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EU-Central America Partnership Facility (EUreCA)
NDICI LA/2022/437-252

Executive Summary

Status of the Central American Regional Electricity Market

[redacted]

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Report

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ATCP N°27-2024

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1. Introduction

The Central American Regional Electricity Market (MER) is one of the longest-running regional electricity interconnection initiatives. Since the signing of the Framework Treaty which established it in December 1996, the MER has made significant progress towards its proposed objectives: establishing a competitive market based on reciprocal and non-discriminatory treatment that has grown significantly, and that has made substantial economic contributions that helped drive the sustainable development of the region.

However, to reach its full potential as an instrument/tool for regional development, it must be transformed from its current state as short-term surplus market to a market that includes long-term transactions and considers the connection with extra-regional markets. To achieve this, challenges related to governance, regulation, infrastructure development and policy must be overcome. International cooperation, financing, and foreign investment could help address these issues.

This report seeks to identify lines of action in terms of cooperation and investment that could consolidate and promote the MER's progress so that it achieves its potential in the long term. It therefore puts the MER in context, based on its background, evolution, challenges, and opportunities and, through a forward-looking exercise, identifies opportunities to enhance its development and positive impact in the region through cooperation and investment.

The report is based on documents and materials developed by MER institutions, multilateral agencies and other cooperating partners that support its development, as well as interviews with the heads of the Regional Electricity Interconnection Commission (CRIE), the Grid Operating Entity (EOR), the MER Board of Directors (CDMER), the Energy Coordination Unit of the Central American Integration System (UCE-SICA), the Inter-American Development Bank (IDB), the European Union (EU) and representatives of ENEL Colombia and Central America.

2. Background

The first actions for the development of MER's institutional framework and infrastructure began between 1960 and 1985, when pre-feasibility studies for regional interconnection were carried out. During this period, binational and multinational interconnection agreements and contracts were established, the Constitutive Agreement of the Central American Electrification Council (CEAC) was signed and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) concluded the Regional Electricity Interconnection Study of the Central American Isthmus (ERICA).

Based on these advancements, between 1976 and 1986, four binational interconnections were built, which allowed the first energy transfers between the countries of the isthmus: Costa Rica - Panama (1976); Honduras - Nicaragua (1976); Nicaragua - Costa Rica (1982);

and Guatemala - El Salvador. Later, in 2002, the El Salvador - Honduras interconnection was added. (González, V., 2021)

In 1987, studies began for the construction of the Central American Electricity Interconnection System (SIEPAC), with the cooperation of the Government of Spain, and subsequently, the Inter-American Development Bank (IDB) provided technical support and managed the project's financing.

The political momentum created by the initiative resulted in the 1996 signing of the Framework Treaty for the Central American Electricity Market (TMEAC), which established and implemented the MER as a wholesale market with its own rules superimposed on the six national markets, and developed and built the first regional transmission system[1].

The TMEAC's objective is the "Creation and gradual growth of a competitive regional electricity market based on reciprocal and non-discriminatory treatment, which contributes to the sustainable development of the region with respect for and protection of the environment". This objective demonstrates the principles defined for the operation of the MER: Competition, graduality, reciprocity and sustainability.

For the operation of the MER, the TMEAC establishes the Regional Electricity Interconnection Commission (CRIE), the market regulator, and the Regional Operating Agency (EOR), which functions as System Operator and Market Operator (SO/MO).

The TMEAC was later complemented by the First and Second Protocols, formalized in June 1997 and April 2007, respectively; the Regional Electricity Market Regulation (RMER)[2], which set the technical and commercial operating rules of the MER; and the regulatory resolutions of the CRIE.

In 1999, EPR, the company that owns the SIEPAC network, was founded. EPR is responsible for the development and operation of the regional transmission network (RTR) which the transmission companies of the six Central American countries are a part of and currently has three extra-regional partners: ENEL[3], Italy; Interconexión Eléctrica, S.A. (ISA)[4], Colombia; and the Federal Electricity Commission (CFE)[5] of Mexico. (IDB, 2017).

The second protocol to the TMEAC established the Regional Electricity Market Steering Committee (CDMER) to facilitate compliance with the Parties' commitments and coordinate the interrelation with the Regional Organizations of the Regional Electricity Market. The committee is the highest political body of the MER and is responsible for

[1] The ratification of the TMEAC by the countries took place between 1997 and 2000.
[2] Until November 2012, when the SIEPAC became operational and the RMER came into force, the MER operated under the rules established in the 2002 MER Transitional Regulation (RTMER).
[3] It initially joined EPR in 2001 under the name ENDESA Internacional de España.
[4] Member of the EPR since 2005.
[5] Member of the EPR since 2009.

setting medium and long-term policy, supervising the operation of the market and its institutions, and harmonizing regional regulations, among other responsibilities.

In 2010, the Guatemala - Mexico connection, which originated in the 2001 Tuxla Dialogue and Agreement Mechanism and the 1997[6] Energy Cooperation Agreement, was formally enabled and came into operation. Work is currently underway on a Panama - Colombia interconnection.

The MER is currently facing important political barriers. On July 12, 2021, Guatemala denounced TMEAC and its first and second protocols, thus initiating the 10-year decoupling process set out in Article 38 of the treaty. In its communication to the General Secretariat of the Central American Integration System (SICA), Guatemala cited the failure to consolidate MER's institutional framework, the absence of a body to appeal the decisions of the regional regulator and the lack of political will to introduce changes that would address these concerns through a third protocol to the TMEAC, among its reasons for abandoning the treaty. However, it is possible that this was also driven by disputes with SIEPAC resulting from the Mexico-Guatemala interconnection, particularly because of the impact that this connection has had on the quality of electricity service in the MER.

The change of government authorities in Guatemala, which occurred in January 2024, could shift the country's position. However, at the time of finalizing this report, there was no official statement from the Guatemalan authorities in this regard.

a. MER's institutionality

The following regional organizations make up the MER:

6 [redacted]

b. SIEPAC's evolution

The first contracts for the construction of the SIEPAC transmission line were signed in 2006, providing for a transmission capacity of 300 MW at 230 kV and a length of 1,800 km from Guatemala to Panama, passing through all the countries in the region. The first section of the line was energized in 2010 and the last in 2014.

In 2002, the CRIE approved the Transitional Regulations of the Regional Electricity Market (RTMER), which established the rules under which the MER operated until 2012, when the RMER came into full force. From that moment on, electricity exchanges between the countries accelerated rapidly.

Currently, the SIEPAC line is 1,797 km long with a nominal transmission capacity of 300MW at 230kV in double circuit towers, 28 bays in 15 substations. SIEPAC's investments, operation and maintenance are financed by the Authorized Network Revenue (IAR) which amounts to about 1% of the cost of electricity for customers (CRIE, 2022).

Since the inception of SIEPAC, the construction of a second circuit of the line over the existing transmission infrastructure was foreseen. This would double the transmission capacity of the network to 600 MW. The work would be carried out by EPR and financed through the IAR. In January 2024, the CDMER approved the projects for the construction of the first two sections of the second circuit of the SIEPAC between Agua Caliente (Honduras) and Sandino (Nicaragua) and La Fortuna (Costa Rica) and La Virgen (Nicaragua).

Mexico and Guatemala have had an electrical interconnection in operation since 2010 through a 98.6 km 400 KV transmission line with one circuit enabled and the structures prepared for a double circuit, with an initial transformation capacity of 225 MW[7]. Mexico does not participate in MER directly but through transactions with Guatemalan agents.

It also contemplates the interconnection between Panama and Colombia through a 500 km transmission line (220 km in Panama, 130 km of submarine cable and 150 km in Colombia) with a transmission capacity of 400 MW[8]. The project is being developed by the ISA-ETESA consortium and is expected to start operations in the third quarter of 2026 with an investment of US$500 million. The main challenges facing the project are related to obtaining environmental licenses and finalizing the agreements with the Wargandí and Guna Yala indigenous communities.

[7] https://www.eprsiepac.com/contenido/interconexion-mexico-guatemala/
[8] https://www.eprsiepac.com/contenido/interconexion-panama-colombia/

c. MER's evolution

The MER has proven to be a successful initiative in terms of the volume of energy traded. Between 2013, when the RMER came into effect, and 2023, the energy exchanged in the MER registered an average annual growth of 17.4%, going from 894.7MW to 5,235 MW. Although a drop in the level of transactions is observed in 2020 as a result of the lower electricity demand caused by the COVID-19 pandemic, the market recovered rapidly in 2021 and 2022. In 2023, the market contracted below the 2020 level as a result of the El Niño weather phenomenon, which caused a noticeable reduction in rainfall that led national market operators to secure larger reserves to mitigate the risk of unavailability of water resources for generation. Despite the meteorological impact, it should be noted that the MER balanced the needs of the countries without rationing.

In 2021, injections to the MER accounted for 5.8% of regional consumption - nearly double the regional consumption covered in 2015. The percentage of MER transactions in relation to regional consumption for the years 2014 to 2021, is as follows:

Year	2014	2015	2016	2017	2018	2019	2020	2021
Coverage (%)	3,3%	3,0%	4,1%	5,1%	5,4%	6,1%	5,9%	5,8%

Source: CRIE, 2022.

In terms of prices, a downward trend is observed between 2016 (USD64/MWh) and 2020 when the minimum annual price was recorded (USD51MWh), mainly as a result of lower electricity demand due to reduced economic activity and the reduction in the price of hydrocarbons that accompanied the COVID-19 pandemic. From that year onwards, the prices registered a significant increase, driven by the economic recovery, higher fuel prices caused by the conflict in Ukraine, as well as by the electricity exchange restrictions imposed to mitigate the risks derived from the El Niño phenomenon.

Year	2016	2017	2018	2019	2020	2021	2022	2023
Price (USD/MWh)	64	60	74	90	51	71	105	159

Source: EOR (2024).

d. Market structure

During 2023, a total 2,649.3 MWh were injected, which represented a 15% decrease with respect to 2022 (3,108 MWh). These injections are distributed as follows: Guatemala (51.45%); El Salvador (18.28%), Costa Rica (15.7%); and Panama (3.9%). Withdrawals were distributed as follows: El Salvador (54.8%); Nicaragua (21%) and Honduras (10.3%) (CRIE, 2024).

These figures reveal the roles played by countries such as Costa Rica, Guatemala and Panama, as net exporters, and El Salvador, Nicaragua, and Honduras as net importers in the MER. Market dynamics could change with the entry into operation of the liquefied

natural gas (LNG) generation plants in El Salvador (378.5MW)[9] in 2022, as well as with the upcoming start of operations of a similar plant in Nicaragua (308MW)[10] in 2024, which would reduce the import needs of both countries. The start-up of the GLN plant in Panama (656MW)[11] should also be considered (EOR, 2024).

With regard to the type of transactions in the market, 66% of the total injections were made through the Regional Contracts Market (RCM)[12] and 34% corresponded to transactions in the Regional Opportunity Market (REM)[13].

A total of 310 agents of different types are authorized by the EOR to participate in the MER, as shown below:

Activity	Trader	Distributor	Generator	Large consumer	Total
Agents	91	19	158	42	310

Source: EOR 2024[14].

e. Structure of the regional electricity matrix

According to EOR figures, by January 2024, Central America had a generation capacity of 17,542.5 MW, mostly from renewable sources (68.3%), especially hydroelectric (40.4%), solar (9.3%), wind (7.5%), biomass (7.6%) and geothermal (3.2%). However, 79.6% of the 55,454.10 GWh generated in 2021 was renewable[15], which implies that the priority for dispatch is given to renewable sources and that in the regional electricity system (SER), thermal energy mostly serves as backup.

Although the renewability of generation sources is in line with the region's aspirations to advance in the energy transition[16], this also exposes the system to risks arising from meteorological events, which may be exacerbated by climate change.

[redacted]

[12] Comprised by all the MER energy injection and withdrawal contracts agreed between agents. The contracts may be Fixed Contracts or Variable Contracts., whether physical or financial.
[13] Contractual injection and withdrawal commitments reported the day before the MER operation.
[14] https://www.enteoperador.org/dashboards/agentes-autorizados-transacciones-mer/
[15] ECLAC, 2022.
[16] As reflected in the Sustainable Energy Strategy 2030 of the SICA Member Countries. ECLAC (2020).

3. Benefits of MER

The MER registers very positive data in terms of the volume of energy traded and, until 2020, showed a sustained reduction in its prices. Since the SIEPAC's line came into operation, the integrated system has contributed to the expansion of installed capacity and generation and has improved the quality of electricity supply.

Economic benefits estimated by the IDB in 2011: The IDB found that, in 2011, according to the 2011-2025 Indicative Regional Generation Expansion Plan and the updated investment costs of the SIEPAC Project, direct economic benefits of USD 950 million could be obtained from the coordinated regional operation together with integrated generation expansion planning, 80% of which came from lower investment costs. (IDB, 2017).

Estimated economic benefits in 2016: the the IDB analysis of the expected direct economic benefits of the SIEPAC Project, with different levels of integration and taking into account the 2015-2024 planning scenarios of the EOR, estimated that, in the scenario of greater integration and regional transmission capacity, investment savings would be in the order of USD1.4 billion.

The direct economic benefits of MER operation in the period 2013 and 2015 were also quantified against those that would have been obtained in a situation of self-sufficiency, discounting the costs of investment, maintenance and operation of the RTR. USD305 million in benefits were obtained as a result of transactions in the MER, distributed as follows: Guatemala USD109.5 million; El Salvador USD33.3 million; Honduras USD68.1 million; Nicaragua USD6.7 million; Costa Rica USD65.4 million; and Panama USD22.0 million.

The IDB also estimated the indirect gains derived from the electricity integration achieved with SIEPAC, defined as price reductions in the productive sectors and greater investment in productive projects. It was determined that SIEPAC would have a positive effect on regional GDP of about 0.3% compared to a scenario without integration. Most of these benefits come from investments, which represent 70% of the positive effects.

Benefits estimated by CDMER: An analysis conducted for CDMER in 2020 determined that the direct net benefit resulting from the operation of the MER (calculated by deducting from the total benefits obtained from the operation of the market from those received in autarky minus the operating costs of SIEPAC) accrued between the 2013 and 2019 amounted to USD391.3 million distributed among the countries as follows: Guatemala (70%), Costa Rica (20%), Honduras (10%). El Salvador has had an insignificant benefit and Nicaragua and Panama have had no benefits (Castro-Kreutz, M., 2020).

4. Prospective vision

The MER has grown rapidly and generated a competitive space that has generally led to a best use of regional resources and, with this, to a reduction in the prices of the energy exchanged.

To increase the benefits derived from the market, it must evolve from its current short-term surplus market state to a higher stage that would incorporate the exchange of energy and capacity within the framework of long-term transactions. This requires addressing the remaining physical and operational constraints in the transmission grid and modernizing the regulatory framework and governance.

A long-term oriented market, with regional planning supported by a strengthened institutional framework, would favor investments in generation directed to the regional market, which would increase the efficiency of the SER. This would also allow the system to take advantage of seasonal differences among countries[17] and share reserves in order to add greater amounts of variable renewable generation to complement the energy transition and the resilience of the SER.

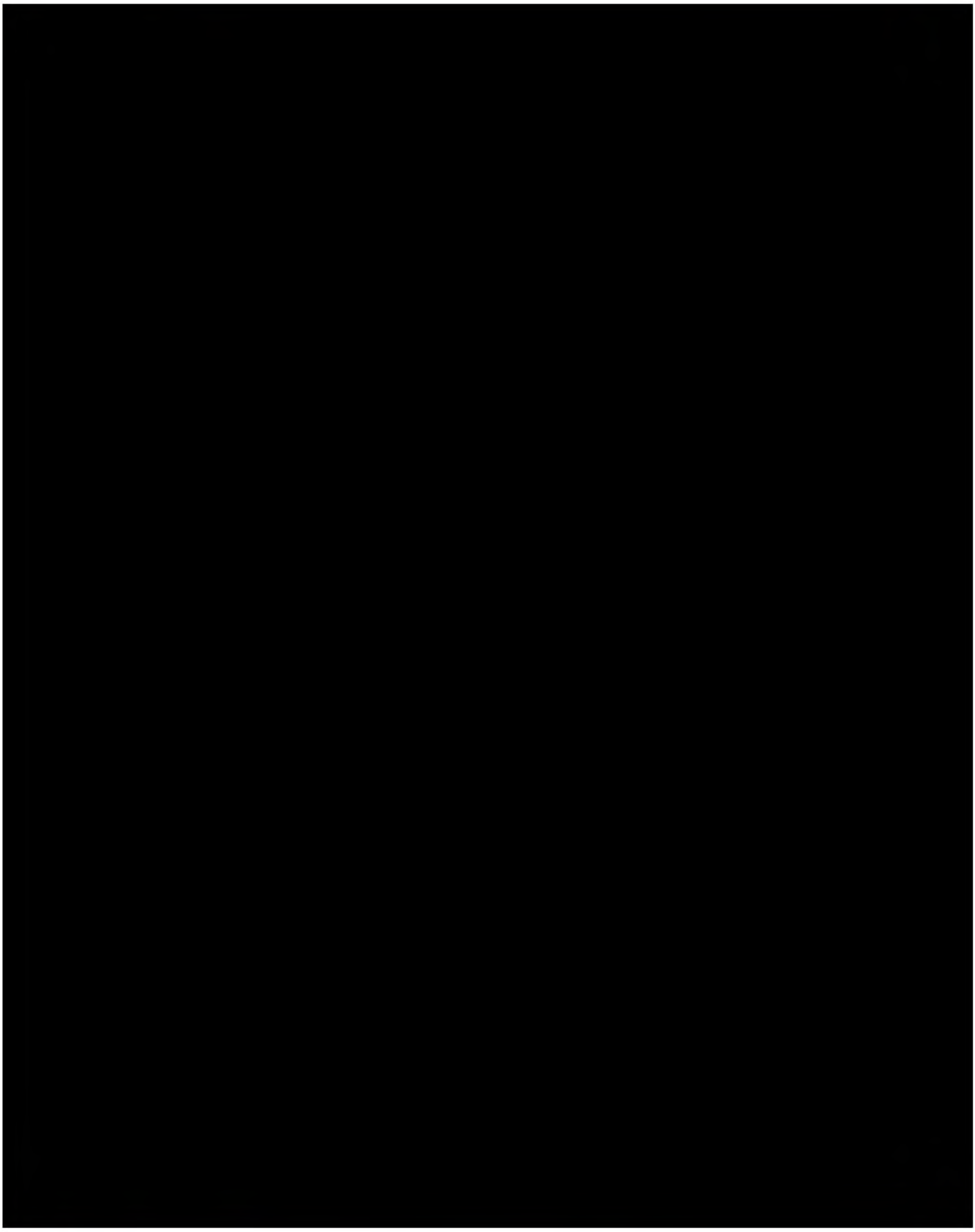
The construction of the second SIEPAC circuit will double the transmission capacity of the RTR, boosting the level of transactions in the MER and providing it with greater security and predictability. This must be accompanied by operational strengthening of the EOR through management systems and adequate infrastructure, as well as the technical capabilities of its personnel.

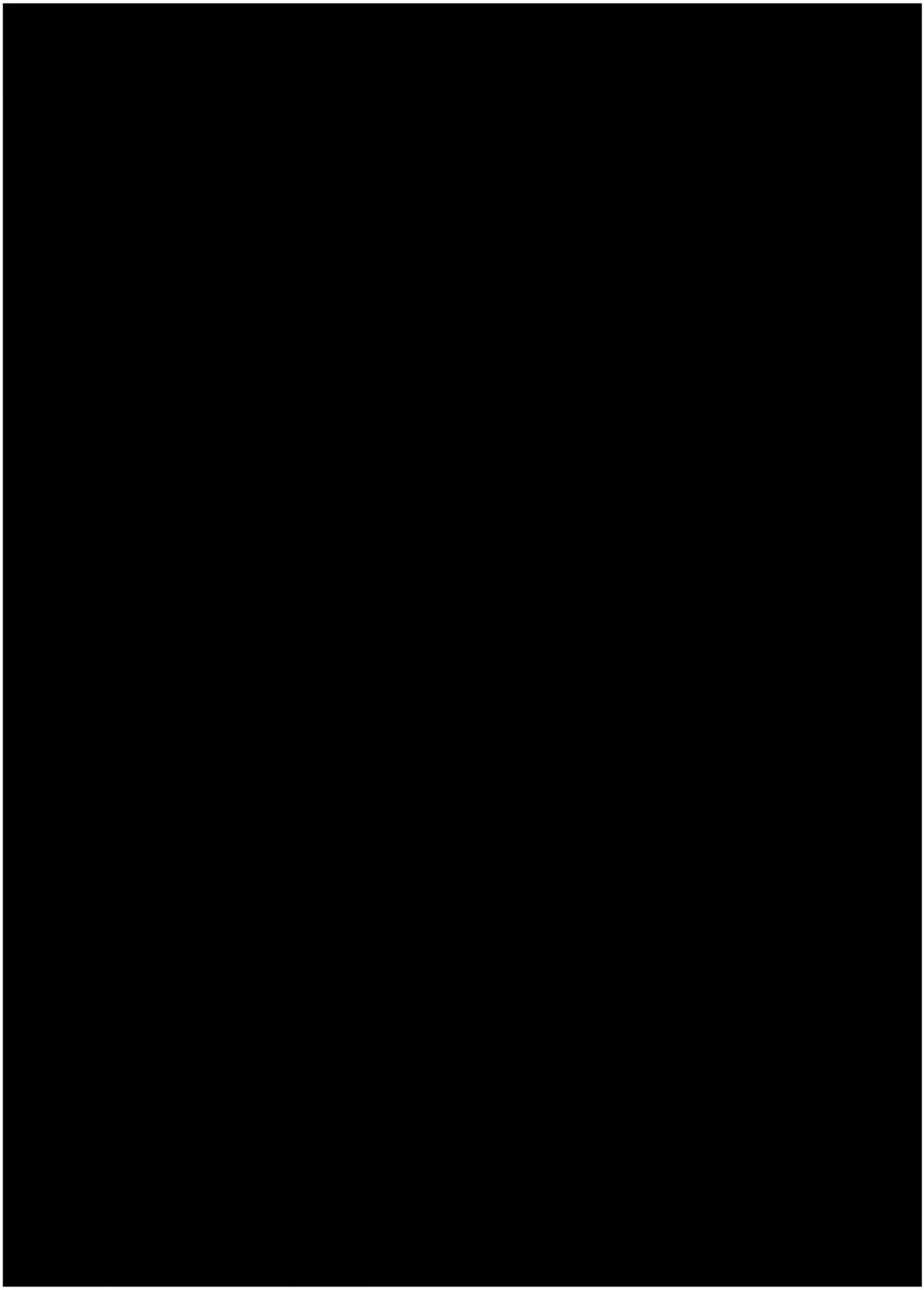
Compliance with national transmission expansion plans is essential to maintain and eventually expand the transmission capacity of the RTR through the construction of the second circuit of SIEPAC.

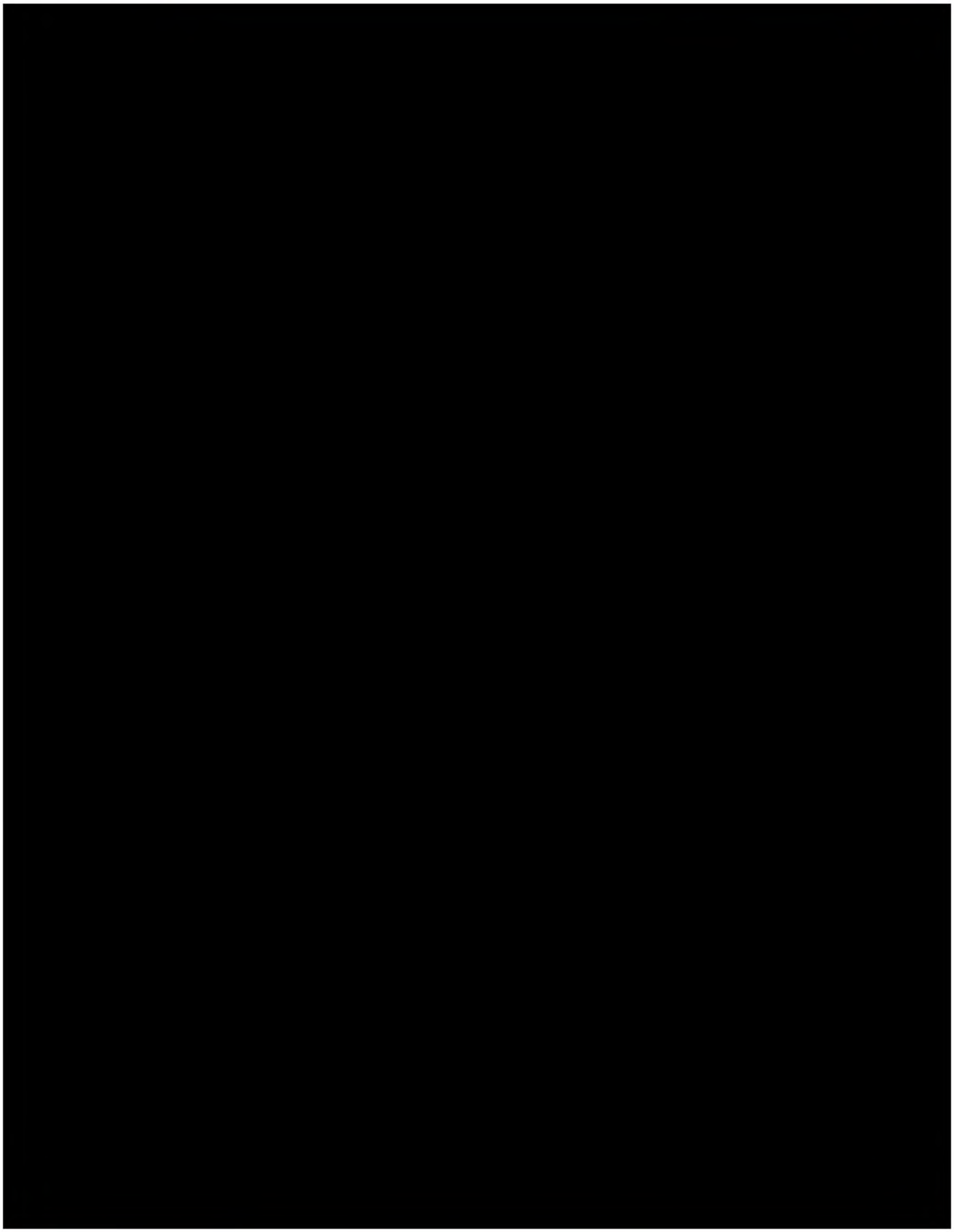
Interconnection with extra-regional markets such as Mexico and Colombia, entails benefits that, in large part, would be determined by the development of suitable regulation for their integration. The benefits of these connections must be reaped by all SIEPAC participants to achieve political viability.

[redacted]

[17] Although the weather regime in Central American countries is very similar, there could be seasonal and occasional complementarities that would lead to a more efficient and resilient system.







6. Opportunities

Addressing the challenges faced by the MER presents opportunities for cooperation and investment in which the private sector can play a relevant role. The EOR identified 29 transmission works to be carried out in the national systems to reach the transmission capacity of 300MW with an investment of USD198 million over the next 10 years, as well as the construction of the first sections of the second SIEPAC line with a combined value of USD45.4 million and investments to strengthen the operation of the EOR for an amount of USD11.62 million.

Technical cooperation can support regulatory improvement and the development of human and institutional capacities.

a. Technical cooperation – Regulatory framework

The CRIE plans to develop the following consultancies to design, propose and implement regulatory reforms that address the development needs of the MER:

- Development of improvements in the allocation mechanism for short-term transmission rights[21].
- Design of the regulatory framework for long-term regional contracts[22].
- Development of the regulatory framework for the application of intra-daily regional pre-dispatches[23].

[redacted]

[21] Strategic Action A.E.1.1 of the CRIE's Strategic Plan.
[22] Strategic Action A.E.1.2 of the CRIE's Strategic Plan.
[23] Strategic Action A.E.1.3 of the CRIE's Strategic Plan.

- Development of regulatory improvements in Regional Transmission Charges[24].
- Adapting the Regional Post-Dispatch model to be functional and adequate to the regional market realities[25].
- Risk analysis of the effective withdrawal of Guatemala from the Framework Treaty and its protocols[26].

b. Technical cooperation – MER's operation

- Development of the RTR's Integrated Maintenance Management Platform. USD116,000.
- Strategic Initiative for Digital Transformation of the EOR: USD1.6 million. The project includes the modernization of the MER's Integrated Information System (SIIM), through which the market's commercial processes are carried out, the database for regional planning, and modernization the EOR's webpage and application.
- Cybersecurity Project: The purpose of this project is to establish security conditions for voice and data telecommunications, as well as critical systems such as SCADA[27], SIIM, SPTR[28], SMFSR[29], MCTP[30] and administrative systems.
- Strengthening the technical capabilities of the staff: developing the technical capabilities of the EOR staff in Big Data, traceability and security (Blockchain) and decision making through artificial intelligence.
- Detailed analysis of mechanisms that enable SER control areas to share primary frequency regulation reserve and contracts for these purposes. This will allow the establishment of a primary frequency regulation reserve market in the MER.

c. Investment – SIEPAC (Second Circuit)

The construction of the first two sections of the second SIEPAC circuit was approved by the CDMER in January 2024. The total investment in these projects amounts to USD45.4 million as follows:

- Honduras (Agua Caliente substation) - Nicaragua (Sandino substation). USD25.6 million, 178.5 km of laying in existing infrastructure, construction of 2 bays and 2 breakers in each substation.
- Costa Rica (La Fortuna substation) - Nicaragua (La Virgen substation). USD19.8 million, 123.3 km of laying in existing infrastructure, construction of 2 bays and 2 breakers in each substation.

[24] Strategic Action A.E.1.4 of the CRIE's Strategic Plan.
[25] Strategic Action A.E.1.5 of the CRIE's Strategic Plan.
[26] Strategic Action 4.2 of the CRIE's Strategic Plan.
[27] Supervisory Control and Data Acquisition
[28] Regional Transmission Planning System
[29] Regional Synchronized Phasor Measurement System
[30] Maximum Power Transfer Capabilities

d. Investment – National transmission expansion

The 29 national expansions identified by the EOR to reach and maintain 300MW of SIEPAC capacity require a total investment of USD198 million. Details of the projects are included in the annex.

System	Number	USD Million
Guatemala	2	16,86
El Salvador	10	25,88
Honduras	11	82,16
Nicaragua	1	0,79
Costa Rica	5	72,31
Total	**29**	**198,00**

Source: EOR, 2024.

e. Investment – MER's operation

- Construction of the EOR Office and Main Control Center (OCCP). USD6.62 million (30% own resources and 70% financing). It will provide the EOR with its own building and mission critical control center.
- Construction of the Alternate Center for Continuity of Operation (CENALCO). USD5 million. It would provide an alternate control center to guarantee the continuity of the operation of the EOR's critical processes. The center would be located in Panama.

References

Álvarez, F. (2021). Propuestas regulatorias para la consolidación del MER. Presentación al III Taller del 25 aniversario del MER, diciembre del 2021.

Banco Interamericano de Desarrollo [BID] (2017). Integración eléctrica centroamericana: Génesis, beneficios y prospectiva del Proyecto SIEPAC; Sistema de Interconexión Eléctrica de los Países de América Central. Echevarría, C.; Jesurun-Clements, N.; Mercado, J.; Trujillo, C.

Castro-Kreutz, M. (2020). Evaluación del beneficio económico de la operación del Mercado Eléctrico Regional (MER) en los mercados eléctricos nacionales de América Central. Años 2018 y 2019. Informe de consultoría para el CDMER, junio del 2020.

Comisión Económica para América Latina y el Caribe [CEPAL] (2020). Estrategia Energética Sustentable 2030 de los países del SICA (LC/MEX/TS.2020/35), Ciudad de México.

Comisión Regional de Interconexión Eléctrica [CRIE] (2022). Evaluación del MER y del estado de la competencia: Una Vista al Mercado Eléctrico de América Central 2021. Guatemala, 2022.

Consejo Directivo del Mercado Eléctrico Regional [CDMER] (2019). Propuesta Ajustada del Tercer Protocolo al Tratado Marco del Mercado Eléctrico de América Central. Noviembre, 2019.

De la Torre, T. (2021). Reseña histórica y visión del mercado eléctrico regional. Presentación al III Taller del 25 aniversario del MER, diciembre del 2021.

Deloitte (2022). Hoja de ruta de Transición Energética de Costa Rica: Un modelo energético sostenible para Costa Rica al 2050. Noviembre, 2022.

Deloitte (2022). Hoja de ruta de Transición Energética de Guatemala: Un modelo energético sostenible para Costa Rica al 2050. Noviembre, 2022.

Deloitte (2022). Hoja de ruta de Transición Energética de Panamá: Un modelo energético sostenible para Costa Rica al 2050. Noviembre, 2022.

Ente Operador de la Red [EOR] (2024). Informe de la Planificación de la Transmisión Regional 2024-2033. San Salvador, El Salvador.

Ente Operador de la Red [EOR] (2024). Planeamiento Operativo de América Central 2024-2025. Actualización enero 2024. San Salvador, El Salvador

González, V. (2021). Retos para la operación eficiente del sistema eléctrico regional (SER). Presentación al III Taller del 25 aniversario del MER, diciembre del 2021.

M. E. Rojas, Estadísticas del subsector eléctrico de los países del Sistema de la Integración Centroamericana (SICA), 2021 (LC/MEX/TS.2022/30), Ciudad de México, Comisión Económica para América Latina y el Caribe (CEPAL), 2022.

Annex

National transmission expansions to reach and maintain SIEPAC's 300MW capacity.

Country	Description	Lenght (km)	Year	Investment (USD Million)
Guatemala	Construction of the new "El Melonar" substation	-	2030	7,018
Guatemala	Construction of the "Aguacapa-Pacífico" new line	21,62	2028	9,837
El Salvador	Construction of the "15 Septiembre-Berlín" new line	15,54	2026	5,415
El Salvador	Repowering of the "Berlín-San Miguel" line	40,1	2026	3,669
El Salvador	Repowering of the "San Miguel- Chinameca" line	23,5	2026	2,15
El Salvador	Capacity adjustment of the "Pacífico – Ahuachapán" line	45,67	2030	0
El Salvador	New transformer Nejapa	-	2026	5,076
El Salvador	New Capacitor Bank Santo Tomás	-	2032	1,856
El Salvador	New Capacitor Bank at Volcán SE	-	2032	1,856
El Salvador	New Capacitor Bank Ateo SE	-	2032	1,856
El Salvador	New Capacitor Bank Tamalnique SE	-	2032	1,856
El Salvador	New Capacitor Bank San Antonio Abad SE	-	2032	2,15
Honduras	New El Taladro SE (Amarateca-Torre 43 line sectioning, Comayagua-Piedras Azules line sectioning)	-	2028	20,78
Honduras	Construction of new Coyoles Central - San Isidro line + San Isidro SE	44,2	2028	30,83
Honduras	Installation of series compensation on Agua Prieta -San Pedro Sula Sur lines	-	2025	5,58
Honduras	Repowering of the San Buenaventura - Amarateca line	12,49	2029	1,158
Honduras	Repowering of the Taladro - Amarateca- Torre 43 line	82,74	2029	7,674
Honduras	Repowering of the Taladro - Amarateca line	51,35	2029	4,763
Honduras	Repowering of Prado-Frontera line	23,3	2027	2,337
Honduras	New Capacitor Bank-Zamorano SE	-	2025	2,15
Honduras	New Capacitor Bank-Miraflores SE	-	2025	2,297
Honduras	New Capacitor Bank-Cañada SE	-	2025	2,297
Honduras	Nuevo Banco de Capacitores-S/E Amarateca-	-	2025	2,297
Nicaragua	New El Taladro substation (Amarateca-T43 line sectioning + Comayagua-Piedras Azules line sectioning)	-	2028	20,78
Costa Rica	Capacity adjustment of the Moín - Cahuita line	43,06	2025	0
Costa Rica	Construction of a new San Rafael SE (Sectioning of the two Lindora-Tarbaca lines and linking with Garabito SE) - North-Center reinforcement	-	2027	14,468
Costa Rica	Construction of new double circuit line Garabito SE -San Rafael - North-Center Reinforcement.	70	2027	28,141
Costa Rica	Construction of new double circuit line Mogote SE - Cañas de Refuerzo North Zone.	47	2027	20,479
Costa Rica	Repowering of the SE Cañas - Garabito de - North Zone Reinforcement line.	60,1	2027	9,222
Total				**198,00**

Source: EOR, 2024