovoltaic Solar       | SING   |
| April         | 2014 | Pozo Almonte 3 (*)               | 16  | Photovoltaic Solar       | SING   |
| May           | 2014 | Portada                          | 3   | Diesel                   | SING   |
| May           | 2014 | Arica Solar 1                    | 18  | Photovoltaic Solar       | SING   |
| May           | 2014 | La Huayca                        | 9   | Photovoltaic Solar       | SING   |
| May           | 2014 | Arica Solar 2                    | 22  | Photovoltaic Solar       | SING   |
| May           | 2014 | La Huayca 2                      | 21  | Photovoltaic Solar       | SING   |
| September     | 2014 | María Elena                      | 71  | Photovoltaic Solar       | SING   |
| September     | 2014 | San Pedro 1                      | 17  | Photovoltaic Solar       | SING   |
| September     | 2014 | San Pedro 3                      | 30  | Photovoltaic Solar       | SING   |
| September     | 2014 | San Pedro 4                      | 30  | Photovoltaic Solar       | SING   |
| November      | 2014 | San Pedro 2                      | 24  | Photovoltaic Solar       | SING   |
| November      | 2014 | Calama Sur                       | 30  | Photovoltaic Solar       | SING   |
| December      | 2014 | Quillagua I                      | 23  | Photovoltaic Solar       | SING   |
| December      | 2015 | Quillagua II                     | 27  | Photovoltaic Solar       | SING   |
| May           | 2016 | Cochrane 1                       | 236 | Coal                     | SING   |
| October       | 2016 | Cochrane 2                       | 236 | Coal                     | SING   |
| October       | 2016 | Kelar                            | 517 | Natural Gas              | SING   |
| December      | 2016 | Quillagua III                    | 50  | Photovoltaic Solar       | SING   |

Source: CNE.

**ANNEX 7:**

**PROJECTED DEMAND  
OF ENERGY PERIOD  
2014-2025**

The demand projected by the CNE since 2008 already incorporate downward trends in its growth due to the expectations of growing efficient use of energy. This is how the growing rates used before that happened to exceed 7%, today are lower for both interconnected systems, including diminishing from 4% by the end of the study horizon for the SIC.

To avoid over expectations, we must establish as comparison baseline for the possible establishment of new energy efficient use goals, the projection of demand for the fixing of node prices in October 2007. Given the development of the economy in our country, this has been changed, and today the projections for 2014, as compared with 2007, go beyond the efficiency goals set at the beginning of 2008. For instance, by 2020 the SIC-SING sales projection is 25% lower and by 2025 is 31% even more lower.

The following projection does not have the possible energy savings effects that would result from the energy efficiency bill considered in this Agenda.

| ENERGY SALES PROJECTION |            |           |               |              |
|-------------------------|------------|-----------|---------------|--------------|
| YEAR                    | SING [gWH] | SIC [gWH] | SING RATE [%] | SIC RATE [%] |
| 2014                    | 16.591     | 50.973    | 5.9%          | 5.6%         |
| 2015                    | 17.695     | 53.543    | 6.7%          | 5.0%         |
| 2016                    | 18.832     | 56.074    | 6.4%          | 4.7%         |
| 2017                    | 20.009     | 58.553    | 6.3%          | 4.4%         |
| 2018                    | 21.248     | 61.062    | 6.2%          | 4.3%         |
| 2019                    | 22.509     | 63.638    | 5.9%          | 4.2%         |
| 2020                    | 23.831     | 66.241    | 5.9%          | 4.1%         |
| 2021                    | 25.211     | 68.896    | 5.8%          | 4.0%         |
| 2022                    | 26.640     | 71.579    | 5.7%          | 3.9%         |
| 2023                    | 28.130     | 74.289    | 5.6%          | 3.8%         |
| 2024                    | 29.626     | 77.079    | 5.3%          | 3.8%         |
| 2025                    | 31.127     | 79.867    | 5.1%          | 3.6%         |

Source: CNE







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