

# RENEWABLE ENERGY

## Medium-Term Market Report 2015

### Latin America summary and special focus: Chile

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**Market Analysis and Forecasts to 2020**



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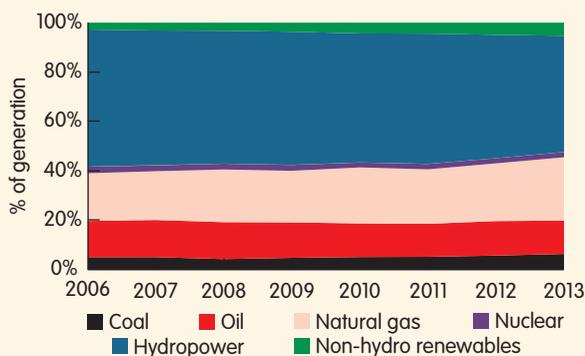
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# Latin America summary and special focus: Chile

The share of renewables in Latin America stood at over 53% of total generation in 2013, the highest among all regions in the world mainly due to the high penetration of hydropower. Hydropower and natural gas have dominated power generation in many countries in the region. However, relatively low hydropower output due to parched reservoirs in recent years and limited regional pipeline capacity for natural gas transit have raised concerns over energy security and the diversification of the power sector. Thus, non-hydro renewables are expected to play an increasing role in Latin America's power mix over the medium term.

renewable power capacity. The main drivers of this growth in the region stem from growing energy demand, resource potential, energy auction schemes with long-term power purchasing agreements (PPAs), and high spot electricity prices. Over the last year developers in Brazil, Chile, Mexico and Panama have signed record-low long-term contract prices for solar PV (USD 80-90/megawatts per hour [MWh]) and wind projects (USD 50-70/MWh), highlighting the economic attractiveness of these technologies in the region.

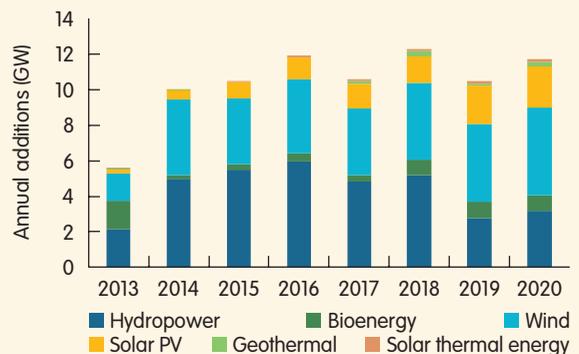
Power generation in Latin America by source (2006-13)



Hydropower and natural gas together provided more than 72% of electricity in Latin America.

Over 2014-20, the largest renewable additions should come from hydropower (27 gigawatts [GW]) and onshore wind (25 GW), followed by solar photovoltaics (PV) (10 GW), while contributions from bioenergy (3.8 GW), concentrated solar power (CSP) (0.8 GW) and geothermal (0.6 GW) are expected to be smaller. Overall, around USD 145 billion will be needed to install the forecasted new

Latin America renewable capacity additions (2013-20)



Wind and hydropower are expected to provide around 78% of new renewable additions in Latin America.

In 2020, cumulative renewable energy capacity is expected to grow by around 30% from 196 GW in 2014 to 254 GW in 2020.

Brazil is expected to install over 55% of all new renewable capacity in Latin America, followed by Mexico and Chile; Ecuador, Peru and Uruguay should also contribute. Renewable generation should reach over 1 060 TWh by 2020, with non-hydro renewables providing over 20%, up from 10% in 2013.

## However, renewables face important challenges to deployment in Latin America.

First, grid integration issues remain an important challenge throughout the region. Over the last few years, renewable project developers experienced grid connection delays in Brazil, Peru and Uruguay, while grid congestions are frequent in Chile and Argentina. Second, the availability and cost of financing could be challenging for capital-intensive renewables. In addition, regulatory barriers, grid constraints, and limited availability of long-term contracts existing in various countries in the region could increase the cost of financing. Should these challenges be met, cumulative renewable capacity in Latin America could be 5% to 7% higher in 2020 under this report's accelerated case.

## Special focus: Chile

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In 2014, Chile's renewable generation expanded by 22% year-on-year, reaching around 32 terawatts per hour [TWh]. This is mainly due to increasing hydropower generation as reservoir levels were recovered. New renewable additions were led by onshore wind with over 500 MW commissioned, followed by hydropower (+370 MW). Solar PV additions were strong with 365 MW, as few large utility-scale projects came online over 2014.

Chile's renewable capacity is expected to expand by over 6 GW over 2014-20 with generation almost doubling to 57 TWh, driven by excellent renewable resources, energy auctions, rising power demand, and high nodal spot electricity prices.

**With the change in design of the annual energy auction, new opportunities have emerged for variable renewables.** In December 2014, Chile held its annual energy tender to procure 13 TWh per year,

starting from 2016-19, and awarded 15-year power purchase contracts with distribution companies. The average price was USD 107/MWh, 20% lower than last year's USD 128/MWh. For the first time, developers were allowed to bid for hourly blocks (morning, evening and night) in addition to the single 24-hour block in which electricity generators are required to provide promised electricity for the entire day. Because of this change in the auction system, few large solar PV developers won contracts at USD 80-85/MWh, which is around 20%-30% lower than many fossil fuel plants.

**High spot electricity prices are an important opportunity for merchant wind and solar PV plants but carry significant revenue risks.** Wholesale electricity prices fluctuated between USD 100/MWh and USD 180/MWh in 2014, with higher prices observed in some nodes, depending on peak demand and transmission congestions. Over the last year, various developers have sold electricity into the spot market in the absence of long-term PPAs. However, spot prices decreased slightly over the first half of 2015, mainly due to lower natural gas prices. Further price reductions could occur in some regions with the timely completion of new transmission lines. Overall, merchant plants are directly exposed to volatile spot market prices that increase their project revenue risks. This situation might limit the availability of financing, potentially resulting in higher capital costs, and decrease bankability of new projects.

**Volatile prices not only affect merchant plants but also developers with long-term PPAs though to a much lesser extent.** The price volatility in the spot market is expected to pose a moderate challenge to renewable developers that signed PPAs with distribution companies. Those PPAs require generators to deliver contracted electricity in promised block hours. If renewable plants are not able

to deliver the promised energy, they must buy electricity from the spot market to fulfil their requirements. This situation increases uncertainty over the project revenue stream, affecting its bankability.

**Bilateral agreements between solar PV and wind developers and mining companies represent an emerging business model and an increasing driver for deployment.**

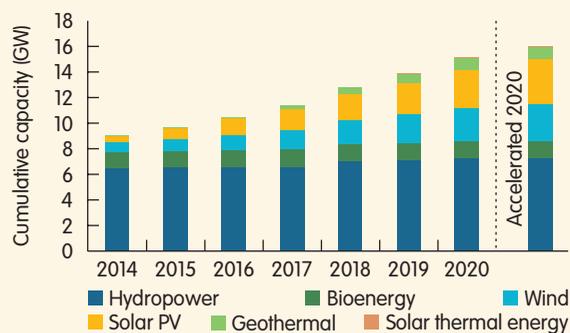
Still, variable renewables face challenges to finding bilateral contracts because mining companies prefer generators that can provide electricity 24 hours a day. In addition, the length of these contracts is usually under ten years, which can be considered short for some renewable developers. In order to meet these challenges, renewable developers have the option of being part of a generation portfolio that includes conventional plants or non-variable renewables such as CSP. Large utilities already considered this strategy in the latest energy auction.

**While the economics might be favorable, the Chilean grid is expected to represent a barrier to deployment,** especially in the Norte Grande Interconnected System (SING) and Sistema Interconectado Central (SIC). The majority of electricity-generating capacity is connected to the SIC grid, which is already highly congested in the north where irradiation is one of the highest. Although the reinforcement of the Copiapó-Santiago transmission line is expected to come on line in 2018, construction has faced financing and administrative challenges. The outlook assumes that the commissioning of the new transmission line will be delayed, resulting in connection delays for some renewable projects.

**In light of these recent trends, solar PV additions are expected to continue growing by around 2.5 GW over 2014-20, with utility-scale projects dominating.** Similar drivers exist for other renewable energy

technologies, particularly for wind power. Thus, onshore wind should expand by 1.8 GW, reaching 2.5 GW in 2020. With over 800 MW of new capacity expected to come on line over the medium term, the forecast for CSP in Chile is optimistic as the country has excellent resource potential. Smaller additions are expected from hydropower (750 MW) and geothermal (100 MW) over 2014-20.

**Chile renewable capacity additions (2014-20)**



*Chile's renewable capacity growth is dominated by solar PV and wind.*

**Greater certainty about long-term revenue streams of renewable projects could enhance Chile's renewable energy deployment.** On this front, more generation could be tendered to new block hours introduced in the latest auction, or the improvement of the market framework to better facilitate long-term power contract arrangements for renewables could spur more deployment. In addition, the timely completion of the Copiapó-Santiago transmission line by 2018 would facilitate grid connection of more renewables and alleviate congestion in some locations. Under these conditions, both onshore wind and solar PV cumulative capacity could be 300 MW to 500 MW higher in 2020.

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## Medium-Term Market Report 2015

Renewable sources of energy now stand poised to lead the world in new electricity supply. Supported by policies aimed at enhancing energy security and sustainability, renewable power expanded at its fastest rate to date in 2014 and now represents more than 45% of overall supply additions. Deployment continues to shift towards energy-hungry emerging markets, and some countries, such as China and India, have bolstered ambitions. Moreover, sustained technology progress, expansion into newer markets with better resources, and improved financing conditions are facilitating more cost-effective deployment for the most dynamic technologies (solar photovoltaics and onshore wind).

But will renewable growth in the coming years falter, or could an even faster expansion take place? Dramatic falls in fossil fuel prices over the past year have raised questions over the competitiveness of renewables and government willingness to maintain policy support. Policy uncertainties remain in the Organisation for Economic Co-operation and Development (OECD), where electricity demand has been stagnating in some markets and the rapid deployment of renewables can put incumbent utilities under pressure. For emerging markets, regulatory, grid and financing conditions can pose challenges to growth. Meanwhile, progress in the transport and heating sectors remains comparably slow, with advanced biofuels and renewable heat technologies requiring enhanced policy attention to scale up.

The *Medium-Term Renewable Energy Market Report 2015* assesses these trends in the electricity, transport and heat sectors, identifying drivers and challenges to deployment, and making projections through 2020. It also assesses the potential impacts of enhanced policy actions under an accelerated case for renewable power, which would put the world more firmly on a path to a more sustainable and secure energy system.

### **Market Analysis and Forecasts to 2020**