

The functioning of the Regional Electricity Market in Central America (MER)

ARIAE 2017



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CRIE**

20 de abril de 2017

The Regional Electricity Market (MER)

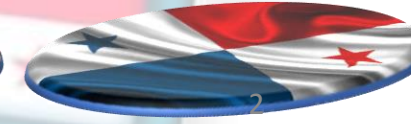
7th Market – Superposed to National Markets



6 Countries

6 Markets

1 Treaty



The legal framework – Agreements

Central American Electricity Market Framework Treaty

- Signed on December 30, 1996, in Guatemala City

Ratified by the six countries, through their respective Congresses

Establishes the principles and agreements to form the Seventh Market.

Protocols of the Framework Treaty

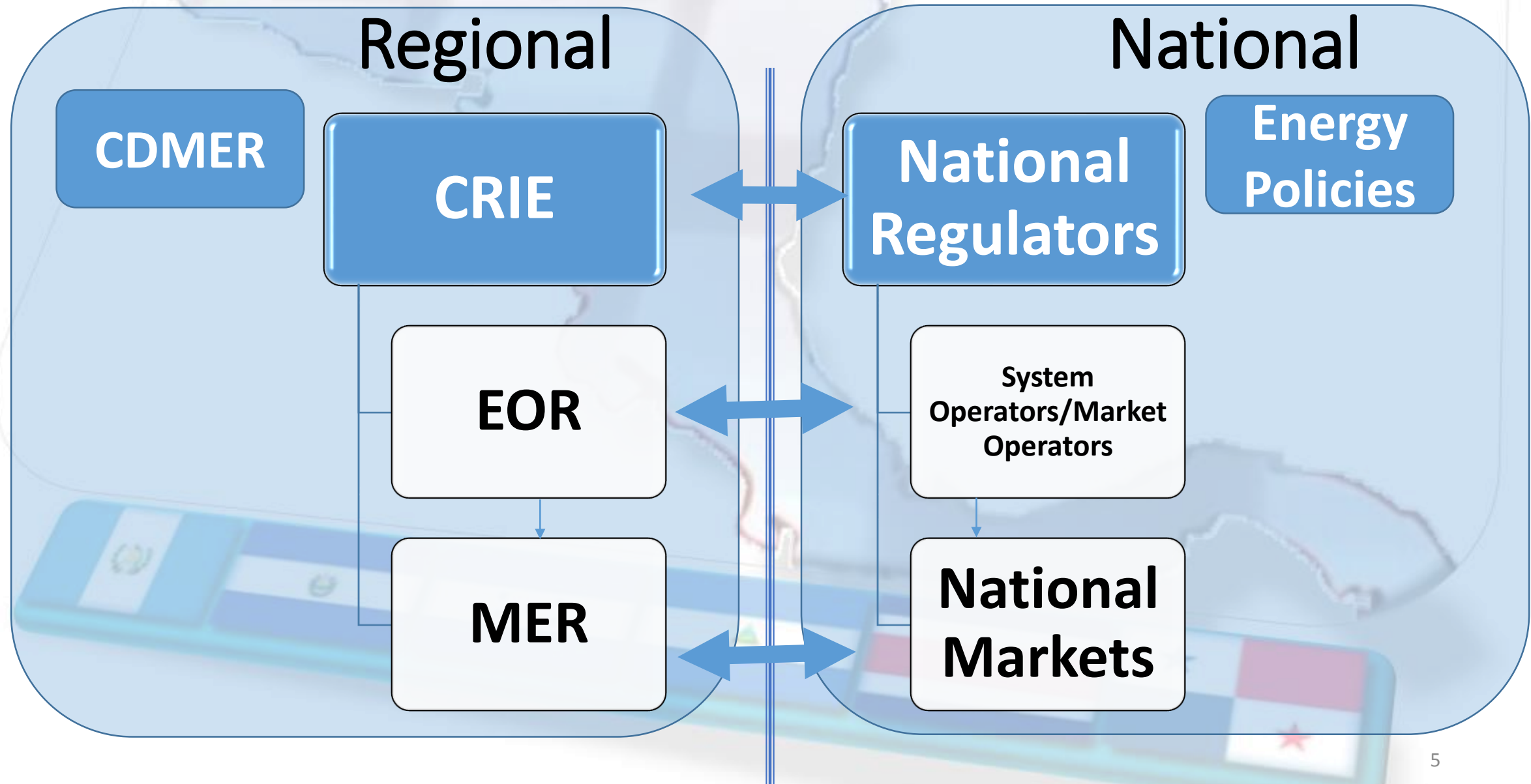
- First Protocol
Signed on July 11, 1997 in Republic of Panama, Panama City
- Second Protocol
Signed on April 10, 2007 in Campeche, Mexico



The Design of the Market

- Seventh Market, superposed to National Markets on the six National Markets.
- Regional Entities are created (Regional Commission for Electrical Interconnection /CRIE and Regional Operator / EOR).
- The Regional Electricity Market Director Council /CDMER is incorporated as a representative body of governments to ensure the correct implementation of the Regional Electricity Market in accordance with the guidelines of the Treaty and its Protocols.
- Regulatory Interfaces allow interaction and exchanges between markets.
- There is coordinated interaction between regional structures and entities with corresponding ones in each country.

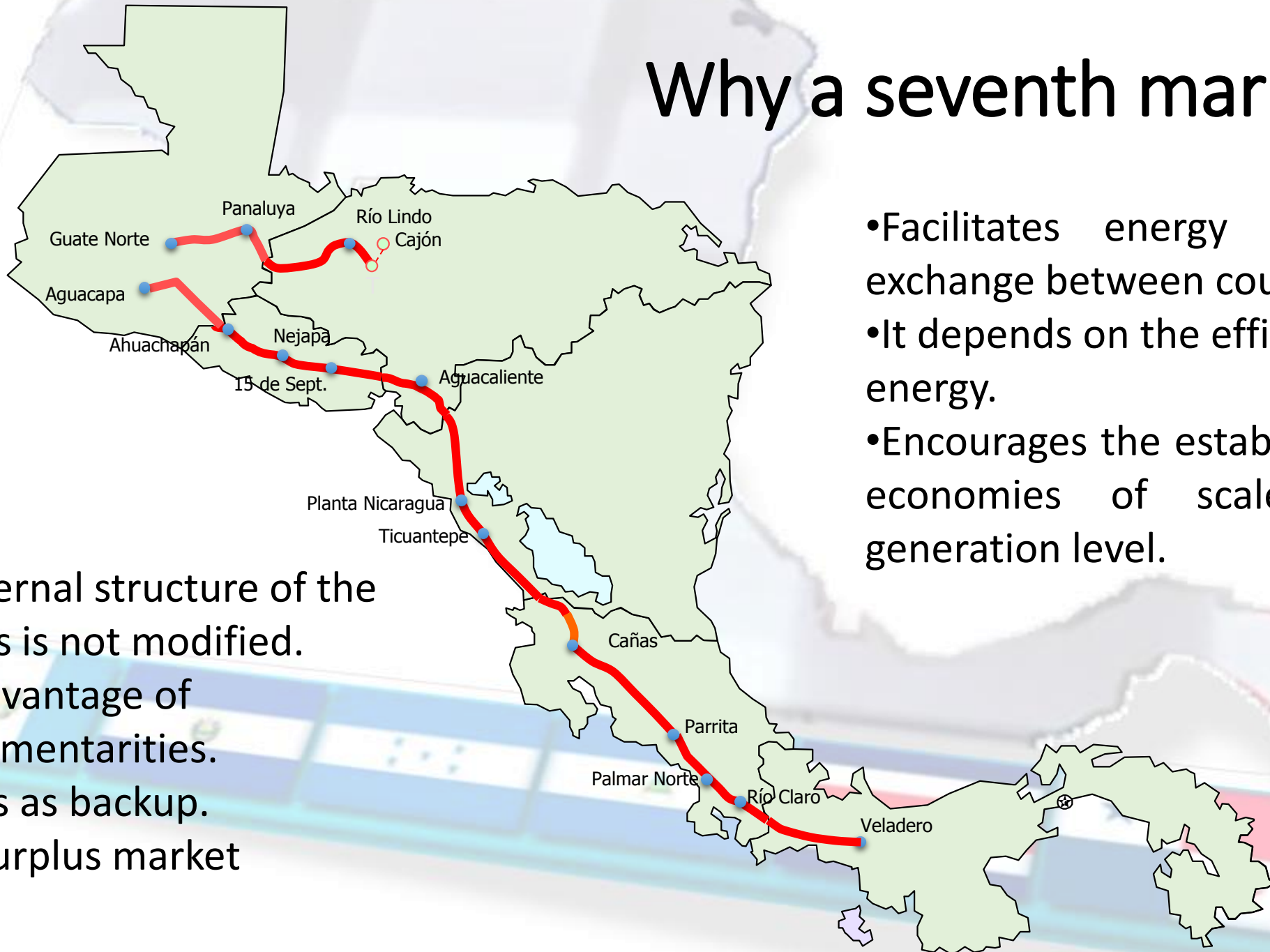
Interrelationships



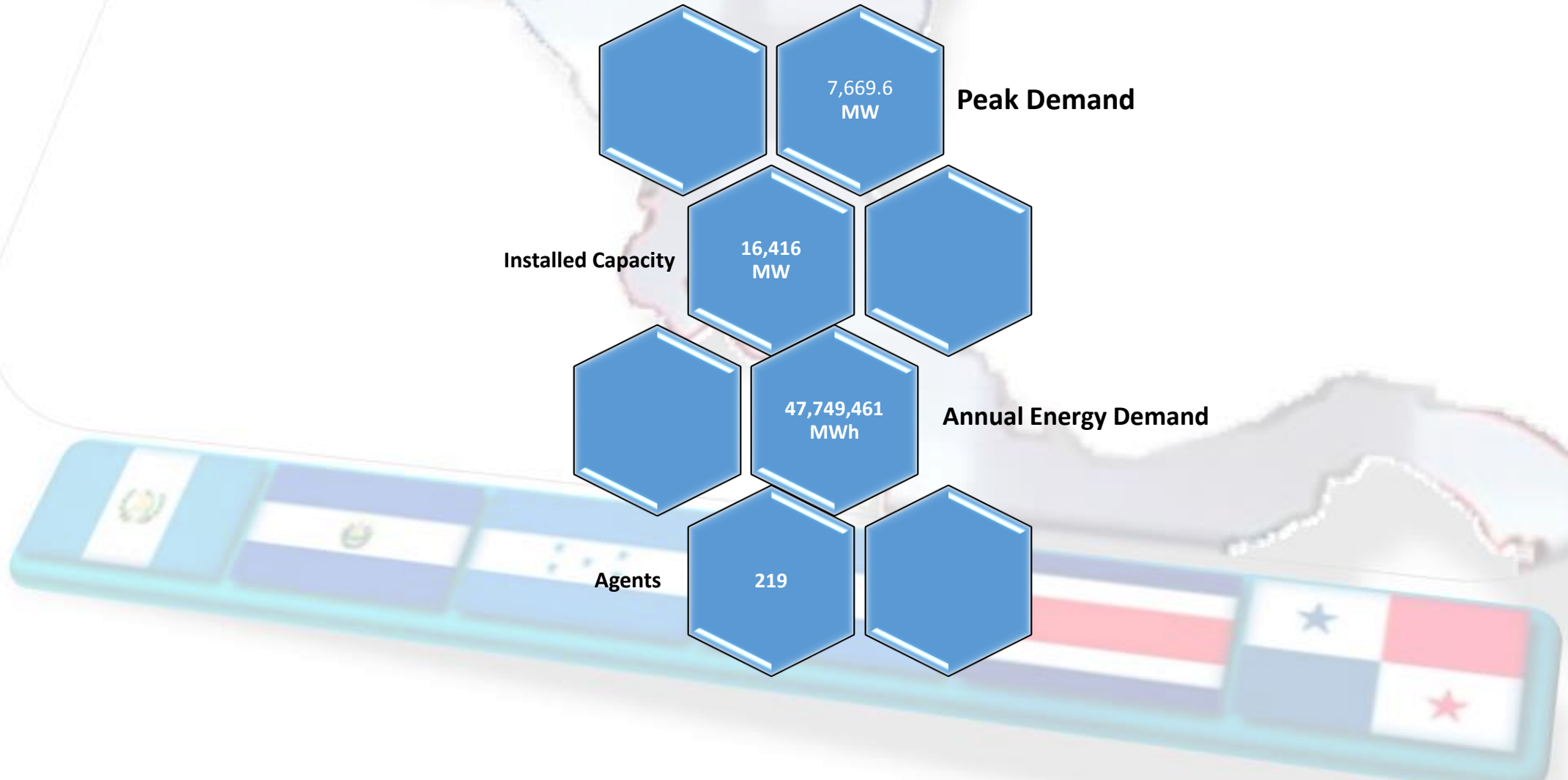
Why a seventh market?

- The internal structure of the markets is not modified.
- Take advantage of complementarities.
- It works as backup.
- It is a surplus market

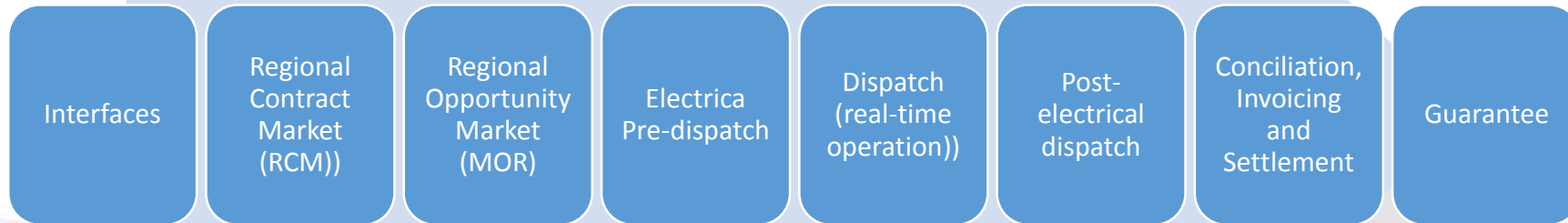
- Facilitates energy trade and exchange between countries.
- It depends on the efficient use of energy.
- Encourages the establishment of economies of scale at the generation level.



Regional Electric Market – Data Sheet

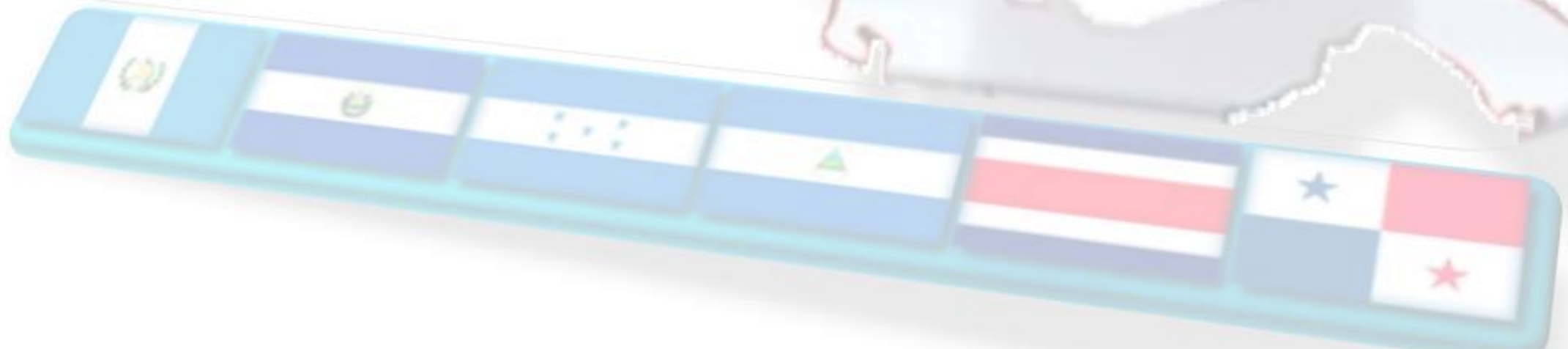


Commercial Operation of the Regional Electricity Market



Regulatory Interfaces

- Mechanisms that allow effective interaction between the National Electricity Market (MM) and the Regional Electricity Market (MER) and better operational coordination



REGIONAL CONTRACT MARKET (MCR)

Its purpose is to provide agents of the Regional Electricity Market (MER) with instruments to manage the risks of energy supply and price.

- The terms and conditions of the Regional Contract (CR) are agreed between the parties.
- Regional Contracts (CR) may only be concluded between agents from different member countries.
- The minimum duration of the Regional Contracts (CR) will be one day and must be informed daily.
- One of the parts of the Regional Contract must have payment guarantees for transactions in the Opportunity Market and Transmission Services, Operation Service and Regulation Service.

REGIONAL CONTRACT MARKET (MCR)

Types of Contracts:

According to the firm commitment of energy commitment, there are two types of contracts in the MER:

Firm contracts– CF

Non-firm contracts– CNF



According to the contractual relationship, Non-Firm Contracts can be of two types:

Non – Firm Financial Contracts- CNFF

Non – Firm Flexible Physical Contracts - CNFPF

REGIONAL OPPORTUNITY MARKET (MOR)

It is a short-term market, based on daily injection and withdrawal offers of energy, for each market period, in nodes of the commercially-enabled Regional Electric Transmission Grid (RTR)

Types



Opportunity offers from MER agents

Flexibility offers associated with Non-Firm Flexible Physical Contracts

The flexibility offers associated with the selling party of the Firm Contracts

Regional electrical Pre-dispatch

National Agents exchange information with their OS / OM

The OS / OM send the national pre-dispatch without import / export transactions to the EOR

The EOR elaborates the regional electric pre-dispatch considering the programmed injections (contracts), opportunity transactions, etc.

The EOR sends to the OS / OM the regional pre-dispatch

OS / OM adjusts national pre-dispatches and reports to national agents

The real-time electrical dispatch

Real-time operation considers:

- The Regional electrical pre-dispatch
- The National Electrical pre-dispatches.
- Uncontested contingencies and restrictions.

With this information, real-time deviations are managed and incorporated into the operation.

The results of all of the above are incorporated into the Real-Time Operational Database.

Regional Post Dispatch

The objective is to determine the nodal ex-post prices of the MER.

Ex-post prices are used only to value deviations in real time.

- To execute the post-dispatch, the injection opportunities offered in the regional pre-dispatch are used to identify the optimal dispatch (ideal) to supply the net withdrawals of the MER.
- The injections and withdrawals of the pre-dispatches declared in the regional pre-dispatch are fixed.
- The physical injections of the Non-Firm Flexible Physical Contracts.

MER - CONCILIATION, INVOICING AND SETTLEMENT

The conciliation of the transactions in the MER is done daily with hourly details

Opportunity transactions are reconciled in the pre-despatch and are valued at ex-nodal prices and the payment of the Electric Transmission Variable Charge (CVT) is implicit in these prices.

The contracts pay the Electric Transmission Variable Cost (CVT) explicitly through the ex-ante nodal price difference.

All MER conciliations are compiled on a monthly basis through the Regional Economic Transactions Document (DTER)

The billing in the MER is made, monthly based on the DTER.

Settlement in the MER is carried out in the month following the transaction, based on the invoicing documents.

Guarantees in the Regional Electricity Market

Money or other liquid financial instruments (Cash or Stand By Letter) that are presented in the MER in support of the payment obligations..

- They must represent a valid obligation, binding and not subject to any condition of payment.
- They will allow the claim and immediate execution.
- The minimum guarantees cover only the regional charges, but if you want to make any transaction the guarantee must also cover the amount of the transaction.
- The guarantees are calculated monthly and verified daily. If the warranty does not cover the transaction, including charges, it is not authorized.

COMMERCIAL ISSUES

Improve the transmission capacity through the National Reinforcements

Improve the import/export potential for all countries



MER Technical Operation

Hierarchical operation

Regional database

Telecommunications,
information exchange
and operational
supervision

HIERARCHICAL OPERATION IN REAL TIME



REGIONAL DATABASE

- The information provided by the market agents is sent to the EOR, through its respective OS / OM. The deadlines for the updating of the Regional Database information are defined in the RMER.



TELECOMMUNICATIONS, EXCHANGE OF INFORMATION AND OPERATIONAL SUPERVISION.

Exchange of operational information

Real-time communications;

Pre and post-operative communications

MER Technical Supervision

In addition, it has a Regional Data Acquisition and Control System (SCADA).



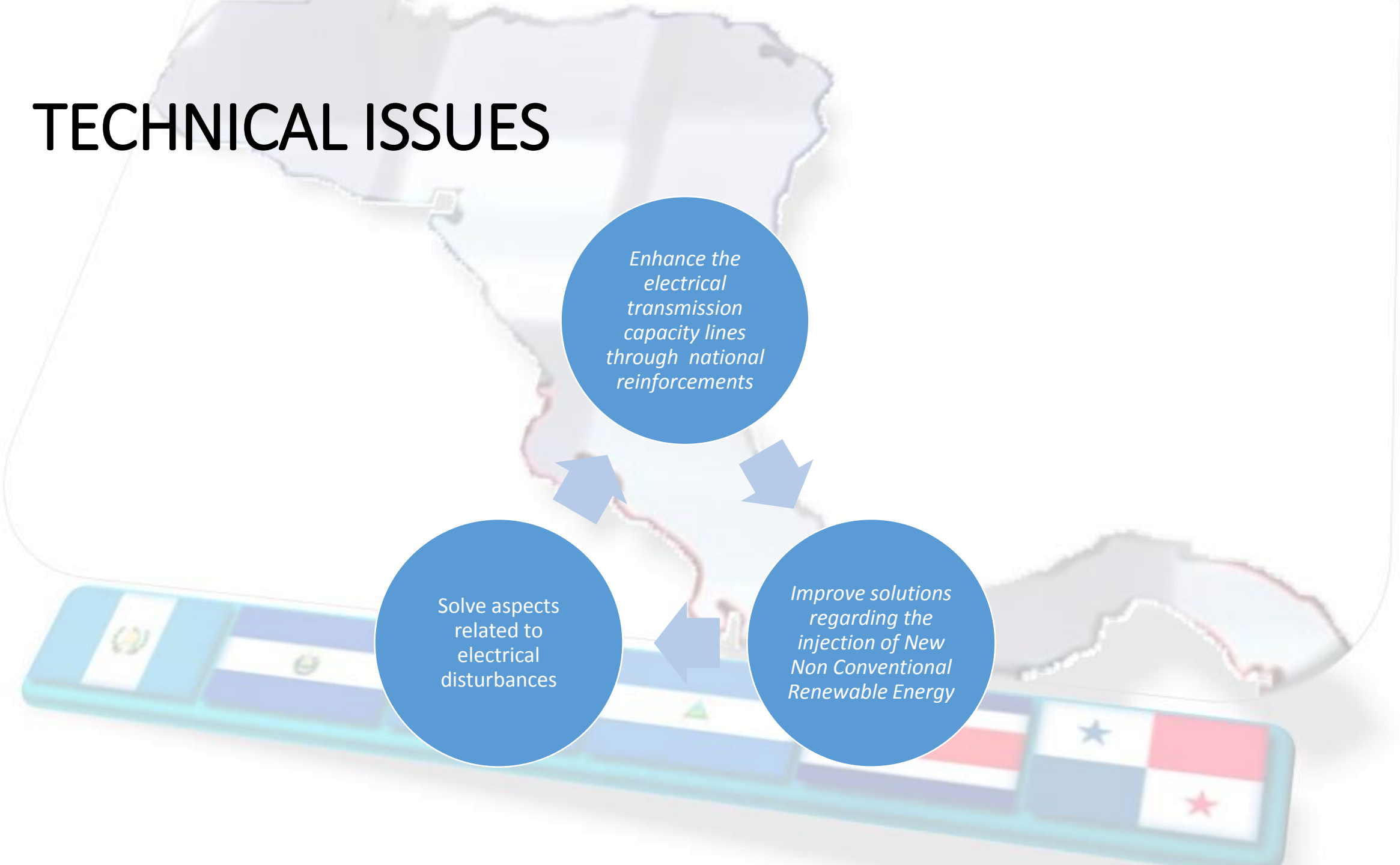
Regional Coordination Center for Transactions of the EOR

TECHNICAL ISSUES

Enhance the electrical transmission capacity lines through national reinforcements

Solve aspects related to electrical disturbances

Improve solutions regarding the injection of New Non Conventional Renewable Energy



Data and Statistics / MER



DATA OF THE TRANSMISSION LINE - SIEPAC



✓ **300 MW capacity**
28 sections in 15 substations
230 KV

REGIONAL TRANSMISSION CAPACITIES

Maximum transfer capacity between control areas

Direction north to south (MW)

ESCENARIO DE DEMANDA	GUA – ELS + GUA – HON + ELS – HON *	HONDURAS NICARAGUA	NICARAGUA COSTA RICA	COSTA RICA PANAMÁ
Máxima	300	150	190	230
Media	300	180	180	250
Mínima	300	170	180	280

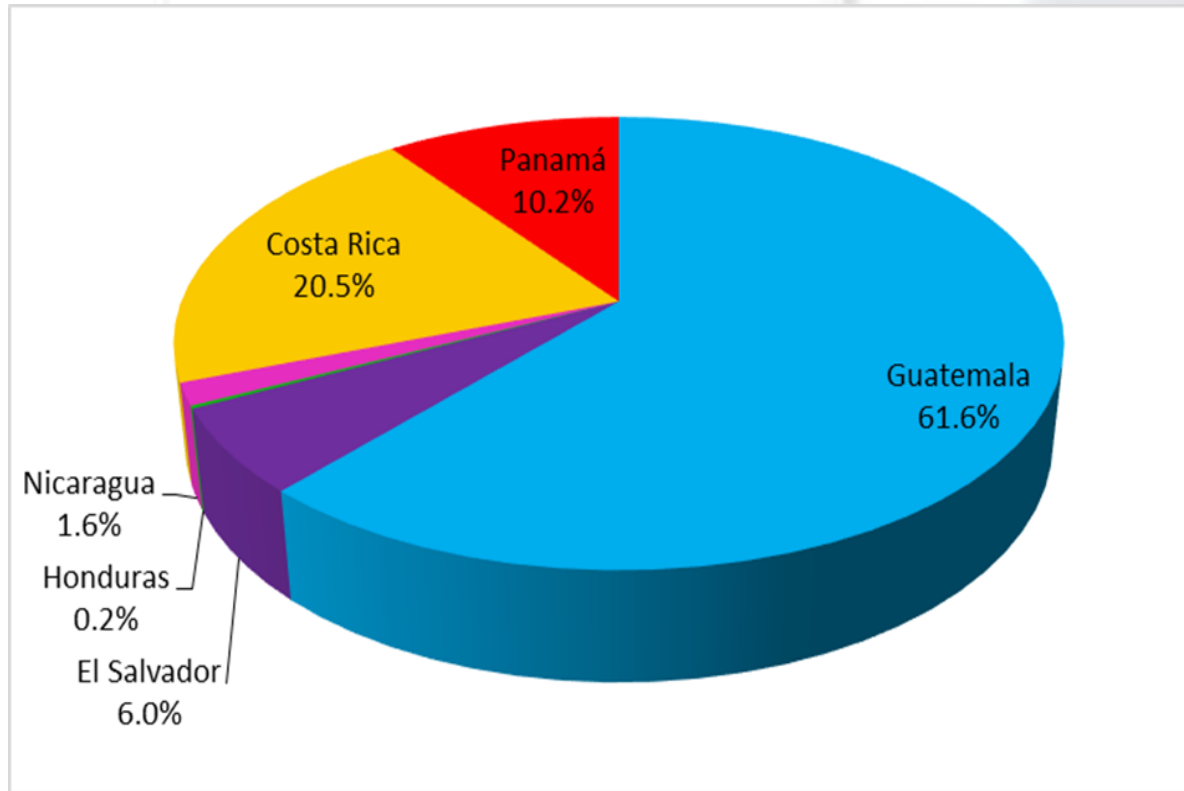
Direction south to north (MW)

ESCENARIO DE DEMANDA	GUA – ELS + GUA – HON + ELS – HON	NICARAGUA HONDURAS	COSTA RICA NICARAGUA	PANAMÁ COSTA RICA
Máxima	200	220	50	270
Media	220	100	50	280
Mínima	300	210	50	180

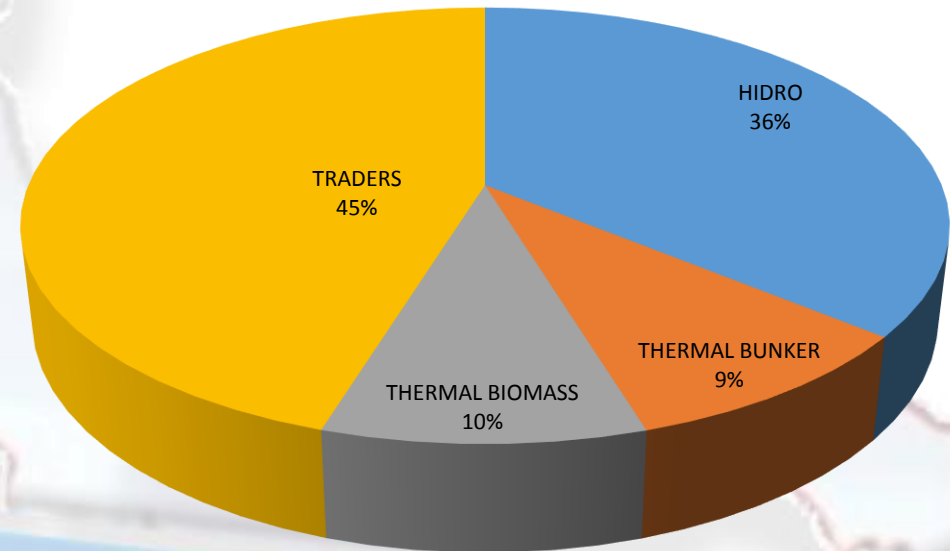
Source: STUDY OF MAXIMUM TRANSFER CAPACITIES MARCH 2017.

MER / Statistics 2016 - Injections

Injections to the MER by country
2016



Injections to the MER by technology,
2016

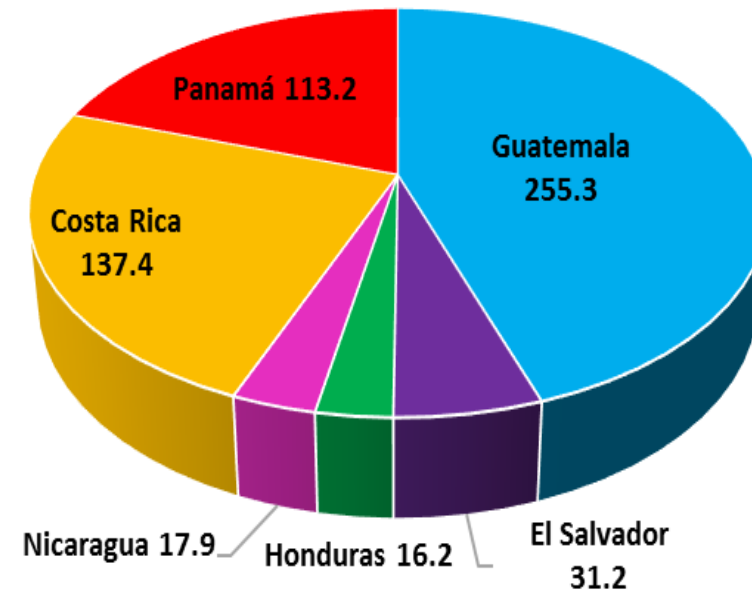
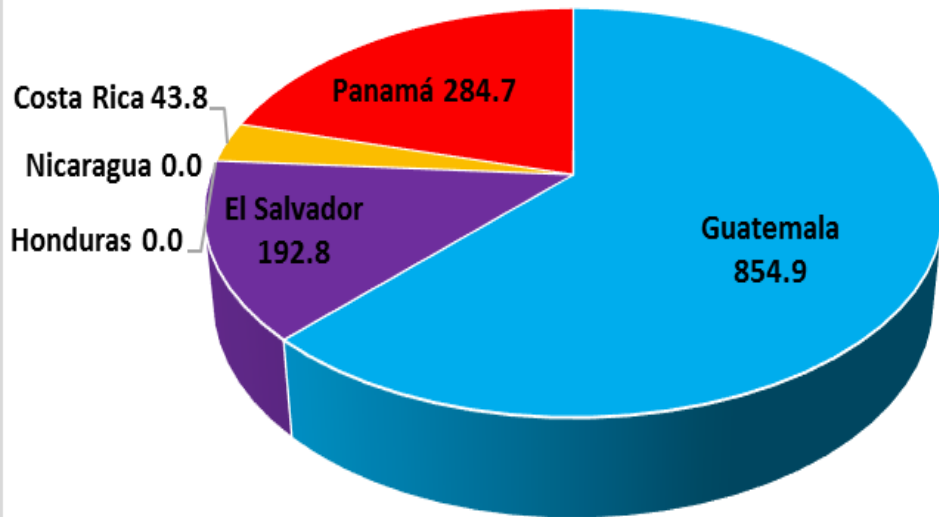


MER / Statistics 2016 - Injections

Injections to the MER by country 2016

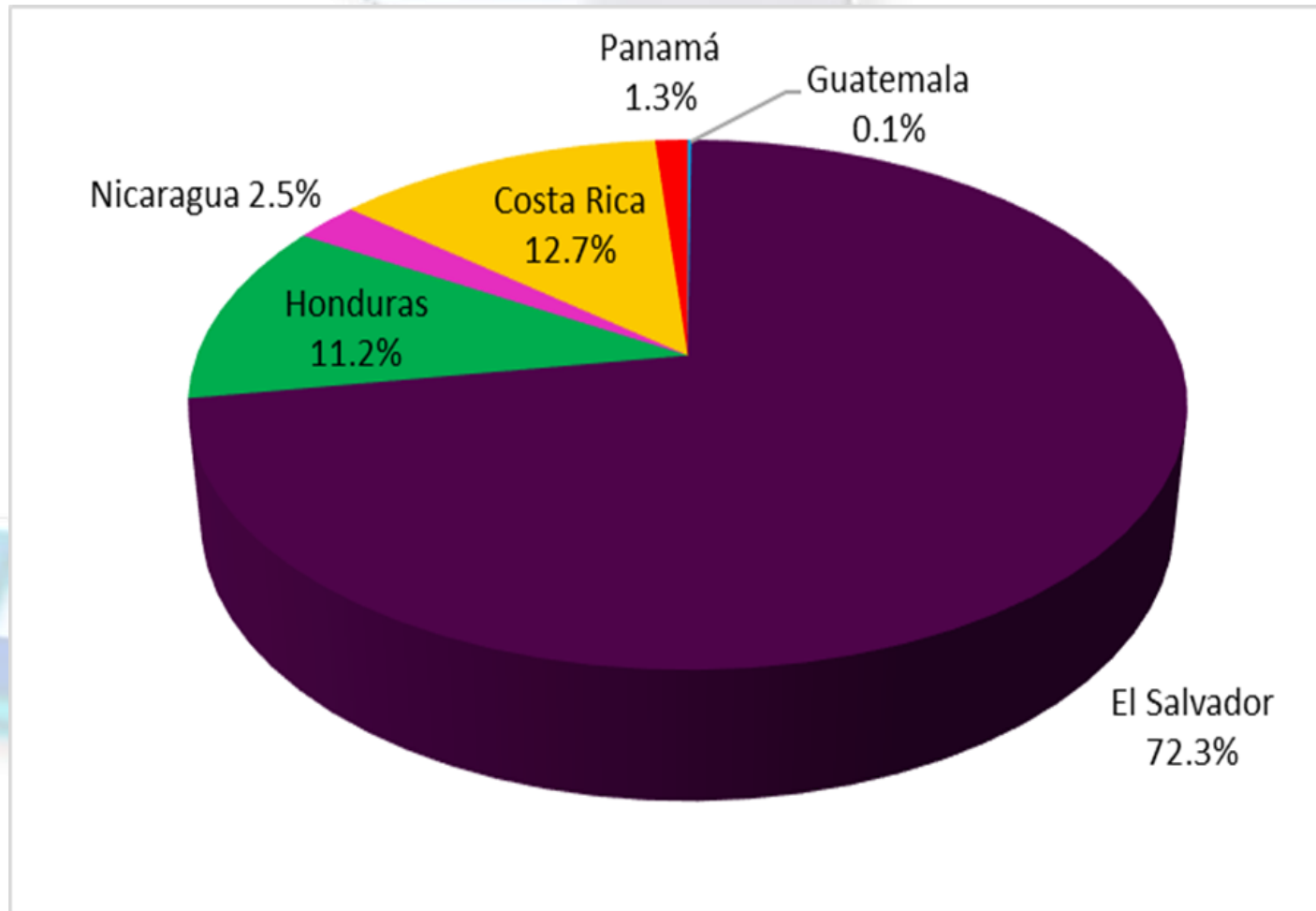
Contract

Oportunity



MER / Statistics 2016 - Retirements

Retirements from the MER by country 2016

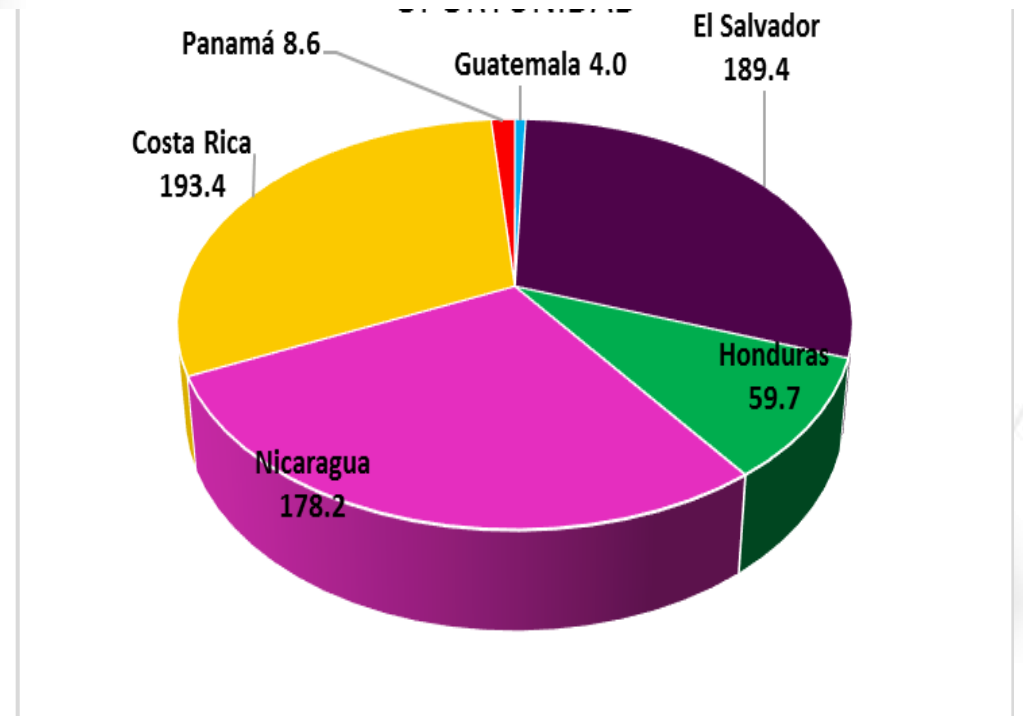
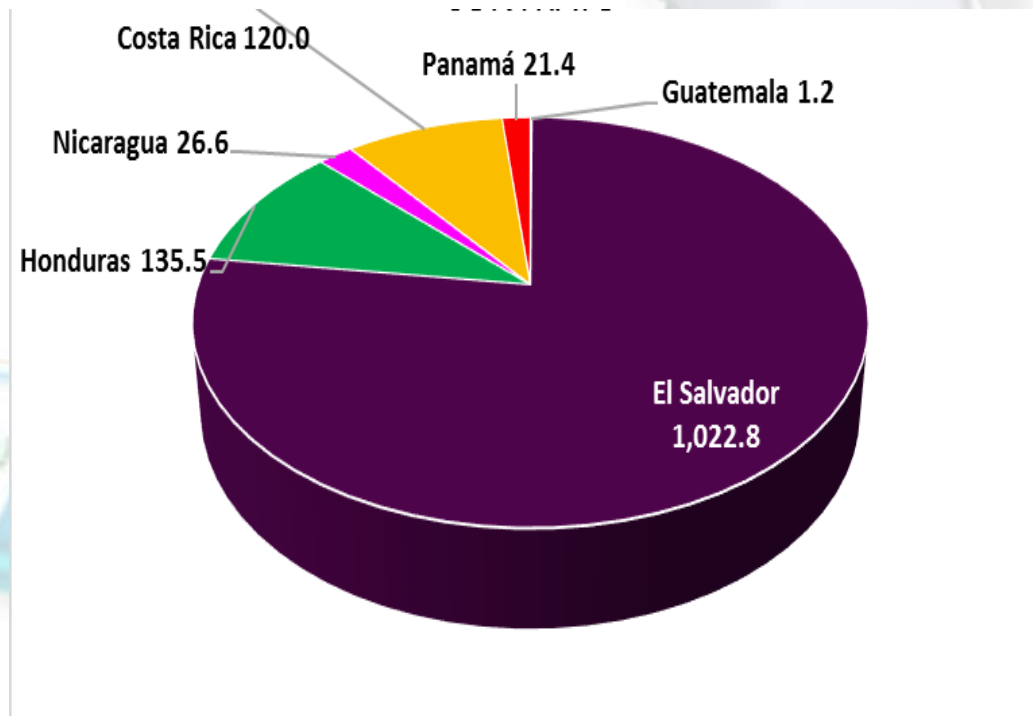


MER / Statistics 2016 - Retirements

Retirements from the MER by country 2016

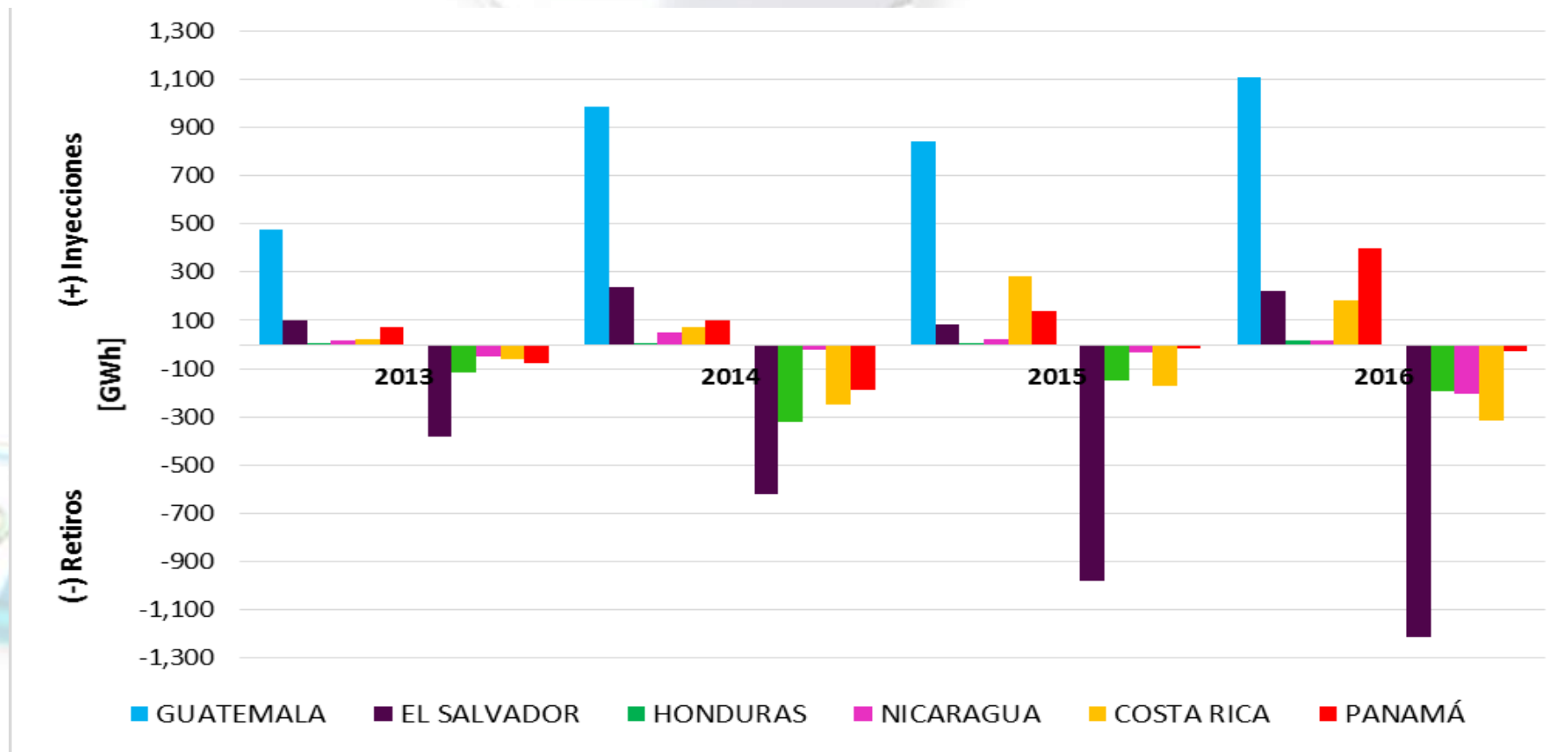
Contract

Oportunity

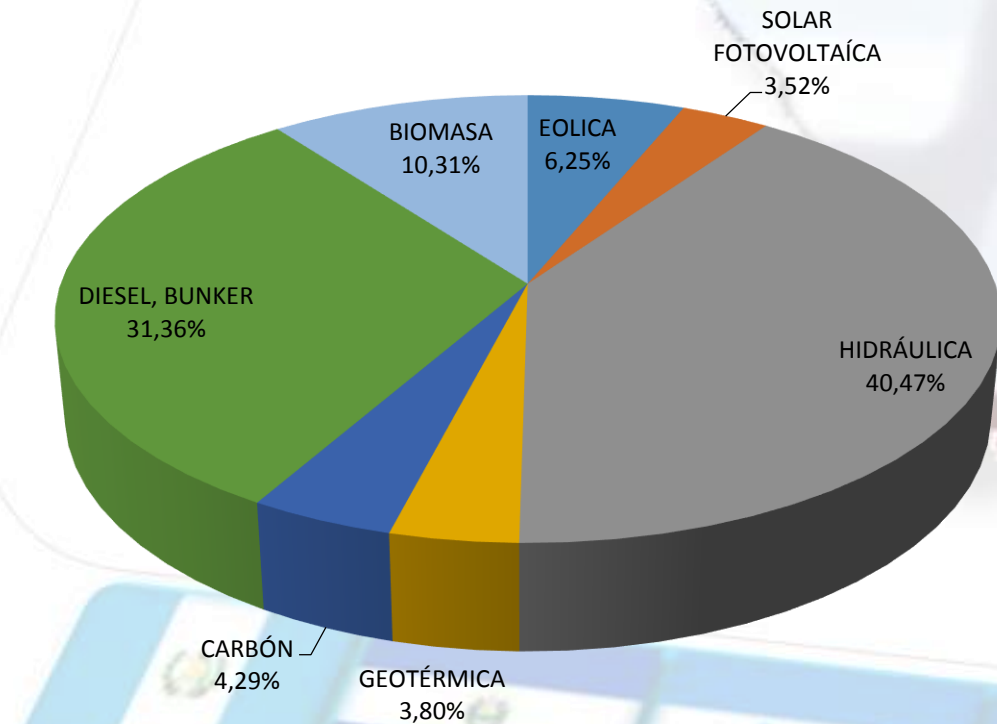


MER / Statistics 2016 - Injections/Retirements

Injections & Retirements by country
2013 - 2016



Statistics / MER 2016 – Installed Capacity



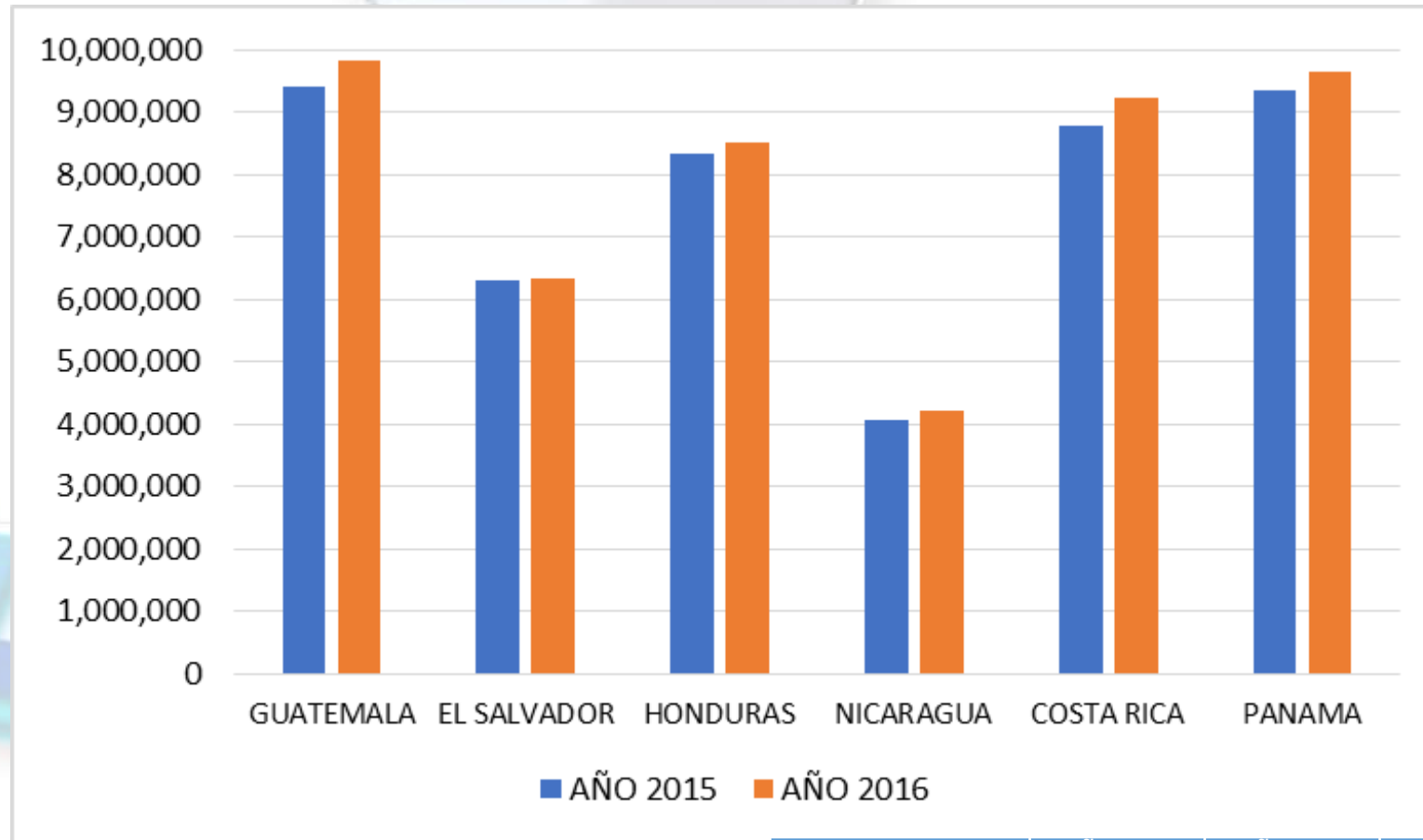
The new technologies, photovoltaic and wind still form part of the main supply base in the national markets, being technologies shipped at very low prices.

Eventually they will become an increasingly important part of regional transactions.

However, with the incorporation of new technologies that supply the Demand, free technologies become more and more economic for the Regional Demand.

MER / Statistics 2016 - Demand

Demand by country 2015 - 2016



	AÑO 2016	AÑO 2015	% Crecimiento
TOTAL	47,749,461	46,186,279	3.3%

Challenges and Opportunities

Continue strengthening the normative and commercial aspects in the MER, to encourage the development of firm transactions.

Develop the necessary methodologies to increase the participation of renewable technologies, both in the MCR and in the MOR.

Increase the percentage share of renewable and non-polluting generation in the regional energy matrix.

END

