

Chilean Electricity Sectors

Shifting Dynamics Set the Pace for a Greener Energy Matrix

Decarbonization Agreement: An agreement between Chilean power-generation companies and the government puts the country on the path toward phasing out coal generation by 2040 with a fully decarbonized energy matrix. AES Gener S.A. (BBB-/Stable) and its subsidiaries Empresa Eléctrica Angamos S.A. (BBB-/Stable), Empresa Eléctrica Cochran SpA (BBB-/Stable) and Guacolda Energía S.A. (BB/Negative) are mainly coal-fired power plants. Fitch Ratings believes AES Gener's has limited room to execute a decarbonization strategy without affecting leverage given its current capital structure. This, as Alto Maipo, AES Gener's USD3.0 billion run-of-the-river project, is still under construction and expected to start operating by YE 2021.

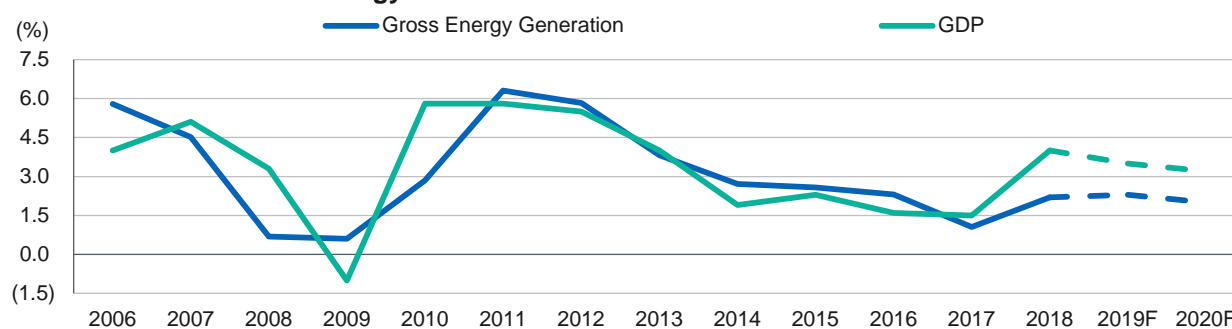
Well-Positioned GenCos: Engie Energía Chile S.A.'s (BBB/Positive) installed capacity is concentrated almost exclusively in thermal sources, and coal represents approximately 58%. As the company successfully concluded an intensive investment program with Infraestructura Energetica Mejillones (IEM), Fitch believes that Engie will be able to finance its energy transition program, shifting toward more renewable energy sources. The agreement is credit neutral for Enel Generación Chile S.A. (BBB+/Positive) and Colbún S.A. (BBB/Stable), as both companies are well positioned to meet this challenge, with generation assets more concentrated in hydro, renewables and natural gas.

Increased Participation of Renewables: Fitch expects renewable energy generation in Chile will continue to grow in 2019–2020 as new projects come online and the Sistema Interconectado del Norte Grande (SING) and Sistema Interconectado Central (SIC) systems are now fully integrated. Renewables projects with expected commercial operation date (COD) during 2019–2020 represent approximately 650MW of installed capacity with nearly USD2 billion in total investments. The most prominent projects are Cabo Los Leones II (205MW of wind-generation power), Parque Eólico San Gabriel (183MW of wind-generation power) and Cerro Dominador, the first concentration solar power (CSP) plant in Chile with 110MW of installed capacity and an estimated USD1,147 million investment.

Transmission System Consolidation: The connection of Chile's two biggest grids in June 2019 will be a positive in the long term. Fitch believes the expansion of Chile's energy transmission grid is crucial to securing energy from the north, especially in providing new renewable energy capacity and grid connections, and reducing system bottlenecks. Fitch anticipates the expansion bidding process will represent approximately USD732 billion in new investments for 2019.

Energy Distribution: Following a review of the energy transmission business in 2016 under the newly passed transmission law, preliminary discussions are underway to create a new energy distribution law. Fitch does not expect significant market effects from revisions to the law, though margins could narrow slightly. Fitch also does not see any significant cash flow impact from regulatory changes, such as a new technical standard or a change in conditions to transfer from regulated to "free" customers. Sector ratings reflect the energy distribution market's low-risk profile for Chilquinta Energía S.A. (AA(c)/Stable), Compañía General de Electricidad S.A. (A+(c)/Stable) and Enel Distribucion Chile S.A., subsidiary of Enel Chile S.A. (AA(c)/Positive). All operate as a natural, indefinite monopoly in defined concession areas.

Chilean GDP and Gross Energy Generation Growth



Source: Banco Central de Chile — Comision Nacional de Energia.

Primary Market Considerations

Growth Prospects: Demand Correlated Closely to GDP

Electricity demand growth in Chile is highly correlated with GDP growth, as industrial activity accounts for approximately 60% of the country's total electricity consumption. Demand growth was weak between 2014 and 2016, as the economy expanded by less than 2.0%, but showed improvement in 2018 as GDP grew by 3.8%. Fitch maintains a conservative outlook for Chilean GDP, projecting 3.5% growth for 2019 and 3.2% for 2020.

Energy demand in the northern zone of the national electric system (SEN) is closely linked to mining activity. The development of large mining projects such as Codelco's (A-/Stable) underground operation in Chuquibambilla, El Teniente's new mine level, BHP Billiton's (A/Stable) Spence expansion project and Teck Resources' (BBB-/Stable) second stage of Quebrada Blanca. All are expected to accelerate economic growth and energy demand from mining activities.

Renewables Potential

Chile's potential to develop renewable energy is enormous. The Atacama Desert has one of the highest levels of solar radiation. Chile's natural resources combine mountain ridges and shorelines, both highly conducive to wind and hydropower. Moreover, declining technology costs allow Chile to tap its vast potential for solar and wind projects. However, to successfully integrate renewable energy sources into the grid, Chile will require additional investment in transmission infrastructure in Fitch's view.

Hydroelectric generation is the most prevalent source of renewable electrical power in Chile, with over 6,600MW of installed capacity in operation, distributed evenly between hydraulic reservoirs and run-of-the-river plants. According to a study of basins by the Ministry of Energy, Chile's hydroelectric potential is 15,938MW, with the greatest potential concentrated in the Biobío (18%), Baker (12%) and Palena (11%) basins. Large-scale river-run projects currently under construction face significant cost overruns due to geological conditions. They are Alto Maipo (531MW), a subsidiary of AES Gener and Los Condores (150MW), owned by Enel Generación Chile S.A. (BBB+/Positive).

Total potential solar energy for Chile is approximately 1,300MW, according to Asociación de Generadoras de Chile, the guild representing Chilean generation companies. Solar energy actually has over 1,800MW under operation, with 220MW under construction with expected COD in 2019–2020. Geographically, solar energy is concentrated in the north of the country, where the first concentrated solar power plant (SCP) in Latin America is under construction. The plant also includes a thermal storage system with molten salts that will permit 24-hour stable energy delivery, as a complement to more intermittent solar energy.

Currently there are 1,300MW of wind farms in operation spread throughout the country, with 418MW under construction with expected COD in 2019–2020. Wind energy has become one of the most dynamic sources of energy in the world and Chile has been developing new projects since 2001. However, exhaustive studies have shown that the full power potential of wind energy in Chile may be mitigated since it depends on atmospheric conditions. This means that exhaustive wind measurements are required for a precise evaluation of the actual exploitable energy potential at a site.

To a lesser extent, Chile also generates energy from biomass and geothermal sources. Wood and pulp companies such as Empresas CMPC S.A. (BBB/Stable) and Empresas Copec S.A. (BBB/Stable) use cogeneration plants that take advantage of the energy residues (black liquor and bark) from other industrial processes such as the production of cellulose, biomass is used to produce electricity for its own industrial processes, injecting the excess energy into the grid. There is approximately 500MW of installed biogas capacity in operation. In 2017, in a joint operation between ENAP and Enel Chile, the first geothermal generation of 48MW of installed capacity was launched. Chile lies within the Pacific "ring of fire," (a large ring of volcanoes and geothermal formations that roughly ring the Pacific Ocean, from the Americas to Asia) and geothermal energy is transmitted by thermal conduction to the surface, and is a highly available resource through the Andes Mountains.

Pricing

Market-Based Pricing for Electricity in Spot Market

Chile's Coordinador Eléctrico Nacional (CEN) runs the electricity system to minimize energy costs while monitoring service quality of generation and transmission companies. To minimize operating costs and improve efficiency, the lowest cost producer available is usually required to satisfy demand at any moment in time. As a consequence, at any specific level of demand, the appropriate supply will be provided at the lowest possible production cost available in the system. As a result, the system defines a marginal cost on an hourly basis as the price at which generators trade energy in the spot market, in terms of both injections (sales) and withdrawals (purchases) to balance their contracted sales in the production determined by the CEN.

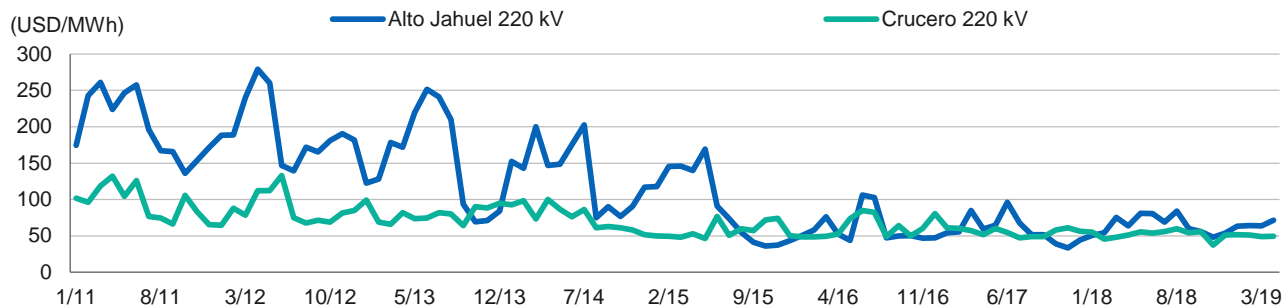
The CEN also ensures energy supply reliability in the system. Each generation unit in the system receives a "capacity payment" set by the CEN based on the generation capacity of each power plant and its availability as a primary resource. This capacity payment is the "firm capacity," and depends primarily on the availability, the type of technology of the power plant and the resources or fuel type used to generate electricity. It is the maximum capacity a generator may supply to the system at certain peak hours, considering statistical data, maintenance time and extremely dry conditions for hydroelectric power plants, but differs from firm capacity because it does not consider the power plants' contribution to the security of the entire system.

As part of the integration of SING and SIC in 2017 the SEN was created, reaching 3,100km and covering almost the entire nation, from the city of Arica in the north to the island of Chiloé in the south. As of April 2019, the SEN provides energy to more than 98.5% of the country, has an installed capacity of 24,868,5MW and 34,522.3km of transmission lines.

The chart below presents the average marginal cost for two specific nodes in the system; SING Crucero 220, in the north, represents what most mining customers pay for energy, while Alto Jahuel 220, south of Santiago, the capital city with a population of more than 6 million has strong energy demand from both residential and industrial customers. For the past two years, average marginal costs have been converging between these two nodes due to low prices for coal, natural gas and oil. The injection of energy from renewable sources such as wind and solar, introduce new low variable costs compared with thermal generation.

As part of the energy agenda set by the government, Fitch expects renewable energy sources in the coming years to reach 20% energy generation by 2025.

Marginal Costs — Sistema Eléctrico Nacional (SEN)



Note: Kilovolts refers to the energy capacity of the node that can be injected or withdrawn per second.

Source: Coordinador Eléctrico Nacional.

Regulatory Framework

The Electricity Law (passed in 1982) and the General Law of Electric Services (1985) created the current electricity regime, making Chile a pioneer in deregulating and privatizing the electricity industry. Various amendments have strengthened the regulatory model and promoted development and diversification of generation, including two laws commonly known as Short Law I (2004) and Short Law II (2005). The regulations provide economic incentives for

companies that operate efficiently. Prices are set using a market-based, marginal-cost model, which determines the most efficient distribution of electricity.

Regulatory Bodies

Ministry of Energy

This agency develops and coordinates the Chilean government's energy sector plans, policies and standards. It also advises the government on energy-related matters.

National Energy Commission (CNE)

The CNE calculates tariffs for regulated customers, forecasts electricity demand and outlines a 10-year recommendation plan to expand the electric system. CNE's recommendation outlines the amount and the timing of new capacity necessary to meet its growth forecast. Generation companies are not required to follow the recommended plans. The CNE is dependent on the Ministry of Energy.

Superintendent of Electricity and Fuels (SEC)

This regulator enforces compliance with laws, regulations and technical standards of power generation, distribution and transmission, as well as those for fuel liquids and natural gas businesses. It is dependent of the Ministry of Energy.

National Electric Coordinator (CEN)

Recently created from the integration of the former Economic Load Dispatch Centers (CDEC) with operations in SING and SIC, CEN operates all electrical installations in order to:

- Preserve operational security and safety in the electrical system;
- To guarantee the most economic operation for all the installations of the electrical system;
- Ensure open access to all transmission systems, in accordance with the law .

Main Responsibilities of CEN

- Coordinate the installations of the national electric system to operate self-sufficiently, according to technical norms determined by the Commission, laws and regulations.
- Direct medium-sized systems in which there is more than one generating company, in accordance with the Law, regulations and technical standards.
- Deliver in a timely, complete and accurate manner all the information necessary for the fulfilment of its functions, and conduct audits of such information.
- Formulate the operation and maintenance programs for the fulfilment of its functions.
- Issue the necessary instructions for compliance with the purposes of the coordinated operation.
- Ensure electrical companies comply with the technical regulations and requirements that the Coordinator publishes, including the provision of complementary services defined by CEN.
- Prepare a report of complementary services and other functions in accordance with the law .

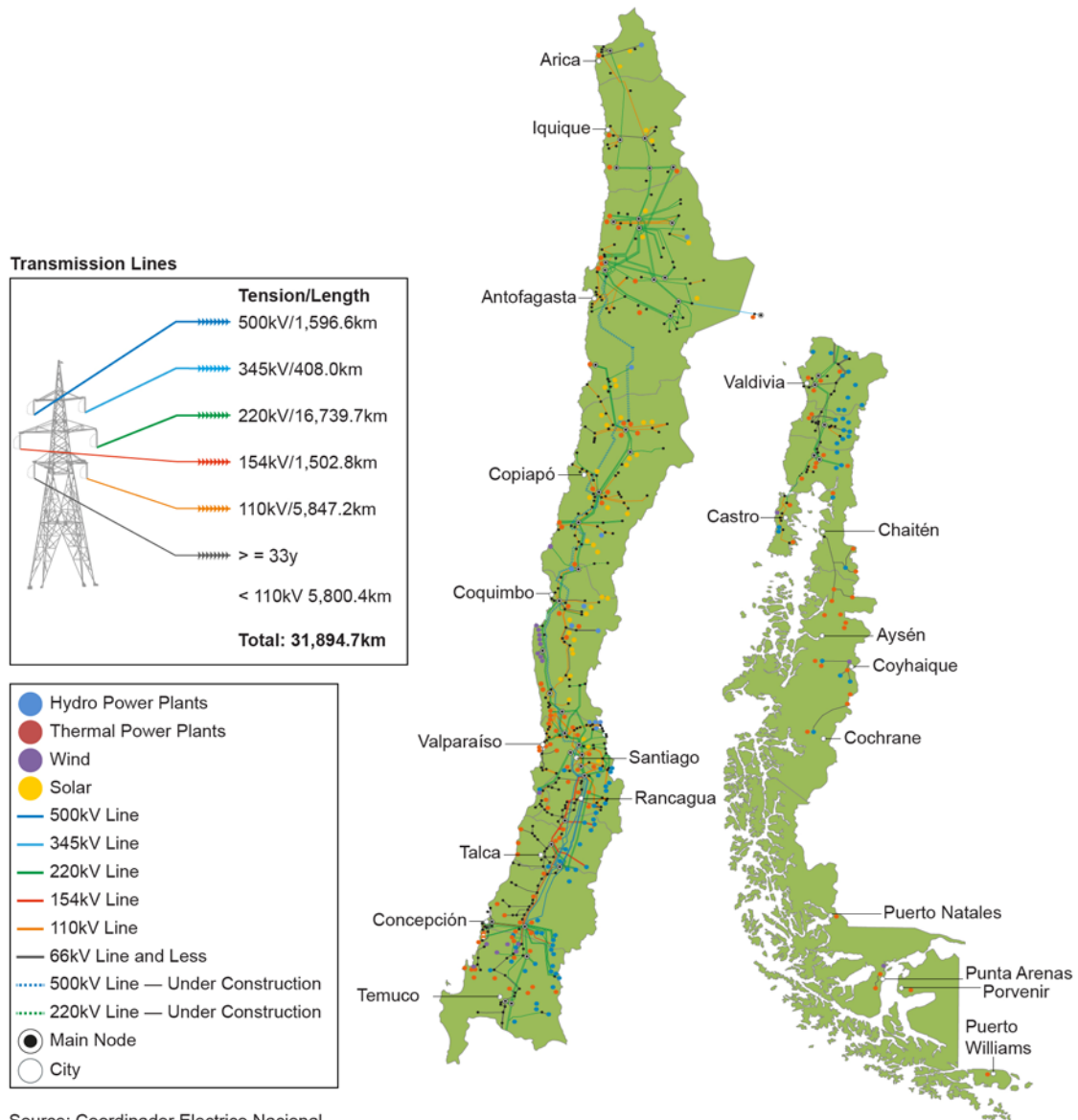
Industry Structure

Chile's electric utility industry is organized into three market segments: generation, transmission and distribution. It is a competitive market, with private competitive investment in generation and regulated private investment in electricity transmission and distribution. Due to geographic challenges in the south of the country, the Chilean electricity sector is physically divided into three main networks, the SEN and two smaller isolated networks (Aysén and Magallanes).

In November 2017, the SEN was created to integrate the SIC and the SING. It extends from Arica in the north to Chiloé in the south, its total installed capacity is 24,868.5MW, and, as of April 2019, covers more than 3,100km with nearly 34,522km in transmission lines and serves 98.5% of Chile's population. In 2018, gross energy generation reached 76,290GWh.

Small electric systems cover areas between the ice fields south of the country. Both systems in Magallanes and Aysen are vertically integrated. Empresa Electrica de Magallanes S.A. (Edelmag) (AA(cl)/Stable), operates 109.2MW of installed capacity in the Magallanes region, with total energy sales of 332,225MWh in 2018. While Edelaysen operates 60.3MW of installed capacity in the Aysen and Coyhaique regions, with total energy sales of 6,317MWh in 2018.

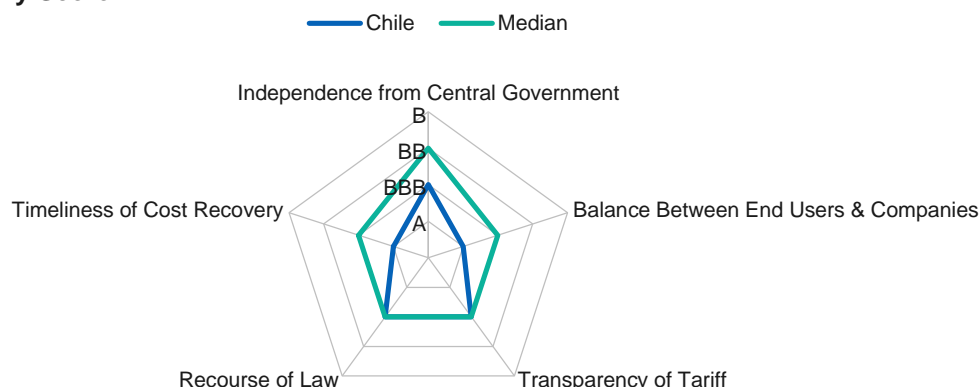
Electric Systems in Chile
(2017)



Regulatory Risk

Fitch considers Chile's regulatory risk among the lowest of rated peers given the low government intervention and independence from the central government's decision making. Fitch assesses a very strong balance between end users and companies. On average, Chile's rated regulatory risk is comparable to a 'BBB' category, and a 'BB' median for the region.

Chile Regulatory Score



Source: Fitch Ratings.

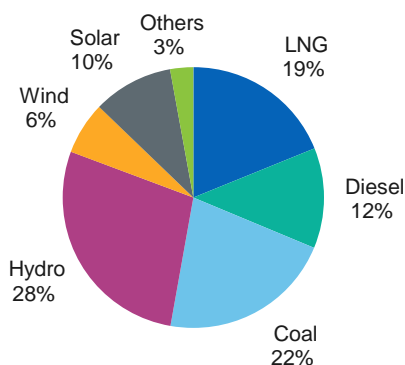
Generation

Installed Capacity

As of April 2019, the SEN's total installed capacity was 24,868.5MW, of which 27.9% was hydro, including reservoir and river sources. Thermals account for 52.8%, with coal being the most prevalent with 21.5%, liquefied natural gas (LNG) second with 18.8% and diesel at 12.4%. Renewables account for 16.4% of the SEN's total capacity, solar being the most prevalent with 9.9% and wind at 6.5%. Other energy sources, such as biomass and geothermal, represent 2.9%.

Total Installed Capacity (MW)

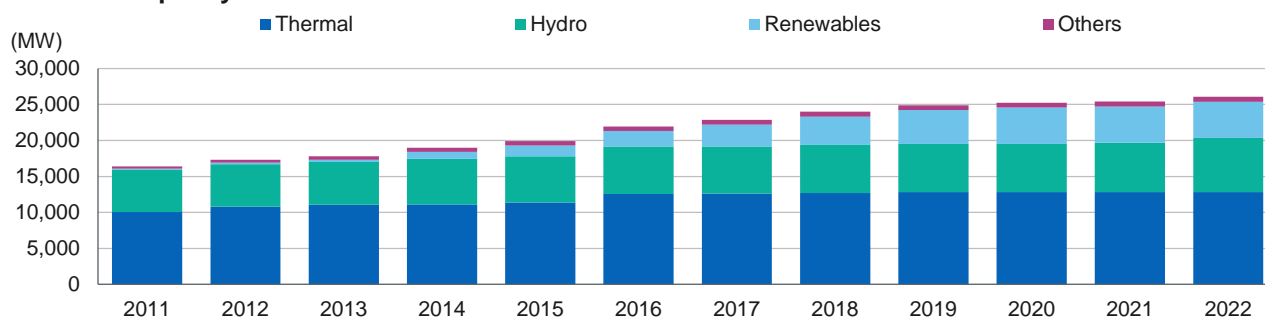
(April 2019)



Source: Coordinador Electrico Nacional.

Fitch estimates Chile's total installed capacity will increase to 26GW in 2022, when thermals will continue to represent nearly 50% of the market, but renewables will reach approximately 20%. Moreover, hydro generation is expected to increase to 7.5GW in 2022, as large run-of-the-river projects like Los Condores and Alto Maipo come online 2021 and 2022 respectively. In line with the decarbonization agreement between the government and generation companies, Fitch does not expect a large increase in thermal capacity, as only small back-up units act as peaking plants for specific nodes in the pipeline. The large combined-cycle project El Campesino is not considered in the chart below, as the environmental approval for the LNG port is still in process.

Installed Capacity



Source: Coordinador Eléctrico Nacional/Asociación de Generadores.

Projects Under Construction

No.	Name	Company	Technology Type	Installed Capacity (MW)	Estimated COD	System	Total Investment (USD Mil.)
1	Parque Eólico Sarco	Mainstream Renewable Power	Wind	170.0	March 2019	SEN	354
2	Arrebol	Besalco	Wind	10.0	March 2019	SEN	20
3	Parque Eólico Aurora	Mainstream Renewable Power	Wind	129.0	March 2019	SEN	400
4	Crucero	Crucero SpA	Solar	3.0	March 2019	SEN	4
5	Ranguil	Energía Chile SpA	Solar	3.0	March 2019	SEN	5
6	Ovalle	Impulso gestión	Solar	3.0	March 2019	SEN	3
7	Laurel	E-Management	Solar	8.6	March 2019	SEN	13
8	Rovian	Grenergy	Solar	8.0	March 2019	SEN	7
9	Doñihue	Grenergy	Solar	7.5	March 2019	SEN	7
10	Placilla	Grenergy	Solar	9.0	March 2019	SEN	9
11	Casuto	CVE Group	Solar	3.0	April 2019	SEN	4
12	Huatacondo	Austrian Solar—Sojitz	Solar	100.0	April 2019	SEN	150
13	Cruz	iEnergía	Solar	3.0	April 2019	SEN	4
14	Las Perdices	Oenergy	Solar	3.0	April 2019	SEN	5
15	Teno	Inersa	LPG	43.0	April 2019	SEN	30
16	Norte Chico	Verano Capital	Solar	2.4	May 2019	SEN	3
17	Los Girasoles	E-Management	Solar	3.0	May 2019	SEN	3
18	Tucuquere	Rden Solar	Solar	3.6	June 2019	SEN	4
19	Las Lechuzas	Oenergy	Solar	3.0	June 2019	SEN	5
20	Las Codomices	Oenergy	Solar	3.0	June 2019	SEN	5
21	CH de Pasada El Pinar	Aaktei Energía SpA	Hydro	12.0	July 2019	SEN	23
22	PE La Flor	Vientos de Renaioco	Wind	30.0	July 2019	SEN	54
23	Parque Eólico San Gabriel	Acciona	Wind	183.0	July 2019	SEN	360
24	Almeyda	Acciona	Solar	60.0	Oct. 2019	SEN	101
25	Pajonales	Prime Energía	Diesel	100.0	Oct. 2019	SEN	50
26	Homopiren	Nanogenera SpA	Hydro	0.3	Dec. 2019	SMH	3
27	Melinka	Ilustre Municipalidad de Guaitecas	Wind	0.4	Dec. 2019	SMA	4
28	Arica I	Skysolar Group	Solar	40.0	Jan. 2020	SEN	50
29	Cerro Dominador	EIG	CSP/Solar	110.0	May 2020	SEN	1,147
30	Cabo Leones II	Ibereólica	Wind	204.7	May 2020	SEN	271
31	Los Condores	Enel Generación Chile S.A.	Hydro	150.0	March 2021	SEN	957
32	San Víctor	EPA S.A.	Hydro	3.0	June 2021	SMA	10
33	Alto Maipo—Las Lajas	AES Gener S.A.	Hydro	267.0	Dec. 2021	SEN	3,048
	Alto Maipo—Alfalfal II			264.0	Dec. 2021	SEN	
34	Hidroñuble		Hydro	136.0	July 2022	SEN	350
—	—	—	Total	2,078.5	—	—	7,463

COD – Commercial operation date.
Source: Generadoras de Chile.

Energy Generated

In 2018, total energy generated in the SEN registered 75,641GWh. Thermal sources represented 54.5%. Coal, the most significant resource, represented approximately 39% of the total energy generated with LNG nearly 15% and hydro at 28.2%. Solar, wind and biomass increased their share of total energy generated in the SEN in 2018, compared with last year, representing 7%, 5% and 3%, respectively.

Fitch estimates fossil fuel-based generation will continue to represent at least 50% of the energy generated in the SEN during 2019–2020, with coal still significantly participating in gross energy generation, despite efforts to decarbonize the energy matrix (coal also remains a more price-competitive alternative when compared with LNG). Fitch estimates load factors for the most efficient coal-fired units in the system in the range of 80%, while efficient combined-cycle units have load factors of 30%–35%. Load factors for hydroelectric generation will be subject to accumulated rainfalls and favorable snow melt conditions.

In addition, Chile has seen a squeeze in hydrological energy generation. In 2018, gross generation rose 2.2% from 2017 to 76.290GWh. Of that total, hydro generation represented 28.2% in 2018, compared with 39% in 2007. Hydro generation companies such as Enel Generacion Chile and Colbun complement their generation mix with thermal units, including coal and combined-cycle units, to serve their purchase power agreements (PPAs). Favorable hydrological and snow-melt conditions boost operating margins for these companies, since hydro generation has a lower variable cost than thermal units.

On Jan. 1, 2010, Law No. 20,257 or the NCRE Law, defined nonconventional renewable energy sources. It also required that generating companies prove that a mandated percentage of their electrical output comes from renewable energy sources. This percentage for each year is presented in the table below. For 2018, NCRE energy from renewable sources represented 17.4% in the SEN, above the mandatory 10% for that year.

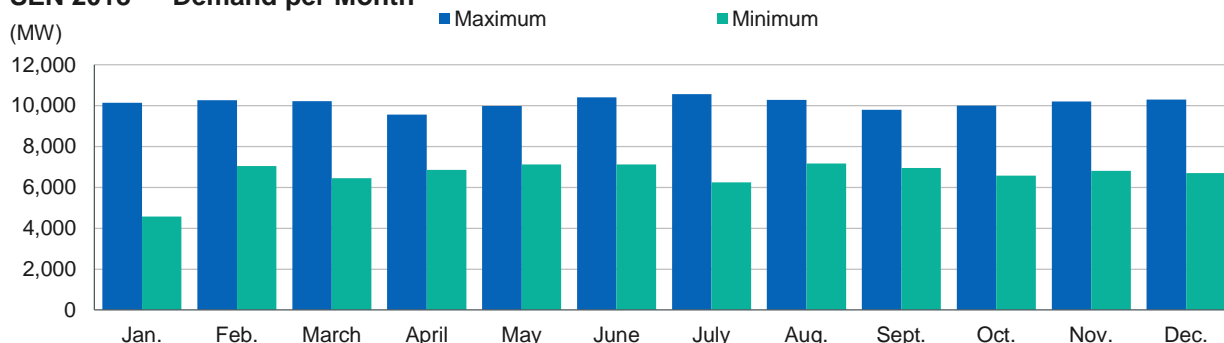
Mandated NCRE Energy Injection		
(%)	Law 20,257	Law 20,698
2010	5.0	—
2011	5.0	—
2012	5.0	—
2013	5.0	5.0
2014	5.0	6.0
2015	5.5	7.0
2016	6.0	8.0
2017	6.5	9.0
2018	7.0	10.0
2019	7.5	11.0
2020	8.0	12.0
2021	8.5	13.5
2022	9.0	15.0
2023	9.5	16.5
2024	10.0	18.0
2025	10.0	20.0

Source: Comision Nacional de Energia — Anuario Estadistico 2018.

Energy Demand Dynamics

Fitch estimates the minimum and maximum energy demand, on a monthly basis, for the SEN is between 4.5GWh and 10.6GWh, from 2018 to first-quarter 2019. Maximum demand in the system is generally reached between 6:00 p.m. and 11:00 p.m., local time. The SEN operates under a marginal cost basis, and peak demand is met by back-up units, mostly diesel-based plants, during the end of summer and fall when hydro generation usually declines.

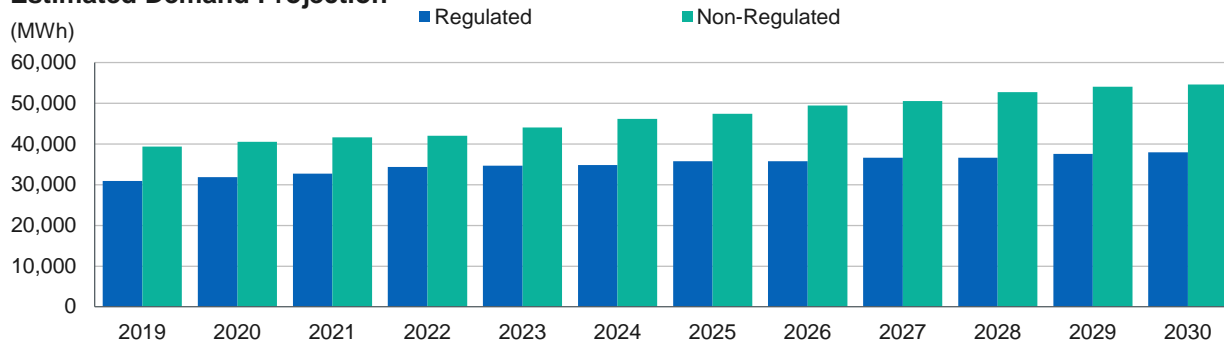
SEN 2018 — Demand per Month



Source: Generadoras de Chile.

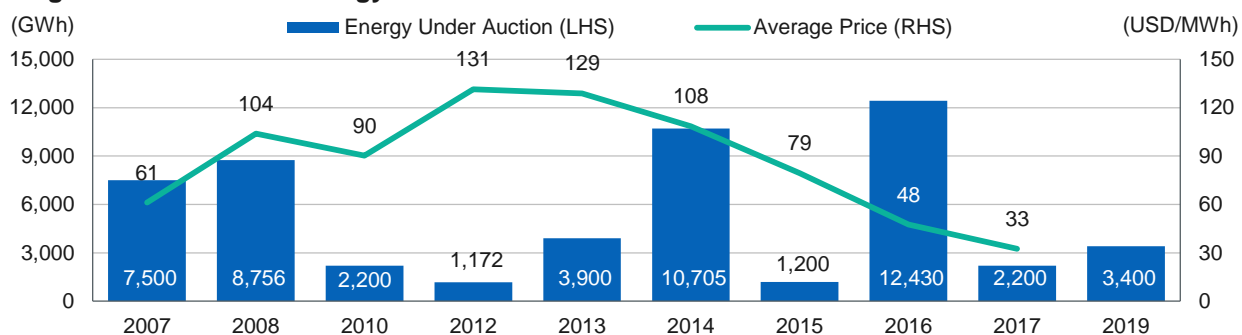
Demand is calculated yearly by the CNE, and encompasses both regulated and unregulated customers. The demand forecast of regulated customers is developed within the framework of the bidding processes for energy supply for regulated clients contained in the “Bidding Report of the General Law of Electrical Services.” The demand forecast report forecasts “free” customers, and the results help determine node prices, charges and bidding.

Estimated Demand Projection



Source: Cordinador Electrico Nacional.

Regulated Customers Energy Auctions



Source: Comision Nacional de Energia.

Distribution

There are four major distribution companies within Chile, most of which are owned by large foreign conglomerates. These companies represent approximately 98% of the energy distributed in the country. The remaining portion is allocated among 12 minor distribution companies with little space to grow given geographical limitations and demand of the concession area. Distribution companies operate under a regime of public service concession, are obliged to provide electricity service to all customers and are subject to regulated tariffs for connected customers with less than 5,000kW capacity, except for customers with between 500kW and 5,000kW of capacity who exercise their option to choose a “free” or nonregulated tariff scheme. Customers with “free” fare can negotiate with any supplier (distributor or generator) and must pay a regulated toll for use of the distribution network.

Demand from regulated clients is served by distribution companies. In 2018 regulated customers reached 32,863GWh, representing approximately 44% of the total electricity generated in the system.

Distribution companies receive their revenue under the Valor Agregado de Distribucion (VAD), which is established every four years by the Ministry of Energy, following the technical report of the CNE. The VAD estimates an average cost that incorporates all the investment and operating costs of theoretical company operating in the country. The VAD also presumes the company is efficient in investment policy and management. As a consequence, the final VAD does not necessarily recognize costs effectively incurred by distribution companies.

Main Distribution Companies in Chile

Parent Company	Distribution Company	No. of Clients (Mil.)	Energy Sold (GWh)	Concession Area (sq km)	Regulatory Cycle (Years)	Next Regulatory Cycle	SAIDI (Hours)
Enel Spa (A-/Stable)	Enel Distribucion Chile S.A.	1.9	16,782	2,105	4	2020	3.0
Naturgy Energy Group (BBB/Stable)	Compañía General de Electricidad S.A. (CGE) ^a	2.9	12,220	N.A.	4	2020	12.4
Sempra Energy (BBB+/Stable)	Chilquinta Energia S.A. ^b	0.7	2,948	10,611	4	2020	7.0
Ontario Teachers Pension Plan/Alberta Investment Management Corporation (AIMCO)	Inversiones Electricas del Sur S.A. (SAESA Group) ^c	0.9	3,572	N.A.	4	2020	26.9

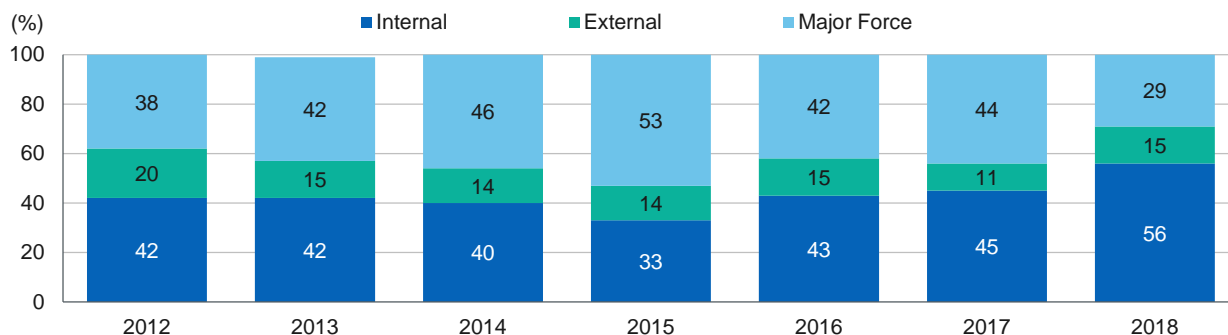
^aDoes not include clients and energy sold from Argentine subsidiaries. ^bIncludes: Chilquinta Energia S.A., Casablanca S.A., Litoral S.A., Luzlinares S.A. and Luzparral S.A. ^cIncludes SAESA, Frontel, Luz Osorno and Edelayen.
Source: Annual reports/Coordinador Electrico Nacional.

Service Quality

The system average interruption duration index (SAIDI) indicator represents the average duration of interruptions customers experience over a period of time. Power outages can be generated by external causes, like supply interruptions from electricity generation and transmission segment companies or major natural events, such as earthquakes.

Distribution companies report interruptions to the SEC and carry out a first qualification, thus giving rise to the SAIDI indicator. Subsequently, the SEC carries out a detailed analysis of the interruptions, classifying them within the categories defined above.

SAIDI — Reported by Companies on Average Interruption Hours per Customer



Source: Superintendencia de Electricidad y Combustibles.

Transmission

In 2016, a new transmission law was passed to prevent the transmission system from being an obstacle to generation sources and to boost the development of nonconventional renewable sources. The main points of the law are:

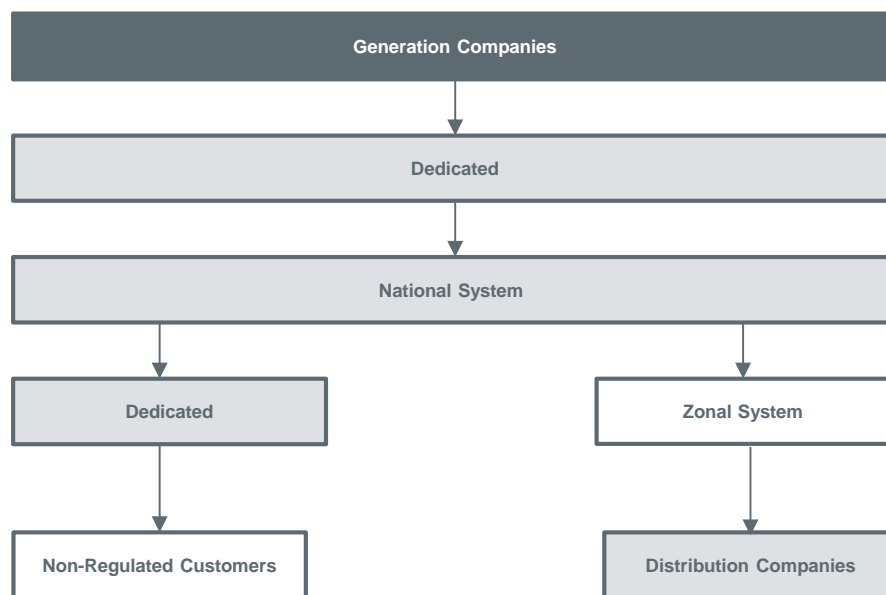
- The use of capital asset pricing model (CAPM) methodology, including a new valuation process for legacy assets of all transmission systems, with the goal of an internal rate of return (IRR) of a maximum of 7% after taxes;
- Introduction of a remuneration scheme for national, zonal and dedicated transmission systems with no exposure to volume or price risks;
- Introduction of development hubs to ensure long-term energy and transmission planning for areas with a high potential for power generation where development poles can be established.

National System: Defined as the economically efficient and necessary facilities to supply overall system energy load, and contribute to form a common market.

Zonal System: All facilities used by groups of consumers (regulated or unregulated) located in a distribution concession zones

Dedicated System: Injection lines from generation units and lines exclusively used by non-regulated customers.

Transmission Market



Source: Transelec S.A. / Coordinador Electrico Nacional.

Upcoming Transmission Auction			
Project	Construction Period (Months)	Referential Investment Value (USD Mil.)	Referential COMA (USD 000)
New Substation Parinas 550/220kv	36	54.31	868.98
New Line 2x500kv Parinas— Likanantai/Energized 220kv	48	105.62	1,698.98
New Line 2x220kv Lagunas— Nueva Pozo Almonte/First Circuit	48	19.17	306.77
New Substation JMA 220kv	36	19.11	305.77
New Line 4x220kv from Substation Los Pelambresto Segment Line 2x220kv Los Piuquenes— Tap Mauro	36	14.97	239.63
New Substation Nueva la Negra 220/110kv	36	14.69	235.11
Bypass Line 1x220kv Atacama — Esmeralda/Line 1x110kv Esmeralda— La Portada & Decommissioning Line 1x110kv Mejillones— Antofagasta	30–48	13.35	213.70
New Line 2x110kv from Substation Caldera to Line 1x110kv Cardones— Punta Paredones	36	2.51	40.17
New Line 1x110kv Crrillos— Kozan	36	2.20	35.27
New Substation La Ruca 110kv	24	6.49	103.90
New Substation Chagres 44kv	36	4.08	65.36
New Line 2x220kv Candelaria — Nueva Tuniche & Substation Nueva Tuniche 220kv	48	19.57	313.17
New Line 1x66kv La Esperanza — El Manzano	36	3.86	61.88
New Substation La Señoranza 220/66kv	36	8.70	139.29
New Line 2x500kv Entre Rios— Ciruelillos/Energized 220kv	84	359.28	5,748.60
New Line 2x500kv Ciruelillos— Pichirropulli/Energized 220kv	84	84.49	1,351.98
Total	—	732.40	11,728.56

Source: Minister of Energy — Decree 4 Exent, published Jan. 9, 2019.

Corporates

Ratings				
Company Name	Long-Term Foreign Currency IDR	Long-Term Local Currency IDR	National Scale Rating	Outlook
AES Gener S.A.	BBB-	BBB-	A+(cl)	Stable
Chilquinta Energia S.A.	NR	NR	AA(cl)	Stable
Colbun S.A.	BBB	BBB	AA-(cl)	Stable
Compania General de Electricidad S.A. (CGE)	NR	NR	A+(cl)	Stable
Empresa Electrica Angamos S.A.	BBB-	BBB-	NR	Stable
Empresa Electrica Cochrane SpA	BBB-	BBB-	NR	Stable
Enel Chile Chile S.A.	NR	NR	AA(cl)	Positive
Enel Generacion Chile S.A.	BBB+	BBB+	AA(cl)	Positive
Engie Energia Chile S.A.	BBB	BBB	AA-(cl)	Positive
Guacolda Energia S.A.	BB	BB	NR	Negative
Transelec S.A.	BBB	BBB	AA-(cl)	Stable

Source: Fitch Ratings.

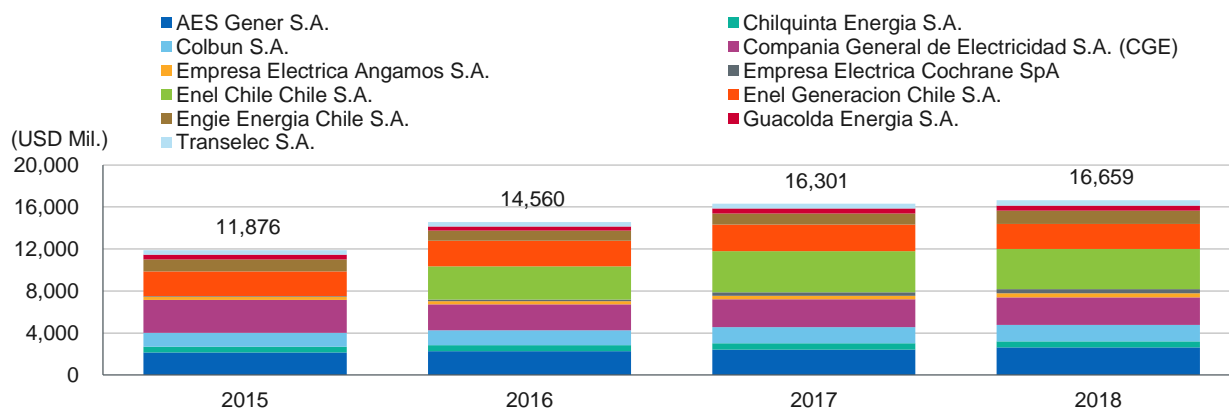
Stable Ratings: Fitch estimates Chilean energy companies will maintain relatively stable credit profiles in 2019, despite the industry's challenges. Most companies in this sector have solid capital structures that enable them to withstand volatile conditions, combined with strong credit strengths that include funding flexibility, adequate liquidity and, to a varying extent, diversified asset portfolios. Key concerns are mainly related to significant regulatory changes and potentially large investment programs that could reduce financial flexibility.

Financial Performance

Fitch's electricity portfolio consists mostly of relevant players in the generation, transmission and distribution businesses. Fitch observed that gross revenues (in U.S. dollars) increased by 2.2% in 2018 compared with 2017. The revenue

increase is primarily due to being indexed to the U.S. and Chilean C.P.I's, as electricity revenues encompass both indexes. To a lesser extent, companies like Angamos and Cochrane started operating at full capacity in 2018, as new PPAs are in full force. In the case of Engie Energia Chile, the 21% revenue increase is due to a step-up of energy contracted with regulated clients at favorable prices.

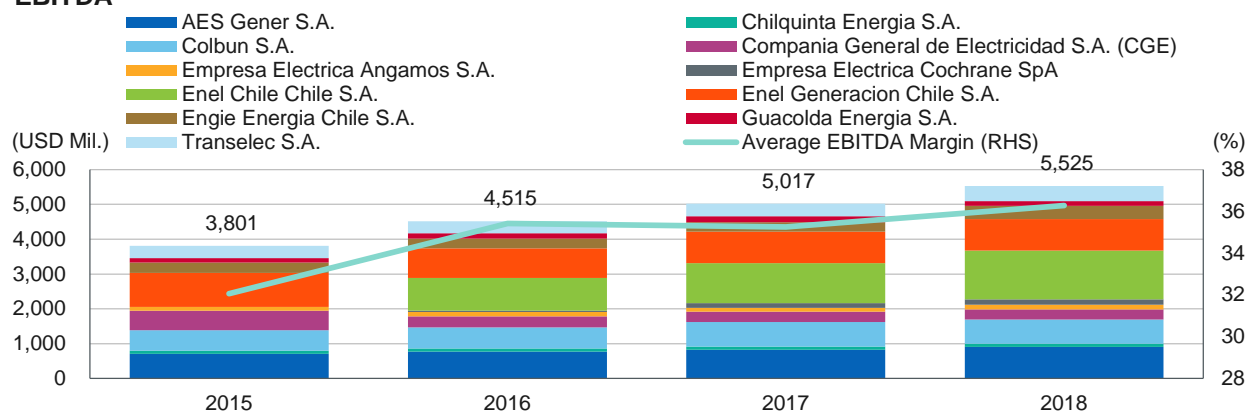
Gross Revenues



Source: Fitch Ratings, company filings.

Within Fitch's rated portfolio, EBITDA margins remain strong, averaging 36% in 2018, in line with 35% historical estimates. Fitch expects EBITDA margins will reach 30%–35% in 2019 for all generation companies mainly concentrated on coal, like AES Gener, its subsidiaries Angamos, Cochrane and Guacolda, and Engie Energia Chile. While Enel Generacion Chile and Colbun present a more balanced generation portfolio between hydro and thermal assets, Fitch anticipates EBITDA margins in the range of 40%–45% in 2019. In the transmission business, Transelec will maintain higher EBITDA margins above 80%, mainly due to the low business-risk profile. Fitch considers the regulatory environment in Chile to be solid and stable while providing certainty in determining regulated transmission revenues and returns on future investments. For the energy distribution business, Fitch believes EBITDA margins will remain around 15% which is expected from regulated revenues derived from a stable and predictable operator operating in a natural monopoly for an indefinite term within a concession area.

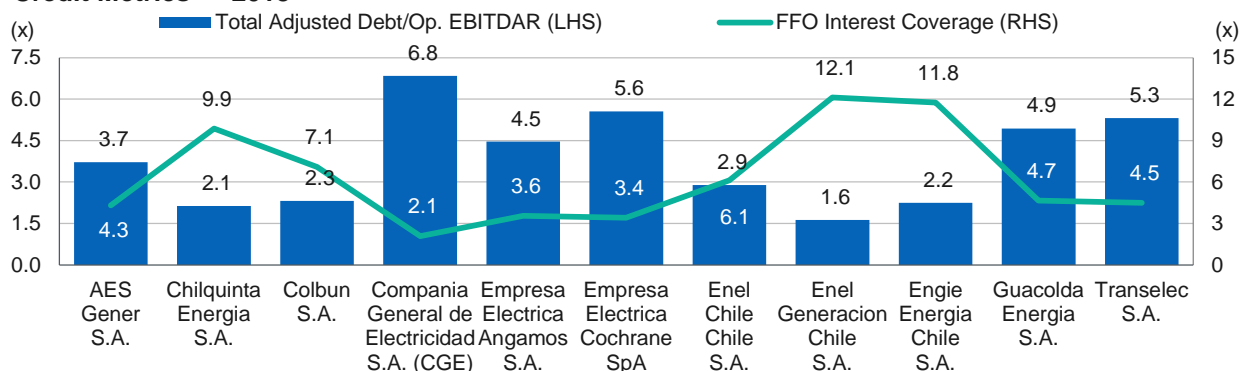
EBITDA



Source: Fitch Ratings, company filings.

The Chilean electricity market is mostly U.S. dollar-denominated due to long-term U.S. dollar-dominated contracts. Most generation companies have a low exposure to local currency costs. On average, nearly 10% of costs are denominated in Chilean pesos. Most companies have FX swaps to mitigate some of the currency risk stemming from debt denominated in local currency. Fitch estimates a 10% depreciation of local currency would lower gross leverage by approximately 0.1x.

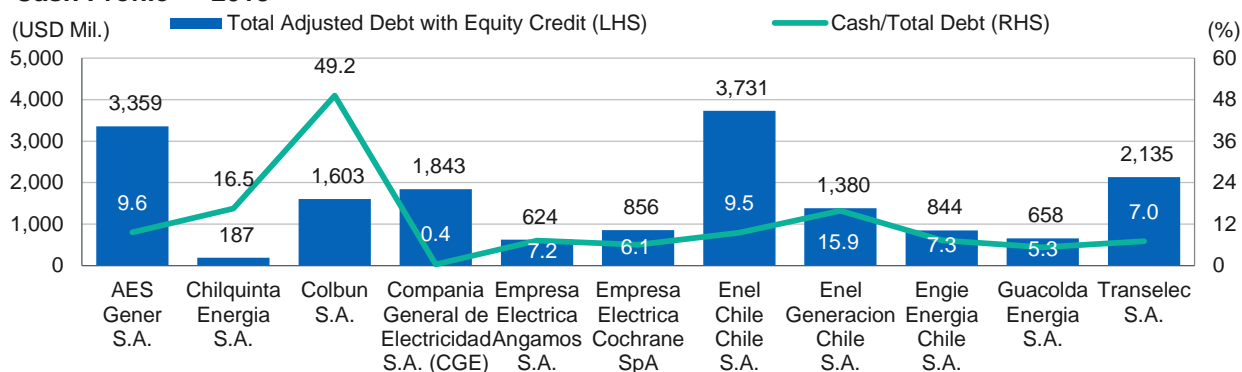
Credit Metrics — 2018



Source: Fitch Ratings, company filings.

Fitch estimates adequate liquidity for Chile's electricity portfolio. Most companies have broad access to local and international markets, coupled with adequate cash flow generation, and readily available cash is mostly allocated in U.S. dollars on banking instruments with high liquidity. Additionally, all companies in the portfolio have a comfortable amortization schedule, combined with secured committed revolving credit lines that further enhance their liquidity profiles.

Cash Profile — 2018



Source: Fitch Ratings, company filings.

Issuer		Business profile							Financial profile			
Name	IDR/Outlook	Operating Environment	Management and Corporate Governance	Regulatory Risk	Commodity Price and Market Risk	Market	Asset Base and Operations	Profitability	Financial Structure	Financial Flexibility		
AES Gener S.A.	BBB+/Sta	a	bbb	bbb+	bbb-	bbb-	bbb-	bbb-	bbb-	bbb-	bb+	bbb-
Colbun S.A.	BBB/Sta	a+	bbb+	bbb+	bbb	bbb+	bbb	bbb	bbb	bbb	bbb	bbb-
Engie Energia Chile S.A.	BBB/Pos	a+	bbb+	bbb+	bbb+	bbb	bbb	bbb+	bbb	bbb	bbb	bbb
Empresa Electrica Angamos S.A.	BBB-/Sta	a+	bbb	bbb+	bbb	bbb-	bbb	bbb-	b	bbb-	bbb-	bbb-
Empresa Electrica Cochrane SpA	BBB-/Sta	a+	bbb	bbb+	bbb+	bbb-	bbb	bbb-	b	bbb-	bbb-	bbb-
Enel Generacion Chile S.A.	BBB+/Pos	aa	bbb+	bbb+	bbb	bbb+	bbb	bbb+	a	bbb+	a-	bbb
Guacolda Energia S.A.	BB/Neg	a+	bbb	bbb+	bbb-	bbb-	bb	bb	bb	bb	bb	bbb

Source: Fitch Ratings.

Importance: Higher (Red), Moderate (Blue), Lower (Light Blue)

Decarbonization Agreement

In June 2019, the government announced a schedule for disconnecting 1,046MW of electrical power generation from eight of the oldest electrical-generation plants that rely on fossil fuels. After 2024, working roundtables will be established every five years to create new disconnection schedules and move toward a total withdrawal of the carbon park by 2040. The schedules will take into account analysis economic, social and environmental impacts, along with the overall security and reliability of the energy system. The goal is that by 2040 the energy matrix will be completely decarbonized and that by 2050 Chile will be a carbon-neutral country.

Following the announcement, the government defined the operational status of strategic reserve for all units being disconnected and retired from the grid. All units under this “Power Regulation” cannot be summoned to dispatch energy on a daily basis, but must be available to dispatch with a 60-day notice from the regulator. Fitch believes that the reserve scheme allows the plants to remain operational for up to five years for security reasons to ensure adequate energy for the grid. Fitch estimates that the companies under this scheme will receive approximately 60% of the capacity payment. Additionally, the operators will receive corresponding power remuneration according to the operating status of each unit.

With the increased participation of NCRE sources in the country, Fitch believes that to successfully incorporate NCREs as a key contributor to the country's power matrix, the country's national grid must be more flexible. Interconnection of the National Transmission System is crucial to secure the energy supply from the north, especially in relation to new renewable energy capacity, grid connection and system bottleneck reduction. Fitch estimates the transmission system will also require additional investments in the country's transmission infrastructure and storage, alongside a conventional fuel source to support the intermittence of renewables.

Decarbonization Calendar									
Company		Total	June 2019	May 2020	Jan. 2022	Nov. 2022	Dec. 2023	May 2024	Dec. 2040
AES Gener	Units	6	—	—	—	Ventanas1	—	Ventanas2	Norgener NT1 & NT2, Campiche, Nueva Ventanas 773
	MW	1,095	—	—	—	114	—	208	
Angamos	Units	2	—	—	—	—	—	—	Angamos 1 & 2
	MW	558	—	—	—	—	—	—	558
Guacolda	Units	5	—	—	—	—	—	—	Guacolda Units 1,2,3,4 & 5
	MW	760	—	—	—	—	—	—	760
Cochrane	Units	2	—	—	—	—	—	—	Cochrane 1 & 2
	MW	550	—	—	—	—	—	—	550
Engie Energia Chile	Units	9	U12 & U13	—	U14 & U15 ^a	—	—	—	CTA, CTM1, CTM2, Homitos & IEM 1,063
	MW	1,501	170	—	268	—	—	—	
Enel Generacion Chile	Units	3	—	Taracapá	—	—	Bocamina I	—	Bocamina II
	MW	636	—	158	—	—	128	—	350
Colbun	Units	1	—	—	—	—	—	—	Santa Maria
	MW	350	—	—	—	—	—	—	350
Total	Units	28	2	1	2	1	1	1	20
	MW	3,582	170	158	268	114	128	208	2,536

^aTocopilla units U14 and U15 could extend until May 2024, subject to Engie's completion of its renewable plan.
Source: Fitch Ratings, company filings.

Outlooks

2019 Outlooks

[Fitch Ratings 2019 Outlook: Latin American Corporates \(Navigating the New Political Landscape\) \(December 2018\)](#)

[Fitch Ratings 2019 Outlook: Latin American Sovereigns \(November 2018\)](#)

Related Research

Chile (March 2019)

[Fitch Affirms Chile at 'A'; Outlook Stable \(February 2019\)](#)

[Chile After the Elections \(March 2018\)](#)

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