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# Regional Integration as a Catalyst for Energy Transition: Conference Report

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# Regional Integration as a Catalyst for Energy Transition:

## Executive Summary

On December 11, 2024, the Institute of the Americas (IOA) and the Brazilian Center for International Relations (CEBRI) co-hosted a high-level conference on regional energy integration in South America. Sponsored by Siemens Energy, Integra Capital, Origem, and ERM, the event convened government officials, private sector leaders, and multilateral development bank representatives to explore opportunities and challenges in fostering cross-border energy cooperation.

The discussions underscored a pivotal moment for the region—where advancing non-hydro renewable energy and natural gas production could enhance energy security, climate resilience, and economic stability. But integration must also play a role. While past efforts toward such connection have yielded mixed results, new geopolitical and environmental imperatives highlight the urgency of leveraging shared energy resources.

Key insights included:

- **Planning and Coordination:** Underutilized interconnections like the Garabí plant between Argentina and Brazil illustrate the immediate opportunities for improving energy security and optimizing regional energy systems. Coordinated regional planning and investment could build on opportunities like this.
- **Stakeholder Engagement:** South America's energy sector suffers from inconsistent policies, underinvestment, and high financing costs. Greater private sector involvement and multilateral development bank support are essential for increasing infrastructure investment to necessary levels—estimated by the Inter-American Development Bank (IDB) at over \$200 billion annually<sup>1</sup>.
- **Leveraging Renewables and Natural Gas:** The region must optimize the use of its renewable and natural gas resources, treating them as perishable assets that require efficient distribution and storage. Enhancing gas storage solutions that cross borders and optimizing LNG infrastructure could improve supply stability and support regional energy flows.

The conference emphasized that enhanced regional integration and increased utilization of infrastructure and technology are essential for a more robust and resilient energy sector. To chart the path forward, stakeholders must align

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<sup>1</sup> For more details, refer to the full IDB report: <https://publications.iadb.org/en/infrastructure-gap-latin-america-and-caribbean-investment-needed-through-2030-meet-sustainable>

themselves and foster innovation. The vision of a cohesive South American energy market not only addresses the region's energy needs but also positions it as a global leader in renewable energy and climate resilience. Regional integration, championed by the private sector and supported by institutions like OLADE, CIER, IDB, CAF, and BNDES, offers a pathway to that end. The challenges are great, but the opportunities are greater.

## **Regional Integration as a Catalyst for Energy Transition**

### Conference Report

On December 11, 2024, the Institute of the Americas (IOA) and the Brazilian Center for International Relations (CEBRI) co-hosted high-level discussions on regional energy integration in South America. Across the course of a full day, three-panel discussion, experts examined the current outlook and areas for enhanced cooperation and hemispheric energy diplomacy.

While the potential benefits of regional integration have long been clear, the event's discussions reflected a sense that South America has arrived at a turning point—one at which directed efforts could unleash what many have long worked toward. The region may now be poised to move beyond years of uneven results.

Top government, private sector, and multilateral development bank (MDB) panelists agreed that the march of massive non-hydro renewable sources and booming natural gas production offers significant energy and economic security inputs that the region can and should exchange. That kind of interaction is more crucial now than ever as unpredictable climatic events pummel regional economies and the energy sector. Enhanced regional integration and increased utilization of infrastructure and technology are a must for a more robust and resilient energy sector.

And regional integration can drive not only economies of scale but also decarbonization and increased competitiveness, thereby positioning South America as a rising clean energy market and supplier. Energy should be considered a tradeable commodity that is perishable, particularly in the case of renewables. Natural gas must be considered in the same light. As such, cross-border storage solutions can bring an entirely different perspective and opportunities for regional energy exchanges.

The conference explored the importance, complexity, and challenge of achieving energy integration in South America. It considered the practical and visionary aspects of that goal, explored the economic, environmental, and geopolitical

benefits of interconnected energy systems, and identified key actions toward the future.

## A case for integration

The growing global emphasis on sustainability and energy resilience has driven home the importance of regional integration in the energy sector. South America holds diverse resources and emerging technologies and can set the example for energy collaboration and the integration of electrons and molecules—energy derived from renewables and natural gas.

Historically, efforts to promote regional energy collaboration have been met with skepticism. However, the global climate crisis and advances in renewable energy, as well as geopolitical turbulence that has pushed countries to reassess their energy security strategies, has helped shift the narrative.

There are three key realities that call for regional integration:

- Energy diversity enhances market efficiency. It ensures that surplus energy can be exported to areas experiencing shortages. This dynamic aligns with the fundamental principles of renewable energy, which suggest that leveraging geographically diverse production sites can mitigate intermittency. For example, surplus solar power in Brazil can complement hydropower deficits during droughts in neighboring countries.
- Energy integration bolsters climate resilience. A poignant example is the Rio Grande do Sul flood, which devastated Brazil's fourth-largest economy. A cross-border transmission line with Uruguay, previously criticized as unnecessary, proved instrumental in stabilizing the energy supply during that crisis. Such cases underscore how interconnected systems can safeguard economies against climate-induced disruptions. Interconnections enable countries to manage supply and demand imbalances caused by intermittency in renewable energy production.
- Regional integration promotes economic transformation. Renewable energy investments catalyzed growth in Uruguay, transforming its economy from one reliant on traditional exports like beef to one diversified with energy production. This success story suggests that deeper collaboration among South American nations could unlock untapped potential and foster sustainable development across the region.

## Planning and Coordination Key

The years of discussion and early steps on a somewhat uneven path to regional integration delivered important lessons and successes. For example, Central America's SIEPAC system, which operates a 1,800 km transmission line from Guatemala to Panama, demonstrates the benefits of integration, including a 1.5%

GDP boost across countries of Central America. Further coordination between operators, regulators, and planners can uncover and resolve operational bottlenecks. Such progress demands a clear-eyed understanding of the region's current status, limitations, and priorities.

Further, many South American countries underutilize existing interconnections, like those in the Regional Energy Integration System of Southern Countries (SIESUR) (Sistema de Integración Energética de los Países del Sur in Spanish) project, which the IDB supports and is comprised of Argentina, Brazil, Chile, Paraguay and Uruguay. For instance, the Garabí plant between Argentina and Brazil reached only a 45% occupancy rate in 2023. Enhancing the use of such infrastructure would be an immediate step toward improving energy security and optimizing regional energy systems.

National planning will always be critical, but a regional approach can help balance disparities and enhance resource allocation. Uruguay, for instance, demonstrates effective planning akin to European models, while other countries lag due to financial and regulatory hurdles. A regional approach can increase opportunities and decrease resource waste. Lack of integration leads to wasted energy, such as spilled water at Itaipu in Brazil or unused solar energy in northern Chile. Better integration could significantly improve resource efficiency and economic benefits. Of course, macroeconomic imbalances, regulatory inconsistencies, and infrastructure deficits all must be addressed to achieve an integrated market. A comparison to Europe serves as a useful reference, but perhaps more of an aspirational one. South America presents significant fiscal and geographic complexities that set it apart from Europe.

It will take planning to fully leverage existing interconnections and build new ones. Sovereign nations must all accept that regional planning will present its own set of challenges, but overcoming those challenges will deliver results. Numerous studies have posited that countries' independent energy planning leads to inefficiencies.

Multilateral organizations like Mercosur, IDB, and OLADE can play a key role in establishing indicative regional planning and fostering better utilization of interconnections. Regional planning, inspired by frameworks like the G20's energy transition agenda, is essential.

## **Stakeholder Engagement**

South America faces a monumental challenge in addressing its infrastructure gap, particularly in energy, to meet United Nations Sustainable Development Goals (SDGs) by 2030. According to calculations and figures prepared by the IDB, while current investments in water and sanitation, energy, transportation, and telecommunications infrastructure represent 1.8% of GDP in Latin America & the Caribbean (as defined by the IDB) only 0.5% comes from the private sector. The

region must scale this total investment to over 3% — an equivalent of more than \$200 billion annually. This figure stands in stark contrast to the \$5 billion the Inter-American Development Bank (IDB) invests annually across the region.

The challenge of closing this gap is compounded by the long gestation periods for transformative infrastructure projects like power plants and transmission lines. Such projects can take six to eight years to complete. By 2025, the region must allocate the necessary resources to ensure project completion by 2030. This goal seems increasingly unlikely. Public and private sectors must collaborate to bridge this gap, but the elevated country risks and expensive financing challenge private-sector involvement.

In addition to physical networks, integration requires clear rules and strong regulatory frameworks. Harmonized regulations are crucial for attracting investment and ensuring the seamless operation of cross-border projects. The Andean Community's recent approval of operational trade regulations for a regional electricity market is an example of a step in the right direction. Infrastructure gaps remain a significant obstacle.

South America faces a complex landscape in its energy sector, characterized by disparities in planning, investment capacity, and governance structures. The diversity of models—ranging from public-private partnerships (PPPs) to state-owned enterprises (SOEs)—creates unique challenges as well as opportunities for collaboration and innovation.

Countries like Brazil, Colombia, and Chile lead in energy planning through their hybrid models that blend PPPs with some SOE involvement. Conversely, nations more reliant on SOEs face fiscal constraints, limiting their ability to invest in expansion and modernization. These constraints affect not only financing but also regulatory development and execution, resulting in uneven progress across the region.

Mechanisms to manage risk are essential for attracting private investment and facilitating cross-border energy trade. Multilateral banks like CAF and IDB play a critical role in developing innovative financial models that mitigate risks associated with macroeconomic imbalances and regulatory uncertainties. These mechanisms should also focus on project preparation, particularly for countries that lack robust planning frameworks.

**Multilateral bank support in project design, feasibility studies, and regulatory alignment can accelerate the implementation of energy infrastructure and foster regional integration.**

MDBs must also take a more proactive role in mitigating risks and reducing the cost of capital for cross-border projects. The IDB's interconnection initiative for the Americas, which builds on regional efforts, aims to enhance energy trade

efficiency from Chile to Uruguay and beyond. The Arco Norte project, which connects Brazil with Caribbean nations like Suriname and French Guiana, demonstrates the potential of broader regional integration.

Finally, and at the core of all efforts, is the importance of redoubling the private sector role. In the case of Brazil, the government has implemented various initiatives to attract private investment, including auctions for renewable energy projects, which have drawn substantial capital from domestic and international investors alike. These auctions are designed to promote competition, drive down costs, and secure long-term contracts for electricity generation from renewable sources.

The success of these auctions has not only increased the share of renewables in Brazil's energy matrix but also showcased the viability of private sector investment in the energy transition. Brazil also attained the highest share of renewable electricity among the G20 in 2023, with a notable reliance on intermittent sources like solar and wind. This market evolution has, in some instances, strained its thermal power plants, many of which remain underutilized. That is to say, a lack of consistent dispatch policies for thermal generation compounds these challenges.

But while the private sector plays a key role in financing and managing energy projects, its perspectives are often underrepresented in policymaking. Initiatives like OLADE's Business Council aim to bridge this gap, fostering collaboration between public and private entities. Regulation, which is the steward of government and public policy, is also critical. The private sector's involvement in regulatory development is essential to attract investment and manage risks associated with energy transition and integration. Clear, consistent regulations are the foundation for all activity.

In all, governments, private enterprises, and development banks will have to work together to finance infrastructure projects, harmonize regulatory frameworks, and overcome political resistance. Partnerships and concessional financing can help bridge the gap between ambition and implementation.

## **Transmitting Electrons**

Cross-border energy integration offers a viable solution to infrastructure deficits while advancing climate goals. Projections suggest that South America can increase renewable penetration to over 80% by 2050. The IDB and other MDBs have supported initiatives like the previously mentioned Central American Electrical Interconnection System (SIEPAC) and Regional Energy Integration System of Southern Countries (SIESUR) project comprised of countries in the Southern Cone, as well as the Andean Electric Interconnection System (SINEA), which further integrates Colombia, Ecuador, Bolivia, Chile, and Peru's electricity

networks. These projects exemplify efforts to maximize current infrastructure and foster cross-border energy exchanges.

In the case of SIEPAC, although the infrastructure can meet 10% of the region's energy demand, only 50% of its potential is utilized. Addressing this underutilization and connecting the system with Mexico and Colombia could unlock substantial benefits. Similarly, SINEA and SIESUR aim to enhance interconnections among Andean and Southern Cone countries, with promising projects like the Ecuador-Peru interconnection and proposed connections between Chile and Peru.

While renewable energy generation is expanding rapidly, grid infrastructure is not keeping pace. This mismatch poses significant challenges, particularly as demand for electricity is projected to surge over the next decade due to decarbonization and digital transformation. Permitting processes, often complex and time-consuming, further delay grid development. Moreover, domestic flexibility in energy systems is a prerequisite for effective regional integration.

It will be crucial to streamline permitting and prioritize grid infrastructure. Governments, multilateral banks, and the private sector must collaborate to ensure that grids can handle increased loads, which would enable the region to fully harness its renewable energy potential.

### **Moving (and Storing) Molecules**

Natural gas and liquefied natural gas (LNG) are transitional, balancing forces in South America's energy matrix. As the panel, "Rethinking the Role of Molecules in Regional Energy Integration," noted, natural gas and LNG contribute to energy security and flexibility, and may contribute to decarbonization efforts in some countries.

The choice of the word molecules to orient the panel and discussion emphasizes the need to rethink the role of natural gas in the region. Brazil's natural gas infrastructure base load demand has stagnated at approximately 50 million cubic meters per day for over 14 years. This stagnation stems from a lack of flexibility in the current system, which relies heavily on associated gas production tied to oil extraction. By improving flexibility and integrating regional gas markets, countries can mitigate seasonal and hydroelectric variability and ensure a steady, reliable electricity supply.

There is also an opportunity to further develop non-associated gas fields and create storage solutions to enhance supply-demand balancing. Storage is key to creating a resilient energy market. And gas storage in reservoirs and salt caverns is an energy-efficient and low-carbon way to hold energy. Globally, gas markets in the U.S. and Europe rely on storage to balance supply and demand and manage price volatility.



LNG also plays a critical role in the regional energy market. LNG infrastructure has provided South America with the means to address intermittency and variability in energy supply. For example, Brazil's hydrology-dependent energy system can double the country's gas demand during dry seasons, highlighting the need for flexible solutions.

The region's existing LNG infrastructure, which includes numerous terminals across Brazil, Argentina, and Chile have contributed significantly to balancing supply and demand while enabling greater energy integration. Better synergy between the public and private sectors will be essential to maximize the LNG potential and existing infrastructure.

Natural gas infrastructure is a challenge for Brazil. The country currently produces approximately 120 million m<sup>3</sup> of natural gas daily, but only 50–60 million m<sup>3</sup> is utilized due to limited pipeline infrastructure and storage capacity.

Beyond domestic integration, Brazil can lead regional energy collaboration. Pipelines connecting Brazil with neighboring countries like Argentina and Bolivia could facilitate cross-border energy flows, leveraging seasonal demand differences and enhancing energy security. Argentina's surplus gas could help meet Brazil's rising demand, while Brazil's storage capabilities could provide a buffer for Argentina's production fluctuations. And Brazil and other countries could become LNG exporters by pivoting LNG terminals that are used for imports.

The Memorandum of Understanding (MOU) that Brazil and Argentina signed on the sidelines of the G20 Summit signifies a major step toward regional energy cooperation. It establishes a framework for leveraging Argentina's Vaca Muerta shale gas reserves and existing pipeline infrastructure. The agreement also considers integrating neighboring countries like Paraguay and Uruguay, as well as reversing the flow of the Bolivia-Brazil pipeline to facilitate greater resource utilization.

While the MOU marks progress, significant hurdles remain. Historical challenges in regional collaboration persist. Decision-making often involves lengthy negotiations among multiple stakeholders who function more like rivals than collaborators, where operators and regulators focus narrowly on their respective domains without considering broader, long-term objectives.

Bolivia's potential as a regional gas storage hub could be transformative. By developing underground storage facilities, Bolivia could balance seasonal variations and enhance supply reliability for both Brazil and Argentina. This opportunity also aligns with the argument for increased flexibility through gas storage to ensure energy security and resilience.

The reversal of Argentina's pipeline flow to Brazil is a promising development, with the potential to transport up to 30 million cubic meters of gas per day.

However, it will take substantial investment to realize this potential, along with policy reforms to optimize dispatch systems across countries.

## A Vision for the Future

Despite its promise, regional energy integration faces significant challenges. Political skepticism, regulatory inconsistencies, and infrastructure deficits have historically hindered progress. But initiatives led by development banks like BNDES, IDB, and CAF, alongside state-owned enterprises and private sector players, are paving the way toward a more cohesive approach.

And with a more cohesive approach, energy can become a "common currency" for the Mercosur bloc and beyond, symbolizing unity and shared prosperity. The region can build a resilient and diversified energy economy by leveraging renewable energy production and conventional resources simultaneously. Three overarching actions can support this vision and build upon newfound opportunities and optimism associated with regional energy integration:

### 1. Promote financial and political investment

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To meet the SDGs and bridge the infrastructure gap by 2030, South America must significantly increase investment, leveraging both public and private resources. Such efforts will take stronger political commitment, regulatory harmonization, and innovative financing models. Expansion of initiatives like OLADE's Business Council to integrate private sector perspectives into policy formation will play a critical role. By fostering collaboration, empowering MDBs to mitigate investment and project risks, and attracting private investment, the region can unlock its energy potential.

### 2. Promote subregional markets as building blocks for broader integration

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The unification of regional markets and hemispheric economies of scale for the exchange of electrons and molecules may best be considered through the lens of subregional markets. Regional electricity markets, taking inspiration from SIEPAC, need to standardize rules and streamline cross-border trade. Subregional markets provide a unique opportunity to serve as a steppingstone. Focusing on subregional markets offers a pragmatic path forward. By strengthening connections and fostering trade within smaller clusters of countries, South America can build the foundation for broader integration. These markets can serve as testing grounds for policies, technologies, and frameworks that could later scale to a regional level.

### 3. Ensure that planning and development prioritize social and environmental responsibilities while fostering economic growth

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With coordinated efforts and a commitment to long-term planning, South America can overcome its challenges and position itself as a global leader in sustainable energy development. Cross-border infrastructure supports renewable energy expansion and lowers the overall carbon footprint. This

approach underscores the need for collective commitment, shared investments, and robust governance to transform energy integration from aspiration to reality in South America.

Climate resilience, economic growth, and energy security are not mutually exclusive goals. They are interdependent pillars that can stand together on a foundation of regional integration. The benefits of such integration are vast. Beyond economic growth, it enhances energy security by diversifying sources. It supports the transition to renewable energy. And it reduces the region's carbon footprint.

South America stands at a critical juncture. The region's abundant renewable energy resources, coupled with its geographic advantages, offer an unparalleled opportunity for global leadership in clean energy. But it will take a unified approach, bold investments, and a commitment to long-term collaboration to unlock the full potential of the region's energy resources and create a more sustainable future. By treating renewable energy as a valuable, exportable resource and adopting a forward-thinking mindset, South American countries can redefine their role in the global energy landscape and pave the way toward a greener, more prosperous future.

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