**REGIONAL ENERGY SECURITY as an alternative approach to south america**

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**INTRODUCTION**

This work shows the main findings of a PhD thesis that questions and challenges many issues and concepts assumed as true by the specialized literature, which, consequently, have impacts on the different decisions of policy makers. Based on a large literature, we understand that the concept of energy security results abstract and vague (in the sense that it fits almost everything) and often ends up as instrument for specific and disconnected purposes. Then, the idea is not to eliminate the concept nor to disregard its relevance, but to show its limitations and changes over the last decades. Therefore, the thesis proposes the concept of regional energy security, which incorporates more than one country in the analysis and, to achieve it in the context of South America (and Mercosur in particular), an essential tool is to promote the regional energy integration.

**MAIN FINDINGS**

Regional integration is often divided into categories, such as economic/commercial, political and physical. Although this may make sense from a pedagogical and analytical point of view, we concluded that this has a very negative impact on the theory and practice of regional integration. This happens because energy integration, the cornerstone of this thesis, is often associated with physical integration, creating the illusion that it is therefore only a technical discussion. This subdivision into categories hides the interdisciplinary, transversal, dynamic and particular features of each experience, hindering dialogue between contributions from Economics, Politics, International Relations, Law, History and Geography, for instance.

When it specifically comes to energy integration, we conclude that the concept of integration, which is already used indiscriminately, becomes even more confusing. This is because (i) integration is not synonymous of neither trade nor cooperation; and (ii) in the energy world, there is a recent discussion of the integration of non-conventional renewable energy (NCRE). Thus, the discussion of energy integration becomes more heterogeneous and, therefore, less precise.

Another conclusion is that there is an extra blur when evaluating Mercosur, since there is no pattern for the countries analyzed: some studies only assess its original formation (Argentina, Brazil, Paraguay and Uruguay), others incorporate Chile, sometimes Venezuela or even Bolivia. In general, the official formation of the bloc is not respected, what makes it even more difficult to understand the literature.

It has also been argued that studies of comparative regionalism are very common in the regional integration literature. While this may be interesting and positive, if it is not done with caution and care, the naive notion that there is an appropriate (single) path to follow would be reinforced, whether from the European (MIBEL and Nordpool), Asian (ASEAN) or Central America (SIEPAC) experiences as the only ways to be pursued by our regional energy initiatives. Therefore, we concluded that there are no one-size-fits-all solutions when it comes to regional integration, mainly when coping with energy integration.

**ISSUES TO TAKE INTO ACCOUNT**

From the existence of different benefits and barriers to energy integration in Mercosur, we established that it would be necessary to deal with issues of commercial, operational and institutional natures. Events such as nationalization of assets (Bolivia and Venezuela), interruption of contracted energy supply (Argentina to Chile, and Venezuela to Roraima, and Petrocaribe) and request for renegotiation of the agreement signed (Paraguay for Brazil, in the case of Itaipu) created a bad and pessimistic history for the advancement of the process. In addition, the relative abundance of energy resources of the countries of the region does not push for integration, leading to (i) sub-optimal exploitation of these resources; (ii) overestimation of the need for investments; and (iii) underutilization of existing facilities and opportunities.

Brazil is often given the essential role in regional energy integration due to its expertise with SIN, since it borders ten countries in South America (except Chile and Ecuador) and because of its territorial extension. However, we established that Argentina and Bolivia have a central role in promoting regional energy integration. The fact that they have borders with five countries each, water resources in abundance, and large-scale conventional and non-conventional reserves places them in a strategic position in promoting regional (physical) energy integration. Peru also plays a significant role, particularly due to its borders with four countries in the region and an enormous hydroelectric potential available.

Although it is common in the literature, we should avoid proposals centered only on Brazil, using its neighbor countries as ‘annexes’ to supply its needs. Regional energy integration planning should be joint and participatory, taking into account the needs of the different countries involved in the process. On the other hand, the recent fact that Brazil does not have substantial threats to guarantee its energy supply, the discovery of the pre-salt, the economic viability of new energy sources and the reduction of national demand itself may help distort the trust other countries have placed in Brazil. In this way, the current moment is an ideal opportunity for Brazil to return to this regional agenda, although the conjunctural uncertainties make it difficult and delay this movement.

In general, it was possible to conclude that regional energy integration projects have been at the mercy of three main variables: (i) the famous (and old) dichotomy between government policy and State policy, which affects the support of certain interests in time (even by the lack of a solid project); (ii) the macroeconomic (inter)national context, which affects investment levels and priority agendas of these countries; and (iii) the asymmetric weight that projects play for the different countries involved, which affects the commitment and interest in making them regional realities. In addition, it was concluded that the institutional, regulatory and resource endowments structure between these countries is extremely diverse and, once again, asymmetric.

It was also established that a peculiar characteristic of Mercosur regional integration (and South American in a broader way) is the so-called presidential diplomacy, in which there is protagonist action of the heads of State in the definition of the objectives, principles and foundations. In this way, the progress of the process ends up being dependent (and vulnerable) to the domestic political situation/ideology of the countries of the region, making a sustainable long-term project impossible.

Besides, there is a relative loss of participation of regional financing mechanisms, such as the IDB, CAF, FONPLATA, FOCEM and BNDES, in favor of China. From a geopolitical and geo-strategic point of view, this movement demands a prompt response from the countries of the region, either by the restoration of regional autonomy or by those who historically seek to represent regional leadership, as in the case of Brazil.

Added to this, in practice the normative effort of Mercosur and UNASUR was not able to overcome political, technical, economic and regulatory barriers that prevent the advance of energy integration in Mercosur countries. Due to the intergovernmental nature of both Mercosur and UNASUR, both institutions end up presenting limitations to their performance. Besides, SGT-9 did not act to structure and coordinate concrete policies or projects on regional energy integration.

Although Mercosur, through FOCEM, and UNASUR, through UNASUR-COSIPLAN, provide funds for projects in regional infrastructure, energy projects carried out by both institutions (i) are spatially concentrated in certain regions; (ii) are few (if compared to the total available value); and (iii) have been falling over time. As an adverse result, the region is experiencing not only the growth of Chinese influence, but the emergence of the Pacific Alliance (Colombia, Chile, Mexico and Peru), which sought to replicate this energy agenda on a more modest scale, seeking a true convergence of views between the countries involved. Moreover, the South American Energy Treaty seems very ambitious and therefore hard to move forward.

Thus, Mercosur’s profile for the energy agenda has hitherto been based on simple bilateral energy trade agreements, energy interconnections for convenience and, at most, international (again binational) hydroelectric and/or gas pipelines, such as Itaipu, Yacyretá, Salto Grande and GASBOL. Ultimately, we concluded that there is no energy integration to date that (i) considers joint regional energy planning; (ii) is concerned with the harmonization of regulatory frameworks; and (iii) brings together producers, distributors and regional consumers in an integrated and participatory way.

When it comes to the current scenario, regional energy integration should be (re)thought considering renewable energies, given the wind, solar and hydro potential of the region. More than punctually integrated in an ad hoc manner, it should be optimized taking into account the complementarity of intermittent renewable sources, rainfall regimes and consumption (given the seasonality of demand, with tradeoff between use of air conditioning and heaters in the region). Therefore, we concluded that energy integration would be an alternative to the expansion of national networks, ensuring (i) the reduction of idle assets; (ii) less interference with geography and the environment; and, consequently, (iii) lower socio-environmental impact.

**QUANTITATIVE ANALYSIS**

We created a new hybrid index called socio-environmental-energy security (SEES), whose main objective was to analyze the evolution of Mercosur energy policies in the past (1990-2010). Considering the evolution of the SEES index for the period under analysis, it falls 8.9%. This suggests that the absence of joint planning and policies among Mercosur countries did not contribute to the improvement of the index, given the selected indicators. It is expected that the SEES index guides policy recommendations based on an indicator-based approach. By doing so, we can ensure a more holistic, intersectoral and appropriate approach to the subject. Thus, we established that the SEES index is completely in line with sustainable development and climate change considering a regional logic.

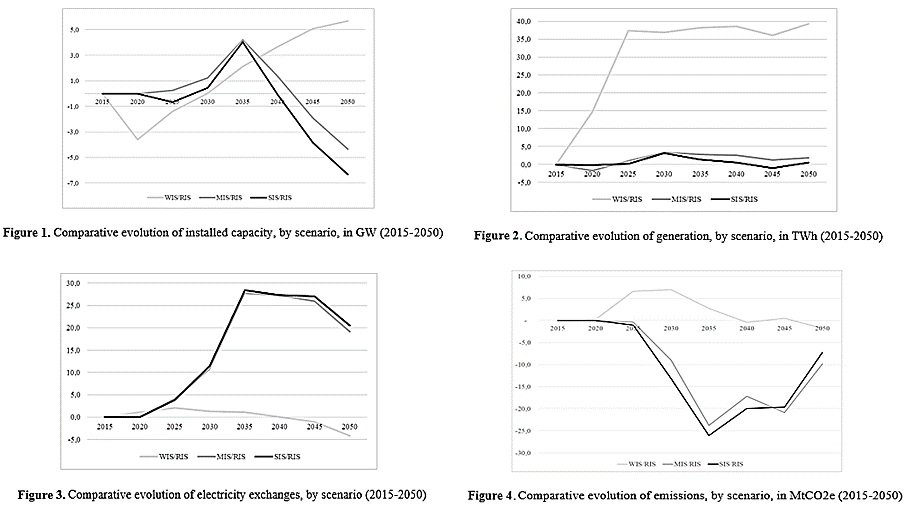
After evaluating the policies of the past until the present, we propose energy scenarios using the Open Source Energy Modelling System – South America Model Base (OSeMOSYS-SAMBA), a model of planning for the expansion of long-term energy systems, whose objective is to analyze present and possible integration scenarios in the future (2015-2050). There are four different energy scenarios: reference integration scenario (RIS), weak integration scenario (WIS), moderate integration scenario (MIS) and strong integration scenario (SIS). They consider expansion and new international interconnection lines, new binational hydroelectric plants, new contractual arrangements (swaps) as well as regulatory harmonization.

**Table 1**. OSeMOSYS-SAMBA integration scenarios general data

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| --- | --- | --- |
| **Scenario** | **Focus** | **Measures** |
| RIS | National | BAU |
| WIS | National | Reduction of HPP expansion + reduced cost of second generation biogas + distributed PV (Br) |
| MIS | Southern Cone | Ar-Br: Garabí (1,152 MW) + Panambí (1,048 MW) |
| Ar-Py: Aña Cuá (2,000 MW) + 1st and 2nd Yacyretá expansion (1,550 MW) + Itacorá-Itatí (1,660 MW) + Corpus (3,500 MW) |
| Bo: El Bala 1 e 2 (3,676 MW) + Rositas (400 MW) |
| Bo-Ar: TL Yaguacua - Pichanal - San Juancito (1,200 MW) |
| Bo-Pe: 2 TLs (1,150 MW) |
| Bo-Cl: TL (180 MW) |
| SIS | South America | Bo-Br: Cachuela Esperanza (990 MW) |
| Ar-Py-Br: TL (2,000 MW) |
| Py-Ar-Cl: ‘Swap’ of energy (200 MW) |
| Co-Ec-Pe-Cl-Bo: SINEA (3,120 MW) |

Source: Santos (2018); BAU = business as usual; HPP = hydro power plant; PV = photovoltaics; TL = transmission line; Ar = Argentina; Bo = Bolivia; Br = Brazil; Cl = Chile; Co = Colombia; Ec = Ecuador; Pe = Peru; Py = Paraguay.

The OSeMOSYS-SAMBA model was used to simulate scenarios of power sector integration in the region. As in the construction of the SEES index, the challenge was to deal with the lack of data and energy expansion plans in some countries. Undoubtedly, it will require *political will* and ‘diplomatic engineering’ to carry out the measures of each scenario in the face of such adverse political-economic context.



Source: Santos (2018); the figures present the graphical evolution for each alternative scenarios (WIS, MIS and SIS) relative to RIS; thus, each curve indicates the difference of the values of the scenarios analyzed against RIS.

The modeling exercise ratified the argument that greater electricity integration in Mercosur (and in South America as a whole) leads to a reduction in the need to increase installed capacity, as well as to lower geographic and socio-environmental impacts.

As seen, oil and natural gas play little role in modeled regional energy integration. Oil is an international commodity, so it is difficult to provide regional contractual arrangements based on oil, either for priority sales or supply guarantee, when it is a type of energy whose price is defined internationally. With regard to natural gas, investment in physical pipeline infrastructure requires large amounts of capital, as well as specific, dedicated assets, having a sunk cost nature; like oil, LNG facilitates access to natural gas without necessarily needing pipeline networks. Both reasons do justify the relative loss of Venezuela’s role in regional energy integration.

**CURRENT CHALLENGES**

As a general challenge, the current context in which the Mercosur countries find themselves is characterized by stagnation and economic recession.

For the time being, the political context does not favor large long-term initiatives, since there is no convergence of strategic agendas between Mercosur countries. In addition, there is no short-term energy demand in Brazil that motivates investments in new power generation sources. The focus lies on Brazil, since both Eletrobras and BNDES have been key players in the elaboration and financing of regional energy projects. However, discussions about the privatization of Eletrobras is currently advancing and BNDES has recently reduced its disbursements. Once again, the events add uncertainty and insecurity to the scenario of regional energy integration.

Therefore, we need to take into account new actors and agendas, such as social, environmental, political-diplomatic, public opinion, human rights, local communities and organized civil society, in general, in the definition, implementation and realization of different international interconnection projects, as well as the construction of the new national, binational and/or multilateral plants. Energy, then, must be understood as a factor of socioeconomic development and, therefore, should aim at (i) promoting economic growth; (ii) guaranteeing universal access to safe, renewable and cheap energy; and (iii) improving the quality of life, respecting environmental limits.

In this sense, State plays a key role in conducting this process, so that it does not prioritize particular and/or exclusive objectives of big business owners, political lobbies and contractors. Private sector is also welcome to provide state-of-the-art projects and technologies and reducing financial burden on government budgets, alone or through public-private partnership (PPP).

Concerning the limitations of the study, it is particularly important to note the difficulty of finding some official national data and the energy modeling itself. One of them concerns the formulation of SEES index, particularly the relative weight of countries and indicators. In order to avoid overweighing one dimension against another, equal weight was given to all indicators in each of the three dimensions. The same happened with the weight of the countries analyzed, despite the existent asymmetry between them. For future work, the relative weight of each indicator/country should be detailed validated on a case-by-case basis.

Besides, a future challenge would be to expand the analysis of power sector integration towards other energy sources as oil and natural gas, and to other key demand sectors, as transportation. Although they were not the focus of the current analysis, these points deserve to be discussed in the near future.

Another limitation of the thesis, particularly regarding the integration scenarios analysis, is their vulnerability to the political-ideological and economic context of the countries of the region. As shown, the regional integration trend has been influenced by these issues for decades, which compromises the viability of the results presented.

Due to a series of assumptions, the intertemporal analysis may not consider eventual conjunctural changes in the region. As an example, the possible advance of carbon pricing instruments is not considered (for instance carbon tax, cap-and-trade or hybrid mechanisms), which would favor the generation from less carbon-intensive technologies. It is well known that some countries, such as Brazil, are analyzing implementation via Partnership for Market Readiness (PMR), which will eventually influence future modeling results.

As recommendations for future work, we suggest updating the SEES index, especially because its results are very sensitive to the lack of data from some of the countries, englobing any of the selected indicators. In addition, it is suggested that it incorporates costs into the social dimension, as well as appropriate weights for each of the indicators considered.

Regarding the scenarios of the OSeMOSYS-SAMBA model, Guyana, French Guiana and Suriname should be also incorporated into the model in order to evaluate potential impacts of *Arco Norte* project on regional energy integration. Besides, it should incorporate other energy sources such as oil and natural gas, as well as key demand sectors like transportation.

**REFERENCE**

Santos, Thauan (2018) *Regional Energy Security*: Re-evaluating concepts and policies to promote energy integration in Mercosur. PhD thesis, PPE/COPPE/UFRJ, Rio de Janeiro, Brazil.