Markets in transition

As digitalization and decentralization change Brazil’s energy and transport markets, businesses press for review of how they are regulated.

Solange Monteiro

LIKE THE REVOLUTION experienced by the telecommunications sector when cell phones began to embed Internet apps like WhatsApp, the transport and energy sectors are under pressure to change their business models. In transport, new technologies have allowed the consumer to circumvent the rigidities and inefficiencies of the system with alternatives like Uber and carpooling. In energy, expansion of the solar market and the emergence of smart grids have transformed consumers into electricity producers.

In both sectors, another strong force for change is the need to reduce emissions of greenhouse gases (GHGs), as Brazil and many other countries committed to do at the 2015 climate conference in Paris. “Eighty percent of the increase in GHG emissions is due to the burning of fossil fuels, which makes the issue
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of global warming fundamentally an energy use problem,” said Suzana Kahn, executive coordinator of Project Green Fund, Federal University of Rio de Janeiro. It is estimated, she says, that to stabilize GHG emissions at an appropriate level would require reducing worldwide carbon dioxide emissions by more than half, from the current 45 GtCO2 per year to an average equivalent of 18 GtCO2.1 “It will be very difficult. We will have to work very hard to both mitigate and adapt our systems,” Kahn says.

Jorge Vasconcelos, president of New Energy Solutions, points out that another significant change is a shift in focus from large energy projects with gains of scale to a decentralized marked with distributed electricity generation in the industrial, commercial, and residential sectors, a result of photovoltaic generation. “Power grid statistics in Germany in the first decade of this century shows growth in high-voltage transmission lines was zero, in medium-voltage lines 8%, and in low-voltage lines 27%,” he says. What at first glance appears to be the perfect way to ensure a supply of clean energy, however, also represents a risk to the financial sustainability of the electricity sector if not well regulated. “Consumers who become electricity producers make less use of the power grid, but the grid still needs to be paid for. Otherwise, we have a perverse effect, which inhibits investments in the power grid,” says Joisa Dutra, director of the FGV Center for Regulation and Infrastructure.

In May, the FGV Center for Regulation and Infrastructure and the FGV Rio Law School sponsored a seminar to discuss the regulation challenges these changes are bringing about, which are already evident in countries where distributed electricity generation has advanced. One is the United States. In the electricity market that covers 13 US states and the District of Columbia, for example, decentralized electricity generation has reached 14 GW—8.6% of the total electricity produced. Ashley Brown, executive director of the Harvard Electricity Policy Group, says that a balanced pricing model for electricity distributors should take into account three costs: energy, which is variable; the power grid, which is fixed; and ability to meet electricity demand when it peaks. However, Brown says, “We adopted a very common mechanism, net metering, through which my excess energy is sold to the grid at retail price. However, the residential energy producer earns as if he is offering the full service, while the operator who has the obligation to do so, loses out.”

1 GtCO2 = 1 Giga ton of CO2-equivalent (1 Gt = 10^{12} kg).
Challenges ahead

Luiz Barroso, president of the Energy Research Company, points out that these changes have also created new businesses opportunities. “In the US, for example, companies now offer leasing of solar panels; they install, operate, and do maintenance. Solar energy has just been converted into a service that you pay for in easy monthly installments,” he says. Barroso emphasizes, however, the need for regulatory adjustments to mitigate erosion of distribution operators’ revenue. “Doing so we would avoid measures such as those beginning to emerge in Europe, especially in Spain, where, after a massive commitment to solar energy, a high tariff was introduced that affected the attractiveness of solar and undermined the sector as a whole,” he says.

Barroso points out that the expansion of decentralized power generation has also affected other branches of the electricity sector: “In the case of generation, renewable energy reduced average prices because they enter at zero cost. There are countries where large conventional electric power producers are willing to pay to stay connected to the grid because they have higher startup costs.” That, he says, has motivated the creation of models to compensate the generation capacity of large power producers in an environment where uncertainty and price volatility are high.

In the wholesale electricity market, in turn, renewable energy is auctioned at ever-lower prices. “Latin America has led these offers; renewable energy prices at auctions in Mexico, for example, reached US$45 MWh. But in May, an auction in Dubai closed at US$30 MWh,” Barroso says.

As Brazil takes its first steps on this path, Barroso says there is a “good confusion” as consumers of electricity become producers and respond to prices. “We have focused on the consumer’s freedom of choice to open up the electricity market and integrate distributed generation—something the US and Europe already do,” he explains. Tiago de Barros, director of the National Electric Energy Agency, points out that Brazil has never been a pioneer in introducing technologies such as wind and solar energy, and when it did, it was necessary to give subsidies to renewable energy. He points out that solar panels have not been adopted in Brazil as in developed countries, largely because prices are higher in Brazil. Residential photovoltaic generation in Brazil is paid for in the same way as in the US (net metering), but an additional fee was introduced.

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to access the grid, though that is still insufficient to cover all costs of the grid, Barros says that the pricing system needs changes to compensate grid costs adequately, but that changes in the pricing system to encourage the adoption of renewable energy will take three and a half years.

Mauricio Bahr, president of the French business group Engie, believes that it is important for adaptation to happen gradually and transparently so as not to bring about negative outcomes and price changes that discourage investments.”

Experts gathered at the seminar recommended carrying out studies to estimate the impact of renewable sources of energy and of the resulting demand to adjust the operational and regulatory framework, ensuring a good environment for attracting investments in transmission and technologies. “The current changes will require large amounts of capital, and new financing mechanisms. So we need to create mechanisms to ensure adequate return on these investments,” Dutra says. Luis Eduardo Barata, director general of the National Electricity System Operator, points out that “We will not have major electricity supply problems in the coming years, which makes this the right time to address and analyze fully the electricity sector business model.”

The main challenge, experts emphasize, will be to address the uncertainties brought about by including in the power grid intermittent sources of energy generation, such as wind and solar energy. “Renewables have a different measurement history and time intervals. We are leaving a world in which things were more linear to enter into a more complex environment,” Barroso says. Vasconcelos says this requires planning that allows for innovation without compromising power grid reliability and safety. “We should not limit the freedom of electricity market participants, but we should ensure that they coexist with power grid integrity,” he insists, while acknowledging that it will not be an easy task.

Vasconcelos argues that regulation is only part of the solution to the carbon emissions problem: “Today we do not have a regulatory framework consistent with lower carbon emissions goals, and we need to give adequate economic signals so that the market can adjust and has some sort of long-term goal. Otherwise, we will be adjusting to the past, not the future.”
A more integrated business model

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AN EXPANDING TRENDS in the electricity sector is the creation of production and distribution business models that cross national borders, integrating regions. Jorge Vasconcelos, president of New Energy Solutions, points out that in Europe this process began 20 years ago: First, national wholesale electricity markets were liberalized. Then technical rules for grid codes were harmonized. Today, companies supply electric power to a number of countries and their supply capacity is checked and guaranteed thanks to an algorithm that centralizes operations. Vasconcelos explains that “Electricity supply in the Portuguese market will be integrated from Portugal to Finland, with the allocation of interconnection power capacity between the various systems made automatically. No bilateral intervention, but global optimization.”

One of the most enthusiastic and active companies in this integrated electricity system is the China State Grid. Cai Hongxian, CEO and president of State Grid Brazil Holding, says that by 2050 the company sees a global interconnection process consisting of three phases. The first, from 2012 to 2020, will be expansion of clean energy sources and interconnection within China. So far China has achieved hydroelectricity capacity of 320 GW, a connected grid of wind power of 130 GW, photovoltaic power of 42 GW, and a project that is adding 22,000 kilometers
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of high-voltage lines. In the second phase, by 2030 the plan is to promote continental interconnection, concluding in 2050 with establishment of wind power bases in the Arctic and solar energy in the equatorial region. “Brazil and South America have rich resources and great potential, and should play an important role in the development of the global energy interconnection,” Hongxian says.

In Brazil, development of this energy market is still only tentative. Tiago de Barros Correia, director of the National Electric Energy Agency, points out that the commercial potential of the country’s energy interconnections with Argentina and Uruguay has not yet been properly explored. “Seldom has this interconnection been used as a business; for that to happen we need a review of the pricing model that harmonizes the markets,” he says. Luis Eduardo Barata, director general of the National Electricity System Operator, says that the current context of electric power oversupply in Brazil and shortages in Argentina has stimulated negotiations between the two countries to contract for the supply of electric power. He added that “For some time we have been trying to develop marketing schemes with Argentina, but now we are able to discuss this on a commercial basis.”

Luiz Augusto Barroso, president of the Energy Research Company, underscores the importance of this type of agreement in regions like Central America. “A thermal power plant in El Salvador has 500 MW capacity, but the country’s peak demand is only 160 MW. This type of marketing is essential to take advantage of spare power capacity and ensure better use of these resources,” he explains.
Smart transportation

Solange Monteiro

LIKE THE ELECTRIC POWER SECTOR, the transportation sector has been shaken by the emergence of new business models, either by the diversification of transport services or by digitalization of business. In addition to carpooling and private car rental, the opening up of urban transport by municipal ordinance to services like Uber in São Paulo—upon payment of R$0.10 per kilometer for the roads maintenance—is one of the most striking examples of this trend in Brazil.

On the one hand, experts point out that new initiatives are important because they fit into the objective of bringing more efficiency to urban transport. “Various studies show great losses of productivity resulting from traffic jams. In addition, in a number of Brazilian cities transport accounts for between 60% and 70% of carbon emissions,” says Luis Antonio Lindau, director of WRI Brazil Sustainable Cities.

On the other hand, Matthias Finger, director of the Florence School of Regulation, emphasizes the trend of creating business value through digitalization. “Digitalization allows the customer to have more information and be able to compare not only operating companies of the same transport service, but several transport alternatives,” he says. In addition, digitalization allows the generation of information about different interconnected services. “The postal service of Switzerland operates 50% of the country’s buses. This strategy began five years ago, when the postal service started to offer free Internet in buses, which enabled data collection for a mobility map. So it is not necessary to be a transport company to collect data on transport. You can do a lot with something like this,” he says. Finger believes that the digitalization of the information on people’s habits now available will allow us to plan intelligent cities and circular economies that produce no waste and pollution.

In Brazil, government efforts to make transport systems more efficient face the challenge of integrating and enhancing the
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spatial planning of cities. Vicente Loureiro, executive director of the Metropolitan Council of Rio de Janeiro, says that the decision that concession services should cover the entire metropolitan area of Rio de Janeiro is still a maturing process. He says the Supreme Court ruling that utility services of common interest to several municipalities should be governed by a municipal council has impacted public services. For instance, public transport decisions are now made jointly by municipalities and the state and governed by state law.

Meanwhile, Goiânia, which has had metropolitan management of public transportation for more than 20 years, now faces challenges resulting from the successful integration of Goiânia and 17 cities. Loureiro explains that “The integrated transport system and single fare rate, along with the low-income housing program, stimulated city sprawl that has compromised transport system productivity. Now local authorities are seeking ways to halt and reverse this situation,”

Daniel Marx Couto, director of BHTrans, said that the challenge in the metropolitan region of Belo Horizonte, which includes 34 cities, is to persuade 70% of the population to use public transport—currently less than 50% do so. “For the World Cup, we invested in bus rapid transit lines that transport 30% of the capital’s population, and we are seeking in the current negotiation of the concession agreement a bus fare in line with inflation and compensation per passenger, following a set of parameters such as bus’ frequency and maximum capacity,” he says.