

Renewables Opportunities in Mexico

by Raquel Bierzwinsky, in Washington

Mexico has set an ambitious goal of having 35% of all energy production derive from renewable energy sources by 2024. In the next 15 years, national energy consumption is expected to grow at an annual pace of 3.7%.

The country is expected to have 13 to 14 operating wind farms within three years.

Solar has been slower to develop.

The government has begun planting the seeds, through legislation and incentives, for the increased participation of private capital in the sector.

Background

The private sector's participation in the power industry in Mexico did not commence until 1992 with legal reforms that allowed private entities to participate in the generation of power.

Transmission, sale and distribution of power remain services exclusively provided by the **Comisión Federal de Electricidad** or "CFE," the state-owned utility.

Currently, Mexican law allows private entities to participate in five generation schemes: as independent power producers or "IPPs," in inside-the-fence projects called "self supply" or "**autoabastecimiento**," as cogenerators, as small power producers, meaning producers of less than 30 megawatts, and as exporters or as importers for self consumption.

Beginning in 1993 with the Mérida III IPP project, the Mexican government has awarded more than 25 IPP projects, mainly employing gas-fired and combined-cycle gas turbine technologies. Under the IPP scheme, electricity may only be sold to CFE under 25-year power purchase agreements awarded through competitive bidding procedures based on the lowest average generation price. IPPs currently represent approximately 35% of the aggregate energy production in Mexico.

In the past 12 months, CFE awarded the 433-megawatt gas-fired combined-cycle Norte II IPP project and is in the process of awarding the 217- to 294-megawatt Baja California III combined-cycle gas-fired power project.

The Mexican government recently included renewable

energy projects under the IPP scheme, namely five wind energy projects, all located in the southern state of Oaxaca (in this case subject to 20-year PPAs).

Of all current Mexican power output, 77% derives from fossil fuels, while only 23% derives from alternative energy sources, mainly hydro.

Renewables Outlook

With the enactment in November of 2008 of the "Law for the Use of Renewable Energies and Financing of Energy Transition," the Mexican government of Felipe Calderón took the first steps in promoting the diversification of sources of energy through the use of renewables developed and operated by private entities.

However, renewable energy IPPs are not subject to the renewable energies law, but rather continue to be subject to the "Electric Energy Public Service Law," which governs generation from conventional power sources.

In terms of development of renewable energy projects different from IPPs, the **Comisión Reguladora de Energía** or "CRE," the government agency responsible for granting all private energy production permits and licenses, had issued 113 permits for the development of wind, biomass, hydro and biogas energy projects, which, once operational, are expected to generate over 3.5 gigawatts of power, with wind power constituting almost 75% of the technology used followed by biomass with 16%, hydro with 8% and biogas with 1%. Notably missing are licenses for private geothermal and solar power projects.

Most of the permits granted are under the small production and self-supply schemes, with the majority being under the latter. Under the self-supply scheme, the power producer must form a venture with its offtakers (**socios autoabastecidos** or self-supplied partners), whereby the offtakers must commit to purchase the entire power output of a plant under 15- to 20-year power purchase agreements.

The Mexican government has adopted certain schemes to support development of privately-owned renewable projects, including 100% depreciation in / continued page 2

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the first year for all renewable energy capital investments and the abatement of annual government fees. Another important incentive may come from the implementation by the Mexican government of mechanisms established by the Kyoto protocol (under which Mexico is designated as an Annex II country, eligible for clean development mechanism (CDM) projects) allowing renewable energy projects to obtain certificates of emission reduction, representing an additional source of financing for the projects.

On the regulatory front, CFE has developed special transmission agreements derived from open season processes for electricity generated from renewable sources, providing for reduced transportation rates, and is assisting in negotiating land rights for the construction of the transmission lines.

The Crown Jewel — Wind Projects

Wind projects have taken off in Mexico. Prime areas for the development of wind projects include the Istmo de Tehuantepec region in the state of Oaxaca, the Baja California region, the Yucatán peninsula, the states of Zacatecas and Veracruz, and along the northern Pacific coast. The state of Oaxaca leads the way with an estimated wind potential of over 10,000 megawatts, followed by the Baja California region with an estimated potential of over 5,000 megawatts.

The Istmo region presents some particularly advantageous conditions for wind power projects, as the average wind speed in Oaxaca is above 8.5 meters per second — approximately 30 empty trailer trucks are turned over by the wind current in the Istmo every year — and the measured load factor is above 50%.

The Istmo region, one of the poorest in the country, requires major investment in transmission lines and interconnection capacity to serve all new projects being developed. To that end, CRE and CFE launched an initial open season invitation for private entities to reserve transmission capacity. Self-supply developers initially subscribed 1,900 megawatts of transmission capacity to be built by CFE, requiring letter-of-credit support from these private entities to guarantee construction. Such reserved capacity was later reduced to 1,491 megawatts as a result of forfeiture of capacity and adjustments in the existing transmission lines. A new 400 kv transmission line with a 2,000 megawatts transmission capacity was placed into operation in 2010. Existing transmission capacity was also reinforced and expanded by 330 megawatts.

A second open season process is expected to be launched in 2011, but CRE has not confirmed the timing for this to occur.

CFE has now awarded five wind IPP projects, all in the state of Oaxaca: the 102.85-megawatt La Venta III, sponsored by Iberdrola, the 102-megawatt Oaxaca I, sponsored by ACS, and the Oaxaca II, III and IV projects, currently under development by Acciona Energy, with an individual capacity of 102-megawatts per project. These IPPs, along with CFE's La Venta I and II projects jointly will have 590 megawatts of installed capacity.

However, the capacity and power output of these CFE projects only represent 10% to 20% of total wind power capacity in the country, as the majority of commercial wind projects in Mexico are being developed under the self-supply scheme. CRE has so far issued permits to develop over 2,000 megawatts, and it is expected that by 2014 there will be 13 to 14 wind projects installed with an aggregate output between 2,500 and 3,000 megawatts.

The forecast is for Mexico to have at least 7,000 megawatts of installed wind capacity by 2025.

Notable self-supply projects that have been or are in the process of being developed within the last year include the 250-megawatt Eurus project in Oaxaca, developed by Acciona Energy and financed by the International Finance Corporation (IFC), the Inter-American Development Bank (IADB), the Corporación Andina de Fomento, Germany's DEG, France's Proparco, Spain's Instituto de Crédito Oficial, Mexico's Nacional Financiera and Bancomext, along with participations from commercial banks BBVA and Banco Espirito Santo, as well as the World Bank Clean Technology Fund. The Eurus wind farm will supply power to Cemex plants throughout Mexico.

Another notable self-supply wind farm in the past year is the 67.5-megawatt La Mata-Ventosa project in Oaxaca, developed by Eléctrica del Valle de México S. de R.L. de C.V., an affiliate of EdF Energies Nouvelles SA of France, supplying power to Wal-Mart stores across the country, and financed by the IFC (along with a loan from the World Bank Clean Technology Fund), the IADB and the Export-Import Bank of the United States.

One of the most significant projects in the country is a 396-megawatt wind farm that Macquarie and FEMSA are developing in Santo Domingo, Oaxaca, to supply power to several FEMSA and Heineken subsidiaries across the country.

Finally, there is a 90-megawatt wind project also in Oaxaca under development by Renovalia's / *continued page 3*

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Mexican subsidiary Desarrollos Eólicos Mexicanos, with Grupo Bimbo's plants as offtakers.

In addition, Iberdrola was recently selected by Gesa Eólica de México to build the 228-megawatt Piedra Larga wind project also in Oaxaca.

The Baja California region also has a pipeline of wind projects developed or under development, beginning with Spain's Unión Fenosa's 10-megawatt La Rumorosa and two 800-megawatt projects currently under development by a venture between Unión Fenosa and Sempra Energy. These three projects have the goal of transporting and selling the power output to the California energy market under the export scheme.

The Aubanel project, located near the town of La Rumorosa, just 15 miles south of the Mexico-US border and 60 miles east of San Diego, will be jointly developed by Gamesa and Cannon Power in several stages and is projected to have a total capacity of 1,000 megawatts. This project is expected to sell its output initially to Mexican consumers under the self-supply scheme, but at a later stage is planned to export electricity to the California market.

What the Future Holds

Unlike wind power, development of projects from other renewable sources has yet to flourish.

Even though Mexico has some of the highest potential for solar power use in the world with average isolation potential of 0.6 kWhs per square foot, large-scale and utility-size solar power projects are yet to be developed. Solar power has been used for thermal solar applications for water heating and photovoltaic applications for the provision of electric power at isolated sites and settlements, including by Pemex for the use of photovoltaic panels to power monitoring systems for its offshore oil and gas production platforms, and in private, roof-mounted PV projects, which represent a total of 18 megawatts of off-the-grid capacity.

High costs and technology concerns have been cited as the main impediments to development of large-scale solar projects.

CFE has announced the development of 12 megawatts of solar energy projects, while, on the private side, only a few developers have proposed solar projects ranging in size from 80 acres to 400 acres contiguous to electric substations in the states of Veracruz and Chiapas, with estimated costs per project ranging from US\$50 million to \$250 million.

Hydro power is the biggest non-fossil fuel source of energy in Mexico, with large-scale utility projects, such as the 2,300-megawatt El Cajón project in the state of Nayarit, being exclusively developed and operated by CFE. Mexico has seen a slow stream of small-scale privately-owned hydro projects being developed in the past few years under the self-supply schemes, representing 292 megawatts of capacity. The Papaloapan basin in the state of Veracruz has been identified as having significant potential for mini-hydro generation. The National Commission for Energy Savings has developed studies of the potential of the Rio Blanco River in the state of Veracruz along Mexico's gulf coast.

Existing geothermal projects have been developed only by CFE and amount to 960 megawatts of installed capacity. Mexico is the world's third largest user of power from geothermal plants. CFE has announced an intention to develop an additional 125 megawatts of capacity in the near future, but has not hinted at any possibility of these being developed by the private sector.

Finally, permits for the development of biomass and biogas projects have been issued for just over 620 megawatts of capacity. The largest use of biomass for power generation in Mexico comes from sugarcane bagasse and from waste. Waste-to-energy projects have been actively promoted by state governments. A handful of projects based on the use of methane and other gases extracted from municipal landfills have been developed, including the Energía de Nuevo León project, which utilizes gas extracted from the landfill in the city of Monterrey and has a production capacity of 7.4 megawatts. Other landfill projects are being considered in Mexico City and the State of Mexico. The World Bank has been monitoring regulatory changes in Mexico for the promotion of biogas projects at landfills.

In conclusion, Mexico offers a wide variety of resources for the development of renewable energy projects. However, a key element for a more robust renewables market depends on the government's willingness to diversify energy sources for public consumption and to allow development of large-scale projects by private entities, under IPP and other schemes, from sources such as wind, solar, hydro and geothermal, of which Mexico has an abundant supply.

For the time being, self-supply and export schemes, along with CFE's periodic bids for IPP projects, present the most viable path for private sector development of renewable projects in Mexico. ☺

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