Breaking Down the Myths: The True Cost of Energy and the Future of Renewable Energy in Chile

White Paper - June 2012

Chile's energy sector is facing a double challenge: To generate the energy necessary for the country to meet its development goals and achieve this objective in the context of a changing climate. As the impacts of climate change become increasingly evident, all countries must make an effort to limit greenhouse gas emissions from the energy sector, and Chile is no exception. Similarly, it is important that Chile's energy development does not cause irreversible damage to its natural environment. In recent years these challenges have unfolded against the backdrop of a growing debate about Chile's energy future, and in particular about whether or not Chile needs to build mega-dams in the Patagonia or resort to coal-fired power plants. Fortunately, Chile has abundant renewable energy resources such as solar, wind and geo-thermal spanning the length of its territory. An analysis of the true cost of energy in Chile reveals that some of these resources are already economically competitive with traditional energy sources. Coupled with existing generation and energy efficiency measures, these sustainable alternatives can help meet the country's energy needs over the coming decades. To create this clean and secure energy future for its citizens Chile must eliminate barriers to the growth of renewable energy projects and energy efficiency.

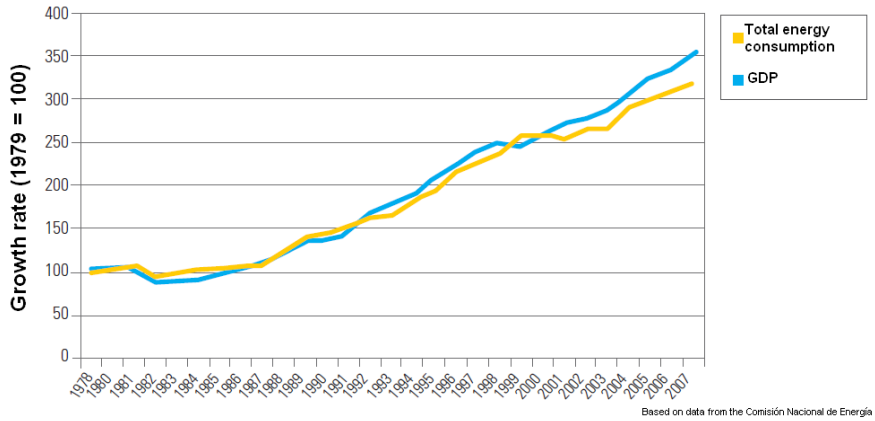
Energy demand growth in Chile will grow at a slower pace than current government predictions.

A common misperception is that Chile's energy demand will continue to grow rapidly. According to government estimates, electricity demand will grow six to seven percent annually through 2020. Such rapid demand growth is cited as justification for large hydro and coal plants.

However, this projection ignores critical factors. In particular, the government projection combines the demand of Chile's two primary electric grids, the Sistema Interconectado del Norte Grande (SING) and the Sistema Interconectado Central (SIC), ignoring that the demand drivers and growth rates of the two systems are very different. In the SING the principle driver of demand is the mining sector and demand grows faster than in the SIC. Yet demand growth in both is now slowing due to higher conventional energy costs, technological changes and energy efficiency—factors the official projections also fail to consider.

Data from Chile and other countries in the Organization for Economic Cooperation and Development also illustrates that enhanced energy efficiency and technological innovation will help slow energy demand growth, allowing electric demand to "decouple" from economic growth. In fact, in Chile this phenomenon is apparent since the year 2000. This healthy trend should be strengthened with the right policies. With slower energy demand growth, Chile can set sustainable energy targets that will drive down costs for end users.

Evolution of primary energy consumption in Chile in relation to GDP



Chile has abundant renewable energy resources and many are already economically competitive. Chile's "non-conventional renewable energy" resources — solar, wind, geothermal, biomass, tidal power and mini-hydro (hydroelectric plants with an installed capacity below 40 megawatts) — span the length of the country. Yet another misperception is that these technologies are prohibitively expensive.

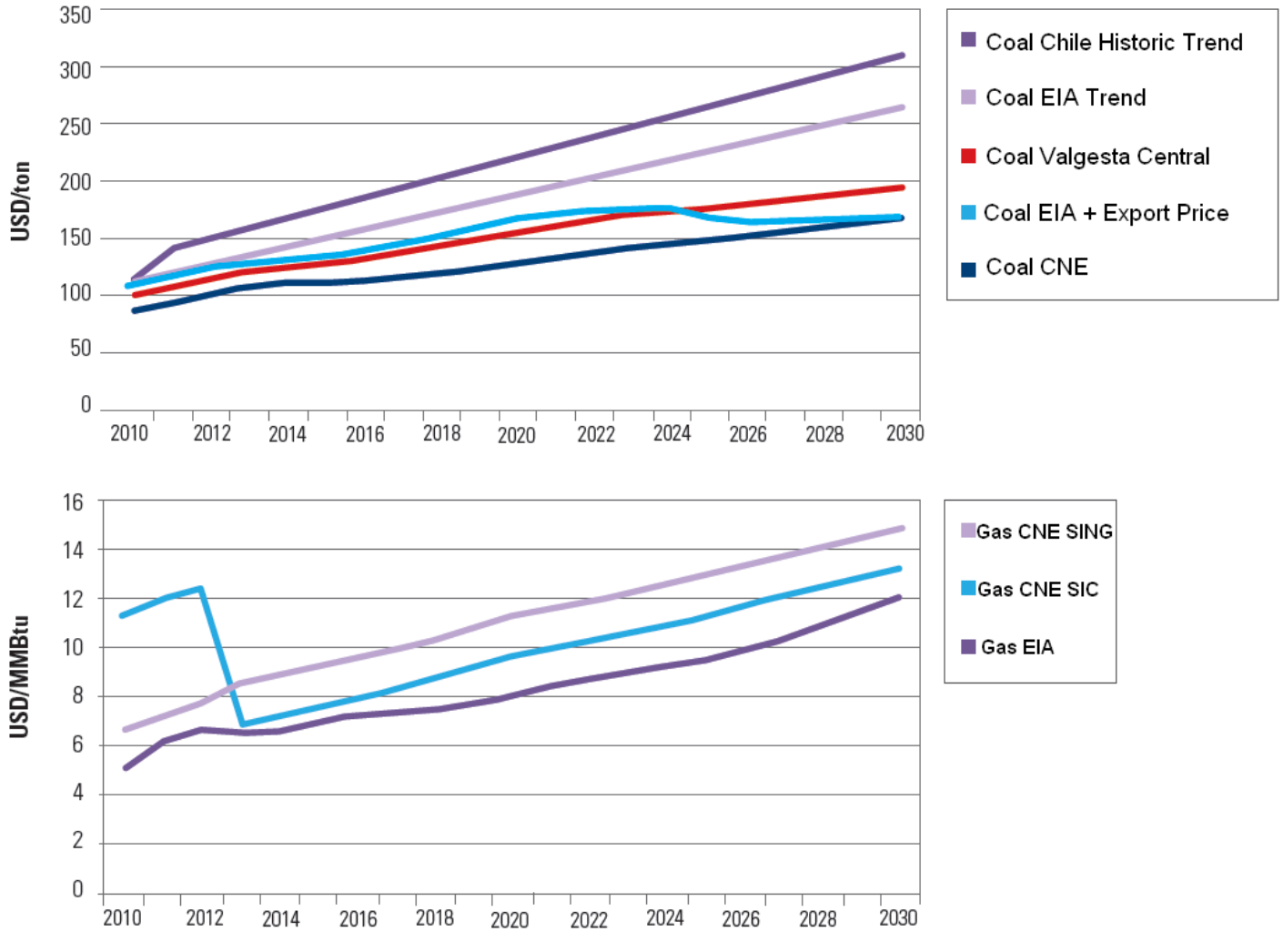
In sharp contrast, an analysis of the true cost of energy in Chile by Bloomberg New Energy Finance (BNEF) highlights that many of these renewable energy resources are already cost competitive with conventional energy sources . The BNEF assessment of the "levelized cost of energy" (LCOE) in Chile shows that renewable energies are viable alternatives to both large hydroelectric dams, like the proposed 2,750 MW HidroAysén project in Patagonia, and to coal-fired power plants, such as the 2,100 MW Castilla proposal.

In particular, this analysis shows that based on available data, mini-hydro, onshore wind, biomass, biogas and geothermal power were already economically competitive with the price of energy in Chile's two main grids in 2011 **(see figure 1.1)**. By incorporating international price trends into Chilean data, the analysis also showed that by 2020 several solar technologies will also be cost-competitive in the Chilean market **(see figure 1.2).** By 2030, all other renewable energies will also be cost-competitive in Chile **(see figure 1.3)**.

Global data compiled by BNEF also shows that prices of these newer technologies are continually falling, unlike more mature traditional energy sources whose prices remain fairly level over time. In fact, the price of fossil fuels such as coal, natural gas and diesel energy generation will rise over the next twenty years.

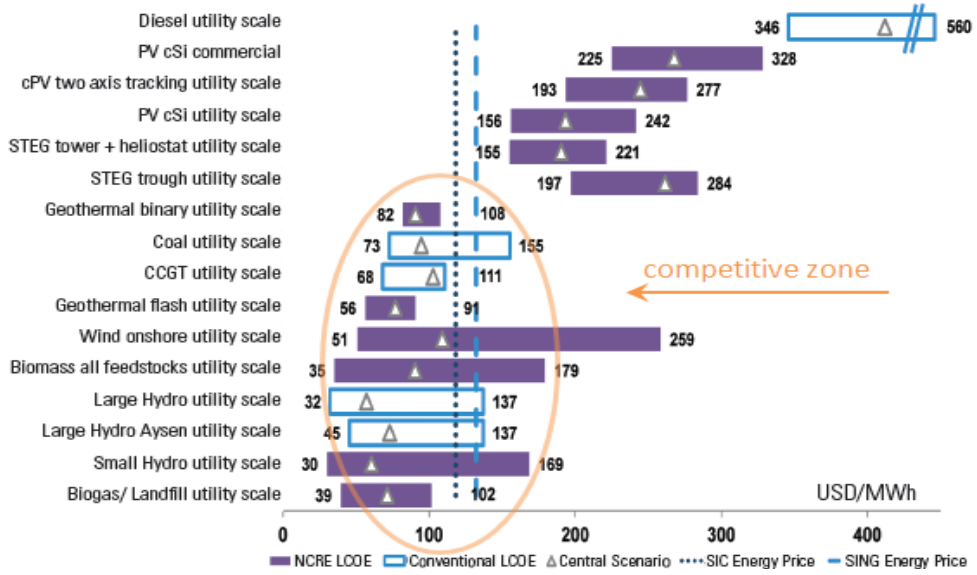
The assertion that renewable energy resources in Chile are not economically viable simply does not hold weight.

Fuel price forecast to 2030



Source: CNE, US Energy Information Administration, Bloomberg New Energy Finance, Valgesta Energia

Figure 1.1: 2011 Chile Levelised Cost of Energy



On an LCOE basis, a wide range of non-conventional renewable energy (NCRE) technologies, including biogas/landfill gas, small hydro, biomass, onshore wind, and geothermal are competitive with the *new build* cost of Chile's mainstay energy sources of large hydro, natural gas, and coal.

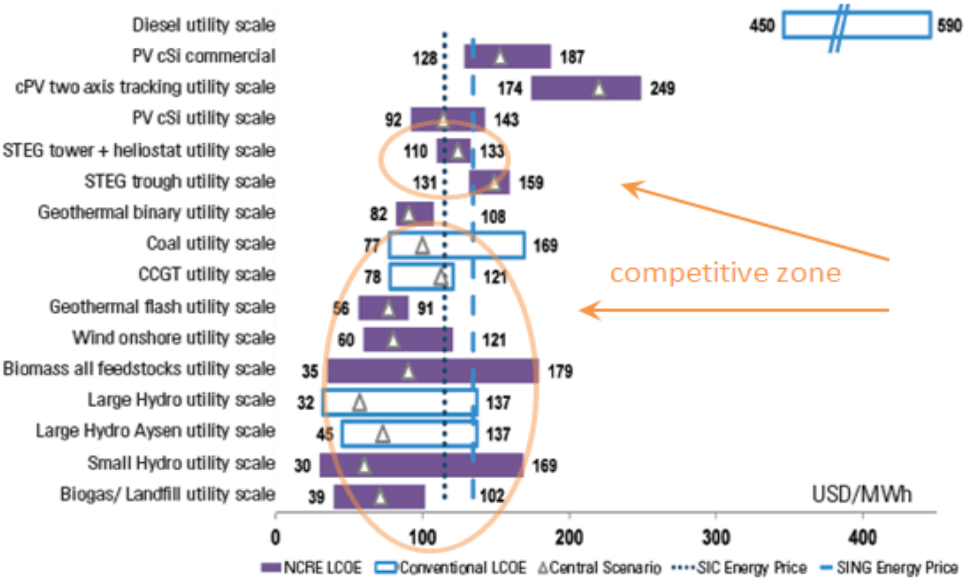
Energy prices are from CNE data and calculated as the average of the first quarter of 2011 and the last three quarters of 2010.

Note: Large Hydro are non-Aysen projects; small hydro are less than 20MW.

Energy sources that are to the left of the energy price lines are competitive on a wholesale basis today. These now include biomass, biogas, geothermal, wind, and small hydro.

Source: Bloomberg New Energy Finance, Chile LCOE Analysis. 2011.

Figure 1.2: 2020 Chile Levelised Cost of Energy



By 2020, utility-scale PV and solar thermal systems will be competitive sources of energy without subsidies.

With increasing thermal fuel prices and decreasing costs for renewables, several technologies such as wind, biomass, geothermal, and small hydro will in some cases be a cheaper option for new energy capacity than conventional technologies.

Energy prices are based on PRIEN* 2008 forecast to 2030, "dynamic" case.

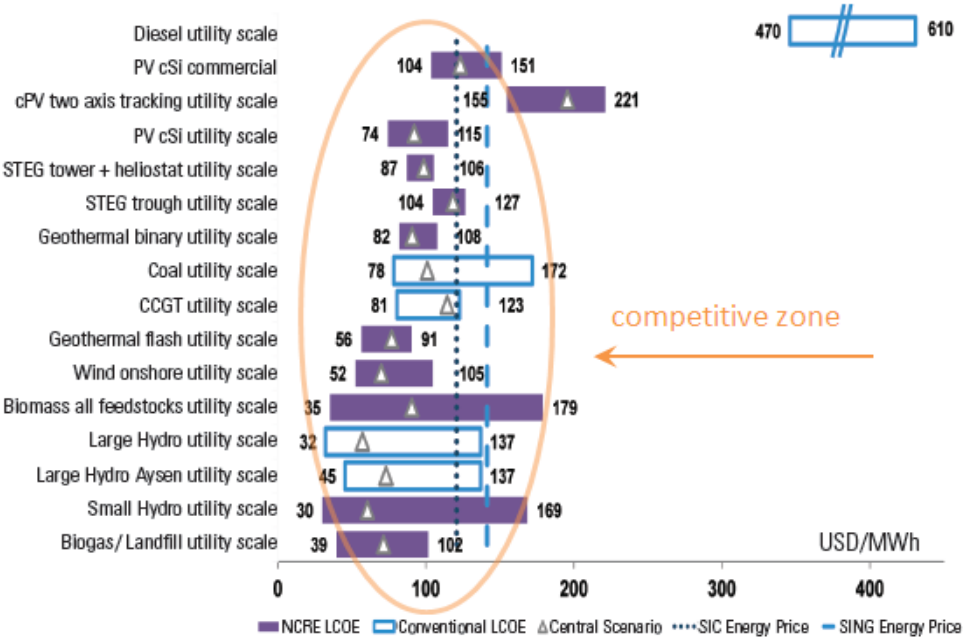
Note: Large Hydro are non-Aysen projects, small hydro are less than 20MW.

*Programa de Estudios e Investigaciones en Energia - Instituto de Asuntos Públicos en Energía Universidad de Chile.

Energy sources that are to the left of the energy price lines are expected to be competitive on a wholesale basis in 2020. These now include most solar technologies, as well as still including biomass, biogas, geothermal, wind, and small hydro.

Source: Bloomberg New Energy Finance, Chile LCOE Analysis, 2011

Figure 1.3: 2030 Chile Levelised Cost of Energy



By 2030, most selected renewable energy technologies will be cheaper or competitive with thermal technologies.

Energy prices are based on PRIEN* 2008 forecast to 2030, "dynamic" case.

Note: Large Hydro are non-Aysen projects, small hydro are less than 20MW.

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Energy sources that are to the left of the energy price lines are expected to be competitive on a wholesale basis in 2030. These now include all NCRE technologies studied other than concentrating solar photovoltaics.

Source: Bloomberg New Energy Finance, Chile LCOE Analysis, 2011

Chile can transition toward a sustainable energy future with the right set of policies.

Chile can meet its electricity demand in the coming decades with a combination of sustainable renewable energies and increased energy efficiency, coupled with its existing generation base and, if necessary, the gradual increased use of flexible resources, such as the liquefied natural gas plants that are already under development.

However, creating this low-carbon and sustainable energy future will only be possible if Chile implements appropriate policies that boost renewable energy development and increase energy efficiency by eliminating the barriers that currently inhibit the growth of these sectors. Chile can create the necessary conditions that will allow it to take advantage of the greatest quantity of energy efficiency possible and of its economically competitive renewable energy resources by implementing key policies, including:

1. Approving a currently proposed law mandating that 20 percent of the national electricity generation come from non-conventional renewable energy by 2020;

2. Facilitating the purchase of non-conventional renewable energy by Chile's industrial sector;

3. Fostering smaller, independent non-conventional renewable energy projects through a "net metering" law;

4. Boosting energy efficiency by decoupling the revenues of electricity distributors from the quantity of energy they sell, and through other mechanisms that encourage greater investment in energy efficiency.

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