

DECEMBER 2018

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*Lessons Learned and Policy Recommendations with
Particular Emphasis on Competitive Procurement*

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Silvia Alvarado de Córdoba

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A Report of the CSIS PROJECT ON PROSPERITY AND DEVELOPMENT

CSIS | CENTER FOR STRATEGIC &
INTERNATIONAL STUDIES

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The main conclusions of this paper were presented at a Private Roundtable at the Center for Strategic and International Studies (CSIS) on June 12, 2018.

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INTERNATIONAL STUDIES

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Contents

1 Summary and Conclusions	1
2 Background of Power Sector Reforms in Latin America	7
3 Conceptual Framework for Evaluation Power Markets	10
4 Central America: Major Developments in the Power Sector	13
5 The Case of Guatemala	18
6 USAID Support for Power Sector Reform in Guatemala	24
7 Central America Regional Power Market (MER): Background	27
8 Use of Natural Gas in Central America	29
9 Recommendations for Central America	31
10 Recommendations for Future Research	36
About the Authors	37

1 | Summary and Conclusions

The purpose of this paper is to analyze the power sector reforms that have taken place in Central America countries and to identify measures to increase the efficiency of their power markets. Additionally, other key interrelated topics like the use of competitive bidding and auctions, the introduction of natural gas to the Central American region, and the impacts and issues around the functioning of the Regional Central American Interconnected Market (Mercado Eléctrico Regional or MER) are also discussed. We believe that given the size of their markets, their level of development, and the socioeconomic environment they face, lessons from those countries can be applicable to a wide range of countries in sub-Saharan Africa, Asia, and the Middle East and North Africa.

Within the Central America region, Guatemala is considered the best performing market for the following reasons: it has sustained rapid and significant increases in coverage as well as low prices for final consumers; it attracted high levels of private investment for generation, transmission, and distribution; it increased the share of renewables in generation; and from having a generation deficit before the reform was undertaken, it has become the net exporter to the MER and now has started to export to Mexico. Therefore, the paper gives particular emphasis to developments and lessons from Guatemala, particularly its use of competitive procurement for power generation and for transmission.

Notwithstanding the above, it is necessary to clarify that during the last two or three years, Guatemala has confronted increasing issues related to social conflicts and electricity theft in rural areas. Such issues could potentially jeopardize the progress accomplished in the last 20 years of implementation of the new power market model. The social conflicts have affected the development of new hydropower projects, transmission infrastructure, and the commercial activities of the distribution companies. As we will point out in sections V and IX of the paper, it is imperative that Guatemala takes the necessary measures to restore the conditions that allow the electricity market to continue to perform in a sound manner.

Latin America led the developing world in terms of power sector reform. Reforms that started in Chile in 1982 were soon adopted and improved in many other countries in Latin America, and included unbundling, privatization, and the establishment of a market for power, or “competition in the market.” But countries with rapid demand growth found that supply was lagging behind demand. To address this lack of sufficient supply growth,

a second wave of reforms was implemented in Latin America in the last 15 years and was characterized by indicative generation expansion plans implemented through the development of different forms of auctions for long-term power, usually referred to as “competition for the market.”¹

Given the evident benefits of auctions, why have they not been more widely adopted in other regions of the world? Eberhard et al. state:²

“Despite the obvious benefits associated with competition, there are a number of common arguments against competitive procurement. First, competitive tenders are considered more complex and expensive than their directly negotiated counterparts. Second, competitive tenders take too long, especially if emergency power is required. Third, there is often insufficient private interest to justify competitive tenders. Fourth, the first developer or sponsor who conceives the project may be unwilling to compete via a tender due to proprietary data, technology, and/or initial investment.”

A fifth reason not discussed by Eberhard is that some tender winners have failed to develop the investments in a timely manner.³

In this paper, we show that it is possible to obviate those issues and that competitive procurement can succeed in other regions in the world.

Private participation in auctions for power do not take place in a vacuum. In the paper, we identify high-level conditions like the macroeconomic context; sector-level conditions like the existence of sound and credible regulations; and utility-level conditions like distribution losses and efficiency parameters that would affect the attractiveness of a country for private investment in power, and hence the attractiveness of participating in an auction. Guatemala has been highly successful in promoting an efficient and resilient power sector and has carried out auctions for power with a growing degree of sophistication. Guatemala has achieved this even though it faces less than optimal high-level conditions. The reasons for the success of Guatemala are that it has had a stable legal environment for the electricity sector; an independent, accountable and competent regulator; cost-reflective tariffs; and efficient and financially strong off-takers of power.

Guatemala has received USAID support for its power sector reform effort since the very beginning of the reform process in 1996, and this contributed to the success of the reforms. USAID funded top international consultants and promoted a highly participatory process to encourage the enactment of the electricity law and the full implementation of the reform. A very important recommendation of the consultants that was adopted was that the state-owned distribution companies (DISCOs) should be privatized and that the adjustment of tariffs should be implemented at the beginning of the process. Therefore,

1. Luis T.A. Maurer and Luis A. Barroso, *Electricity Auctions: An Overview of Efficient Practices* (Washington, D.C.: The World Bank, 2011). <http://documents.worldbank.org/curated/en/114141468265789259/Electricity-auctions-an-overview-of-efficient-practices>.

2. Anton Eberhard et al., *Independent Power Projects in Sub-Saharan Africa Lessons from Five Key Countries* (Washington, D.C.: The World Bank, 2016), <http://documents.worldbank.org/curated/en/795581467993175836/Independent-power-projects-in-Sub-Saharan-Africa-lessons-from-five-key-countries>.

3. Eric Hyman, message to authors, June 2018.

since the reform began 1996, Guatemala has had efficient and financially strong off-takers and cost-reflective tariffs. And while the regulations (bylaws) have been modified to reflect changing conditions, the original law has not been amended, thus giving a large measure of certainty to investors.

Importantly, the reform effort in Guatemala emphasized the extension of the grid to unconnected regions. This was done through an innovative “output-based assistance” program, funded partially through the proceeds of privatization under which a trust fund finances the connection of new users that the distribution company is in charge of carrying out. This rural electrification program was directly supportive of the peace accords. Additionally, legislation was enacted to provide incentives for renewable energy production, thus making electricity generation cleaner and reducing the risks associated with volatile hydrocarbon prices.

An important feature of the Guatemala power market has been its use of competitive bidding to procure long-term power, beginning with First Price Sealed Bids (FPSB) and eventually moving to its first electronic reverse auction in 2013. This sequence of reforms, where there is an initial opening of the spot market followed by a market for long-term power, is common to most of the large and medium-sized countries of Latin America. The paper proposes that most, if not all countries, even those that follow a single-buyer model, should introduce some form of competitive bidding. The theory behind competitive bidding is that its use as a procurement tool leads to improved price discovery and creates opportunities for price reductions, especially when costs are declining due to technology improvements and economies of scale, lower prices, and to enhanced transparency and thus to a reduction of the opportunities for corruption.

The last competitive procurement for power in Guatemala was an electronic reverse auction. The process was as follows:

- Long-term, least-cost indicative plan is prepared by the Ministry of Energy with input from the regulator.
- Based on the plan, the DISCOs estimate demand needs and the regulator validates the estimates.
- Terms of Reference (TORs) for the procurement are formally requested by the DISCOs.
- Regulator issues TORs.
- Based on the TORs, the DISCOs prepare bidding documents for the approval of the regulator
- From that point, the process is carried out by the DISCOs with oversight from the regulator.
- Draft power purchase agreements (PPAs) are part of the bidding documents and cannot be modified or amended without the approval of the regulator.
- Bids are received, evaluated, and awarded in public, thus promoting transparency.

The last auction took place in 2013 and is referred to as Plan de Expansión de la Generación or PEG 3. Key aspects were:

- Total time required was 12 months, including three months for the development of the least-cost planning model.
- Sixty-five firms participated and each paid US\$10,000.
- Total costs to the off-takers were US\$100,000, including \$50,000 paid to a consulting firm that specializes in auction design and implementation.
- Total weighted average price declined from US\$117.50/MWh in 2010 to US\$97.74/MWh in 2013.

Another important innovation in Guatemala has been the promotion of private investment in transmission implemented through competitive bidding procedures in 2009 (PET-1-2009) and 2014 (PETNAC-2014). The main characteristics are summarized in the table below.

Table 1: Transmission Tenders⁴

Characteristics	PET-1	PETNAC
Year of auction	2009	2014
Investment cost (US\$ million)	370	255
Length (km)	845	546
Capacity	230 kV	230, 138 & 69 kV
New substations	12	21
Increased capacity substations	15	19
Annual payment (US\$ million)	32.3	33.3
Purpose	Extend the National Interconnected Transmission System to areas that had the strongest generation potential for renewables	Connect 2,100 communities presently lacking access

We have identified a series of measures to improve the operations of power markets in Central America. Some of these measures would be applicable to all countries, some of them are more relevant for particular countries, and some of them deal with the regional power pool. An additional set of recommendations deals with measures to enhance power trade with two additional countries in the region—Mexico and Colombia.

General Recommendations

- Enact legislation and regulations to implement International Labor Organization (ILO) 169 “Indigenous and Tribal Peoples Convention,” which can eventually become an issue in every country that ratified it but is already a bottleneck in Guatemala.
- Focus subsidies to low-income consumers

4. Elaboration by the authors based on PowerPoint presentations made by Silvia Alvarado

- Promote long-term private investment in distribution companies
- Provide training on regulation, project finance, cost-benefit analysis (CBA), and advanced modeling software to the regulatory agency staff.
- Promote private investment in transmission companies (TRANSCOs), as Guatemala has been doing since 2009 and Panama has just started.
- Continue to promote renewable energy.

Country-Specific Recommendations

Country-specific recommendations are summarized in the table below.

Table 2: Country-specific recommendations

Country	Recommendations
Costa Rica	<ul style="list-style-type: none"> ▪ Consider unbundling. ▪ Expand the scope for private generation.
El Salvador	<ul style="list-style-type: none"> ▪ Continue with auctions for new generation. ▪ Carry out auctions for transmission.
Guatemala	<ul style="list-style-type: none"> ▪ Enact legislation to implement ILO convention 169 on the rights of indigenous people. ▪ Take measures to reduce organized electricity theft.
Honduras	<ul style="list-style-type: none"> ▪ Unbundle sector de facto. ▪ Strengthen DISCOs through management contracts or privatization to reduce average technical, commercial and collection (ATC&C) losses and improve efficiency in general. ▪ Improve integrated resource planning (IRP) and transmission planning. ▪ Carry out competitive bidding for new generation.
Nicaragua	<ul style="list-style-type: none"> ▪ Reduce ATC&C losses, particularly electricity theft. ▪ Carry out competitive bidding for new generation.
Panama	<ul style="list-style-type: none"> ▪ Conclude process for awarding concessions for transmission.

Regional Power Pool Recommendations

MER is comprised of Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. The MER Strategic Plan of December 2015 listed 15 substantial issues that need to be resolved for market performance to improve.⁵ Some of the more critical issues are:

- There is a need to award long-term transmission rights and implement regulations to allow firm contracts.
- It is necessary to improve the performance and coordinating capacities of the regional system and market operator (Ente Operador Regional or EOR) to facilitate transactions throughout the region.

5. USAID Initiative for Clean Energy, *CDMER-CRIE-EOR Joint Strategic Plan* (USAID, 2015).

- Resolutions issued by the regional regulator, the Regulatory Commission of the Electrical Interconnection (CRIE), cannot be effectively contested because the same entity would have to accept or reject any challenge filed. Therefore, it would be very important to establish a dispute settlement procedure to contest resolutions issued by the CRIE.
- National delegates appointed as CRIE commissioners should have a strong technical background and very solid expertise in regulation and market issues.
- Coordination between the CRIE and national regulators should be strengthened.
- A better mechanism for formal consultation with market agents needs to be developed.

Power Trade with Colombia and Mexico

Given the excess power existing in some of the MER countries, the interconnection with Colombia represents another important measure to maximize the potential of the MER. This is particularly true now that Panama is getting ready to start up its Liquefied Natural Gas (LNG)-fired electricity generation, which would be a very good complement to Colombia's power system with its predominance of hydropower. Panama should be encouraged to accelerate actions towards facilitating interconnection with Colombia. It would also be important to continue working towards eliminating the transmission constraints within some of the countries that have been preventing the use of the full interconnection capacity (300 MW between countries) of the Central American Interconnection System (SIEPAC) line.

However, Mexico is not a member of the MER and incorporating it would require a modification of the Framework Treaty for the Electrical Market of Central America signed by the six Central American countries in 1996. El Salvador and other countries have expressed interest in transacting with Mexico. Guatemala's official position has been that the interconnection is outside of the MER scheme and it is a bilateral interconnection that operates under an operations protocol agreed upon with Mexico. Therefore, any transactions using this interconnection should be originated in the Guatemalan market through the establishment of a local brokering company. This has created tensions within the MER and the steering committee of the MER (CDMER) has formed a working group to analyze how to incorporate Mexico into the MER.

2 | Background of Power Sector Reforms in Latin America

Latin America led the developing world in power sector reforms. Chile was the first country to reform the power sector in the early 1980s by unbundling and emphasizing the role of competition. Chile's reforms preceded those carried out in England and Wales. The reforms in Chile were soon adopted and improved on by Argentina and Peru in the 1990s.⁶ Eventually, a large proportion of countries in the region followed by establishing an independent regulator, adjusting tariffs, unbundling, privatizing, strengthening the off-takers of power, and establishing wholesale spot markets to enable competition in the market. But strong spot markets were not sufficient to ensure supply adequacy, particularly in countries with rapid demand growth.⁷

To address this lack of supply growth, the second wave of reforms was implemented in Latin America and was characterized by indicative generation expansion plans implemented through the development of different forms of competitive bidding for long-term power; this is usually referred to as “competition for the market.”⁸ Competitive bidding to select Independent Power Producers (IPPs) has been carried out successfully in Latin America in around 10 countries, including countries with large markets such as Brazil, Mexico, and Argentina; mid-size markets such as Chile and Peru; and relatively small markets such as Guatemala, El Salvador, and Panama. We believe that the lessons from auctions in these latter three countries would be applicable to the other three countries in Central America as well as to a wide range of countries in sub-Saharan Africa, Asia, and the Middle East and North Africa. Furthermore, auctions would be beneficial not only in unbundled markets but also in single-buyer models such as the one in Costa Rica and in many countries in the rest of the world.

6. When USAID began to support power sector reform in Guatemala, the main consultants who were engaged by the Agency came from Chile and Argentina: Sebastian Bernstein, Juan Carlos Fassi, and Jorge Karacsonyi. For the past 20 years, Ignacio Rodriguez (Tetra Tech) has supported reforms in Guatemala and other countries in Central America.

7. Rodrigo Moreno et al., *Lessons from Five Years of Experience in Energy Contract Auctions in South America* (Rio De Janeiro, Brazil: International Association for Energy Economics, 2010), <http://reegle.info/policy-and-regulatory-overviews>.

8. Maurer and Barroso, *Electricity Auctions*.

After analyzing many IPP transactions, Eberhard et al. concluded:

There are benefits to competitive bidding in terms of transparency and lower price. Competition is also associated with good practices, such as transparent tendering and contracting procedures or standard contracts with fair risk allocation, which increase predictability and therefore lower perceived risks by prospective investors. As demonstrated by the South African REIPPPP and the Uganda GETFiT program, multiple bid rounds enable the progressive improvement of documentation and contracts; they build investor confidence and a pipeline of bankable projects, which can more easily reach financial close and commissioning.⁹

The World Bank has encouraged countries to use international competitive bidding or national competitive bidding for all goods and services.¹⁰ The World Bank has often recommended a form of FPSB for government procurement of goods and services.¹¹ In the case of IPPs, the Bank generally recommends competitive bidding, including reverse auctions. A very good example of the promotion of competitive bidding is the World Bank Group initiative called Scaling Solar, which has received support from USAID under the Power Africa Initiative.

Scaling Solar offers a package that includes:

- **Advice** to assess the right size and location for solar photovoltaic (PV) power plants in a country's grid.
- **Simple and rapid tendering** to ensure strong competition from committed industry players.
- **Fully developed templates** of bankable project documents that can eliminate negotiation.
- **Competitive financing and insurance** attached to the tender and available to all bidders.
- **Risk management and credit enhancement products to lower** financing costs and tariffs.¹²

This support has resulted in a reduction of the time required to take a project from the very first stage to the beginning of construction to only two years. Other donors should follow the World Bank Group and proactively support auctions through technical assistance and training.

In 2009, Phadke made an effort to estimate the benefits of auctions to procure power. Phadke used data from 41 combined-cycle power plants in eight countries in Asia and the Middle East.¹³ Phadke shows that the stated investment cost of IPPs in developing

9. Eberhard et al., *Independent Power Project*, <http://documents.worldbank.org/curated/en/114141468265789259/Electricity-auctions-an-overview-of-efficient-practices>

10. Rules define thresholds, depending on the type of good or service.

11. FPSB is also called blind auction. In this type of auction, all bidders submit offers at the same time in sealed envelopes so that no bidder knows the bid of any other participant.

12. World Bank Group, "Scaling Solar." <http://www.scalingsolar.org>.

13. Amol Phadke, "How many Enrons? Mark-ups in the stated capital cost of independent power producers' (IPPs) power projects in developing countries," *Energy* 34, no. 11 (2009): 1917-1924, <https://ideas.repec.org/a/>

countries is up to 50 percent higher in the absence of competitive bidding. But as he noted, this does not necessarily mean that the introduction of competitive bidding can reduce the investment costs by 50 percent. Some countries are simply unable to attract investors into the electricity sector under competitive procurement processes. Basically, it is possible and perhaps likely that countries that introduced auctions have better environments for private investment in the power sector.¹⁴

[eee/energy/v34y2009i11p1917-1924.html](http://www.who.int/energy/v34y2009i11p1917-1924.html).

14. We are exploring the possibility of defining an alternative model to the Phadke model that would include some additional independent variables that would address the issue of multicollinearity.

3 | Conceptual Framework for Evaluation Power Markets

In order to analyze the environment for private investment in power markets in the different countries of Central America, we developed a framework and gathered the relevant data. We classify the conditions that affect the attractiveness of a particular power market for investment as follows:

- **Higher level.** These are conditions that affect investment in the economy in all sectors, particularly foreign investment. It is generally not feasible to improve these conditions in the short term and doing so would lie outside a program of power sector reform. But actions such as sovereign guarantees or establishing power purchase agreements in hard currency such as the U.S. dollar and the inclusion of provisions that allow adjustments according to inflation rates can mitigate some of the risks which prevail at this level.
- **Sector level.** These are conditions that affect the energy sector directly. They are central to the reform of the power sector. Adequate laws and regulations are necessary but equally important are regulators that are independent, accountable, and capable.
- **Utility level.** These are conditions that relate to the firm or firms distributing and/or transmitting power. Improvements often require some form of private participation – ranging from management/operations contracts, leases, and concessions – to privatization. A financially viable off-taker of power may be the most important condition to promote adequate private investment in generation and low energy wholesale prices.

Below we discuss these factors and identify possible indicators.

Higher Level

- An unstable **macroeconomic environment** usually affects investment negatively, and the effect is more pronounced in the case of foreign investment as macroeconomic instability increases foreign exchange risk. Central American economies have fairly stable macroeconomic environments. Additionally, all PPAs in Central America have been denominated in US dollars and, overall, long-term contracts have been respected regardless of political pressures for renegotiation over time.

- **Country risk indexes** from rating agencies such as Standard & Poor's (S&P) measure the degree of risk for lending to governments. Some well-functioning power markets with strong off-takers such as Guatemala or Panama have not needed a government guarantee to secure financing.
- **General laws, regulations, and institutions.** Countries that respect private property and hold a proven track record of legal certainty around long-term contracts would provide a better environment for investment, for example. The Index of Economic Freedom of the Heritage Foundation could be an indicator.
- **Business climate.** The World Bank's Doing Business project in a sense estimates red tape and would be a good indicator.
- **Banking.** A strong banking system would allow potential investors to borrow in local currency, thus reducing foreign exchange risk and to a certain extent, political risk. A potential indicator would be the total credit to the private sector as a percent of GDP, an accepted measure of financial depth.
- **Equity market.** A strong equity market would allow potential investors to issue stock in local currency, thus reducing foreign exchange risk and political risk. A potential indicator would be the total value of shares of listed companies as a percent of GDP.

Sector Level and Utility Level

- **Laws and regulations.** These are the laws and regulations dealing with the energy sector, and it is difficult to conceptualize a single indicator that would reflect their quality. A possible and imperfect proxy is the year the reform was initiated and/or how stable the legal framework has been. In the case of Guatemala, the Electricity Law (Ley General de Electricidad, or LGE) has never been amended or modified in the 20 years since its enactment; there have been some regulatory adjustments but those were at the level of secondary legislation or bylaws.
- **Independence, accountability, and a capacity of the regulator.** Unfortunately, a comparative indicator has not been applied to all countries. Ashley Brown et al. developed a method for evaluating infrastructure systems but it has not been applied systematically.¹⁵ Also, the Gilardi Index has been applied to some countries in Central America that are members of the Ibero-American Association of Energy Regulators (ARIAE).
- **Full cost recovery tariffs and technical tariff regimes.** Full cost recovery tariffs and a transparent system of periodically adjusting them as costs increase or decrease is the best guarantee that the power off-taker will be able to meet its financial commitments to the generators. In general, markets where technical tariff regimes prevail have proven to attract sound investors, both in distribution and in generation. In Guatemala, the DISCOs have been sold a number of times at increasing dollar-

15. Ashley Brown et al., *Handbook for Evaluating Infrastructure Systems* (Washington, D.C.: The World Bank, 2006), <https://www.adb.org/.../brief-02-regulation-infrastructure-sevices.pdf>. An alternative methodology was developed by Fabrizio Gilardi has been applied to a few of the energy regulators of a few countries under the auspices of the Ibero-American Association of Energy Regulators (ARIAE).

denominated prices, an indication that tariffs reflect real costs and an adequate return on equity.

- **Human capital.** Quality of human capital is key. It is important to have technically qualified staff within all the main institutions that govern the market. A key factor is to have the budgetary resources available to recruit competent staff for the regulator and to pay them competitive salaries. International donor support can play a role in providing relevant technical assistance and planning tools like software, as well as training.
- **Land, environmental, and social aspects (E&S).** These increase investment costs as well as risks.¹⁶ This risk can be mitigated if the land is acquired and the permits are issued before the investment. An important issue in Guatemala and other countries has been the ILO Convention C 169. In Guatemala, it is necessary to enact legislation to codify procedures.
- **An independent market and system operator** is key to guarantee the transparency of wholesale transactions, providing the necessary confidence to all market agents in relation to their investments.
- **The creditworthiness of the distribution operator.** A proven track record of payment compliance from the off-taker is key. Another possible indicator of performance is the level of ATC&C losses, as low losses are a good indicator that a utility is well managed.

16. Under the World Bank/IFC Scaling Solar Program, the land is often secured and acquired by the government before the bid along with preliminary E&S studies.

4 | Central America: Major Developments in the Power Sector

Over the past 20 years, there has been a major improvement in the performance of the power sector in all countries of Central America – a result of power sector reforms as well as a general improvement in the business climate. In the 1990s, the power sector in several Central American countries was highly deficient, with habitual load shedding (“blackouts”) that resulted from poorly managed utilities – a consequence of political interference – and generally low tariffs that constrained new investment. Exceptions were the power companies in Costa Rica and Panama, which offered reasonably good services but were relatively inefficient and were characterized by overemployment. Costa Rica’s utility, the Instituto Costarricense de Electricidad (ICE), also provided telephone services and used the profits generated by long distance services to subsidize local telephony and electricity, particularly for residential customers. All Central American countries have introduced some form of power sector reform, ranging from permitting some IPPs to full retail competition; and three of them, Guatemala, Panama, and El Salvador, have introduced auctions for long-term power.

Two power markets that have performed quite well in Central America in the past five years are Panama and Guatemala. Interestingly, while Guatemala does not have the most favorable high-level conditions, it has been highly successful in promoting an efficient power sector and has been the pioneer in the region in promoting power auctions. This is an indication that a country with some general business environment challenges can still have a well-functioning power market that is able to promote private investment. In Table 1, we compare the performance of the six Central American countries with respect to higher-level conditions.

Table 3: Central America: Key Higher-Level Conditions

Indicator	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua	Panama
GDP per capita (US\$) ¹⁷	11,824	4,224	4,147	2,361	2,151	13,680
Population (million) ¹⁸	4.9	6.3	16.6	9.1	6.1	4.0
Installed Capacity (MW) ¹⁹	3,467	1,671	4,201	2,421	1,381	3,339
Inflation (%) 2016 ²⁰	1.7	0.8	4.9	4.0	4.0	1.6
Index of Economic Freedom ²¹	57	75	73	94	100	54
S&P rating ²²	BB-;neg	B-;neg	BB; neg	B+; pos	B+; stable	BBB; stable
Domestic credit (% of GDP) ²³	59.3	45.6	34.3	56.3	35.7	91.0
Doing Business Ranking ²⁴	61	73	97	115	131	79

In terms of the **higher-level conditions**, Panama and Costa Rica present the most favorable environment. Both countries have relatively high per capita incomes and are largely free market-oriented according to the Heritage Foundation’s Index of Economic Freedom. Panama uses the U.S. dollar as the medium of exchange thus essentially eliminating foreign exchange risk, its government has received an investment-grade ranking from S&P, and it has a highly developed financial system as measured by the relationship between domestic credit and GDP.

It is more difficult to assess the **sector-level and utility-level conditions** objectively with data that are readily available. Table 2 summarizes some key indicators. Costa Rica implemented limited reforms in 1990 with USAID support to allow private generation for IPPs under a size limit that was eventually raised to 25 MW. All other countries initiated the power sector reforms a few years after Costa Rica.

The Guatemalan reforms were supported from the very beginning by USAID (see Section VI). Nicaragua and Honduras were encouraged by a donor to introduce a competitive model (Model 4) when their power sectors were significantly smaller than 1,000 MW, a threshold advocated by the World Bank as the minimum market size required to implement a competitive market scheme.²⁵

Both countries faced significant issues initially but have seen improvements in the past five years, and load shedding is now not as prevalent as it was 10 years ago. Honduras enacted legislation to unbundle electricity generation from transmission and distribution, but this was

17. Using the World Bank’s definition, Panama is high income; Costa Rica, El Salvador and Guatemala are upper middle income; and Honduras and Nicaragua are lower middle income.

18. “Population,” World Bank, <https://data.worldbank.org/indicator/SP.POP.TOTL>

19. Manuel Eugenio Rojas Navarrete, *Estadísticas del Subsector Eléctrico de los Países del Sistema de la Integración Centroamericana (SICA)*, (Mexico: CEPAL, 2016), <https://www.cepal.org/es/publicaciones/42720-estadisticas-sub-sector-electrico-paises-sistema-la-integracion-centroamericana>.

20. “Inflation,” World Bank, <https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG>.

21. “2018 Index of Economic Freedom,” Heritage Foundation, <https://www.heritage.org/index/>.

22. “Standard & Poors,” [countryeconomy.com](https://countryeconomy.com/ratings/standardandpoors). <https://countryeconomy.com/ratings/standardandpoors>.

23. “Domestic Credit to Private Sector (%),” World Bank, <https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS>.

24. “Doing Business 2018,” World Bank, <http://www.doingbusiness.org/content/dam/doingBusiness/media/Annual-Reports/English/DB2018-Full-Report.pdf>.

25. Maria Vagliasindi and John Besant-Jones, *Power Market Structure-Revising Policy Options* (Washington, D.C.: The World Bank, 2013), <https://openknowledge.worldbank.org/handle/10986/13115>.

never implemented. The World Bank and the IDB are presently encouraging the Government of Honduras to implement these reforms. During the 2018 presidential elections in Costa Rica, a topic the two candidates debated was the high energy tariffs that many non-residential customers must pay and the negative effect this has on international competitiveness.

Table 4: Key Sector and Utility-Level Indicators

	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua	Panama
Year of Reform	1990	1997	1996	1994	1998-99	1996
Model	1	4	4	2	4	4
Regulatory quality (Gilardi Index) ²⁶	0.83	NA	0.83	NA	0.73	NA
ATC&C losses (%) ²⁷	11	11	9	35	21	14
Customers per employee 2016 ²⁸	54	615	2202	NA	NA	NA
Sales per employee ²⁹ GWh	0.28	2.31	5.99	NA	NA	NA
Average retail price \$/MWh (2016) ³⁰	219	150	110	139	191	162
Average Spot Prices (2016)	61.9	81.5	51.8	NA	73	58.5
Average residential price 2015 \$/MWh	177	128	130	142	173	144
Average industrial price 2015 \$/MWh	188	148	130	193	219	218
Percentage change in total generation capacity 2011-2016 ³¹	31	11	62	49	26	46
Percentage change in renewable generation capacity 2011-2016	42	13	99	102	75	65
Net exports GWh 2016	-132	-988	1,105	-179	-187	368
Exports GWh 2016	181	224	5	16	18	398
Imports GWh 2016	313	1,212	1,110	195	205	30
Percent private generation 2016	18	72	76	72	90	90

26. Asociación Iberoamericana de Entidades Reguladoras de la Energía (ARIAE), http://www.ariae.org/cooperacion_detalle.asp?id=108&idMDP=6 Estimated by ARIAE.

27. Filippo Cavassini, The OECD Best Practice Principles on the Governance of Regulators (Madrid: OECD, March 2015), <https://www.ariae.org/sites/default/files/2017-04/Governance%20Principles%20for%20Regulators%20.pdf>.

28. Guatemala: EEGSA, El Salvador: CAESS, and Costa Rica: ICE as per CIER's Tarifas Electricas en Distribucion para Clientes Regulados 2017, <http://www.cier.org/es-uy>.

29. Guatemala: EEGSA, El Salvador: CAESS, and Costa Rica: ICE as per CIER's Tarifas Electricas en Distribucion para Clientes Regulados 2017, <http://www.cier.org/es-uy>.

30. All prices from "Tarifas Eléctricas en Distribución para Clientes Regulados, América Latina." Comisión de Integración Energética Regional (CIER), 2017, <http://www.cier.org/es-uy>.

31. All data on generation and trade from Manuel Eugenio Rojas Navarrete, Estadísticas del Subsector Eléctrico de los Países del Sistema de la Integración Centroamericana (SICA), (Mexico: CEPAL, 2016), <https://www.cepal.org/es/publicaciones/42720-estadisticas-subsector-electrico-paises-sistema-la-integracion-centroamericana>.

Unfortunately, we do not have information on the quality of sectoral regulation for all countries. The Gilardi Index shows that the Costa Rica and Guatemala regulators are similarly competent while the Nicaragua regulator is somewhat less so.³² An effort to rank all countries in the region using the Gilardi Index or the methodology developed by Brown et al. would be useful, but is beyond the scope of this paper.³³

The utility-level conditions are very important as the strength of the off-taker is a very important consideration for investors. Costa Rica, El Salvador, Guatemala, and Panama have ATC&C of less than 15 percent, while losses in Nicaragua are 23 percent and in Honduras 35 percent.

According to a survey carried out by the Commission on Regional Integration (CIER in Spanish),³⁴ by January 2017, the retail tariff in Guatemala was US\$112/MWh for low consumption customers (30KWh or less) served by the largest distribution company in the country, EEGSA. In contrast, the same type of customers of El Salvadoran CAESS paid US\$134/MWh and those served by ICE in Costa Rica paid US\$130/MWh. Meanwhile, commercial customers paid US\$110/MWh in Guatemala, US\$150/MWh in El Salvador and US\$210/MWh in Costa Rica. It is clear that the strong competition registered at the generation level in Guatemala led to a significant drop in the cost of generation and resulted in a significant decrease in tariffs to all regulated users.

Another useful indicator of efficiency is the index of the number of clients served per employee by distribution companies. According to CIER in its 2017 annual survey, in Guatemala EEGSA served 2,202 customers per employee, whereas in El Salvador, CAESS served 615 customers per employee. In Costa Rica, ICE only served 54 customers per employee. The great difference between this indicator in Guatemala and Costa Rica is that the privatized DISCOs in Guatemala outsourced many functions. For those countries that have allowed private operators to take over the distribution business, indicators are significantly better than in the case of countries that have chosen to keep the electricity service in the hands of the state.

Considering the degree of the openness of the electricity sector to private investment, three markets provide an interesting comparison. Guatemala adopted a market model with a high degree of private participation 20 years ago with considerable USAID support discussed in Section VI. El Salvador reformed its power sector more or less at the same time as Guatemala and privatized the distribution companies as well. However, the model initially adopted was based on a price bidding system with just a few generators and the state-owned power company (CEL) continued to grow, sending mixed signals to investors that resulted in a lack of private investment and higher prices than its neighbors.

Eventually, El Salvador implemented a market model based on marginal costs, similar to the rest of the region. In the case of Costa Rica, the country has chosen to maintain the

32. A methodology for evaluating infrastructure regulatory systems is in Brown, et al., *Evaluating Infrastructure Regulatory Systems*. Implementing their methodology in Central America would be an interesting exercise that goes beyond this paper.

33. Ashley Brown et al., *Handbook for Evaluating Infrastructure Systems*.

34. "Tarifas Eléctricas en Distribución para Clientes Regulados, América Latina 2017," Comisión de Integración Energética Regional (CIER), <http://www.cier.org/es-uy>.

vertically integrated utility model, allowing a limited private participation in generation under 25 MW through a build-own-operate-transfer (BOOT) scheme.

In terms of **results**, all countries have improved reliability, reduced and in some cases eliminated unscheduled load-shedding, increased coverage, and diversified the generation matrix through more reliance on small and medium-sized hydropower, wind, and solar. Between 2011 and 2016 the region increased total generation by 40 percent and renewable generation by 63 percent. As shown in Table 2, Guatemala, Honduras, and Panama have been most successful in increasing generation. Some of the issues in Honduras are that some of the recently developed solar generation is far from the main load center in San Pedro de Sula, the transmission network may not be fully ready for increased generation, and limited competition in the award of the PPAs has resulted in high prices. Of all the countries in the region, the one that could benefit the most from least cost planning for generation and transmission and a system of competitive bidding would be Honduras – competitive bidding would be particularly beneficial.

Guatemala is the country with the highest reserve margin in the region and has been a major net exporter of power during the past five years. The only other country that has been a net exporter is Panama but to a much lower extent. Guatemala has the lowest spot prices as well as the lowest prices for industry and commerce. In contrast, Costa Rica has the highest prices for industry and commerce, and this is considered a constraint to competitiveness.

5 | The Case of Guatemala

We have chosen to discuss the case of Guatemala at length as it is, by almost every indication, the most successful market, and achieved this in the context of less than optimal high-level conditions. We believe that the case of Guatemala could serve as a model for other countries in the region as well as for countries in Asia and Africa.

In 1996, in response to the inability of the state-owned utility to provide power to a growing economy, a competitive regulatory framework for electricity was introduced through the General Electricity Law. Drafting the electricity law was a condition for the disbursement of a World Bank Structural Adjustment Law (SAL).³⁵ The new legislation created an independent regulatory agency, the Comisión Nacional de Energía Eléctrica (CNEE) and an independent system administrator, the Administrador del Mercado Mayorista (AMM), which is governed by a board of directors with representatives of the GENCOs, DISCOs, TRANSCO, large users, and traders. The law also included mandatory unbundling of market activities, an open market for generation, and set the rules for transmission and distribution activities. The government-owned distribution assets were successfully privatized in 1998. Some of the proceeds of the privatization were used to fund a universal access fund for power, which succeeded in increasing grid access from 63 to 92 percent.

In 2007, secondary regulations to promote long-term contracting based on indicative planning were introduced. As a result of this, generation and transmission expansion plans were prepared by the regulator, and the distribution companies started to hold open tenders for long-term contracts.

In 2016, the total installed capacity in the country was 4,200 MW, 63 percent of which was renewable energy, more than 75 generation units for a 1,700 MW of peak demand. There were eight transmission companies, 22 brokering companies (traders), 19 distribution companies and about 1,000 large/unregulated users with a demand of 100 kW or more.

Electricity rates to end-users are 50 percent less in 2018 than they were in 1996 before the reform was approved. In regards to other results of the reform, according to a report from

35. As discussed in Section VI, the government of Guatemala asked USAID for support to draft the law. From that point on, USAID provided support for many years in a highly cost-effective manner.

the Guatemalan Association of Renewable Energy, the private investment in generation in 2015 was over US\$7 billion, while investment was US\$400 million in transmission and over 1,200 million in distribution. And in terms of the regional market, Guatemala has been the largest net exporter of electricity to the MER for the last decade. And more recently, the country started to export to Mexico during certain hours of the day, and exports to Mexico based on spot-price difference are gradually growing, representing a new business opportunity for Guatemala.

A Brief History of Auctions

- The first tender for long-term contracting was carried out in 2009 through a sealed envelope process (technically an FPSB) that resulted in the installation of a 300 MW coal-fired plant at a combined average price of US\$84/MWh
- The second process (known as PEG 1) to contract long-term power was carried out in 2011, again through FPSB and resulted in contracting 213MW. Fifty companies acquired the TORs and 33 companies presented bids. The average combined price (capacity and energy) awarded at this tender was US\$117/MWh.
- The third process (known as PEG 2) was carried out in 2012 and resulted in awarding contracts for 406 MW. This resulted in a significant diversification of the energy matrix, as the majority of projects awarded were hydropower, PV, and wind power projects. The average combined price (capacity and energy) awarded at this tender was US\$112.50/MWh.
- Considering a large number of participants registered in the 2011 and 2012 competitive processes, the fourth tender used an electronic reverse auction methodology. The auction resulted in the award of 250 MW at lower prices than those obtained in the two prior processes, a combined price of US\$97.74/MWh (Table 3).
- PEG3, as the three other prior tenders, was carried out by the off-takers with the supervision of the regulator CNEE. All the logistic costs were covered by the off-takers that financed them through the sale of the bidding documents (US\$10,000 per bidder). Bidding documents were public and available to any potentially interested party, but if a given investor decided to participate in the tender, purchase of the bidding documents was required to have access to the website for the bidding process.
- One key step was an evaluation of the technical and financial qualifications of bidders. The bidding committee members were representatives of the off-takers. The committee was responsible for carrying out the prequalification process. It is important to ensure that pre-qualified bidders have the required technical and financial capabilities to implement the project. Once the prequalification process was completed, the bidding committee was in charge of organizing the reverse auction process.
- An important aspect of the auction process was that the economic evaluation and optimization for the award of bids was conducted on-site in public, thus promoting transparency. To accomplish this, the bidding committee (made up of delegates of the DISCOs) hired an expert firm from Argentina to develop tailor-made software (similar to PEG 2) to mathematically evaluate each and all bids and choose the optimal

portfolio to fill the combined load curve of the DISCOs in terms of capacity, operation characteristics, and price.

Representatives from 65 bidders controlling more than 100 generation units participated in the reverse auction process in a conference room in 2013. After 17 rounds, the capacity to be contracted (250 MW) was awarded. All rounds of the auction required approximately five hours. A summary of the main parameters of the auction is presented below:

COSTS OF PEG 3

- Consulting fees: \$50,000
 - Computers (100) and other auction costs: \$50,000
 - Total cost to off-takers for the third auction: \$100,000
- Net Costs:** Auction fully self-financed through sales of bidding documents (US\$10,000 per bidder)

TIME REQUIRED

- Least-cost modeling: 3 months (required regardless of whether ICB or DN)
- All other activities: 6-8 months
- Total time: 9-11 months

AMOUNT CONTRACTED LONG-TERM

- Capacity 250 MW
- Value of investment \$500 million

COST OF AN AUCTION AS PERCENTAGE OF THE VALUE OF INVESTMENT: 0.02 percent

Tables 5 and 6 compare prices in the two auctions:³⁶

Table 5: Prices in Long-Term Tenders in Guatemala, 2011-2013

Tender	Date	Monomic (US\$/MWh)	Method
PEG 1	2011	117.50	Sealed Envelope
PEG 2	2012	112.80	Sealed Envelope with virtual offers by technology
PEG 3	2013	97.74	Electronic Reverse Auction

36. Silvia Alvarado, “Experiencias de la Reforma Eléctrica en Guatemala” (paper presented at VI Foro Anual, Asociación de la Industria Eléctrica Dominicana, Santo Domingo, Dominican Republic, October 2016).

Monomic Cost Comparison (average purchase price)

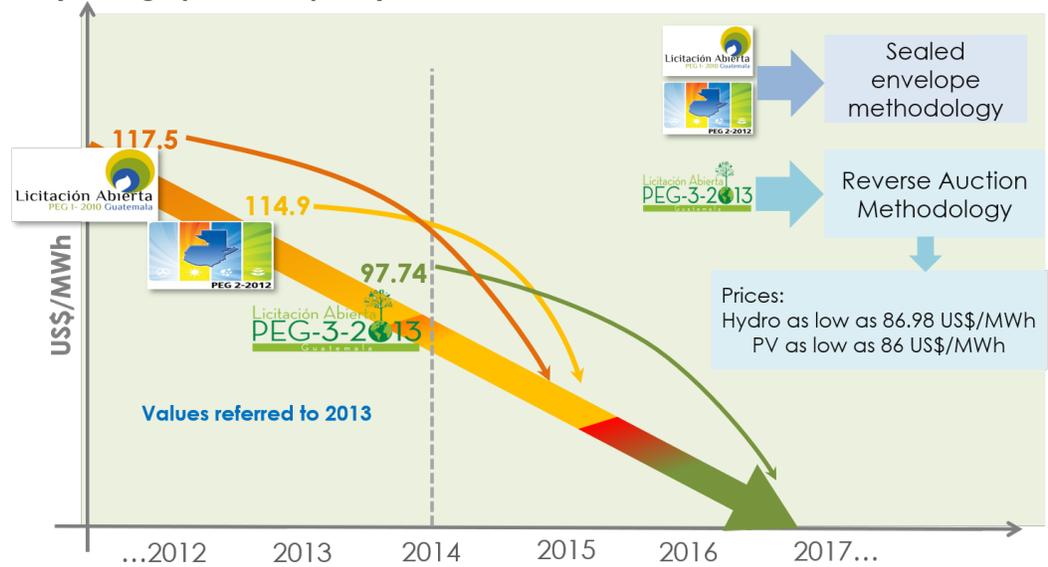


Table 6: Guatemala Price Comparison between Short-Term Tenders

Tender	Date	Monomic (US\$/MWh)	Methodology
Short term 2014-17	2014	133.7	Electronic Reverse Auction
Short term 1-2015	2015	89.82	Electronic Reverse Auction
Short term 2-2015	2015	87.04	Electronic Reverse Auction

Another important innovation in Guatemala has been the promotion of private investment in transmission, implemented through competitive bidding procedures in 2009 (PET-1-2009) and 2014 (PETNAC-2014). Both were FPSB. The selection was based on the lowest annual payment bid, and winners were international consortia composed of foreign firms.

Table 7: Guatemala Transmission Expansion Awards³⁷

Characteristics	PET-1	PETNAC
Year of auction	2009	2014
Investment cost (US\$ million)	370	255
Length (km)	845	546
Capacity	230 kV	230, 130, and 69 kV
New substations	12	21
Increased capacity substations	15	19
Annual payment (US\$ million)	32.3	33.3
Purpose	Extend the National Interconnected Transmission System to areas with the strongest potential for renewable power generation	Connect 2,100 communities presently lacking access
Length of Process	6-8 months	6-8 months
Authority issuing TOR	Regulator (CNEE)	Ministry (MEM)
Costs	US\$250,000	US\$50,000; cost was lower because some of the work was done under PET-1

Social Conflicts and Electricity Theft

In recent years, the Guatemalan power market has suffered the impacts of conflicts with rural communities that oppose the development of new generation, transmission, and distribution infrastructure. In spite of efforts by project developers to implement community engagement programs following guidelines from the World Bank and other international organizations, some internationally funded non-governmental organizations (NGOs) have been successful in raising the opposition from communities to the installation of new hydropower projects and transmission infrastructure. One of the arguments that these NGOs base their complaints on is the lack of implementation of the consultation process established in the 169 ILO Agreement on Tribal Peoples. Using this argument, NGOs have been successful in obtaining rulings from the courts to suspend construction and operation of some of projects.

Another important issue that is affecting the performance of the power market is the increasing electricity theft led by an NGO that has a presence in all the Guatemalan territory and against whom the distribution company has filed more than 2,000 legal suits for fraud and illegal grid manipulation. According to a study carried out by the Guatemalan Central American Business Intelligence agency (CABI) and presented in October 2018, the estimated losses to date of the social conflicts that affect the power sector can be quantified as a loss for each Guatemalan in order of US\$300 and more than 600,000 of new jobs lost for the country. And according to the figures presented by the distribution company (ENERGUATE), their annual losses due to electricity theft in 2017 were in the order of US\$48 million.

37. Silvia Alvarado, “Experiencias de la Reforma Eléctrica en Guatemala” (paper presented at VI Foro Anual, Asociación de la Industria Eléctrica Dominicana, Santo Domingo, Dominican Republic, October 2016).

Because of public pressures, the rulings of the local courts lately have failed at adequately protecting the rights of the power sector agents, favoring in most of the cases the challenges filed by the communities and NGOs and raising the concerns among the private investors about their legal rights and business prospects. It is therefore very important for Guatemala, in order to safeguard the results accomplished by the power sector reform, to implement an appropriate structure and bylaws to comply with the implementation of the commitments under the 169 ILO Agreement. And, on the other hand, to launch a strong campaign against electricity theft enforcing the provisions of the penal code that include electricity theft as a crime subject to prosecution.

6 | USAID Support for Power Sector Reform in Guatemala

USAID has been providing crucial support to the government of Guatemala (GOG) for the design and implementation of power sector reform since the mid-1990s. The main reason to discuss this is that it can serve as a model for donor support of reform programs in other countries. This support is widely known in Guatemala but few outside are aware of it, partially because it was not the result of a large program, and the activities were never formally evaluated. In November 2016, the GOG organized a series of events to commemorate the 20th anniversary of the enactment of the law, and several of the speakers referenced the support provided by USAID during these events. This section presents a brief summary of USAID support for the power sector, which both authors of this paper were directly involved in.³⁸

Enron installed the first private IPP to help the country deal with a supply shortage that resulted from a lack of government investment. The power plant consisted of two barges with a total capacity of 110 MW, and it had a long-term, take-or-pay PPA contract with the state-owned distribution company, Empresa Eléctrica de Guatemala, S.A (EEGSA). It is important to note that USAID was not involved in any way with this transaction, which was not competitive, was clouded in secrecy, and was shown to have included multimillion-dollar payoffs to the highest political authorities in the country.

USAID began to support comprehensive power sector reform in Guatemala in 1996. At the time, a SAL stipulated the drafting of a new electricity law as one of the conditions for disbursement. While not explicit in the SAL document, the World Bank was generally promoting reforms that would follow the Chile-Argentina-Peru models, and this is what the government was encouraged to do. The GOG then approached the USAID mission to provide the services of a consulting firm knowledgeable about the power sector reforms in South America.

In response to the GOG request, USAID funded the consultant services of SYNEX Ingenieros from Chile, led by Sebastian Bernstein, who had played a key role in power sector reform

38. USAID also supported the reform of the telecommunications sector, a subject totally outside the subject of this paper. The telecommunications reform had many innovative aspects in terms of spectrum management, arbitration for interconnection disputes, licensing, etc. that are still considered innovative 20 years after the telecommunications law was enacted.

in Chile, to draft the General Electricity Law (LGE) and its bylaws. The LGE was approved by the Guatemalan Congress in October 1996 and mandated a series of actions for its implementation, including the establishment of an independent regulator (CNEE), an independent System and Market Operator (AMM or Wholesale Market Administrator) and the assignment of policy-making to the Ministry of Energy and Mines (MEM).

As part of the assistance to the GOG for the full implementation of the new legislation, USAID also funded other key consultants including Ignacio Rodriguez, Juan Carlos Fassi, and Jorge Karacsonyi from Hagler Bailly to work on the drafting of the norms and regulations required and to help in the process of privatizing the main distribution companies and assets. Privatizing the distribution companies and adjusting tariffs upward were very important recommendations that were followed by the government and may be one of the identifiable conditions for the success of the reforms.

Successful privatizations of the two main state-owned DISCOs, EEGSA and INDE, were completed in 1998 and 1999 respectively. Shortly after the LGE was approved, USAID also sponsored a workshop with the assistance of the U.S. Energy Association for key players of the public and private sectors to make them acquainted with the new regulatory framework that would govern the power sector.

Other important aspects of the reform dealt with access and renewable energy. Approximately US\$101 million from the proceeds of the privatization of the Instituto Nacional de Electrificación (INDE) distribution assets were used to capitalize a trust fund at the Bank of New York to provide resources for an electricity access fund. Essentially, the privatized firms received US\$650 per connection from the fund. This resulted in an increase in the electrification rate from 60 percent in 1996 to 85 percent in 2006, mainly in low-income households, and this was an important component of the peace accords. USAID supported the GOG throughout the whole process of the privatization of the distribution assets in a technical capacity as part of the working groups formed to direct those activities.

To promote cleaner energy and a diversification of the energy matrix, a renewable energy incentives law was drafted and enacted in 2006. The main features of this law were to provide significant tax incentives: import duties and VATs during construction and 10 years of income tax after the commercial operations date (COD). USAID facilitated the assistance of several consultants through organizations such as Fundación Solar, Winrock International, and the National Hydropower Association (NHA) among others.

Some key results of the reform have been:

- A functional regulatory framework with clear rules that has been in place since its approval without any modifications to the LGE
- Over US\$7 billion dollars of private sector investment attracted for new generation projects
- A long-term energy policy in place that prioritizes the use of renewable energy

- The diversification of the energy matrix reversing the use of fossil fuels towards the use of renewable energy sources, mainly hydro but also wind and solar

Also, through the use of open bidding processes, the country has awarded 86 new generation plants that represent over 1,000 MW of new installed capacity.

In summary, due to the legal certainty created by the sector's reform, Guatemala has achieved:

- Over US\$1.2 billion of private sector investment in distribution
- Over US\$400 million of private investment in new and upgraded transmission assets
- Over US\$7 billion of private investment in new generation assets
- A generation capacity that is double the country's peak demand
- An increase in the coverage of electricity services from 63 percent in 1996 to 92 percent in 2018
- A residential end-user tariff that is 50 percent less of what it was back in 2010
- The lowest spot prices in the Central American region
- Guatemala is a net exporter to the MER and currently an exporter to Mexico thanks to its excess of installed generation capacity.

7 | Central America Regional Power Market (MER): Background

In 1996, the six countries of the Central American region began a process designed to interconnect all national grids with a high voltage line and to establish a regional market for electricity. The purpose was to promote the installation of regional, more efficient generation projects, capable of achieving economies of scale, and to enhance the reliability of all national systems. The so-called “Framework Treaty” (Tratado Marco) was signed by the six Central American presidents on December 30, 1996, in Guatemala City. The treaty is aimed at supporting the creation and gradual growth of a regional electricity market based on reciprocal and non-discriminatory conditions conducive to the sustainable development of the region.

The MER provided the framework for regional transactions of selling and buying electricity by market agents; these transactions take place through either short-term exchanges or medium and long-term agreements or contracts among agents. There are four regional entities that provide the institutional framework to the operation of the MER: the Directive Policy Council (CDMER), the Regional Regulatory Commission (CRIE), the Regional Operator (EOR), and the Owner of the Regional Grid (EPR).

MER Operations

According to official data, the transactions volume in 2016 of the MER was 4,581 GWh, representing around 9 percent of the total electricity produced in the member countries. The total number of agents authorized to make transactions in the MER was 219, of which 113 were generating companies, 17 were distribution companies, 48 were brokers, and 41 were large consumers. Of these agents, 102 were from Guatemala and the rest were from the remaining countries.

Table 8, the summary of sales and purchases within the MER for the period of January 1 to May 31, 2018, is shown below:

Table 8: MER Sales and Purchases Jan-May, 2018³⁹

Country	Sales (GWh)	Purchases (GWh)
Guatemala	781.6	1.1
El Salvador	95.1	788.5
Honduras	7.9	96.2
Nicaragua	0.0	96.1
Costa Rica	28.3	65.3
Panama	157.3	13.3

Source: Ente Operador Regional (EOR)

According to official figures of the EOR, the total electricity sales in the MER increased from 1,359 GWh in 2015 to 2,444 GWh in 2017. The country with the largest amounts of additional electricity generation was Guatemala, with 842GWh, 1,110GWh and 1,741GWh in 2015, 2016 and 2017 respectively.

However, there is criticism among investors in the region that the performance level of the MER remains well below the system's current top capacity of 300MW. A total volume of 2,444 GWh was injected in 2017 whereas the line was designed to carry out transactions in the order of 5,000 GWh per year.

39. Jose Hernandez. "Status of the Operation of the Regional Electric System" (paper presented at 21st Annual Central American Energy Conference, S&P Global Platts, Panama City, Panama June 7-8, 2018).

8 | Use of Natural Gas in Central America

A very significant new development in the region is the imminent introduction of LNG in Panama. This will reduce generation costs in Panama significantly and could potentially position the country as a regional hub for reexporting gas in barges to the other countries in the region. Additionally, LNG-based generation in Panama could increase the financial and economic returns of the interconnection with Colombia.

In the last decade, natural gas became an important alternative source to supply growing global demand needs driven by more stringent environmental requirements, the increasing importance of the operational flexibility afforded by gas-fired turbines, and the commercial success of aeroderivative turbines in combined cycle configurations. Central America is not the exception to this situation, especially considering the latest developments in the U.S. gas market that are resulting in lower prices for smaller countries.

There have been several initiatives looking at the feasibility of building a pipeline from Mexico to Guatemala to bring gas to the region for power production and other industrial uses. Many studies and assessments have been undertaken in the last few years but practically all of them have concluded that to anchor such a pipeline project, national demands of electricity in at least the north triangle (Guatemala, Honduras, and El Salvador) would have to be aggregated. Given the logistical complexities that would involve aggregating different markets, the project has not moved forward as envisioned. In addition, the uncertainties on the Mexican side about the potential of supplying gas to the region in light of insufficient capacity to supply their own gas demand first has diminished the potential to continue to pursue this pipeline initiative, at least for the time being.

In the meantime, the prices and technology options for the use of LNG in small countries like those of Central America has advanced. To date, at least Panama and El Salvador have awarded PPAs in the last few years for the construction of LNG projects.

In 2015, the government of Panama carried out two tenders to award PPAs to two thermal plants running on regasified LNG expected to come on-line in 2018 and 2021: the 380 MW AES Colón and the 380 MW Martano. The construction of the AES facility is well advanced and includes an LNG terminal with sufficient capacity – according to the developer – to perform as a hub to supply LNG to other Central American countries through barges,

which would significantly increase the chances of installing gas-fired units in other countries like Guatemala.

Also, El Salvador awarded a PPA to Energía del Pacífico for supplying 350 MW of electricity from LNG. Although construction is behind schedule, the developers have expressed their commitment to complete the project and the government has granted them extensions of their PPA. On June 20, 2018, the developers announced to the local press that the plant is expected to reach its COD in the third quarter of 2021.

The current excess of generation supply in the Guatemalan market has motivated the government to put long-term bids on hold for the time being. However, when new tenders are launched in the future, LNG might be one of the technologies awarded to substitute other less clean fuels like coal and heavy fuel oil. The other country that might consider LNG in near future tenders is Honduras, whereas Costa Rica has a defined policy of carbon neutrality that would not favor the development of new thermal generation facilities in that country.

The issue of reliability of service, as we know, is an important consideration when defining or updating long-term energy policies. That is why for several of the Central American countries, LNG may represent a sound alternative to continue with the energy matrix diversification both of individual countries and the region.

9 | Recommendations for Central America

All Countries

- In light of the commitments acquired by some countries in the region that ratified the ILO 169 Agreement, it is recommended that priority is given to issuing national guidance to regulate the public consultations mandated by the convention. Donor support could be valuable in drafting the regulations and establishing national capabilities to implement an effective consultation mechanism in each of the countries that may have ratified the convention. Otherwise, current and future development of new generation projects, especially those using renewable sources, would be seriously jeopardized.
- Another important aspect to be improved is the implementation of direct and focused subsidies in substitution of unfocused schemes. Given the limited resources of the Central American governments, subsidies need to be targeted to benefit only low-income consumers through very transparent mechanisms that are sustainable and do not interfere with the operation of the markets.
- The maintenance of technical and transparent tariff regimes is critical to the sustainability of the power markets. Central American countries should make every effort to avoid political interference in tariff setting and their regular adjustments, allowing distribution operators to fully recover all the legitimate costs of providing the service.
- The off-takers are the core of the power market; therefore, it is very important that Central American countries make their best efforts to attract and maintain long-term investors as operators of their distribution companies. Short-term investors in this segment of the market may represent a potential risk due to their reluctance to make the necessary investments to maintain the quality of the service, and their lack of technical expertise in the utility business could be detrimental to maintaining losses under control.
- The technical quality of the staff of the regulatory agencies is essential. In this regard, even though there has been a lot of progress in enhancing the competence

of the regulators of most of the countries in the region, it is necessary to continue to strengthen the technical capabilities of their staff. Also, given the need for the regulatory agencies to adequately oversee tenders and auctions, it would be recommendable to reinforce training in particular areas such as project finance, CBA, and advance modeling software uses.

- Transmission expansion has proven to be an important constraint to the sound development of markets. In this regard, it would be important for the countries in Central America to review and evaluate alternatives to open transmission to private investment, like Guatemala has been doing since 2007. Notably, the process for awarding a concession for transmission has begun in Panama.
- The majority of the countries in the region have made good progress in terms of diversifying their energy matrixes and promoting the use of renewable energy in their respective markets. However, it is important in terms of reliability to maintain a good mix of technologies and promote cleaner and more efficient thermal sources of energy to mitigate the risks associated with climate conditions.

Individual countries.

- **Costa Rica.** ICE has been able to provide reasonable quality electricity services and achieve a very high rate of coverage. But the lack of openness in the country's electricity market has had a significant impact on the price and efficiency of the sector, thereby hindering the competitiveness of the country. Additionally, considering the fiscal situation of the country, there would be important benefits from introducing more private investment and competition into the electricity market. Therefore, it seems that Costa Rica should consider at least revising upwards the limit on private generation projects (above the present 25MW) and using auctions to award long-term contracts. A deeper restructuring of the sector should also be considered, as was done successfully in the case of telecommunications.
- **El Salvador.** After the privatization of the distribution and generation assets in 1998, the country has been encountering difficulties for attracting new private investment in generation. In recent years, the country has been the largest buyer of excess power from Guatemala and other countries through the MER, and that has allowed it to deal with its tight reserve margins. The two long-term tenders to promote renewable energy were very successful in attracting a good number of credible bidders.⁴⁰ Therefore, the country should continue on this path towards diversifying its energy matrix. It would also be advisable to encourage the use of open and public tenders with private investors to implement all the new expansion in generation and also in transmission.
- **Guatemala.** It is urgent for the country to work on issuing legislation and/or regulations implementing ILO 169 Convention public consultations, since several proposed hydropower investments—large and small—have started to face serious issues from groups that use the convention to oppose hydropower development of even run-of-the-river projects. The other major challenge that the power market

40. USAID supported this under a contract with Tetra Tech.

faces is electricity theft, mainly in rural areas serviced by ENERGUATE. The GOG and the justice system need to work together in supporting the operator's fight against organized electricity theft to avoid its spread, which would have severe consequences for the sustainability of the power market.

- **Honduras.** Honduras has reformed the sector de jure but not de facto. The World Bank and the IDB are encouraging the authorities in Honduras to reform the sector. A priority would be to continue to work towards implementing the plan to reduce the distribution losses. One alternative is the awarding of management contracts to improve DISCO performance (losses and collections), and perhaps privatization. It also would be important to introduce more competition in tenders and eventually use auction mechanisms since the prices of the latest tenders continue to be high in comparison with other countries in the region. There is a pressing need for Integrated Resource Planning (IRP) and better transmission planning.
- **Nicaragua.** Nicaragua could benefit from introducing tenders and eventually auctions into its power market. Its wind and geothermal resources are excellent and that would be a factor for lowering prices if tenders were to be used. Also, it would be important to continue to work towards loss reductions, particularly non-technical reductions (theft). This would require the use of the police power of the state, which is politically difficult. The political situation in Nicaragua continues to deteriorate and will definitely affect the performance of the power sector in terms of new investments as well as the operation of existing assets.
- **Panama.** Panama has been successful in attracting private investors both in thermal generation and in renewable energy projects. It will be the first market to have LNG available and could work towards becoming the hub for LNG for the region. But it is important that transmission is expanded at the pace required and the SOE, ETESA, has proven to lag behind schedule in most of the expansions planned. Therefore, introducing tenders for transmission as Guatemala has done would also be important.

Regional Energy Market (MER)

The MER Strategic Plan of December 2015 listed 15 substantial issues that need to be resolved for market performance to improve. The issues are: development of interinstitutional coordination and monitoring mechanisms; development of dispute resolution mechanisms; consolidation of the MER bylaws and resolutions; development of long-term contracts and long-term transmission rights; development and implementation of the measurement integrated system; review of the tariff regime for transmission rights; development of the rules for interconnections to the SIEPAC line; implementation of the transmission protection system; development of the regulatory interfaces for the national and regional planning; development of coordination processes for regional tenders to procure power from regional projects; evaluation and improvement of the current regulatory interfaces; options to improve the regulatory operation of the Guatemala-Mexico interconnection; and political, legal and regulatory regime for extra-regional interconnections.⁴¹

41. USAID Initiative for Clean Energy, *Strategic Plan*.

Probably the most critical limitation to consolidate the MER operations is the award of long-term transmission rights and the implementation of permanent regulations to allow firm contracts. The regional institutions, EOR and CRIE, have been working on these aspects for the last few years. However, to date, these important commercial tools are still missing. Very high priority should be given to these aspects since in the absence of them, countries will continue to be focused on supplying their local demand needs on a long-term basis only with projects installed within their own markets.

The working relations between the regional operator and the national ISOs have been tense, especially with Guatemala, but to a certain extent, with the rest of the local operators as well. It would be advisable to improve the performance and coordinating capacities of EOR in order to expedite transactions throughout the region.

One example of the tension between the EOR and national regulators has to do with the dispute resolution. Several participants in the MER argue that the resolutions issued by CRIE cannot be effectively contested since it is the same commission that reviews and eventually would have to accept or reject any challenge filed. In this regard, it would be very important to establish a dispute settlement procedure to contest resolutions issued by CRIE in order to strengthen the governance of the MER.

In the MER, as in any other electricity market, the actions and decisions of a credible regulator are vital to providing legal certainty to investors. There has been criticism in several of the participant markets of the region that CRIE needs to strengthen its technical capacity and governance. It would also be advisable to avoid—to the maximum extent possible—political interference in its decisions. National delegates appointed to be CRIE commissioners should ideally have strong technical backgrounds and very solid expertise in regulation and market issues. Keeping close coordination with national regulators would also be very positive, especially in those cases where the appointed commissioner is not part of the local regulator's structure.

Given the wide participation of private market agents in several of the MER countries, it would be useful to implement mechanisms to engage those agents' views and opinions into the decision making process. This could contribute significantly to market agents having increased confidence in the functioning of the MER.

Given the excess power existing in some of the MER countries, the interconnection with Colombia represents another important measure to maximize the potential of the MER. Panama should be encouraged to reinforce actions towards working out the interconnection with Colombia as soon as possible.

In terms of promoting more trade between the MER and Mexico, the main features to be considered are:

- Guatemala has had a bilateral interconnection with Mexico that has been in operation since 2006.
- The current transmission capacity is 250MW for imports and 400MW for exports.
- The line in Guatemala is open-access as required by regulations.

- INDE, the SOE, has been importing 120MW under a contract with the Mexican utility (CFE). Transactions under this contract are only dispatched when Mexico's spot price is lower than the Guatemalan one.
- In 2012, through PEG2, a Guatemalan investor won a 120MW PPA to supply the distribution companies from a plant located in Monterrey at the U.S.-Mexican border that burns natural gas supplied by pipeline from the United States. Operation of the plant (Huinala/Energía del Caribe) began in May 2017.
- In 2017, a few trading companies in Guatemala started to import energy from Mexico on a spot-market basis during certain periods of the day. Shortly thereafter, the Guatemalan ISO (AMM) started to place daily bids for exports as well. Export amounts were modest initially but lately have reached 200MW at certain hours of the day.
- El Salvador and other countries have expressed interest in transacting with Mexico. Guatemala's official position has been that the interconnection is outside of the MER scheme and it is a bilateral interconnection that operates under an operations protocol agreed upon with Mexico. Therefore, any transactions using the interconnection should be originated in the Guatemalan market through the establishment of a local brokering company. This has created tensions within the MER and CDMER has formed a working group to analyze how to incorporate Mexico into the MER.

In terms of SIEPAC's second circuit, currently under discussion, some features to consider are:

- SIEPAC's interconnecting line was built at a cost of US\$505 million. The funding came from IDB (US\$253.5 million), CABEI (US\$109 million), other sources (US\$84 million), and the region's SOEs (US\$58.5 million). And the line was built for eventually allowing the installation of a second circuit without having to make major additions but a second wire.
- The regional transactions in 2017 were almost US\$160 million, which is approximately 5-6 percent of the region's total demand.
- Currently, there are discussions to install a second circuit to increase the exchange capacity from 5,000GWh/year to 10,000 GWh/year.
- Additional benefits would include strengthening of national grids.
- The IDB is currently working on the feasibility study of the second circuit in coordination with the regional institutions (CRIE, EOR, and CDMER).
- Given that the cost of building the second circuit would be marginal in comparison with the original costs of the SIEPAC line, this may be a viable project. But it would be necessary to carry out thorough financial analysis to ensure that the EOR is not saddled with unprofitable debt that will negatively affect its financial position.

10 | Recommendations for Future Research

There are a number of possible extensions to this paper as well as ideas for additional studies:

- Document the experience with auctions in Panama and El Salvador as was done in this paper on Guatemala. This paper concentrated on the reforms in Guatemala as it is the best performing market and data were more readily available. Further analysis of the reforms of El Salvador and Panama would be valuable.
- Carry out a consultation of proposed policies with stakeholders in Central America. We have been asked to present the paper in Costa Rica and El Salvador, which would allow a discussion of the proposals in those two countries. Further discussions in Guatemala, Honduras, Nicaragua, and Panama would also be useful.
- Determine the applicability of the Central American experience to Africa, Asia, and the Middle East. Using the methodology developed for this paper, we would propose to look at conditions in these countries and determine those that could be better ready for competitive bidding for power generation and transmission.
- Design a program to promote auctions similar to the World Bank Group's Scaling Solar. This could be considered by USAID, the Inter-American Development Bank, and other donors.
- Perform econometric analysis of the potential benefits of auctions vs. direct negotiation. Phadke's paper concluded that it is impossible to say with certainty whether prices resulting from auctions were lower than prices that resulted for direct negotiation because countries that conducted auctions were likely to have better underlying conditions for investment.⁴² We think it could be possible to introduce a few selected variables to eliminate the multicollinearity discussed by Phadke.

42. Phadke, "How Many Enrons?"

About the Authors

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