

# Integrated Regional Energy Systems

MERCOSUR AND ITS PARTNERS

**In 2005, a Framework Agreement on Regional Energy Cooperation between Mercosur Member States and Associated States was signed. Almost 10 years later, it is debatable as whether this agreement has fulfilled its goal of advancing regional energy integration.**

The Framework Agreement aims to advance regional integration related to the production, distribution, transport and marketing of energy in the signatory countries (Argentina, Brazil, Paraguay, Uruguay, Chile, Colombia, Ecuador and Venezuela). Two main goals are highlighted: the securing of energy supplies and the minimisation of transaction costs of energy exchanges between the States. Moreover, this should be done in a sustainable manner, ensuring a fair and reasonable use of the natural resources<sup>1</sup>.

A first challenge of such integration refers to the agreement's entry into force. According to its general provisions, the agreement shall enter into force after the forth notification of compliance with internal rules<sup>2</sup>. Only in 2010, for instance, Brazil enacted the Presidential Decree required for its internalization<sup>3</sup>. Such a delay undermines the impact of a legal instrument that seeks to facilitate the development of energy projects between countries, for which further specific agreements are also needed. In order to deepen integration between the State parties, regional, sub-regional,

or bilateral agreements may be concluded<sup>4</sup>. The areas listed in the agreement are: a) *gas and hydrocarbons* (commercial exchange of hydrocarbons; interconnection of gas and other hydrocarbon products; cooperation in prospecting, exploiting and industrializing hydrocarbons); b) *interconnection of electricity transmission networks*; c) *renewable and alternative energy*.

The importance of hydrocarbons in the region is undeniable. According to OPEC<sup>5</sup>, Venezuela has the world's largest oil reserves (297.7 billion barrels), followed in Latin America by Brazil (13.1). In the framework of the proposed *Petrosur*, alliances between national energy operators are expected to coordinate hydrocarbons trade and politics. The complexity of this issue requires a separate analysis, which will be developed in a future report.

In this work, we will focus on the integration of **electricity systems** and the potential for integration of more **environmentally friendly energy resources**.

## Regional Integration of Electricity Systems – *the case of Hydropower*

When Argentina, Brazil, Paraguay and Uruguay signed the Treaty of Asunción (1991) establishing the Mercosur, energy integration in the region was already an ongoing process, especially regarding electrical integration. There are binational projects and interconnections dating from

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the 1970s – take the hydroelectric dams of Itaipú (Brazil-Paraguay) and Salto Grande (Argentina-Uruguay), for instance. Besides being instruments for cooperation and peace, they promote energy security and lower costs.

From an environmental point of view, the impacts associated with this energy source should not be disregarded - flooding land for a hydroelectric reservoir destroys forests and threatens wildlife habitats. In addition, hydroelectric dams produce significant amounts of CO<sub>2</sub> and methane, the latter being a much more potent greenhouse gas than the former. Nonetheless, hydropower in Brazil represents around 75% of the domestic electricity supply<sup>6</sup>, possibly a better option when compared to thermo energy. Hydro energy contributes to the presence of a predominantly renewable electricity matrix. Remarkably, Brazil's renewable energy resources account for some 47% of its primary energy supply matrix, compared to 7% for OECD countries<sup>7</sup>. New binational hydroelectric plants (Garabi and Panambi) are planned for the Uruguay River, on the border between Argentina, Brazil and Uruguay. The plants should have a combined capacity of 2,200 MW. Not to be limited to Mercosur member states, Andean nations rich in water resources are expected to cooperate with their neighbours as well. Chile, a Mercosur Associate and party to the Framework Agreement, could export hydropower from its southern rivers to Argentina. Transmission of the energy would be cheaper and more efficient, because the power lines would stretch just 200 kilometres on average<sup>8</sup>.

Hydropower is a relatively clean energy source. In addition, the regional integration of hydroelectricity systems in South America seems to be positive in terms of energy efficiency and security. Some advances have been made in this

area taking into account existing and planned binational interconnections. Lessons learned from this model should serve to expand the energy integration to other energy sources, especially to more environmentally friendly ones.

### **The potential to cooperate in renewable energies**

According to the Framework Agreement, the parties shall pursue to strengthen institutional capacities in order to promote the rational and efficient use of conventional and renewable energies<sup>9</sup>. This should be accomplished through knowledge exchanges and technical updates between States. The harmonization of regulations is also a core issue.

Latin America is known for its great abundance of renewable energy sources such as sun, water, geothermal energy, wind and biomass. Exploring and developing this potential will help Latin America to satisfy its growing demand for energy. As oil becomes scarcer and energy more crucial to development, energy security has become a major concern, and it could be achieved using alternative energy sources<sup>10</sup>.

Notably biomass (and biofuels) play an important role in terms of renewable energy in Latin America and are sources which present special potential for regional cooperation. Biomass (mostly firewood and charcoal) represented a third of residential energy consumption in Brazil in 2013<sup>11</sup>, this rate being even higher in Paraguay (73,44%) and Uruguay (37,58%)<sup>12</sup>.

As an energy source, biomass can either be used directly via combustion to produce heat (mostly residential

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consumption), or indirectly after converting it to various forms of biofuel. Biomass residential use has always had a very important role in South American countries in terms of energy production and job creation. Nevertheless, it is often associated to a low stage of technological development. To minimize the environmental impacts of this rudimentary model of energy production, an environmentally friendly use of biomass should be encouraged – the firewood supply, for example, should result from reforestation.

Contact between biomass experts should be increased, promoting the exchange of experiences and encouraging joint projects that take into consideration the social and environmental aspect of biomass energy production in the region. **Biofuels** in particular can be used as a main instrument to resume and develop integrationist ties in the region. Progress in this topic at the national level has already taken place. Given its technological development of biodiesel and ethanol, Brazil could play a leading role in promoting the production of biofuels and their supply within Mercosur<sup>13</sup>. The Brazilian biodiesel program incorporates both large-scale agribusiness and family farms across the country<sup>14</sup>, encompassing not only an economic approach, but also a social and environmental one. Such a strategy could be expanded to the neighbouring countries, since the region's climate and geographical indicators represent a comparative advantage in this field. Soy, cotton, and sunflower crops are the major sources of vegetable oils for biodiesel production in the area, followed by palm oil along with castor beans. Argentina is also an important producer of biofuels and the most important biodiesel exporter<sup>15</sup>. The biodiesel industry has been one of the most

dynamic businesses in the country over the past 5 years. This new sector emerged in 2007 and has reached scale and competitiveness due to its focus on exports<sup>16</sup>.

Furthermore, according to OECD-FAO Agricultural Outlook, "less important from a global perspective but notable from a national perspective is the production of biodiesel based on tallow in Paraguay and Uruguay, as a result of the large livestock sector in these countries"<sup>17</sup>.

These countries already participate in bilateral technical cooperation initiatives. Among the coordinated initiatives in Latin America, highlights are OLADE's Biofuels Regional Program<sup>18</sup> and Mercosur's Special Working Group on Biofuels<sup>19</sup>. Nonetheless, the use of biofuels does not enjoy universal acceptance. Regarding sustainable development in biofuel production, researches exhibited that biofuel is not the final resolution to improve or assure the fuel problem in an environmentally friendly way. As an example, scientists found out that big parts of the rainforest in Brazil are endangered because of the growing production of biofuels. As the Brazilian biofuel production in south, south-east and north-east is growing, more agricultural land is needed. This increase causes a displacement of cattle farming to the Amazon region. Big parts of the rainforest are needed to be deforested to create new farming areas. That leads to the consequence of an additional increase of global warming. As a response to this threat, it is prohibited by law in Brazil to come close to the Amazon forest and other forest areas<sup>20</sup>. This is a first answer to the question how serious Brazil is taking the biofuel industry in terms of environmental protection.

In addition, scientists found out that the environmental effects caused by biofuel

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are worse than expected. Researches focusing on the content of ozone in the atmosphere of São Paulo have shown that the increase of using biofuel causes an increase in ozone content.

Nevertheless, regarding to the effects of regular fuel which increases the content of nitrogen oxide and carbon monoxide in the atmosphere, it has to be considered whether biofuel or regular fuel has worse environmental effects<sup>21</sup>.

Moreover, an important topic of heated debate concerns the use of crop based biofuels. Some of the questions raised refer to the displacement of other crops, the clearing of valuable habitats and the rise of food prices. Accordingly, EU Energy Ministers recently agreed to limit production of food-based biofuels<sup>22</sup>. They defend that biofuels should only be subsidised if they lead to substantial greenhouse gas savings and if they are not produced from crops used for feed and food. In reply, producers have argued that new types of biofuel are not in competition with food, nor they require additional land, being sustainable and green at the same time<sup>23</sup>.

Ultimately, scientists warn that biofuel is not the final solution to solve the decreasing resource problem of mineral oil and gas but it can be understood as one important part of the solution. Brazil's Federal Government seeks to provide answers to these questions. Brazil officially supports the biofuel production and wants to increase exports. The government claims that it is a clean energy and wants to turn Brazil's National Biodiesel Program (PNPB) into a sustainable development project in the broadest possible sense (environmental, economic, social, technological and strategic)<sup>24</sup>.

New legislation<sup>25</sup> now defines biodiesel as a new fuel in Brazil's energy mix.

Recently, the required percentage of biodiesel component blended to 98% diesel oil has been increased to 6%<sup>26</sup>. The outlook for Brazilian biodiesel on international markets is also promising, partly due to the growing demand, but also due to the efforts of Brazil's diplomatic missions in creating international markets for biofuels and increasing exports worldwide. Brazil bets on the gains to be had by replacing petroleum products with alternative energy sources<sup>27</sup>.

Back to the context of Mercosur. Brazil and Argentina, in particular, could benefit as main suppliers of technology for ethanol production by Mercosur members. Regionally, it is necessary to coordinate public policies and regulations on biofuels. Energy integration boosted by biofuels may create an opportunity to leverage investments in the region. Besides, it may foster the internationalization of South American companies which, in turn, can profit from economies of scale in order to develop. Energy has worked as a basis for integration processes before. Take the EU for example: its first institution (European Coal and Steel Community) was based on joint energy exploitation. Its aim was the encouragement of peace between European nations through a higher control of materials essential for war. Energy could also work as a source of increased desire for unity among Mercosur countries. But, this time, integration should be based on a more modern and environmentally friendly type of energy cooperation.

This does not mean that developed nations should have no role to play in the ongoing energy diversification process in South America. Traditional partnerships

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between Latin America and Europe, for example, can be triggered to prompt the development of alternative sources of energy. Technical initiatives are always a useful route for cooperation. Additionally, instruments created by international agreements can also be activated, such as the Clean Development Mechanism (CDM). Created by the Kyoto Protocol, it allows for the implementation of emission-reduction projects in developing countries, in exchange for saleable certified emission reduction (CER) credits<sup>28</sup>. This mechanism is designed to stimulate sustainable development and emission reductions, and can be an important tool for overseas cooperation.

### Conclusion

The process of creating an integrated regional energy system is not new for Mercosur countries and its partners. Although the idea has been under development for decades, and although some projects have already been implemented, the pace of progress does not seem to correlate with the growing need for change and demand. The framework agreement, as well as favourable natural and technical conditions for the use of alternative energy sources already exist. Concrete advances in this area can no longer be postponed.

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<sup>1</sup> Chapter 1, Article 1 of the Framework Agreement (*"Acuerdo Marco sobre Complementación Energética Regional entre los Estados Partes del Mercosur y Estados Asociados"*). Spanish version available at <http://www.aladi.org/>

<sup>2</sup> Chapter 3, Article 11 of the Framework Agreement.

<sup>3</sup> Decree 7.377, 1st December 2010, available at <http://www.planalto.gov.br/>

<sup>4</sup> Chapter 2, Article 6 of the Framework Agreement.

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<sup>5</sup> Opec Annual Statistical Bulletin 2013.

<sup>6</sup> Brazilian Energy Balance 2013 Year 2012 / Empresa de Pesquisas Energética – Rio de Janeiro: EPE, 2013.

<sup>7</sup> Deloitte, Brazil's Energy Matrix and Prospects for Energy Integration with South America, available at [http://www.deloitte.com.br/publicacoes/2007/Brazils\\_Energy\\_Matrix.pdf](http://www.deloitte.com.br/publicacoes/2007/Brazils_Energy_Matrix.pdf)

<sup>8</sup> According to Sinval Zaidan Gama, head of operations abroad in Brazil's state-owned power company Eletrobras. *In Brazil Drives Energy Integration in South America*, by Mario Osava, available at <http://www.ipsnews.net/>

<sup>9</sup> Chapter 2, Article 8 of the Framework Agreement.

<sup>10</sup> Rodrigues, R. A.; Accarini, J. H. Brazil's biodiesel program *In Biofuels in Brazil: REALITIES AND PROSPECTS*, available at <http://dc.itamaraty.gov.br/imagens-e-textos/Biocombustiveis-09ing-programabrasileirobiodiesel.pdf>

<sup>11</sup> Brazilian Energy Balance, EPE.

<sup>12</sup> SIEE-OLADE 2011.

<sup>13</sup> Branco, L.G.B.; Khair, M. BIOFUELS AND MERCOSUR: a chance for regional integration. In *Revista CEJ*, Brasília, Ano XIV, n. 51, p. 41-50, out./dez. 2010

<sup>14</sup> Langevin, Mark S. The Brazilian Biodiesel Program. In *Journal of Energy Security*, 2010, available at [http://ensec.org/index.php?option=com\\_content&view=article&id=273:brazilian-biodiesel-program&catid=112:energysecuritycontent&Itemid=367](http://ensec.org/index.php?option=com_content&view=article&id=273:brazilian-biodiesel-program&catid=112:energysecuritycontent&Itemid=367)

<sup>15</sup> OECD-FAO Agricultural Outlook 2011-2020, available at <http://www.oecd.org/site/oecd-faoagriculturaloutlook/48178823.pdf>

<sup>16</sup> See information at <http://www.agrositio.com/vertext/vertext.asp?id=142716&se=1002>

<sup>17</sup> OECD-FAO Agricultural Outlook 2011-2020, available at

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<http://www.oecd.org/site/oecd-faoagriculturaloutlook/48178823.pdf>

<sup>18</sup> OLADE (Latin American Energy Organization).

<sup>19</sup> 2006 Memorandum of Understanding – Mercosur/CMC/Dec. No. 36/06

<sup>20</sup> See more information at

<http://www.bp.com/en/global/alternative-energy/our-businesses/biofuels/biofuels-operations-technologies/brazil-ethanol-from-sugarcane.html>

<sup>21</sup> <http://www.spiegel.de/wissenschaft/natur/smog-biotreibstoff-steigert-ozonbelastung-in-sao-paulo-a-966693.html>

<sup>22</sup> <http://www.ictsd.org/bridges-news/bridges/news/eu-energy-ministers-agree-to-limit-production-of-food-based-biofuels>

<sup>23</sup> <http://uk.reuters.com/article/2012/09/17/eu-biofuel-idUKL5E8KHA4120120917>

<sup>24</sup> Rodrigues, R. A.; Accarini, J. H. Brazil's biodiesel program *In Biofuels in Brazil: REALITIES AND PROSPECTS*, available at <http://dc.itamaraty.gov.br/imagens-e-textos/Biocombustiveis-09ing-programabrasileirobiodiesel.pdf>

<sup>25</sup> Federal Law No. 11,907 passed January 13, 2005.

<sup>26</sup> Medida provisória 647/2014.

<sup>27</sup> Rodrigues, R. A.; Accarini, J. H. Brazil's biodiesel program *In Biofuels in Brazil: REALITIES AND PROSPECTS*, available at <http://dc.itamaraty.gov.br/imagens-e-textos/Biocombustiveis-09ing-programabrasileirobiodiesel.pdf>

<sup>28</sup> [http://unfccc.int/kyoto\\_protocol/mechanisms/clean\\_development\\_mechanism/items/2718.php](http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php)