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Silvina Ceclia Carrizo, Sébastien Velut

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AUTEURS
Silvina CARRIZO, CONICET, UNNOBA (Argentine)
Sébastien VELUTIHEAL - CREDA (France)

RÉSUMÉ
Dans la dernière décennie, les pays d'Amérique du Sud ont connu une croissance économique robuste fondée sur l'exportation de matières premières, ce qui implique une consommation croissante d'énergie provenant de différentes sources. Les États ont dû aussi faire face à deux défis : les inégalités sociales et territoriales ainsi que les grandes distances et les faibles densités de population. Le premier défi implique que les États doivent mettre en place des politiques publiques pour apporter des réponses spécifiques aux groupes sociaux vulnérables. Le second entraîne des problèmes particuliers d'aménagement du territoire et de construction d'infrastructures. Les relations entre États, dans le cadre politique de l'UNASUR, font jouer un rôle central à l'énergie pour soutenir la croissance et réaliser l'intégration régionale. Cet article montre que, si ces programmes ont apporté des solutions pour fournir de l'énergie bon marché à des grands programmes productifs, ils n'ont pas donné de solutions adéquates à une autre série de problèmes sociaux et géopolitiques.

MOTS CLÉS
Énergie, réseaux, intégrations

ABSTRACT
In the last decade, South American countries went through robust economic growth based on commodities exports, which implies a growing use of energy from various sources. They also had to face two main challenges: social and spatial inequality, as well as huge distance and low density. The first challenge means that governments must devise public policies in order to give specific energy solutions to vulnerable social groups. The second entails specific problems for land planning and the development of infrastructures. The relations between countries, within the political framework of UNASUR, have put energy in pivotal role to sustain economic growth and build regional integration. This paper shows that these programmes have obtained some results to provide cheap energy to large scale projects, but fail to give adequate answer to another set of social and geopolitical issues.

KEYWORDS
Energy, networks, integration

INTRODUCTION

Regional integration of South American countries has already a long history. Political instability, rivalries between countries as well as the ups and downs of economic cycles led to phases of integration, such as in the beginning of the 1990s with the creation of the Mercosur (Common Market of the South), as opposed to phases of dismantlement of existing mechanisms, like the present terminal crisis of the CAN (Community

of Andean Nations). In contrast to these political fluctuations, supra national integration of some precise sectors is sometimes seen as a pragmatic way to build stronger ties between countries, based on common interests. Since the 1970s, energy is one of those sectors, probably the most important for two main reasons. The first is that South America as a whole has a rich energy endowment, ranging from fossil fuels to renewable energies, whose geographic distribution differs from the geography of consumption, making necessary connections between regions and countries. The second reason is that such connections and energy facilities represent long term investments. They are built to stay and operate for several decades, shaping the relationships between spaces and between economic agents.

According to a document published in 2012 by UNASUR (Union of South American Nations) and OLADE (Latin American Energy organization), energy integration should become a tool for social and economic development and contribute to eradicate poverty. The universal access to energy is seen as a citizen's right and it is one of the main challenges for South America, where social and spatial inequality is high and persistent. Most governments implement public policies in order to give specific energy solutions to vulnerable social groups and to connect isolated regions to energy networks. Economic subsidies to companies, social tariffs for the poor and building of large infrastructures across low density regions are the common actions tackled by South American governments. Within the political framework of UNASUR, created in 2010, governments have put energy regional integration in pivotal role to sustain economic growth and social welfare. This paper exposes a set of elements about economic and social challenges in South American countries and energy regional integration. It discusses the results of energy integration policies in relation to two main goals: economic development and social integration.

1. ENERGY AND DEVELOPMENT

South American exports have risen steadily during the last decade due to the opening of trade barriers, companies outsourcing and the momentum of Asian economies, especially China. Mining activities have expanded in order to satisfy external demands. Only 1/4 of regional exports stays in the subcontinent, which means that exchanges between South American countries remain at a low level. Exports are going principally to North America and Europe, but Asia represents a substantial and growing destination for many countries particularly Brazil and Argentina. Commodities such as ores, metals and agricultural products, notably soy beans, represent the main exported products. Only Brazil is also significantly exporting industrial products, like motor vehicles and electronic devices. These exports mean that South American countries are exporting energy not only because some of them, notably Venezuela and Ecuador, are oil exporters and OPEP members, but also because mining, agriculture and long distance transportation require large quantities of energy. Although no estimations have been made, one can say that exported South American products incorporate a significant energy content and, as a matter of fact, green house gases emissions. Energy availability in good conditions of prices, quality and quantity has become crucial to sustain the current model of economic development.

Agricultural production depends more and more on hydrocarbons, since the so called "green revolution" is based on the use of chemical and machines. Mining and ore processing are important electricity consumer with increasing demands. For instance, in Peru,

where mining is growing fast, mines absorb 10% of national power capacity (850 MW of 8,600 MW) and new investments are planned (Latinomineria, 2011). In Chile, copper production takes 1/3 of electricity sold in the country (passing from 27% in 1995 to 34% in 2008). It represents more than 80% of power sold in the Northern regional system and 20% in the Central system, where population is concentrated. Moreover electricity represents half of direct energy consumption for Chilean copper production (Cochilco, 2008, 2010). These examples show the enormous quantities of energy needed by mines. Nevertheless, transportation is the main energy user in South America. In most countries, it relies on road transportation for goods and people, since railways networks do not cover the countries and river shipping is limited to some regions. Even in largest South American countries, railway or fluvial transportation is underdeveloped, except on some of the large rivers, like the Amazon and the Parana. As a consequence, most of the energy use by the transportation sector is demanded by trucks carrying products to consumers and exports facilities. Regional integration of transport networks is still to be done.

In spite of the fact that South America has large energy resources used to sustain economic development, energy distribution is still socially unfair. The region shows a high degree of urbanization, above 80% in some countries. It connects to modern energy networks, mainly electricity and gas in an easier way than in countries where the population is disseminated. Although urban energy services are extended, universal energy access has not been accomplished. Energy access is still a problem for two types of populations. Poor city dwellers, and particularly those living in slums, represent the highest figure. People living in low density areas far from large urban centers form the other group. 40 million people lack of access to modern electrical services in Latin American and Caribbean countries (BID, 2012) and many urban inhabitants do not obtain energy in a legal and safe way, using instead illegal and precarious connections to power lines passing by their homes. Bolivia and Peru exhibit the lowest electrification levels : 1/5 of their populations has no connection to power networks. In rural regions, far away from large urban centers, millions of households depend on wood and coal for cooking and heating, and, what's more, through the use of unhealthy and unsecure equipment. Bottled gas is also an important energy source for people that do not have access to modern networks, but its prices increased significantly. Poor people who have access to electricity employ it to heat their house and sanitary water, in an expensive, inefficient and dangerous way.

All South American governments have devised policies for universal access to energy, putting rural communities in first place. Most countries put increasing emphasis on diversifying their energy supply and using renewable energies. They also look for distributed energy production and support investment in order to bring power to isolated or low-income population. For instance, Argentina operates the PERMER (*Programa de energía renovable para mercados rurales/Programme for renewable energy in rural markets*) a successful initiative, developed in most Argentinian provinces, that enables to bring energy to isolated population and public buildings (schools, dispensaries, police stations). Thousands of photovoltaic systems installed in localities have changed many people life. Similarly, the Brazilian programme *Luz para Todos* (meaning "light/power for all"), launched in 2002, has brought energy to millions of rural households in a decade.

In order to contribute to universal energy access, but also to reduce social inequalities,; subsidies are given either to consumers or to companies. Public policies include

subsidies for fossil fuels and electricity as a way to control tariffs for final users or help energy companies install equipment. In some cases, public subsidies are universal, aiming to improve social welfare and boost the economy. In other situations, they are restricted to certain sectors of population, productive activities or services like transport. Subsidies are controversial because their impacts on energy efficiency, environment, foreign trade and public finance are negative. Fossil fuel subsidies are costly and socially unfair because rich consumers and large private companies are receiving higher benefits than poor households and small firms. Conversely, charging all consumers with the real cost of energy services might entail social exclusion and trigger political protests. Therefore, energy integration, within the countries and between them, must find its way through many contradictions.

2. THE REGIONAL INTEGRATION PATCHWORK

Building large scale infrastructure to strengthen energy systems has been a big challenge for South American countries with restricted financial capacity, but also a necessary endeavour to harness huge rivers with dams, exploit fossil fuels in harsh conditions and bring power to far away consumers. In the second half of the 20th century high levels of demand in South American metropolis had justified large investments in energy facilities. Consuming centers import and transform energy to satisfy their needs but also to secure their energy supply. Meanwhile, in many cases, territories that export energy do not have enough resources or proper services. Often the territories crossed by large infrastructures do not benefit from them (Carrizo and Forget, 2011).

Binational hydraulic dams –like Itaipu (Brasil-Paraguay), Yacyreta (Argentina-Paraguay) and Salto Grande (Argentina-Uruguay)– are examples of those projects responding to metropolitan demands, planned in the 1970s. They have considerable impacts on the environment and have been built with little consideration for local people. Moreover, high voltage power lines that cross large distances to take energy to the main consuming region do not provide energy to local consumers adjacent to the lines. For instance, Yacyreta (3,200 MW), built upon the Parana river, is connected to Buenos Aires (700 km) by several power lines; meanwhile the Argentina Northeast –where the dam is located– exhibits the lowest level of electric service (Carrizo and Forget, 2011). International dams were historically the first elements for energy integration and they still embody regional problems, not only of territorial inequalities, but also of national asymmetries. For example, for many years Paraguay has been claiming better prices for the electricity from Itaipu and Yacyreta, sold to Brazil and Argentina, and the right to sell it to third countries. In 2011, after a long negotiation, Brazil eventually agreed to triplicate prices but did not allow Paraguay to use its transmission line to sell power to distant markets. Electricity exports represent the main export for Paraguay and the main fiscal income, like gas for Bolivia. For those two poor countries, it is important that energy integration with their richer neighbours improves the way in which they sell their resources and get a fair price helping them to finance needed investments and relieve poverty. If energy integration only serves the interest of richer countries, it can become a source of disagreement between partners.

While hydroelectric binational connections have been planned several decades ago, international gas connections were only conceived at the end of 20th century. In the 1990s, many governments implemented liberal reforms that included the privatization of energy

companies, deregulation of activities and decentralization. Multinational companies developed international projects to build larger energy markets. At that time, only Argentina had an important natural gas network that the State started to extend in 1946, building the first national gasline (1,700 km long) to carry gas from Comodoro Rivadavia (Province of Chubut) to Buenos Aires, feeding patagonian and *pampean* cities located on its way. The State also laid out gas pipelines from the five national hydrocarbon fields (situated at the extreme South of the continent, in central Patagonia on the Atlantic coast, in the Andes in North Patagonia and Cuyo, and in the North of the country) and from Bolivian gas fields. In the 21st century, almost all South American countries extended their gas networks, building pipelines from Bolivia and Argentina to Brazil, and Chile, developing their gas fields and installing liquefied natural gas terminals. Unlike power lines, gas pipelines, between fields and consumption centers, are easy to use by medium-sized towns. Equipment for gas derivation is not as expensive as for electricity. Nevertheless, low population density, scarce economic activity and low incomes of inhabitants often makes it impossible to achieve even small and medium scale projects.

The share of gas is rising in most countries. Significant reserves exist, both conventional and unconventional, scattered all over the continent, but with the exception of Argentina, countries did not use this energy vector until the last two decades. Transnational gas connections have triggered gas use, but they also nurtured the interest for national gas sources. Most countries have built new facilities to satisfy national demands but also for imports and exports. In this context, regional integration stands somewhere between national integration of gas and power networks and participation in the world gas market. The former is consistent with national energy policies seeking to take advantage of all national resources, the latter helps exporting countries to get the best prices, and importing ones to guarantee supply through long term contracts with different providers. South American integration of gas and power networks, in spite of political support and the obvious advantage of cutting distance, seems difficult to achieve due to local resistance to large infrastructure, mistrust of private companies towards governments and the lack of common guidelines for energy policies.

Even if regional interconnections have been built in South America, regulation frameworks are still different from one country to another, and between energy subsectors. For instance, differences appear in public and private degrees of participation in energy activities, technologies, standards and in policies aims. Multinational companies' ubiquity, external demands dependence have helped to associate interests and unify some rules. Regional institutions, like OLADE, have tried to promote uniform norms, to negotiate changes in national policies to make them compatible at the South American scale. Nevertheless energy tariffs, prices and taxes differ widely between countries. Differences in tariffs are responsible for local conflicts or tensions in border regions, especially when there are shortages of fuels and smuggling becomes problematic. Prices and taxes are key elements used to stimulate energy production, either for national demands or for exports: cheap energy (*e.g.,* Argentina) improves industry competitiveness and facilitates energy access for low income population but does not stimulate exploration of new resources and energy efficiency. Conversely high prices (*e.g.,* Chile) trigger investment in energy production and make consumers more responsible but they can also become a burden for consumers and firms. Taxes on oil and gas must be carefully crafted in order to provide fiscal revenues without killing the golden egg hen. The lack of dialog on those

crucial topics between South American countries, eager to defend their own sovereignty, is a major obstacle to integration. On the political side, UNASUR and multilateral banks are focused on transnational infrastructures: these are certainly useful to make the whole energy system more efficient, but the discussion on energy policies and norms will also have to be tackled.

CONCLUSIONS

Public policies are still mainly national, although they share many common goals and tools: universal access to energy, cheap energy for mines and industries, development of new energy sources. Environmental aspects, such as green house gases emissions, are not on the top of the agenda. Energy efficiency has not been seriously taken into consideration in the most consuming sectors like transportation. On the contrary, many South American countries rely on their large energy endowments from different sources to keep pace with rising consumption. Energy integration between countries is conceived mainly as a matter of infrastructure, devised to bring cheap energy to consumers in large urban regions. Social and spatial inequalities are given specific attention in most countries. Regional integration is still limited to physical exchanges without a common legal framework that might soon prove indispensible. Small countries with high energy endowments perceive physical integration as redolent of colonial intentions from their energy-hungry neighbours. Regional integration in South America must be compatible with bold nationalism exhibited by most countries eager to preserve their own sovereignty, and at the same time take advantage of complementarities between them: a challenge that energy issues exemplify thoroughly.

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THE AUTHORS

Silvina Carrizo
CONICET
Centro de Estudios sobre Territorio, Energía y Ambiente
UNNOBA
scarrizo@conicet.gov.ar

Sébastien Velut
IHEAL – CREDA
Université Paris 3 - Sorbonne Nouvelle
sebastien.velut@univ-paris3.fr