



Decarbonizing Brazilian and Japanese economies: Four ideas for the energy sector

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Ambassador Eduardo Paes Saboia joined the Brazilian Foreign Service in 1990. He served in the Brazilian Mission to the United Nations in New York; in the Permanent Delegation to ALADI; as well as in the Brazilian Embassy in La Paz. He also served in the World Bank and the IMF, in both cases as an advisor to the executive director of Brazil. At the World Bank, he was involved in several discussions related to environmental and climate issues, including the Climate Investment Funds. In Brazil, he worked in the MERCOSUR Division, the Directorate-General for Latin American Integration, the Department of Financial Affairs and Services, and the Cabinet Office of the Minister of State. He was also diplomatic adviser to the Federal Senate's Foreign Affairs and National Defense Commission, senior adviser in the government's leadership office in the Federal Senate and chief of staff to the Minister of Foreign Affairs. He has been Ambassador of Brazil to Japan since March 2019.

Climate change is an international challenge that will require quick paradigm shifts in the global economy. In this sense, some of the world's largest economies such as Japan and Brazil are taking concrete measures today to achieve carbon neutrality by mid-century. As the executive director of the International Energy Agency (IEA), Fatih Birol, pointed out in a recent article in the Financial Times, this is a Herculean undertaking that will require "nothing short of a total transformation of our energy infrastructure"¹.

It is exactly this transformation of the energy infrastructure that will also present the benefits of creating meaningful economic opportunities. In fact, in its latest "Global Renewables Outlook", the International Renewable Energy Agency (IRENA) estimates that "the envisaged transformation would effectively pay for itself, with every dollar spent bringing returns between three and eight dollars", while quadrupling the number of jobs in the renewable sector².

Prime Minister Yoshihide Suga highlighted the economic benefits of the future carbon neutral economy in his Policy Speech to the Diet in October last year: "addressing climate change is no longer a constraint on economic growth. [...] proactive climate change measures bring transformation of industrial structures as well as our economy and society, leading to dynamic economic growth."³

Brazil and Japan have recently announced ambitious goals to curb climate change. As our

countries take on this challenge of historic proportions, I believe we have the right set of circumstances to boost our bilateral agenda on energy, creating fresh prospects for increasing trade, investment, and joint research.

Last October, Prime Minister Yoshihide Suga announced that Japan will aim to reduce greenhouse gases (GHG) emissions to net-zero by 2050. Last December, Brazil submitted its Nationally Determined Contribution (NDC) to the Paris Agreement, not only confirming its previous intended NDC commitment to reduce its greenhouse gases emissions in 2025 by 37%, compared with 2005, but also going beyond that by committing to reduce its emissions in 2030 by 43%, compared with 2005.

The Brazilian government also stressed that its NDC is compatible with an indicative long-term objective of reaching climate neutrality by 2060, leaving open the possibility of adopting an even more ambitious long-term objective at the appropriate time⁴.

I would like to emphasize how ambitious the Brazilian commitments are. Brazil's NDC surpasses similar commitments by all non-European members of the G20, as well as those of all other developing countries with large territories or populations. Another noteworthy aspect is the setting by Brazil of an intermediate target in 2025, which increases the responsibility for implementing mitigation efforts throughout the decade, and not

just at the end of the period.

As Brazil and Japan pursue the common goal of decarbonizing our economies, it is important to recognize that the two countries come from different energy profiles. Yet, exactly because of that, there are many complementarities to be explored. It is well known that Japan is one of the world’s largest energy importers. According to Japan’s most recent Strategic Energy Plan, published in 2018, “Japan depends on imports for almost all of its energy resources”⁵.

The main feature of Brazil’s energy profile is its reliability on renewable sources. It is surprisingly

little known that Brazil has one of the cleanest energy profiles in the world. According to the latest National Energy Balance, renewables represent 83% of power generation, 46% of automobile fuel consumption, and 41% of the total primary energy mix. In fact, even today, no other country with more than 60 million people has more than 40% of its primary energy composed of renewables.

It is no exaggeration to say that Brazil is a renewable energy superpower. According to IRENA, Brazil is the third largest producer of electricity from renewables, behind China and the United States of America⁶. (Figure 1) Also, according to data from the International Energy Agency, Brazil is the world’s fourth largest producer of renewable energy as a primary source, behind China, the US and India⁷. (Figure 2)

Having in mind our goal to decarbonize our economies and our energy profiles, I would like to present four non-exhaustive areas in which I see opportunities for Japanese and Brazilian businesses.

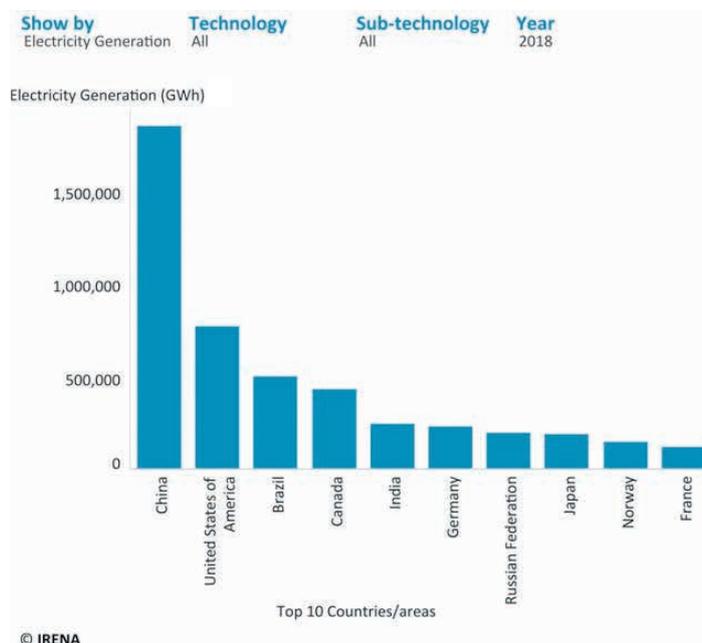
1. Bioenergy

One such area is bioenergy. Modern bioenergy is responsible for half of the generation of all renewable energy today. It is, to use an expression from IEA, the “overlooked giant” of renewables⁸. According to both IEA and IRENA, bioenergy in final energy consumption needs to double by 2030 and biofuels in transport needs to triple to keep global warming in check.⁹

Brazil and Japan already have a successful collaboration in the field of bioenergy, but there is scope – and need – for much more. Brazilian biofuel made of sugarcane is currently exported to Japan in the form of ethyl tert-butyl ether (ETBE). ETBE is then mostly blended to the gasoline at the rate of 3%. This is still a low percentage, which means there is ample room to increase the participation of ETBE and Brazilian ethanol in Japan’s transport sector.

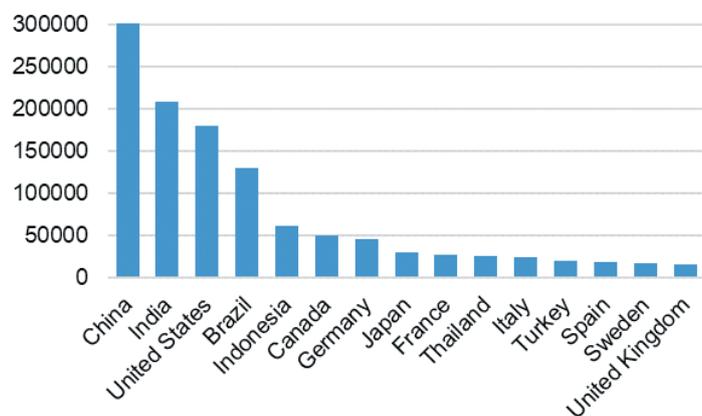
Sugarcane ethanol reduces carbon dioxide emissions by 90% on average compared to

Figure 1. Renewable energy country rankings



Source: IRENA. Country rankings.

Figure 2. World’s largest producers of renewable energy



Source: prepared by the Embassy with data from the International Energy Agency (2020). World Energy Balances Highlights (2020 edition). Production (ktoe, 2018). Renewables and waste.

gasoline¹⁰. The industry is working hard to make it carbon neutral. This biofuel also contributes to the reduction of local air pollution. Compared to gasoline and diesel, it brings almost to zero the emission of suspended particulate matter, considered an aggravating factor for respiratory diseases, including COVID-19.

This advanced biofuel can be added to the gasoline at a high percentage without any modification to conventional engines. Furthermore, engines that function entirely with ethanol are relatively cheap and assimilated by all major Japanese carmakers. Biofuels can be transported using tankers and other infrastructure we already spent billions to build, which frees up resources to other sectors.

Given these characteristics, I am convinced that increasing the use of Brazilian sugarcane ethanol is probably the single most powerful policy to reduce emissions in the short-term for the transport sector.

I believe this biofuel is an alternative that can increase **energy security** in Japan, by diversifying its sources of fuels. It contributes to Japan's **environmental** goals, by reducing 90% of emissions when compared to gasoline (with the possibility of becoming a carbon neutral fuel, given the growing accountability of emissions across the supply chain). It is **economically effective**, as its price is competitive and, in some cases, cheaper than gasoline, depending on market conditions. And it is a **safe** source of energy. It addresses all the key elements of the principles of the 3E+S (energy security, economic efficiency, environmental performance, and safety).

In my view, there is an opportunity for Japanese companies to invest in this sector both in Brazil and Japan, expanding the infrastructure and industrial processes. Should Japan increase its use of this biofuel, I see also an opportunity for the Japanese industry to absorb some key links of the supply chain. Just as important: the development of sugarcane biofuel to be used in airplanes is advancing fast. This is a sector hard to electrify. I see many opportunities for Japanese and Brazilian

companies in this segment.

Also in the field of bioenergy, the use of biomass is another promising area for Brazilian and Japanese companies. The sector is set to grow strongly. In a recent publication, IRENA predicts that biomass participation in the electricity mix will have to increase from 4% to 16% by 2050¹¹.

A Brazilian and a Japanese company are on the forefront of this technology. Cosan/Raízen and Sumitomo Corporation formed a joint venture to develop sugarcane bagasse pellets. It is ideal for repurposing coal power plants. As a versatile technology, it can substitute mineral coal, natural gas and fuel oil in the generation of electricity and heat, with minimal or no need to make changes in power plant equipment at all. A major advantage: greenhouse gases emissions are reabsorbed within a year with this technology, whereas emissions from wood pellets take 10 to 100 years to be reabsorbed, according to data from the companies involved in the project.

Many experts, including the Intergovernmental Panel on Climate Change, have recognized the importance of combining bioenergy and carbon capture and storage (CCS) to achieve carbon neutrality¹². In a recent seminar, IEA's Fatih Birol said that bioenergy associated with CCS is the main technology available for delivering negative emissions. The combination of bioenergy and CCS contributes much more to reducing emissions than the combination of coal and CCS.

I believe sugarcane bagasse pellets have a lot of upside potential for Japan as a source of energy and as a tool to achieve net-zero emissions. Brazil is well positioned as a partner to conduct joint research, provide supplies, and receive investments. Japanese and Brazilian companies could have a first-mover advantage in this segment, shaping the repurposing of coal and natural gas power plants across the world for years to come.

2. Market for renewable electricity generation, transmission, and distribution in Brazil

A second area in which I see potential for an

increased partnership between Brazilian and Japanese companies is the market for renewable electricity generation, transmission, and distribution in Brazil. The country is one of the largest wind energy producers in the world, holds second place in investments in hydroelectric energy and boasts excellent conditions for solar energy development¹³. Keep in mind that 83% of the electricity generated in the country come from

renewables.

There has been a surge in the participation of international firms in electricity in Brazil in the last few years. This is evidence of the attractiveness of the sector to investors. As an emerging market with a large territory and a growing population, Brazil has increasing needs for energy, which means a healthy demand for investments in the sector. Importantly, asset prices in the electricity sector in

Brazil remain relatively low for investors, while similar assets are reaching bubble-like valuations in other corners, diminishing returns. One example: currently, 10 out of the 18 companies that compose the Index of Electric Energy at the B3 stock exchange are trading at prices that represent 5 to 10 years of earnings.

The largest shares of the electricity market in Brazil were taken by Chinese, French, Spanish, American and Italian firms¹⁴. The participation of Japanese companies is still relatively small, although one Japanese company is involved in a large project in the sector. Mitsui & Co. Ltd has a 20% stake in the hydroelectric plant of Jirau. This project was recognized by United Nations Clean Development Mechanism as reducing CO₂ emission by 6 million metric tonnes of CO₂ equivalent per annum, which represents more than one month of emissions in Tokyo¹⁵. Japan is a champion of energy efficiency. Should more Japanese companies enter the sector, the impact for the Brazilian grid would be positive.

The electricity sector is organized around regular bidding rounds for different sources of energy generation, as well as for energy transmission. The first bidding round of this year for wind, solar, hydro and biomass generation is due to take place in June 25 for contracts to start delivering energy in three and four years. The following bidding round will take place in September 30 (for contracts to start delivering energy

Figure 3. Nationalities of generation concessionaires (MW)

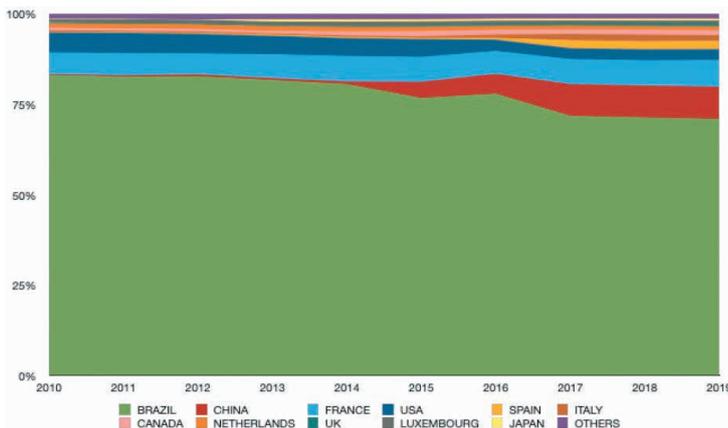


Figure 4. Countries' percentage of the transmission sector (km of transmission lines)

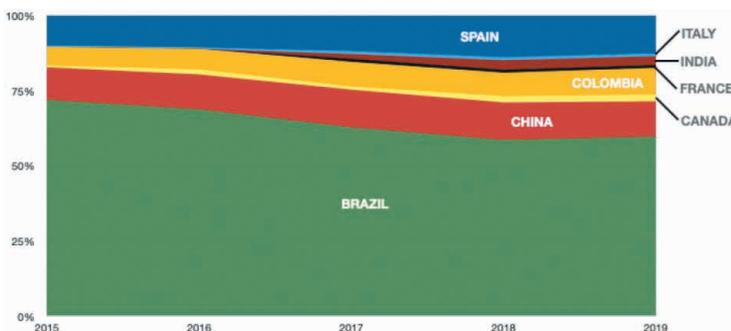
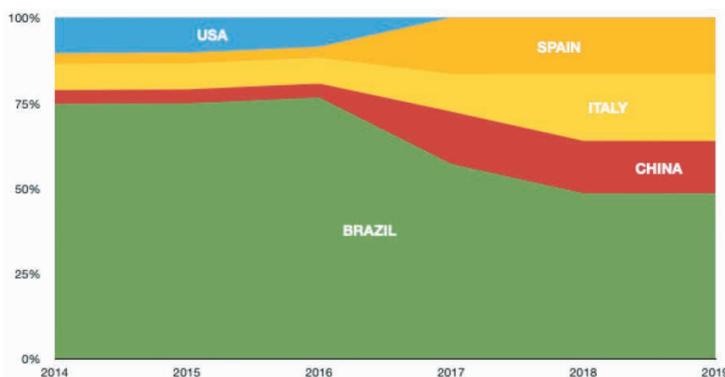


Figure 5. Countries' percentage of the distribution sector (number of consumer units)



Source: Pedro Henrique Batista Barbosa. New Kids on The Block: China's Arrival in Brazil's Electric Sector. Data from the Brazilian Electric Energy National Agency (Aneel).

in five and six years). The first bidding round for transmission will take place in June 30.

3. Nuclear Energy

A third area for cooperation is nuclear energy. The Brazilian government is interested in attracting investments to the supply chain of nuclear energy. This is an area in which Japan excels. Brazil is determined to complete its third nuclear power plant—Angra 3. In 2019, through Decree 9.915/2019, the project was included in the Investment Partnership Program (IPP), which is responsible for managing concessions and privatizations of infrastructure projects considered as priorities for the Brazilian government. In 2020, a study on the model for the completion of Angra 3 was approved by IPP, representing an important milestone. I see opportunities for Japanese investors here¹⁶.

4. Hydrogen

A fourth area in which I see positive prospects for bilateral cooperation is the nascent sector of hydrogen. Hydrogen is enjoying unprecedented momentum, with many countries pledging to increase its use. At this point, according to IRENA, “around 95% of all hydrogen is generated from natural gas and coal [...]. Currently there is no significant hydrogen production from renewable source”¹⁷. For this reason, the “production of hydrogen is responsible for CO₂ emissions of around 830 million tonnes of carbon dioxide per year, equivalent to the CO₂ emissions of the United Kingdom and Indonesia combined.”¹⁸

However, hydrogen can also be made from clean primary sources and there are meaningful developments in this field. For example, Nissan, in partnership with the University of Campinas and the University of São Paulo in Brazil, is developing an electric fuel cell car based on hydrogen produced from ethanol. Besides being much cleaner, it can also benefit from already existing infrastructure for ethanol. This is an example of the avenues that Brazilian and Japanese firms could explore in the sector of hydrogen.

Without underestimating the political and

technological challenges of decarbonizing our economies, I believe the need to transform our energy infrastructure will also create great economic opportunities. Together, Brazil and Japan are well positioned to seize them.

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