

Technical Note

22

Electrical Interconnections in Latin America and the Caribbean

A window of opportunity for regional energy integration

 **olacde**
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1. Introduction: a window of opportunity

Latin America and the Caribbean (LAC) occupy a unique position in the global energy landscape. Nearly 67% of its electricity originates from renewable sources, well above the global average¹, thanks to its massive hydroelectric endowment. To this is added world-class solar and wind potential: the Atacama Desert, Patagonia, the Amazon and Paraná basins, and the geothermal potential of Central America configure an extraordinary and complementary resource endowment among countries.

Yet this wealth coexists with a structural paradox: the region's electricity systems operate largely in a fragmented manner. Each country plans, invests, and operates as if it were an energy island, without taking full advantage of the complementarities that geography provides. The result is a region that duplicates investments in backup capacity, squanders renewable surpluses, and remains more exposed than necessary to climatic and hydrological volatility.

The increasing frequency of droughts and extreme hydrological events has elevated energy security to a top-priority issue across several countries in the region². In the face of this challenge, two conditions make this an opportune moment to move forward: the Indicative Plan provides robust technical evidence that integration generates net benefits under virtually any plausible future scenario, including adverse climate conditions. This outcome emerges, moreover, within an active regional dialogue context, reflected in forums such as the Brasilia Consensus (2023)³ and the CELAC Energy Ministerial Meeting in Montevideo (June 2026), which offers a coordination framework to advance its implementation.

Except for the Central American Electrical Interconnection System (SIEPAC), which demonstrated the feasibility of multilateral cooperation and has driven a sustained expansion of regional electricity trade⁴. The region has advanced primarily through punctual bilateral agreements. Regulatory barriers, institutional fragmentation, perceived sovereign risk, and the absence of clear benefit-sharing mechanisms have perpetuated a state of inaction that severely restrains the realization of a potential that, as demonstrated below, is considerable.

In this context, OLACDE spearheaded the development of the Indicative Regional Electrical Interconnection Plan, with technical support from ISCI, Centro ENLACE, and research teams from Universidad de Chile and Universidad Adolfo Ibáñez. The Plan combined a technical planning study—which quantitatively evaluates 16 candidate interconnection projects across 14 countries under six scenarios through 2040—with a bilateral dialogue process involving countries and multilateral development banks (IDB, CAF) that validated and enriched the analysis through the direct experience of system operators. This technical note summarizes the central findings of that Plan and their strategic implications.

¹ OLACDE (2025). Energy Panorama of Latin America and the Caribbean 2025. Quito.

² International Energy Agency – IEA (2021). Climate Impacts on Latin American Hydropower. Paris.

³ Ministry of Foreign Affairs of Colombia (2023). Brasilia Consensus.

⁴ Regional Energy Integration Commission – CIER (2021). International Interconnections: Status and Electricity Exchanges – South America and Central America. Montevideo.

2. Current fragmentation and its roots

2.1 From major bilateral projects to SIEPAC

Efforts toward electrical integration in the region possess deep roots: as early as the 1950s, discussions between Argentina and Paraguay regarding the hydroelectric utilization of Yacyretá anticipated the logic of cross-border cooperation. A decade later, the 1973 oil crisis prompted the creation of OLACDE and opened an initial window of cooperation that drove emblematic binational undertakings such as Salto Grande, Itaipu, and Yacyretá. However, these endeavors responded to an essentially bilateral and geopolitical logic, centered on managing shared cross-border resources rather than constructing an integrated regional market.

The Central American experience of SIEPAC marked a paradigm shift: confronted with small, fragmented, and vulnerable systems, six countries established a supranational institutional framework—the Grid Operating Company (Empresa Propietaria de la Red, EPR)—and constructed an 1,800-kilometer regional transmission line that gave birth to the region's first multinational electricity market. The core political lesson is that no country could resolve its vulnerability in isolation, generating the collective incentive required to overcome the obstacles to integration.

2.2 Complementary resources, disconnected grids

The architecture of the regional power system stems from pronounced heterogeneity, both in matrix composition and in available interconnection infrastructure. A few economies concentrate most of the regional power demand, while the remainder constitute smaller-scale systems that are far more sensitive to supply and demand fluctuations. National matrices combine distinct proportions of hydropower, gas-fired thermal generation, and rapidly growing solar and wind penetration. This diversity forms the very bedrock of the value of integration: unlike domestic transmission, whose value stems from internal demand growth, the value of an international interconnection depends upon the presence of complementarities between systems, whether due to cost differentials, natural resource availability, or contrasting consumption patterns.

The physical architecture of interconnections differs substantially across subregions. In South America, the grid is discontinuous and predominantly radial: existing links are bilateral, have moderate capacity, and cross-border trades take place on an ad-hoc, opportunistic basis. It does not yet configure an integrated regional market, but rather a set of national systems with occasional exchanges. In Central America, conversely, the grid operates in a meshed topology, and interconnection already represents a structural component of routine system operations, albeit facing persistent capacity and regulatory bottlenecks. This distinction carries direct implications for planning: marginal benefits from new interconnections tend to be larger in South America, where they can unlock power trades that are currently impossible, whereas in Central America additional value is primarily tied to reinforcing and completing a mesh that already fulfills a permanent operational role.

3. The Indicative Regional Electrical Interconnection Plan

The Indicative Plan constitutes the first integrated regional energy planning exercise at this scale in Latin America and the Caribbean⁵. It is indicative and non-binding: it does not substitute national planning processes, nor does it imply investment commitments by sovereign states. Its objective is to provide a common technical benchmark, grounded in evidence and validated with the countries themselves, to orient future decisions regarding investment, cooperation, and integration.

The Plan was developed across two complementary stages. The first was a technical study that jointly modeled the expansion and operation of the power systems of 14 countries⁶, evaluating 16 candidate interconnection projects under six scenarios of demand, fuel prices, and hydrological conditions through 2040. The second was an extensive bilateral dialogue process: 14 consultation meetings with representatives from 14 countries and multilateral banks (IDB, CAF) that validated, corrected, and enriched the technical modeling. This process culminated in a CELAC ministerial meeting in Montevideo (June 17–18, 2026), where countries confirmed the robustness of the results and provided feedback to refine and broaden the scope of the study in subsequent phases.

To avoid reliance on a single projection of the future, the technical study evaluated each of the 16 candidate projects under six alternative scenarios, combining diverse assumptions regarding fuel prices, demand growth, and hydrological conditions through 2040 across the 14 participating nations. This design makes it possible to distinguish projects whose value depends on a specific trajectory from those that prove advantageous under virtually any plausible future pivotal distinction for interpreting the findings presented in the following section. Table 1 summarizes these six scenarios and their evaluation criteria.

Scenario	What it Evaluates
S1 - Reference	Current trends: average fuel prices and hydrology, historical demand growth.
S2 – Low Fuels	Drop in international prices of diesel, natural gas, and coal.
S3 – High Fuels	High fossil fuel prices; expands opportunities for renewable power exchanges.
S4 - Electrification	Structural surge in demand driven by transport, thermal uses, and industrial electrification.
S5 - El Niño	Water stress across the Andean zone and Central America; higher hydrological availability in the Southern Cone.
S6 - La Niña	Opposite pattern: higher availability in the Andean and Central American zones, hydro restrictions in the Southern Cone.

Table 1. Scenarios analyzed by the regional model. Source: Indicative Regional Electrical Interconnection Plan, OLACDE-ISCI (2026).

Figure 1 illustrates cross-border transmission capacity (MW) for interconnections across South America, distinguishing existing links from candidate projects evaluated by the Plan. The map corroborates the diagnosis outlined in Section 2: a discontinuous, predominantly

⁵ OLACDE / ISCI (2026). Indicative Regional Electrical Interconnection Plan. Prepared under the OLACDE-CELAC cooperation framework, with support from the European Union (Euroclima programme) and GIZ. Quito.

⁶ ISCI / Universidad de Chile / Universidad Adolfo Ibáñez (2026). Preliminary Technical Document – Regional Electrical Interconnection Plan. Prepared for OLACDE. Santiago.

radial network, where candidate corridors concentrate on bridging existing gaps between national subsystems.

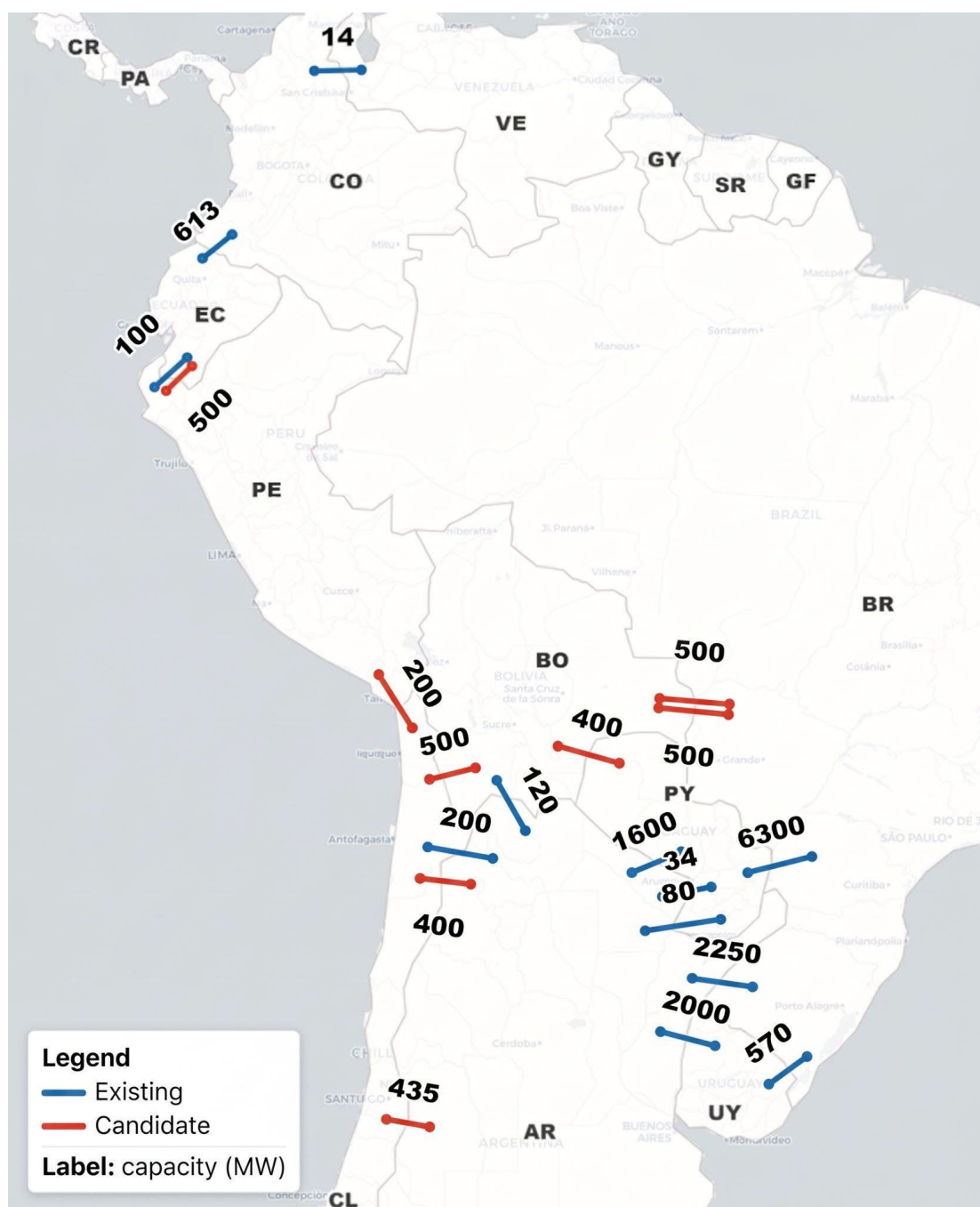


Figure 1. Existing cross-border capacity (blue) and candidate capacity (red) in South America, in MW. Source: Indicative Regional Electrical Interconnection Plan, OLACDE-ISCI (2026).

Figure 2 illustrates the corresponding assessment for Central America and Mexico, where the grid already operates in a meshed topology. Unlike South America, candidate projects in this subregion primarily aim to reinforce and complete existing links rather than establishing entirely new connections.

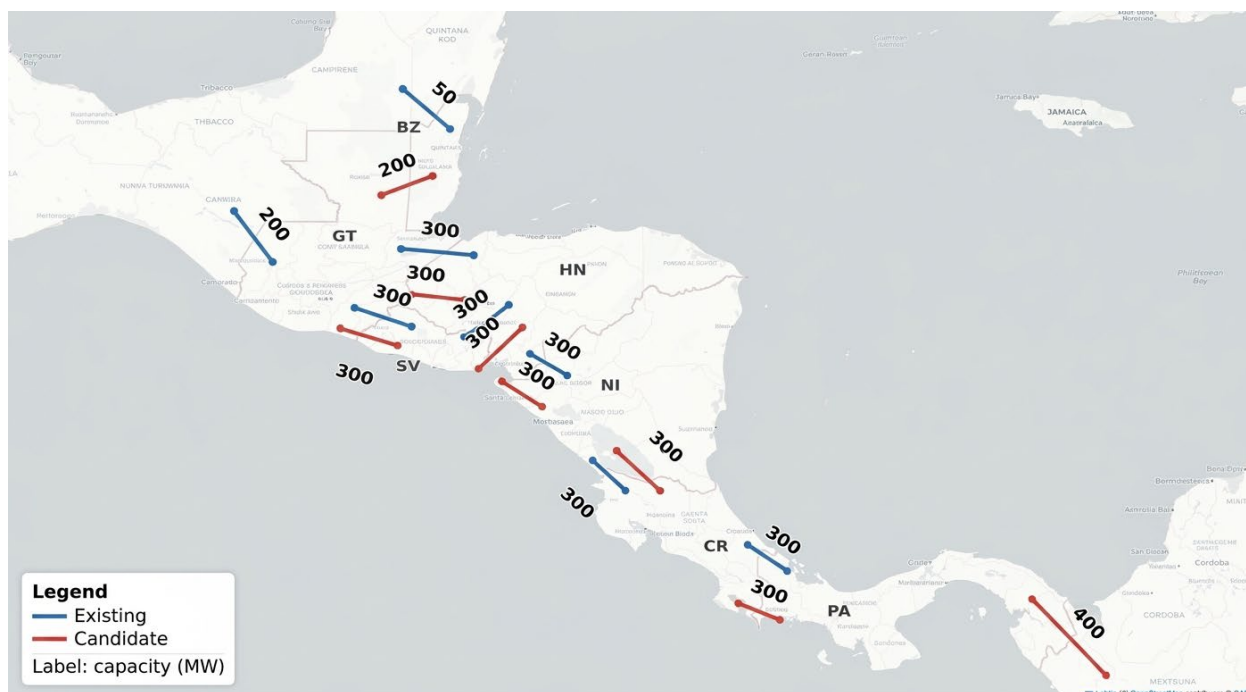


Figure 2. Existing cross-border capacity (blue) and candidate capacity (red) in Central America and Mexico, in MW.
 Source: Indicative Regional Electrical Interconnection Plan, OLACDE-ISCI (2026).

4. What the results show

The Indicative Plan produces an extensive body of technical results. This note prioritizes the three findings bearing the greatest strategic import for decision-makers; comprehensive technical details can be consulted in the full Plan document and its technical annex.

4.1 Integration does not depend on betting on a specific future

The most critical finding is the robustness of the optimal portfolio: twelve of the sixteen evaluated projects prove advantageous across all six analyzed scenarios, without exception⁵. This includes the entirety of candidate corridors located in South America. The strategic implication is direct: the decision to invest in these corridors does not require betting on a particular energy future. It constitutes a strategy that generates value under virtually any plausible scenario, thereby substantially diminishing the weight of uncertainty as a justification for postponing investment decisions.

The sole exceptions are concentrated in four internal links within the Central American system, each governed by a distinct economic mechanism. Guatemala-Honduras and Nicaragua-Honduras are activated exclusively under the high fuel price scenario (Scenario S3), when surging diesel and natural gas prices widen marginal cost spreads, rendering the exchange of renewable surpluses highly lucrative. Honduras-El Salvador appears advantageous solely under the El Niño scenario (Scenario S5), fulfilling a pivotal resilience function during hydrological droughts. El Salvador-Guatemala is activated under both accelerated electrification and El Niño simultaneously (Scenarios S4 and S5), demonstrating that its value responds to both operational pressures acting in tandem. Far from indicating an absence of value, this behavior shows that these four projects deliver targeted resilience against specific shocks, justifying their appraisal through criteria complementary to average-condition assessments. A key insight contributed by the dialogue process is that the Central American grid already operates in a meshed structure; hence, the marginal benefit of further internal reinforcements depends directly upon the level of operational stress imposed upon the system.

The project prioritization exercise ranks corridors according to their incremental contribution to system-wide performance. The greatest economic and technical impact arises from coupling subsystems that are currently isolated from one another: Panama-Colombia tops the ranking as the inaugural physical link between the Central American and South American power grids. It is followed by corridors that reinforce power exchanges across the Southern Cone: Argentina-Chile (Center), Bolivia-Brazil (Phase I), and Argentina-Chile (North); while Chile-Bolivia and Bolivia-Brazil (Phase II) consolidate the region-wide opportunity to access lower-cost renewable energy—principally solar generation—free from the scarcity bottlenecks currently imposed by isolated domestic markets. This hierarchy is not merely economic: the top positions correspond to structural corridors that bridge separate regional grids, while subsequent ranks reinforce existing axes, as illustrated in Figure 3.

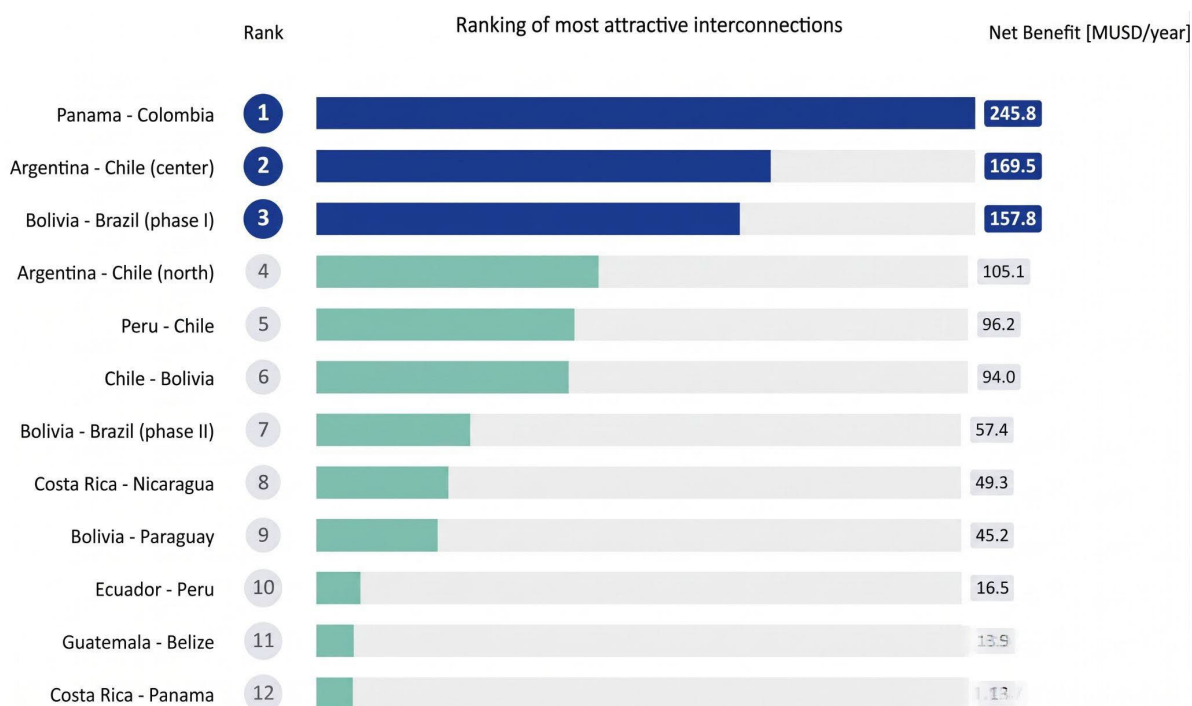


Figure 3. Ranking of interconnections by regional net benefit (MUSD/year). Source: Indicative Regional Electrical Interconnection Plan, OLACDE-ISCI (2026).

4.2 Benefits are substantial and sustained across all scenarios

Regional net benefit—defined as aggregate operational savings plus avoided capital expenditures in generation, storage, and national transmission, net of the cost of constructing the interconnections—ranges between approximately USD 1.0 billion and USD 5.3 billion annually, depending upon the scenario⁵. The underlying mechanism driving this benefit shifts according to context: in the reference, high fuel price, and hydrological stress scenarios, savings stem predominantly from operating the power system more efficiently, dispatching the lowest-cost energy first (which is predominantly renewable); in the accelerated electrification scenario, the predominant benefit derives from averting redundant overinvestment in domestic generation and storage assets.

Figure 4 decomposes regional net benefits by component and scenario, differentiating operational cost reductions (OPEX) from avoided capital investment (CAPEX) in generation, domestic transmission, and storage assets. This disaggregation highlights that the economic mechanism varies across contexts: while operational savings dominate in several cases, under accelerated electrification (Scenario S4) most of the economic value arises from avoiding overinvestment in generation capacity.

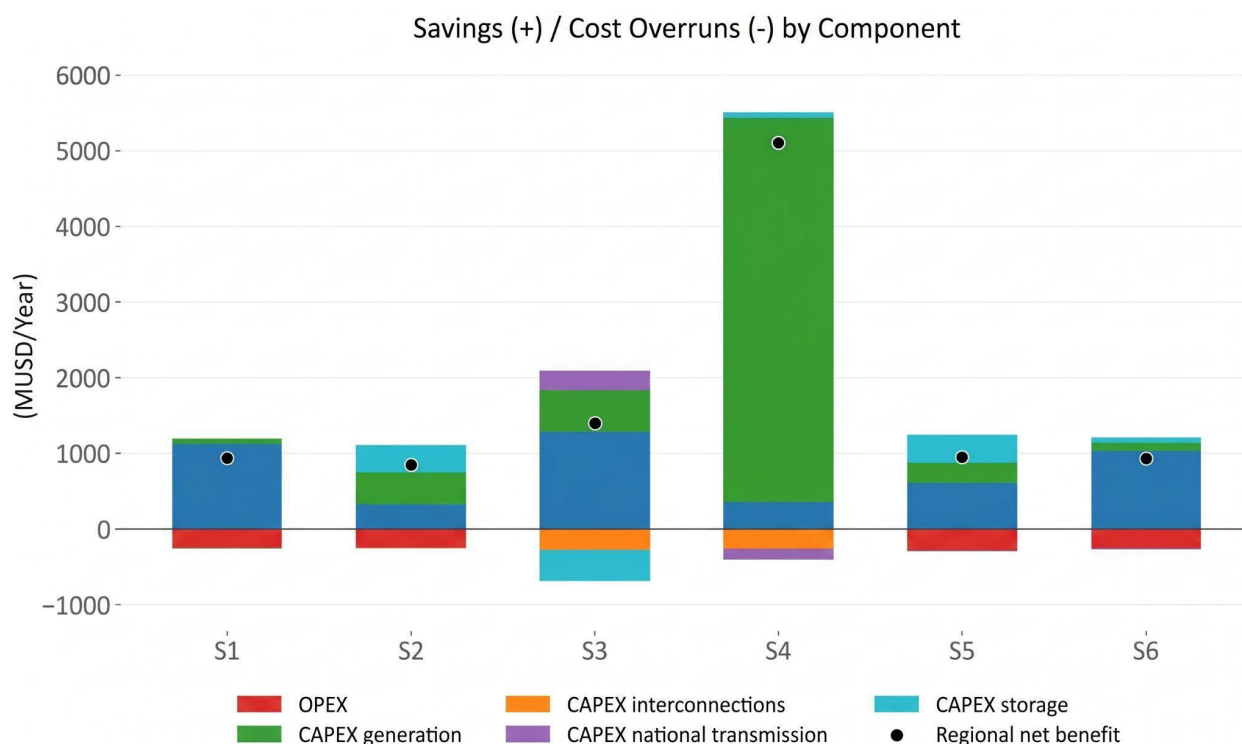


Figure 4. Savings (+) / overcosts (-) by component and scenario, relative to the case without new interconnections (OPEX, CAPEX in interconnections, generation, national transmission, and storage; MUSD/year). Source: Indicative Regional Electrical Interconnection Plan, OLACDE-ISCI (2026).

The distribution of benefits across participating countries is not homogeneous: certain power systems tend to consolidate as net exporters, leveraging their renewable or hydroelectric surpluses, while others secure access to more competitive imports. This divergence does not negate the overarching rationale for integrating the region—joint benefits remain robustly positive in all cases—but it underscores a critical reality confirmed during country consultations: absent explicit, transparent mechanisms for equitable benefit-sharing, divergent distributional outcomes can evolve into a formidable barrier to execution.

4.3 Current planning may be underestimating the value of integration

A complementary analysis conducted under idealized conditions without regulatory frictions reveals that, across several key South American corridors—Bolivia-Chile, Chile-Peru, Bolivia-Brazil, and Argentina-Chile (North)—optimal interconnection capacities vastly exceed those currently envisioned in national plans. In contrast, SIEPAC links exhibit optimized capacities closely matching planned figures, corroborating that the Central American network already internalizes a substantial portion of available potential. Consequently, the primary expansion frontier lies within the structural corridors that articulate South America. Figure 5 compares optimal capacity under idealized conditions with currently planned capacity for each analyzed corridor.

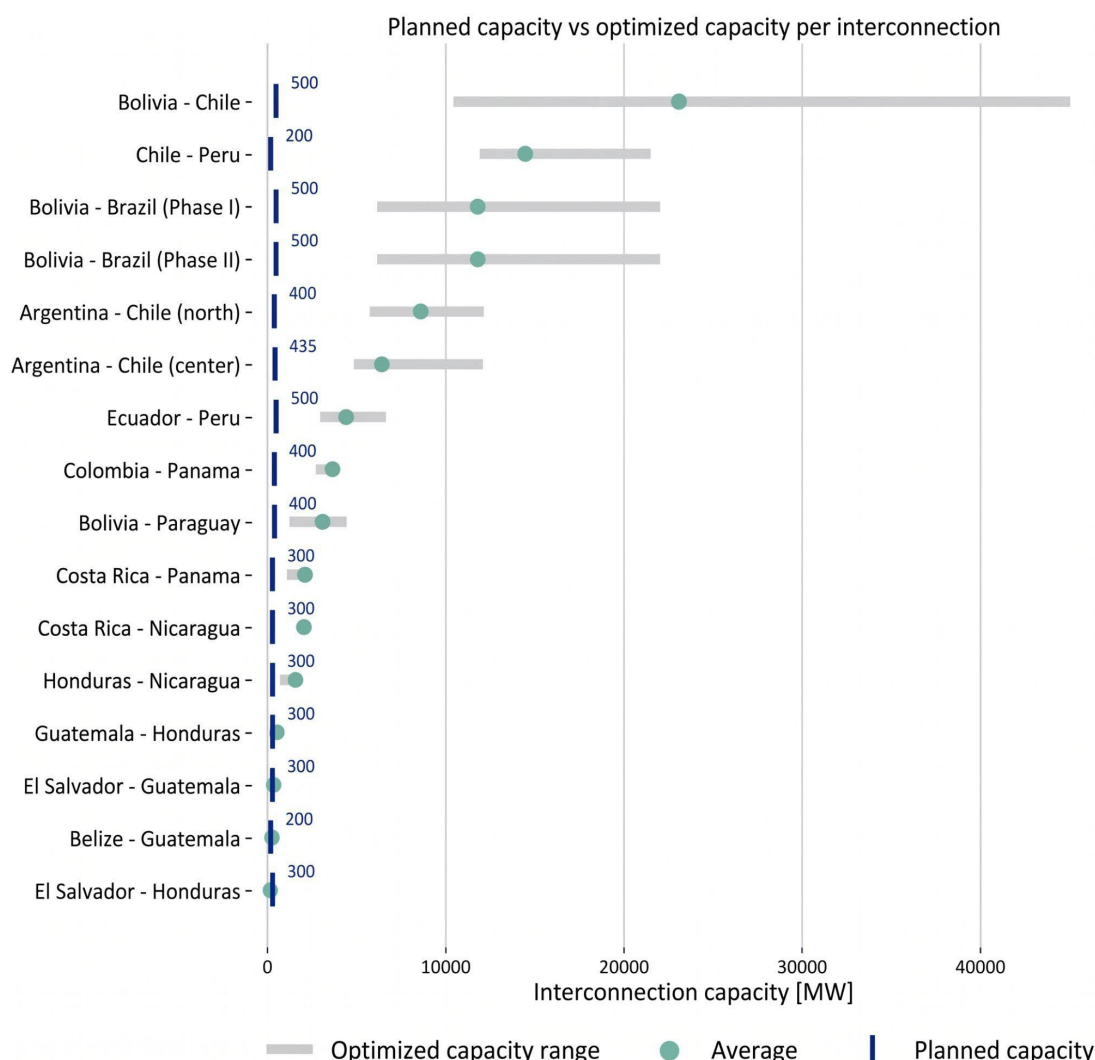


Figure 5. Comparison between planned capacity and optimized capacity by interconnection (MW). Source: Indicative Regional Electrical Interconnection Plan, OLACDE-ISCI (2026).

5. Dialogue with countries: institutional barriers

The bilateral dialogue process conducted with 14 countries, multilateral development banks, and regional organizations reaffirmed the solidity of the technical modeling while identifying with precision the true bottlenecks confronting integration. The most overarching finding, articulated independently by delegations across different subregions, is that the foremost obstacle to electrical interconnection is institutional and regulatory in nature, rather than technical or engineering related.

- **Necessary vs. Sufficient Conditions:** Physical infrastructure represents a necessary but insufficient condition. Its value can only materialize if institutionalized arrangements exist to sustain cross-border power flows over time, including long-term contracts, transparent dispatch rules, and risk-allocation mechanisms, even under system-wide stress.
- **The Energy Security Paradox:** The very crisis situations that enhance the economic value of interconnection are precisely those capable of triggering protectionist decision-making biases toward curtailment or isolation, as sovereign states prioritize short-term domestic self-sufficiency in the face of uncertainty.

- **Cost and Benefit Allocation:** The equitable allocation of costs and benefits—specifically the regulatory and economic treatment of power in transit when trades involve three or more nations, represents the issue that most frequently stalls multilateral arrangements, far more than physical engineering obstacles.
- **Industrial Organization Diversity:** Heterogeneity in the industrial and market organization of national power sectors dictates which cooperation mechanisms are feasible in each corridor, demanding adaptive, bespoke solutions rather than a rigid, uniform model.
- **Reinforcement of Existing Assets:** Consultations revealed an entire category of projects overlooked in initial planning portfolios: brownfield reinforcements and expansions of existing assets (second circuits, line repowering, terminal substation upgrades), which are routinely faster, cheaper, and less socially disruptive to implement than entirely greenfield transmission corridors.
- **Alignment with Political Bodies:** Countries explicitly requested that subsequent phases of the Plan be systematically coordinated with active subregional political mechanisms (such as SICA, CAN, and MERCOSUR), acknowledging that regional energy integration cannot proceed in isolation from broader diplomatic integration processes.

The conclusion for policymakers is unequivocal: the regional energy integration agenda must not remain confined to the technical arena—where empirical evidence is already conclusive—but must urgently pivot toward the diplomatic, regulatory, and contractual domain, where project viability is truly decided.

6. Toward a new regional framework: governance and financing

6.1 An instrument to give form and substance to integration

The region currently possesses subregional integration mechanisms (Central America, the Andean Community, the Southern Cone) that have advanced at differing velocities but share an inherent geographic constraint: they were designed among contiguous, homogeneous systems. The corridors exhibiting the highest systemic value identified by the Plan are precisely those spanning across subregional boundaries—linking Central America with South America and connecting the Andean zone with the Southern Cone—for which no existing subregional body provides an articulation framework. The analysis identifies an institutional void: the need for a regional entity endowed with normative and legal mandates to foster regional-scale energy markets, capable of coordinating and aggregating existing subregional efforts without supplanting them.

6.2 Interoperability before standardization

In light of regulatory and structural diversity across member nations, a pragmatic objective is not the exhaustive homogenization of domestic legal codes, but rather establishing system interoperability: ensuring that dispatch rules, operating protocols, and grid access standards are sufficiently aligned to enable fluid cross-border trade without requiring countries to dismantle their domestic regulatory regimes. This establishes a well-defined work agenda: targeting concrete points of friction including wheeling charges for transit power, priority protocols during emergency scarcity, and technical reliability standards, which require dedicated, tailored negotiation.

6.3 From technical to financial viability

A project being technically sound and economically attractive does not guarantee bankability. Securing financing requires creditworthy long-term off-takers, dependable capital remuneration mechanisms, unambiguous allocation of exchange rate, demand, and regulatory risks, and robust dispute resolution venues. Consultations confirmed that projects currently stall precisely over these contractual and financial conditions, not technical feasibility.

A Concrete Recommendation: Tender the Need, Not the Asset

Rather than awarding concessions for predefined engineering specifications, it is recommended to structure priority interconnection developments as competitive tenders for transmission service requirements, maintaining strict technological neutrality. This empowers developers to formulate optimal solutions, including innovative combinations of HVAC/HVDC lines and battery energy storage systems (BESS). Several countries in the region already possess robust national concession frameworks that can be readily adapted to cross-border deployment.

6.4 A roadmap across three horizons

The Indicative Plan is conceived as the initial cycle of an ongoing institutional process rather than a static conclusion. The proposed roadmap is structured across three sequential horizons:

- **Short Term:** Formalize a permanent regional coordination platform, validate portfolio modifications identified during country consultations, and advance detailed pre-feasibility studies for priority corridors, explicitly incorporating brownfield infrastructure reinforcements.
- **Medium Term:** Establish standardized methodologies for cross-border cost and benefit sharing (including third-party transit charges), structure standardized transmission service concession contracts, and broaden analytical modeling to encompass the island power systems of the Caribbean.
- **Long Term:** Consolidate an integrated regional electricity market underpinned by a dynamic, continuously updated energy planning platform capable of iteratively absorbing new infrastructural projects, updated macroeconomic data, and expanding country participation.

7. Conclusions

Regional electrical integration in Latin America and the Caribbean represents a structurally advantageous and climate-urgent imperative. The Indicative Regional Electrical Interconnection Plan demonstrates that the coordinated expansion of cross-border grid interconnections yields positive net benefits across all evaluated future scenarios, entirely independent of specific trajectories in future demand growth, international fuel prices, or hydrological cycles.

The robustness of the optimal portfolio—with twelve of sixteen candidate projects proving economically attractive in every single scenario—removes future uncertainty as a plausible justification for policy paralysis. Concurrently, the consultation process with sovereign governments made clear that unlocking this extraordinary potential will not occur on the

physical transmission drawing board: the decisive hurdles are institutional, regulatory, and financial. These are precisely the critical levers that this technical note and the Indicative Plan place before regional decision-makers.

Implications for Decision-Making

Looking toward 2040, the Indicative Plan establishes that regional electrical integration provides the lowest-cost, most resilient, and most sustainable development path for Latin America and the Caribbean. This conclusion rests upon robust technical evidence, rigorously validated by the countries themselves throughout bilateral consultations and reaffirmed at the CELAC Ministerial Meeting in Montevideo in June 2026. The Indicative Plan places this empirical foundation and strategic corridor prioritization at the disposal of regional governments as a vital technical instrument to guide national planning and multilateral cooperation.



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