Opportunities in the Mexican Electricity Sector

Global Strategy Group

Energy & Natural Resources

KPMG in Mexico

Contents

A new regulatory framework

Background

Before the Energy Reform, Mexico had a traditional industry model where a vertically integrated State agency, the Federal Electricity Commission (CFE), was responsible for developing all activities of the power industrial chain, from energy generation to delivery to end users. This model allowed, as an exception, the participation of private generators in those activities that the law did not consider a "public service".

Technological change in the global power industry and the rigidity of the model, among other factors, led to various inefficiencies in the system, which, in turn, resulted in higher electricity costs, significantly impacting the competitiveness of the domestic productive sector.

The reform seeks to establish a new industrial organization that, on one hand, allows the productive sector to acquire electricity at competitive prices from a wholesale electricity market and to have a legal framework that allows regulators to develop such market efficiently and competitively and, on the other hand, gives strength and thrust to a power industry with huge challenges ahead by attracting private resources for development.

The new industry organization is similar to the wholesale electricity market models established around the world since the early nineties of the last century.

The principles governing the restructuring are:

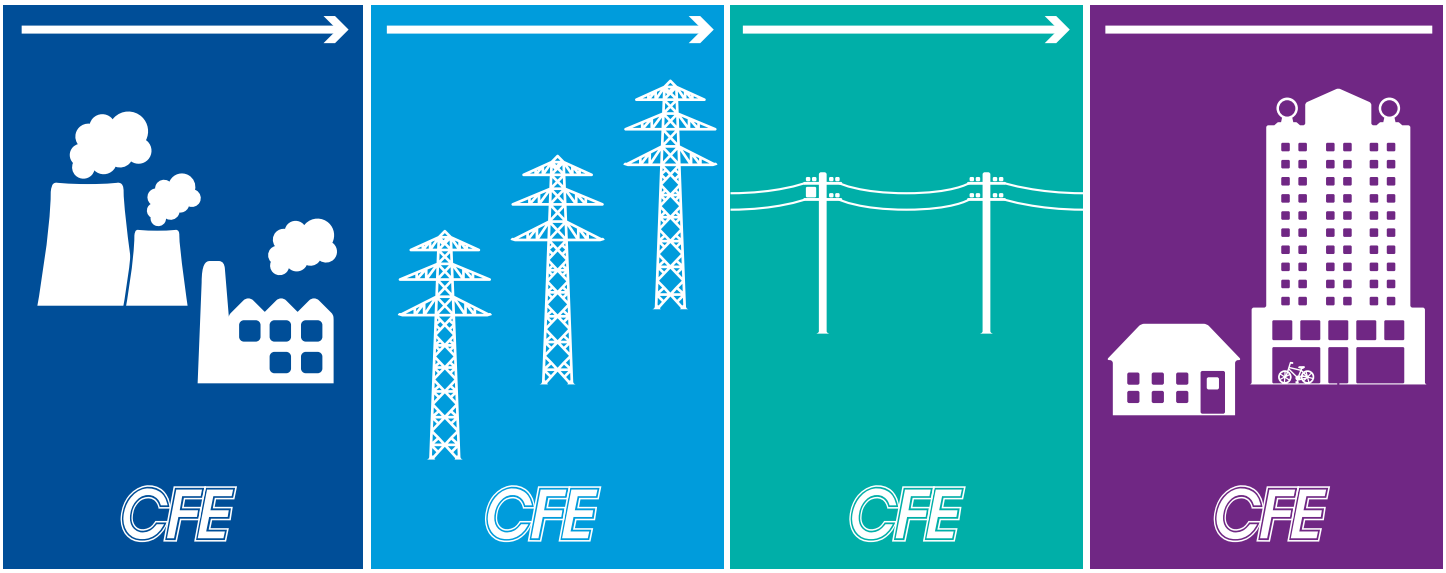
1. It remains as strategic activities exclusive to the Mexican State:
    a. The planning and control of the National Electric System (SEN)
    b. The nuclear power generation
    c. The electricity transmission and distribution
2. Unbundling of the industrial chain, into its different links: (i) generation, (ii) transmission, (iii) distribution, and (iv) supply
3. Allow: (i) direct private investment in electricity generation and trade, creating a "wholesale electricity market" and (ii) private investment through partnerships or contracts entered into with the Mexican State regarding finance, installation, maintenance, management, operation, and expansion of the transmission and distribution grids

Pre-reform operating landscape

Industry structure

Before the Energy Reform, the industry maintained a vertically integrated state monopoly operated by CFE, with private generators operating on a limited basis in:

- Independent Energy Production
- Self-supply
- Cogeneration
- Small production
- Import
- Export.



The private sector could generate electricity as an external energy producer if, and only if:

- The energy produced was destined for its own consumption
- Intended for exports or direct sale to CFE
- The generator has a permit awarded from the Energy Regulatory Commission (CRE)
- Using an independent energy production or small production permit, for exclusive sale to CFE or for exports
- Using self-supply and cogeneration permits, for the procurement of the generator's own energy needs or the company's self-supply needs, and in case of production surpluses for exclusive sale to CFE
- Using import permits for self-consumption and export permits through independent production, cogeneration, and small production.

Before the Energy Reform, Mexico had a traditional industry model where a vertically integrated State agency, the Federal Electricity Commission (CFE), was responsible for developing all activities of the power industrial chain, from energy generation to delivery to end users

Post-reform operating landscape

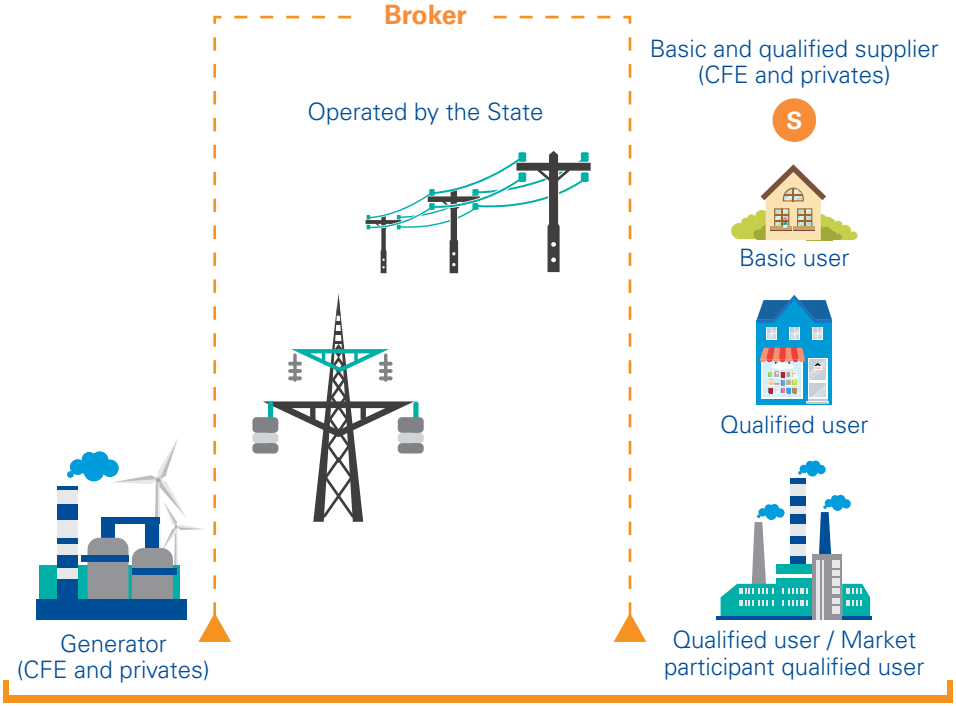
New market structure

After the Energy Reform, the market was liberalized for the generation and supply of electricity; CFE has now become a competitor in the marketplace to operate under a competitive environment and private investors will be able to install new power plants.

The new market structure allows for large energy consumers to satisfy their electricity needs from an array of options available, marking a threshold for CFE's historic monopoly in the consumer sector of the value chain. Qualified users and market participant qualified users may participate in a competitive environment to select the provider that best suits their needs, inevitably forcing an eventual reduction in prices, beneficial to all stakeholders.

The electricity transmission and distribution public service remains reserved for the Mexican State. Notwithstanding the foregoing, the law stipulates that the State may enter into contracts or partnerships with the private sector for the operation of the transmission and distribution grids.

A new operative framework has been created where new products and market mechanisms are introduced to incentivize investment in new energy generation, transmission and distribution, and supply to final users.



Reform impact on new and existing projects

Permits and contracts under the previous regime (legacy) have the option of maintaining their pre-reform status (including benefits and obligations) or migrate (totally or partially) to the new scheme in order to participate in the new markets. Additionally, once an existing private generator has decided to migrate to the new regime, it has a grace period of five years to return to its previous regulatory framework.

Legacy contracts (previous regime)	Contracts under the new law
Existing power generators ruled under the previous regime have the option of migrating to the new law or of maintaining the existing benefits and obligations.	New projects governed by the Electric Industry Law (LIE) will participate in long- and mid-term auctions, as well as short-term markets.
Furthermore, legacy utilities may transfer a portion of their plant capacity to the new Electric Industry Law to participate in long- and mid-term auctions, as well as short-term markets.	Projects that are in a pre-construction or construction stage are able to participate in long-term auctions, allowing them to secure a stable income before starting their operations.
These players have the option of bidding in long-term auctions and then migrating to the new market framework only if they are awarded a contract.	New products are introduced, such as clean energy certificates, financial transfer rights, and ancillary services.

The new Wholesale Electricity Market in Mexico was designed to incentivize and give numerous benefits to both new and existing participants that move their contracts to the new regime, based on the new market mechanisms, products, and operating structure.

The "unbundling" of the Federal Electricity Commission (CFE)

In January 2016, Ministry of Energy (SENER) published in the Official Gazette the terms under which CFE must be unbundled. These terms include the separation of CFE into companies with activities that shall be strictly carried out, independently of each another, and categorized as follows:

- Generation
- Transmission
- Distribution
- Basic Supply
- Commercialization other than Basic Supply
- Procurement of Primary Inputs

Additionally, CFE may establish other subsidiaries as it considers necessary.

Furthermore, SENER established that, under the Generation activity, CFE must constitute at least six different companies that operate its electric utilities. These utilities will be assigned to CFE in equal measures, taking into account financial sustainability, technology mix, efficiency, and asset's useful life.

The terms establish that CFE may continue carrying out the aforementioned activities directly, including the participation in the Wholesale Electricity Market, until six months after the official publishing of the unbundling terms. This means that as of June 28, 2016, CFE had to be fully unbundled and operating independently of each of its divided companies.

This unbundling seeks to minimize CFE's inherited market power and create a competitive environment that allows new entrants to participate under fair conditions.

During 2015, CFE served a total of 39.6 million customers out of which 88.6 percent are grouped in the domestic sector and account for around 20 percent of the national consumption. Additionally, CFE owns a total of 41,915 MW of installed capacity, which corresponds to 61.6 percent of the total installed capacity in the market, and controls another 12,953 MW through contracts with independent power producers (IPPs), while the remainder belongs to private companies according to the activities allowed under the previous regime.

This is one of the main reasons why a correct and successful unbundling of CFE is crucial to a correct implementation of a new market structure that will provide tangible incentives to private investors for participating in the new Mexican market.

Announced CFE investments

Project	Value
11 natural gas pipelines	USD5.2 billion
7 thermoelectric plant conversions	USD200 million
7 combined cycle power plants	USD6 billion
15 renewable generation projects	USD4.8 billion
A combination of 7 transmission lines and 9 distribution projects	USD1 billion

Source: CFE web site.

Market players

Generators and Intermediary Generators	Represent one or more plants and, in the case of intermediary generators, represent plants under the previous regime.
Basic Service Supplier	Represents load centers corresponding to basic service users.
Qualified Supplier	Represents load centers corresponding to qualified users that do not participate directly in the Wholesale Electricity Market.
Basic Service User	Final user that receives energy procurement from a Basic Service Supplier.
Qualified User	Final user that receives energy procurement from a Qualified Supplier. Estimated demand must be larger than 2 MW for 2016 and 1 MW for 2017.
Market Participant Qualified User	Represents load centers for own consumption or for consumption within its facilities. Procures electricity and related products directly in the market, without any need of being represented by a Supplier.
Last Resort supplier	Represents qualified users for a given period of time, usually under emergency grid situations.
Non-supplying broker	Commercializes energy in the wholesale market without representing physical assets.

New market mechanisms

Long-term auctions

Long-term auctions, reserved for clean technologies, provide new and existing generation projects with a stable income for 15 - 20 years. Projects in a pre-construction or construction stage are entitled to participate in these auctions, providing certainty over the return of an investment; they must be exclusively designed (for clean technology plants, conventional utilities may participate only with capacity).

While participating in auctions, the generators submit Sale Offers specifying the desired income for each product, which consists of a product "package". If the package is assigned, the bidder will receive the requested income for each product over the contract term (15 and 20 years):

- Energy – 15 years
- Capacity – 15 years
- Clean Energy Certificates (CEL) – 20 years

Generators can decide the amount of total energy to offer in these auctions and may reserve the remaining to participate using other mechanisms.

This market mechanism reduces investment risks as power generators secure a stable income that enables them to recover their variable and fixed costs, even when the electric utility is not yet built.

On the consumer side of the spectrum, long-term auctions are designed to secure a stable price for users of basic supply, although participation is not limited to these, while qualified suppliers are entitled to participate under the established conditions.

Tenders for these auctions are based on a long-term demand estimate, which will be then met with real demand as the mid-term auctions and short-term markets take place.

Mid-term auctions

Mid-term auctions include Energy and Capacity products to be offered by generators, which result in binding contracts for a three-year term. In mid-term auctions, all technologies are entitled to participate, including fossil fuel generation.

Both long-term and mid-term auctions are designed to ensure a stable price for basic service suppliers and avoid their exposure to price volatility. However, qualified user suppliers are entitled to participate if they decide to do so.

Short-term markets

In short-term markets, utilities are assigned through an economic dispatch model, where most efficient (clean) plants are assigned accordingly until the total demand is met at a given point in time.

The last plant is dispatched in order to cover demand sets the location marginal price (LMP), determined by its variable and maintenance costs, which also varies according to the generation technology. This LMP will be paid per megawatt to every generator assigned, regardless of its own costs.

This new market mechanism is designed to incentivize new investment in clean energy generation, given the larger profit margins obtained from efficient plants rather than plants that use fossil fuels and represent higher operating costs.

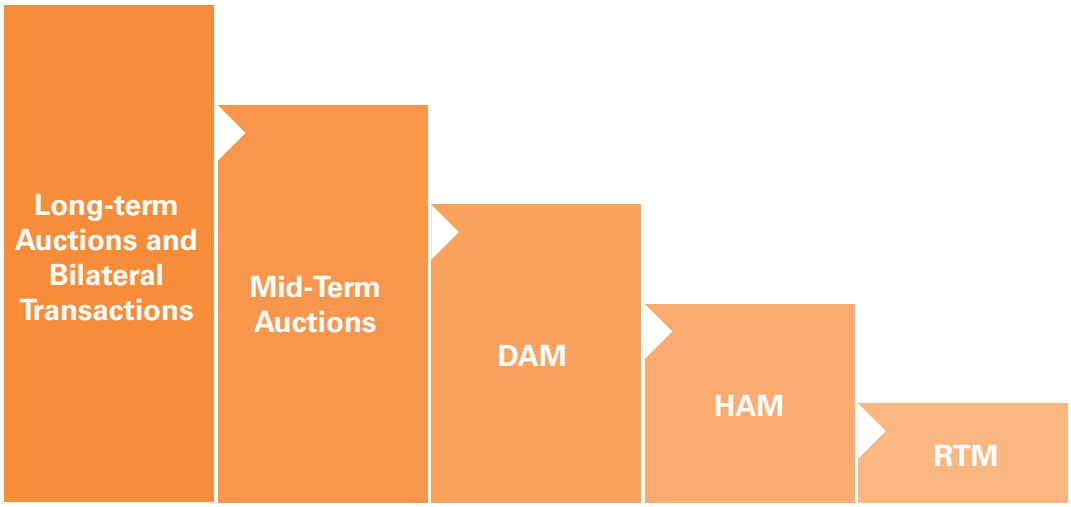
Day-Ahead Market: The Day-Ahead Market (DAM) allows both generators and suppliers to acquire energy and related products in order to balance their long- and mid-term demand estimates from their revised short-term estimates. Market participants may submit offer/purchase bids up to 10:00 a.m. on the day prior to the operation day:

- First Market Stage: Bidders will submit a fixed-sale bid, specifying only the quantity (in MW) and location (node).
- Second Market Stage (2018): Bidders will submit a price-sensitive bid, specifying quantity and price per hour ($/MWh), minimum daily energy limit, ramp capacity, notification time frame, and location.

Hour-Ahead Market: The Hour-Ahead Market (HAM) will be implemented up to the second market stage. It will allow a supplementary energy and ancillary services procurement upon estimated demand changes an hour before beginning the operation day, for every hour of operation.

Real-Time Market: The Real-Time Market (RTM) adjusts the estimated demand in the DAM from real-time demand, allowing market participants to submit hourly bids for energy and ancillary services, at least 15 minutes before each operating hour.

The main challenges for electric generators are their energy placement on the market, given the existence of numerous markets with a certain degree of complexity. These are designed to be traded based on final user's demand estimates from long to short term, allowing users to make an efficient planning of their consumption and to secure rates in order to make their estimated expenses more predictable.



Note: DAM: Day-Ahead Market, HAM: Hour-Ahead Market, RTM: Real-Time Market.

Investment opportunities

The Energy Reform implemented in Mexico since January 2016, involves a process of change that will create a market comprised of independent generation, transmission, distribution, and commercialization companies. Particularly, in the generation and commercialization activities, the market will be open to the private sector. Market participants ought to fully understand their new legal, regulatory, and commercial framework to be able to take advantage of the operational as well as business opportunities it brings.

Future development of the sector

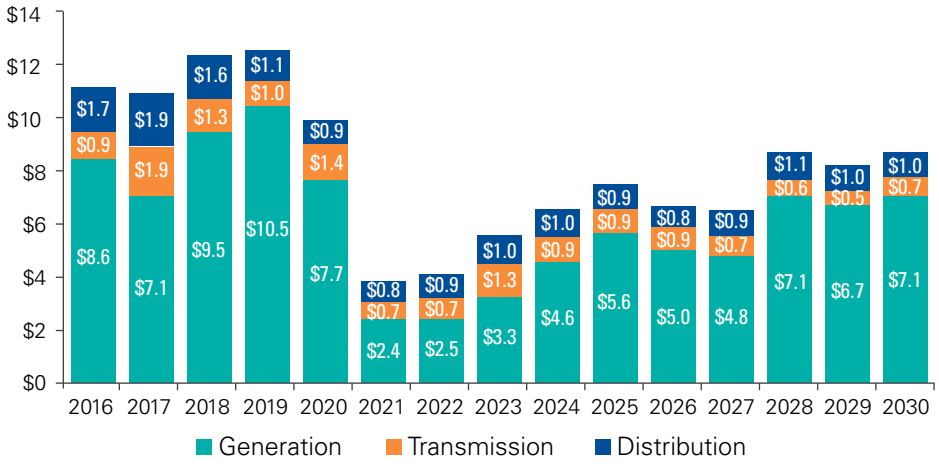
The Wholesale Electricity Market has a wider growth perspective given the country's lag to adopt a structural reform in the Energy Sector. However, this represents a strong competitive advantage as the market has been designed copying the international best practices, which reduces the risks of committing past regulatory mistakes.

Situation by the end of 2015	2030 forecast
Installed capacity: 68 Gigawatts (GW)	57 GW of new and replacement capacity
Generation: 309,553 GWh; reaching 39.6 million clients	At least 517,000 GWh; clients will reach 50 million
Transmission grid: 104,393 km Distribution grid: 775,483 km; Substations and transformers installed capacity: 55,464 Megavolts ampere (MVA)	Transmission grid: 25,000 additional km. Distribution grid and the installed capacity of substations and transformers should grow in the same proportion, given that current networks are insufficient to absorb generation growth
Non-fossil generation accounted for 20% of Mexico's electricity supply	Non-fossil generation should account for 41% of total supply

Expected investment in the electricity sector 2016 - 2030

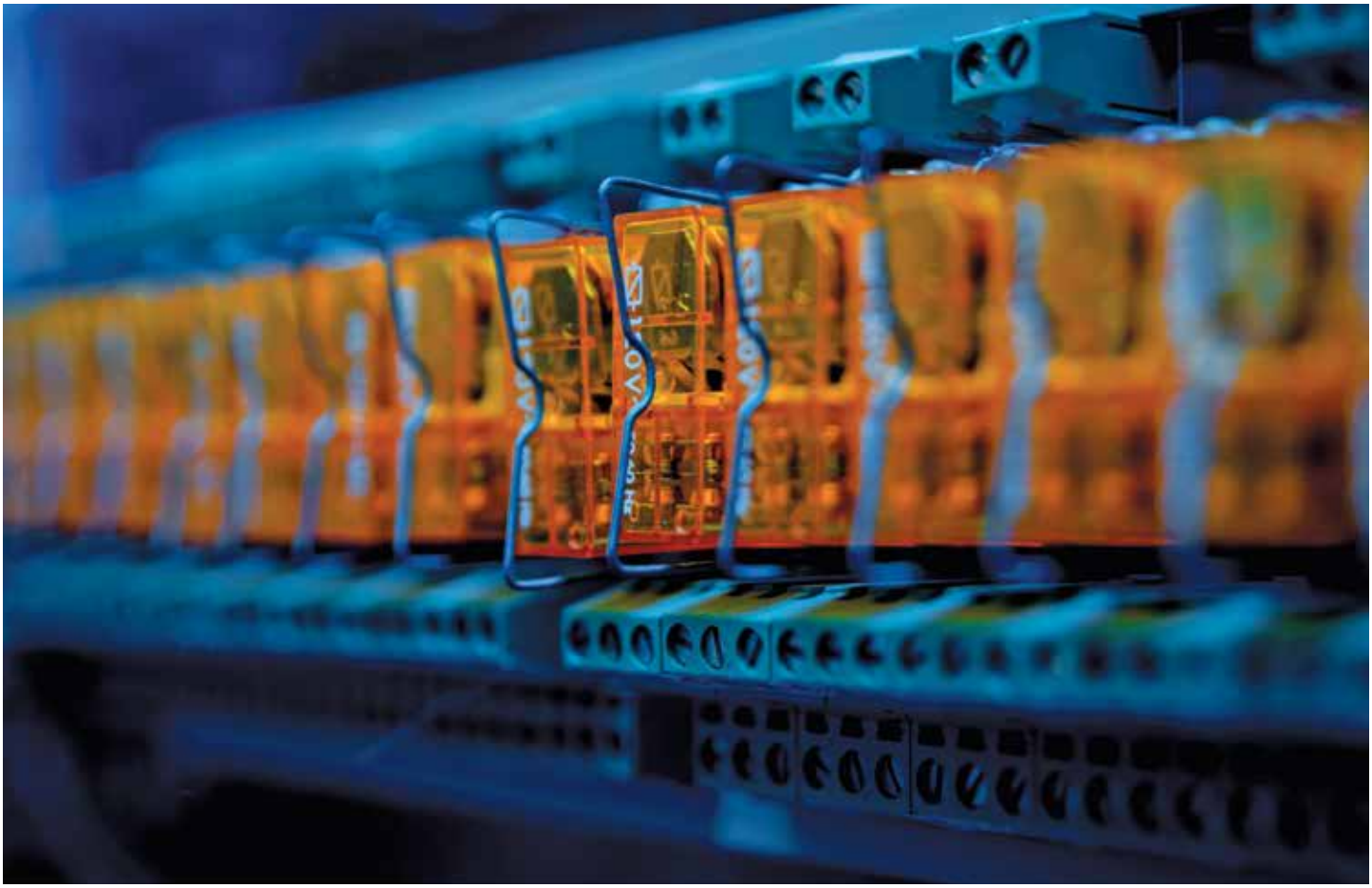
During the next 15 years, it is estimated that Mexico will require a total investment of USD123.4 billion in electricity infrastructure in order to achieve the goals set by the government. Out of the total investment, 75 percent will correspond to investment in generation infrastructure, equivalent to USD92.5 billion from 2016 to 2030.

Estimated investment 2016-2030 in US billions



*Considering an exchange rate of $18.2MXN/USD.

Source: PRODESEN 2016.



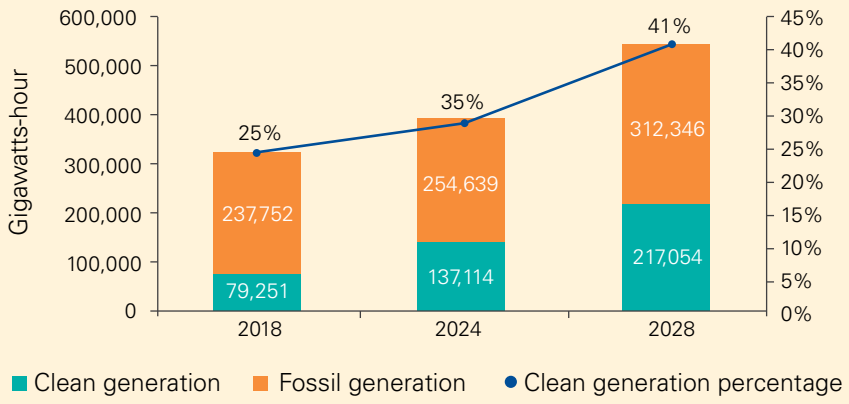
Generation

Clean Energy Generation

In recent years, international governmental and non governmental bodies have worked to introduce policy programs that set out a framework for action to reduce greenhouse gas emissions. The COP21 talks in Paris are a strong example of worldwide efforts being made to take action on climate change.

In parallel to the efforts made around the world to secure a cleaner environment, the Energy Reform in Mexico, along with its secondary laws, seeks to reach goals on the matter by setting a minimum percentage of electricity generation from clean sources.

Clean Energy Generation Goals in Mexico



Note: Based on electricity generation estimates.
Source: Energy Transition Law and Renewable Energy Prospective 2014.

Market participants on the supply side of the Electric Market are required to acquire a certain percentage of their energy from clean sources. Basic and qualified users' suppliers must acquire at least 5 percent of their energy from clean sources in 2018 and 5.8 percent in 2019. Failing to comply with these standards will result in costly penalties per megawatt-hour (MWh) not acquired.

According to Jesus Serrano, Commissioner at CRE, "CELs provide clean energy technologies with the necessary resources to make them more competitive. The market will determine the price of CELs, which will cover the difference between the costs of clean generation and fossil fuel generation, without resulting in excessive revenues for clean energy generators. It is expected that clean sources will become more competitive in the medium term, reducing the price of CELs and, in turn, lowering the cost of achieving the clean energy generation objectives."[1]

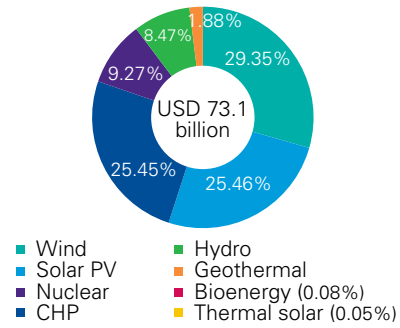
In 2015, 20.3 percent of total energy generation was produced through clean sources.[2] According to the Ministry of Energy (SENER), at least 62 percent of the new installed capacity from 2016 to 2030 will consist of investment in clean energy technologies. This represents an important opportunity for private investors due to the country's energy needs and the clean energy goals established by the Mexican government.

> During the next 15 years, Mexico will require a total investment of USD130.5 billion in electricity infrastructure in order to achieve the goals set by the government, with 97.9 billion corresponding to generation

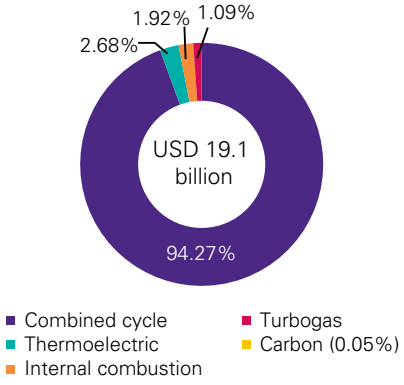
[1] Mexico Energy and Sustainability Review 2015.

[2] It includes large-scale hydro and nuclear energies, which in other markets are not considered clean sources.

Clean Energy Investment 2016 - 2030



Conventional Energy Investment 2016 - 2030

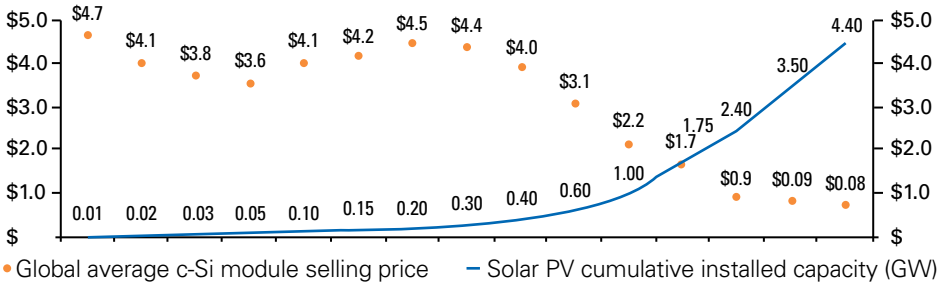


The new market is designed to incentivize investment in new clean generation technologies via the mechanisms discussed before. Furthermore, clean energy certificates provide an additional income to clean generators independently from their energy and capacity income.

Additionally, renewable technology costs have been dramatically reduced over the past few years on a global scale, which makes these technologies a much more viable investment than in the past. Such is the case of Solar PV plants, which became 75 percent cheaper in 2014 compared to 2009.

Cumulative Global Solar PV Development and Module Prices

USD/Wp and installed capacity (GW)



Source: IRENA (International Renewable Energy Agency) Renewable Cost Database.

Wind turbine prices declined by almost one third over the same period. This technology has become one of the most competitive technologies available, mostly due to technology improvements and the continued reduction of installation costs over the past years. According to IRENA (International Renewable Energy Agency), onshore wind projects are now within the same, or even lower, cost range than fossil fuels. The best wind projects around the world are consistently delivering electricity for USD0.05/kWh without any financial support.

According to Cesar Hernandez Ochoa, Undersecretary of Electricity at the Ministry of Energy, "Over the past two years, both electricity generation from natural gas and renewable have grown by 10% compared with the previous two years, gradually displacing fuel oil. It is a tendency that will continue."[3]

Natural gas

As investment in clean technology increases, less efficient plants will be gradually displaced out of the market, causing a larger reliance on natural gas-fired plants. This is because natural gas is the fastest growing fossil fuel, supported by its high efficiency levels, relatively low emissions compared to other fossil fuels, current relatively lower costs in North America, and its strong reliability.

By 2015, there was a total of 63 Combined Cycle utilities in Mexico, primarily grouped in the Northern and Gulf regions of the country.

The total installed capacity for these plants summed 24,961 MW with an estimated annual generation of 155,167 GWh.

Combined Cycle Installed Capacity, 2015

Source: Development Program for the National Electric System (PRODESEN) 2016-2029.

[3] IBID.

According to SENER, out of the estimated 21,598.7 GW of new installed capacity in Mexico for conventional technologies from 2016 to 2030, 94.7 percent will come from Combined Cycle utilities (excluding clean technology).

This projected growth for natural gas-powered utilities places the development of pipeline infrastructure as one of the top investment priorities in the upcoming years.

Mexico's midstream has suffered after years of underinvestment. Transport constraints due to pipeline bottlenecks have provoked a crisis in natural gas supply, and inadequate transport and storage capacity have increased the risk of supply disruptions.

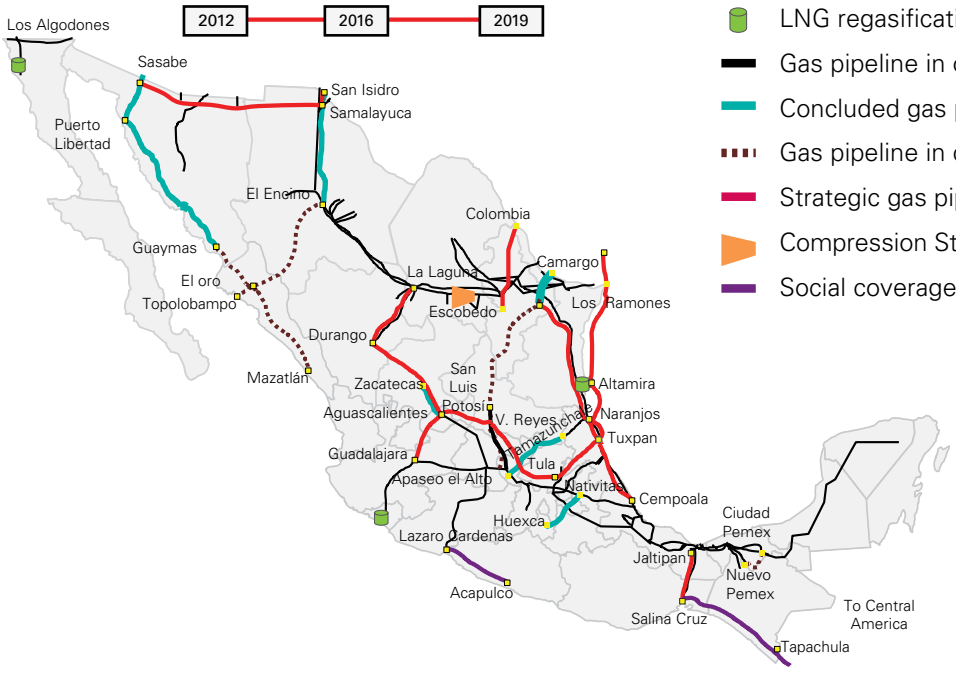
In 2012, the use of natural gas in electricity generation passed the 50 percent threshold and this share will continue to expand rapidly as the pipeline grid is extended and new power plants are built. As the gasification program progresses, natural gas will totally displace fuel-oil in power generation assuming that gas prices remain relatively constant.

According to David Madero, General Director of CENAGAS (National Natural Gas Control Center), "Mexico is shifting from liquid fuels to natural gas for electricity generation, making gas security a crucial element in the energy industry."[4]

The natural gas pipeline construction program must progress rapidly, as well as the interconnection facilities to appropriate U.S. hubs. This will allow Mexico to fully benefit from available low-cost supply and make the most of unique logistical advantages.

U.S. pipeline exports of natural gas to Mexico have doubled between 2009 and 2013. SENER estimates that U.S. pipeline exports to Mexico will reach 3.8 billion cubic feet per day (Bcf/d) in 2018. Such increase would represent more than double the U.S. pipeline exports to Mexico in 2013, which averaged 1.8 Bcf/d. This projected growth is mainly driven by higher demand from Mexico's electric power sector.

Five-Year Plan CENAGAS Tenders



- LNG regasification terminal
- Gas pipeline in operation
- Concluded gas pipeline (2013/2014/2015)
- Gas pipeline in construction (2015/2016)
- Strategic gas pipeline included in Five-Year Plan
- Compression Station "El Cabrito" included in Five-Year Plan
- Social coverage pipeline included in Five-Year Plan

Estimated Investment: USD10+ billion

According to the Gas Pipeline's Five-Year Plan, Mexico will have the following infrastructure by 2019:

- 10 new strategic gas pipelines
- Around 5,000-6,000 kilometers of pipelines
- 7 interconnections with the USA
- Connect the Eastern and Western Mexico
- Bring gas to new locations

Source: KPMG analysis with information from Mexico's Ministry of Energy (SENER). Available in Spanish at: http://www.gob.mx/sener/acciones-y-programas/plan-quinquenal-de-gas-natural-2015-2019

[4] IBID.

Transmission and distribution

The electricity transmission and distribution remains reserved for the Mexican State through CFE. However, the law stipulates that the State may grant open access to all market participants and can enter into contracts and partnerships for the operation of the transmission and distribution grids.

In opinion of Eduardo Meraz, General Director of CENACE (National Energy Control Center), "The challenge will be to provide enough transmission infrastructure so that generators do not have to fight over the grid in order to reach consumption points. Congestion will be minimized through proper plans to expand the grid."[5]

Private-public coinvestment with CFE is possible and necessary under the new regulatory framework, in order to develop the grid's required infrastructure in Transmission and Distribution, according the national development program. The development of a solid grid will be crucial to avoid system "bottle necks" which, in turn, lead to a rise in electricity prices for certain nodes. As generation-installed capacity in the country increases, private-public coinvestment in the electric grid will be required at the same pace.

PRODESEN 2016 points out three general objectives regarding **transmission infrastructure** development:

Objective 1: Connect the National Interconnected System (SIN) with Baja California's isolated System

Objective 2: Connect the National Transmission Network (RNT) with North and Central America

Objective 3: Serve all electricity supply and demand needs

Moreover, three objectives were set for the development of the **distribution network**, as follows:

Objective 1: Serve all electricity supply and demand needs:

- Expand coverage, modernize the National Distribution Network, reducing energy losses

Objective 2: Extend the distribution service:

- Foster Distributed Generation

Objective 3: Incorporate state-of-the-art technological systems:

- Smart grids, Advanced Metering Infrastructure (AMI), SCADA and EPROSEC systems

SENER has announced that this year will tender two transmission lines with a combined length of 1,225km and a total cost of USD1.44 billion. The projects will be awarded as Public Private Partnership contracts (APP) in international public tenders.

The first project:

- 1,200 km of 3,000 MW direct current (DC) trunk lines with 600km of distribution lines
- Will run between the southwestern state of Oaxaca and the State of Morelos (near Mexico City)
- It will be the first DC circuit in the country
- By 2Q16, the CFE will launch the first call for tender of the 25-year, USD1.2 bn APP contract
- The contract execution is scheduled to take place towards the end of 2016

The second project:

- 25 km of submarine transmission lines with 12.5 km of distribution lines
- Will run between Playa del Carmen and Cancun in the Southeast state of Quintana Roo
- An estimated cost of USD240m; it would also be a 25-year PPP
- The tender is scheduled to be launched before the end of 2016

Both lines should start operation in 2019. The capex costs for the lines will be covered by the sponsors. The winning bidder will receive annual payments based on their requested transmission rate. In the competitive tender process, the contract will be awarded to the bidder that proposes the minimum annual payment alongside the other technical and economic requirements.

[5] IBID.

Supply

Private companies may compete directly against CFE's supply load centers in a competitive environment. CFE's inherited inefficiencies for its long-lived electric utilities could provide a competitive advantage to new private suppliers who may offer a lower market price when representing clean technologies.

Basic Service Suppliers: Provide energy and ancillary services to basic service users, and represent exempt generators that request it.

Qualified Suppliers: Qualified suppliers provide energy and ancillary services to users whose consumption surpasses 3 MW in 2015, 2 MW in 2016, and 1 MW in 2017.

Energy trading

The energy sector's liberalization allows final users to meet their energy needs along with suppliers mentioned earlier through private and independent brokers (nonsupply brokers). This allows final users to acquire energy, clean energy certificates, and ancillary services at competitive market prices, while offering attractive returns to generators.

The nonsupply broker figure allows the physical and financial trading of energy and ancillary services on the wholesale electric market representing one or several generators in the market.

In short-term markets, the broker receives economic offers from generators in real time, depending on their capacities and operating costs.

However, on the mid- and long-term auctions, the broker analyzes the current contracts of each client, identifies opportunities, and seeks to renegotiate contractual terms or obtain better options on the short-term market.

Consumer opportunities

Prior to the Energy Reform, all consumers were required to meet their electricity needs through the state-owned Federal Energy Commission. This scheme caused consumer dependence on CFE's established prices for energy, with CFE having few incentives to improve electricity generation efficiency.

The new market structure allows large energy consumers to satisfy their electricity needs from an array of options available, creating a competitive environment in the supply value chain and allowing potential savings to these consumers. This will allow the final supply of electricity to users to be defined by prices in open market conditions. Participants may select the provider that best suits their needs or participate directly in the market if they fulfil the requirements to do so. The following options could represent an attractive alternative to the traditional supply model, depending on each consumer's specific needs:

Direct investment in generation plant

Market scheme: Generator

Pros

- Guaranteed energy through a self-owned plant
- Fixed energy price
- Lower-than-market price
- Sale of energy surpluses in the Wholesale Electric Market

Cons

- High investment required
- Specialized energy team required
- Penalties for deviations in generation (not supplying in the market when assigned)

Direct participation in Wholesale Electric Market

Market scheme: Market participant qualified user

Pros

- Ability to participate in procuring energy at market prices
- Variety of generators to select from
- Control over decision making in energy procurement

Cons

- Specialized energy team required
- Market price volatility
- Minimum 5 MW and 20 GWh demand required to obtain permit

Energy supply through a Qualified Supplier

Market scheme: Qualified User

Pros

- No specialized team in trading required
- Avoids penalties for deviations (generator pool)
- Demand response services (load following)
- Seeks to offer lower-than-market price (spot reference)

Cons

- Low control over prices
- Supplier may charge a handling fee

Electric coverage contract

Market scheme: Market Participant

Pros

- No investment required
- Secures a fixed price for a defined timeline (subject to volatility in primary inputs if applicable)
- Energy supply through the generator that best adapts to the consumer's needs

Cons

- Requires contract with CENACE
- Uncertainty over the future evolution of market prices
- Limited renegotiation of contracted terms upon change in market price reference

Other alternatives include a Distributed Generation scheme, which implies installing a smaller than 0.5 MW plant within the final user's facilities, which is used to supply the consumer's own energy needs. These plants do not require a Generation permit by CRE, and energy surpluses may be sold through a registered Supplier.

The appropriate option for each user will depend on its infrastructure, electricity consumption evolution, and potential savings (as a percentage of all its costs) as well as willingness to invest in its own generation assets and electricity trading teams. The final objective for a qualified user beyond reducing its costs should be to lock in medium- to long-term rates to facilitate its planning.

Market entry strategies

Due to the market liberalization, investment in Mexico will significantly increase in the next years (see page 12), which will in turn provide numerous investment options for both investors and operators.

Joint venture

Players with operating utilities in the country:

- According to the operating manuals, electric generators may create consortiums to participate in auctions in a way that they can offer attractive product packages according to the generator's and auction's requirements

Pros	Cons
– Synergies from both players to be more competitive in the market	– Difficult integration from both organizations
– Risk reduction	– Lower returns

- The placement of energy on the different market mechanisms may become a complex task to generators who are not familiarized with the new operating structure and market rules. Therefore, a joint venture with an energy brokerage firm that handles the sale of energy may be an attractive option, given that the generator avoids the development of an internal energy sales team and may centralize its operations to electricity generation

Pros	Cons
– Efforts centered only on operation	– Few internal control on commercialization
– Assured energy placement based on broker's generation and client portfolio	

Players with no participation in the Mexican market:

- Given the complexity of the Mexican regulation and differentiation from other markets around the world, foreign investors may decide to create joint ventures with companies which have projects in a development or pre-construction stage. The added value that each party provides, centers on the combination of technical, relational, and local business knowledge from one end and financial capabilities from the other

- Furthermore, the lack of previous experience in project development from a Mexican Enterprise may also be supplemented by a partner who provides experience and know-how in the development stage

Pros	Cons
– Know-how exchange	– A thorough understanding of "doing business" in Mexico
– Synergy from both parties	– Risk evaluation and project feasibility study required

Due to the market liberalization, investment in Mexico will significantly increase in the next years (see page 12), which will in turn provide numerous investment options for both investors and operators

Participation purchase in generation assets

- Direct investment may be a feasible option for global corporations with a large project portfolios in electric utilities and energy infrastructure
- This option requires a high investment expenditure and an extensive market knowledge in the current operating markets
- Several of the largest energy-consuming corporations have already or are considering to invest in the country directly in electric utilities. This allows them to self-supply their energy needs and avoid market price volatility

Pros	Cons
– Energy procurement without price volatility	– High investment with slow recovery

Green-field investment/ Acquisition

- It is common for investors seeking to acquire existing generation projects either in operation or in a development stage. Risks for these entries are low given the market mechanisms that allow a stable long-term return over investment. The required investment, however, is significantly high
- With long-term auctions, Greenfield or clean utilities acquired become attractive as the sale of products (energy, capacity and CELs) is assured for a period of 15 - 20 years
- Given the market is currently in an early maturing stage, growth in generation assets will be on the rise in the next years, which becomes economically attractive to invest in them

Pros	Cons
– Low commercial risk	– Higher investment
– Growing market	– Regulatory uncertainties

[6] Sumitomo Mitsui Banking Corporation, 4th Mexico Electric Power Summit.

[7] Mexico Energy and Sustainability Review.

Financing challenges

One of the main challenges in the development of new generation projects under the reformed market will be project financing. New markets' complexity makes it difficult for banks to fund an energy project with the uncertainty as to how the market will develop and the degree of success on the Energy Reform implementation.

Unless long-term bilateral contracts have been executed for a project under development or a considerable amount of energy has been placed in long-term auctions, banks are currently considering the electricity market a high risk taking into account that, nowadays, very little reference exists on how the energy prices will transform over time which in turn makes revenue prediction extremely difficult.

However, according to Ivan Oliveros, Latin America Project Finance Director and Renewable Energy Lead at SMBC,[6] a hybrid project with a maximum participation of 20 percent in the short-term markets and the rest in either long- and mid-term auctions or bilateral contracts, significantly reduces the uncertainty risk and provides a higher degree of probability to receive funding.

Clean Energy Certificates and the Capacity Market significantly reduce banking risks as well, given the income certainty over the long term. According to Noe Navarrete, Commissioner at CRE, "New law allows for bilateral contracts, so a generator can enter into a contract with a supplier that will enable both parties to leverage their investments. In addition, a tender for CELs with a ten-year duration makes any project bankable. The most attractive scheme today is capacity bids for ten-year contracts, since the tenders are designed to make projects bankable."[7]

Current situation

First long-term auction

The first long-term auction in the new Wholesale Electric Market received significant interest from private generators, where more than 460 technical offers were submitted by 103 bidders, out of which 18 offers were selected correspondent to 11 bidders.

Average prices assigned

Out of the 5,402 GWh of electricity and 5.38 million CELs assigned, an average price of USD45.48 per package (MWh + CEL) was obtained in the first long-term auction, where 74 percent of the energy corresponded to solar PV projects and the remaining 26 percent to wind projects:

Wind: USD55.39/MWh+CEL

Solar: USD45.15/MWh+CEL

No capacity was assigned in the first 2015 long-term auction, as no bidders presented an offer for CFE's MXN10,000 max purchase price offer, which seemed too low for most participants.

The assigned projects will supply 15 years of electricity and 20 years of clean energy certificates to CFE's Basic Service Supply subsidiary.

SunPower Systems México S. de R.L. de C.V.
Guanajuato
Cap. MW: 100

Energía Renovable de la Península S.A.P.I de C.V.
Yucatán
Cap. MW: 90

Enel Green Power México S. de R.L. de C.V.
Coahuila
Cap. MW: 330

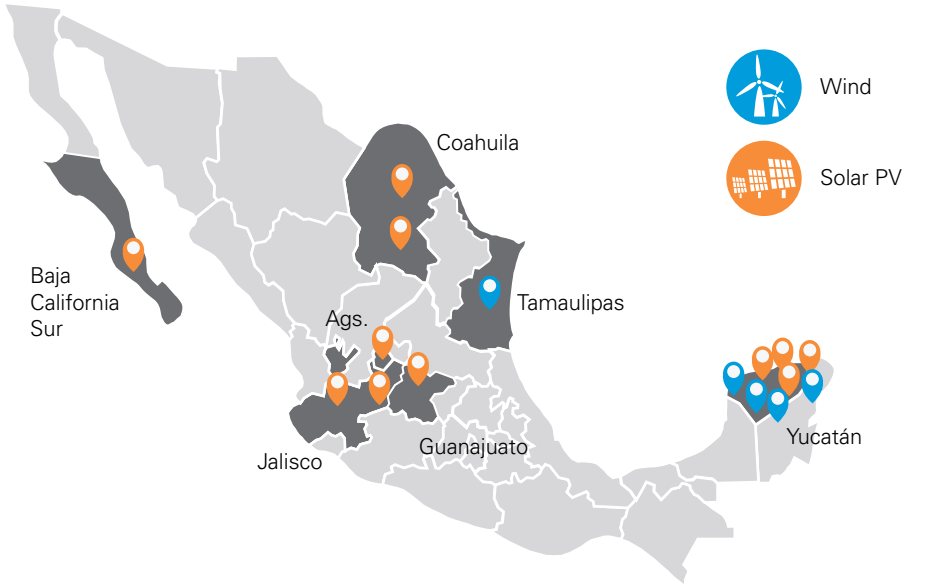
Recurrent Energy Mexico Development S. de R.L. de C.V.
Aguascalientes
Cap. MW: 63

Enel Green Power México S. de R.L. de C.V.
Coahuila
Cap. MW: 250

Aldesa Energias Renovables S.L.U.
Yucatán
Cap. MW: 30

Enel Green Power México S. de R.L. de C.V.
Guanajuato
Cap. MW: 207

Aldesa Energias Renovables S.L.U.
Yucatán
Cap. MW: 30



Consorcio Energía Limpia 2010
Yucatán
Cap. MW: 76

Jinkosolar Investment Pte. Ltd.
Yucatán
Cap. MW: 18

Energía Renovable del Istmo II
Tamaulipas
Cap. MW: 168

Jinkosolar Investment Pte. Ltd.
Yucatán
Cap. MW: 70

Photoemer is Sustentable S.A. de C.V.
Yucatán
Cap. MW: 30

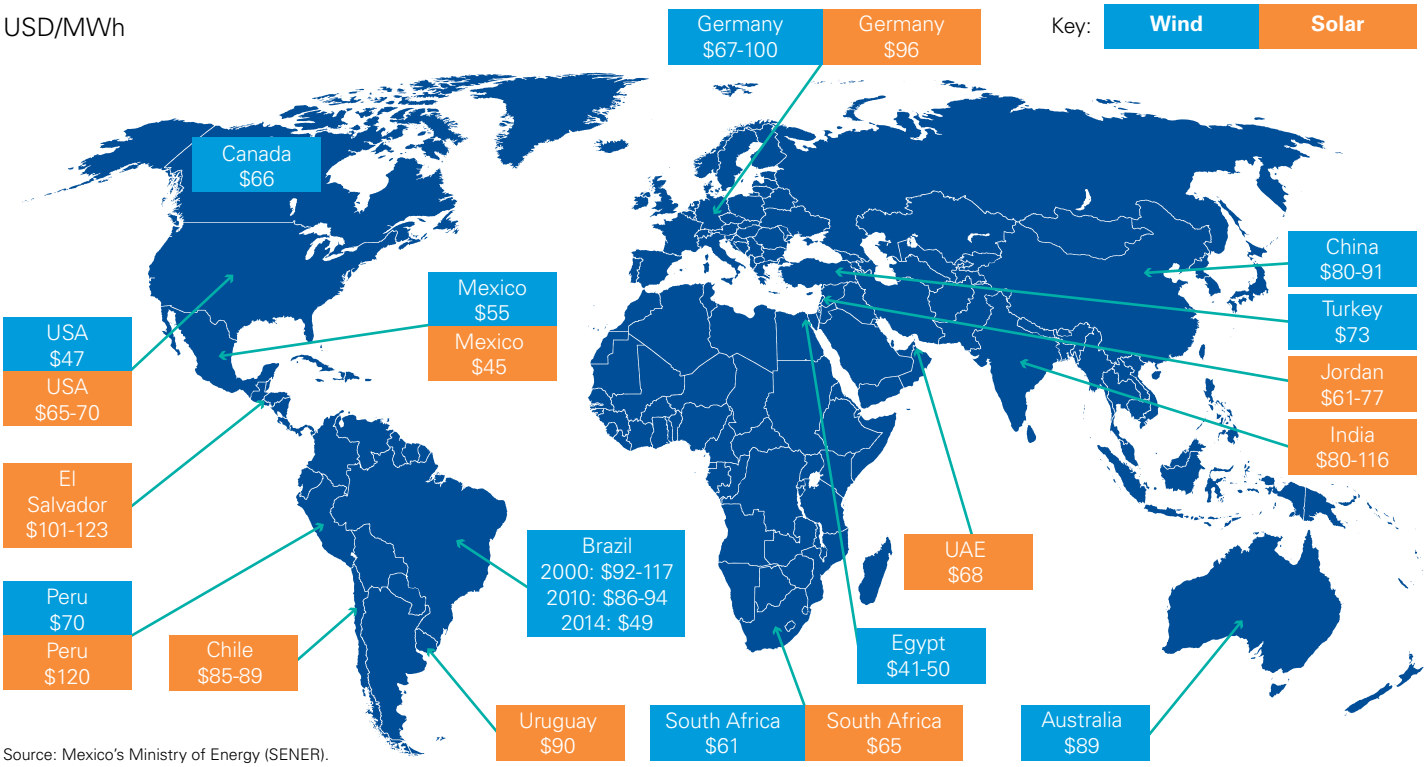
Jinkosolar Investment Pte. Ltd.
Jalisco
Cap. MW: 100

Sol de Insurgentes S. de R.L. de C.V.
Baja California Sur
Cap. MW: 23

Vega Solar 1 S.A.P.I de C.V.
Yucatán
Cap. MW: 500

Mexico's first long-term auction has shown a clear sign of tangible efforts towards more competitive prices in the market, even when compared to other countries around the world (see the map below), and a shift towards a cleaner technology mix by designing auctions where the most efficient plants (and thus cheaper) are assigned.

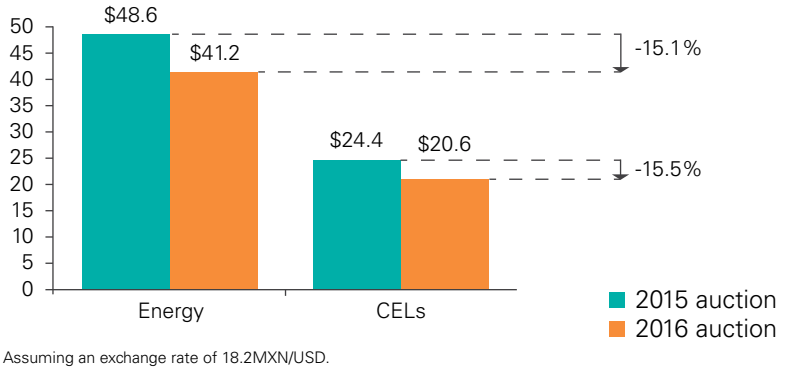
International clean energy auction comparison (mid- and long-term)



Source: Mexico's Ministry of Energy (SENER).

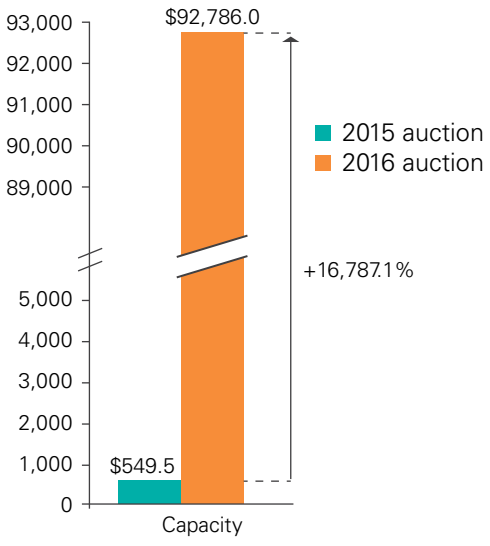
During the second 2016 long-term auction, CFE has presented its purchase bid, with maximum prices being 15 percent lower compared to the 2015 auction for Energy and CELs, but over 168 times higher for capacity, showing a clear sign of interest in new investment in electric power plants.

CFE Energy and CEL purchase bid
In USD/MWh and USD/CEL



Assuming an exchange rate of 18.2MXN/USD.

CFE capacity purchase bid
In USD/MW



Macroeconomic environment

Energy consumption is a primary input for the development of productive activities and the country's development, which has a direct impact on economic growth. It is also an indispensable good for the population, which makes the continuous and reliable supply of electricity a crucial activity.

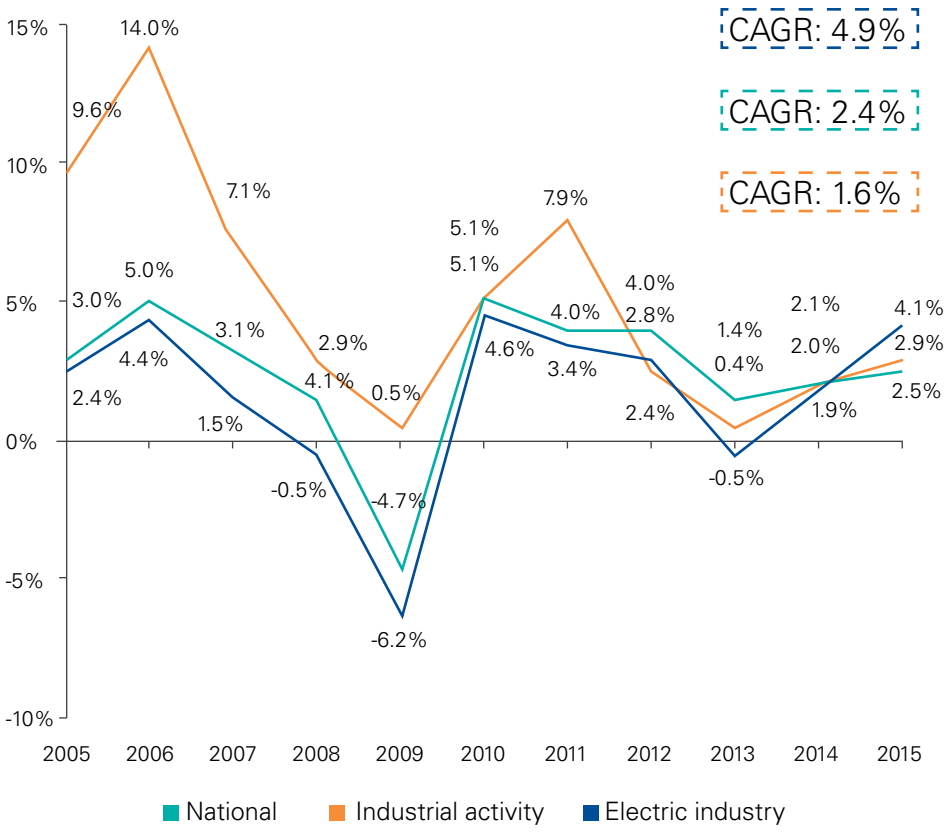
Gross Domestic Product

Electric Industry GDP and other activities

Over the past 10 years, the electricity industry has grown at a compound annual growth rate (CAGR) of 4.9 percent. By comparison, the national GDP has grown at a rate of 2.4 percent over the same period, and the country's industrial activity has maintained a 1.6 percent growth rate.

Despite having a high correlation, the electricity industry in Mexico grows at a higher pace than the national gross domestic product (GDP) and the industrial activity, while presenting lower contractions during recessions.

Gross Domestic Product 2005 - 2015
Annual variation



Source: INEGI, 2015.

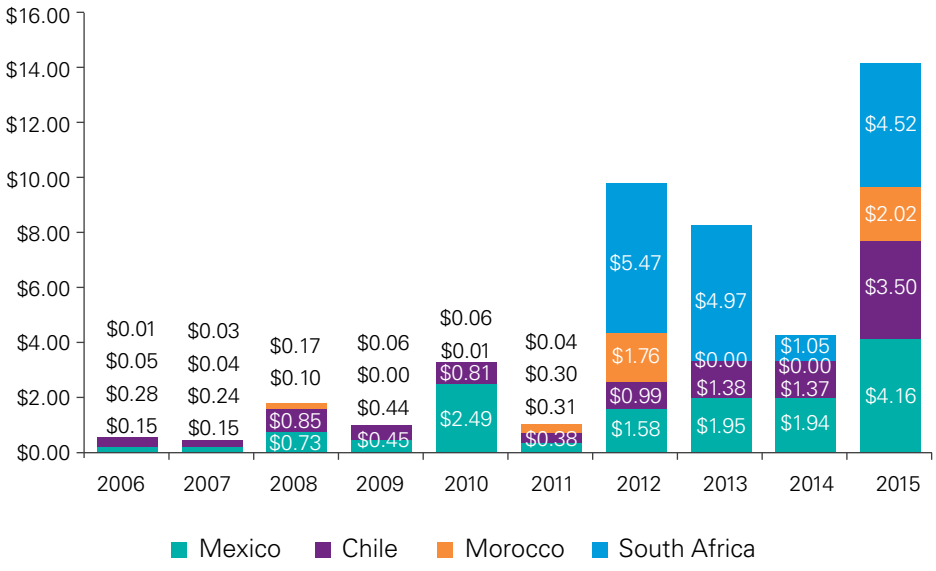
This is mainly due the characteristics of energy consumption as a basic need with no substitutes.

Foreign direct investment

Mexico had a record growth in clean energy investment of 214 percent in 2015. According to Bloomberg New Energy Finance, Mexico received a total of USD4.16 billion in Foreign Direct Investment during that period, compared to USD1.94 in 2014.

Additionally, Mexico's Ministry of Energy expects to receive more than USD150 billion over the next 15 years of investment in new generating capacity, both clean and conventional.

Foreign Direct Investment in Clean Energy
Billion USD

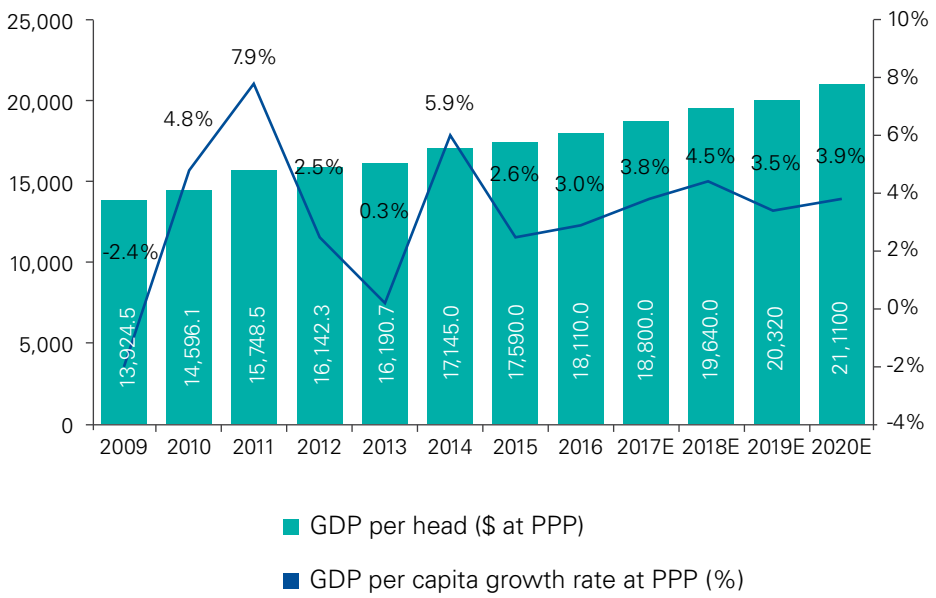


Source: Bloomberg New Energy Finance.

Other indicators

In addition to the electric industry´s performance, Mexico´s overall macroeconomic indicators are positive as well. While both government debt and the current exchange rate raise issues for Mexico, there is an overall positive outlook in terms of market growth and business environment.

Mexico GDP per head
USD at PPP and percentage change



Source: KPMG Analysis with information from the Economist Intelligence Unit (EIU).

Based on the GDP levels, a positive future macroeconomic situation is predicted for Mexico. After decreasing by 4.5 percent in 2009, Mexico´s GDP recovered in 2010. According to the Economist Intelligence Unit (EIU), Mexico is expected to grow at a CAGR of 3.11 percent during 2016-2020 to reach approximately USD1,527 billion within five years.

Purchasing power parity (USD) projections for Mexico´s GDP per capita imply an even more dynamic growth at a 3.11 percent CAGR during the 2015 - 2020 period, reaching an estimate of USD21,110 per person for 2020.

In the World Bank Group´s "Doing Business 2015" report, Mexico was ranked 39 out of 189 global economies. Due to a new reform in Mexico, the country reduced the number of procedures to start a business by about 60 percent, due to this the country saw an increase of 6 percent in the number of total firms (negotiations).

Conclusions

The Energy Reform approved by the Mexican government in December, based on the Electric Industry Law published in August 2014 and implemented late 2015, represents one of the major breakthroughs in the Energy Sector not only for Mexico but for all energy stakeholders around the world. Given its geographic location, Mexico holds an important commercial and economic position in terms of foreign trade and its proximity with the United States, making it an attractive economy for doing business.

Previous governments had made efforts to liberate the market, but they had only done so on a limited scale. Now, it seems clear that the required efforts have been made to create a competitive market that can be internationally viewed as a success, considering the extremely limited time frame of implementation.

Although Mexico lagged far behind other economies in liberating the energy sector, it has now done so with a considerable advantage where it can learn from previous regulatory mistakes in other countries and apply the best practices to create a set of market mechanisms adapted to the Mexican sector.

The timing of the new market implementation could not have been better; it is surrounded by a global environment and is focused on and determined to make strong efforts towards sustainability and lowering greenhouse gases.

CFE's restructure plans will be a key factor in determining a successful implementation of the reform, as the previously State-owned company will need to reduce its monopolistic power to enable a competitive environment in the market. As it has been stated, the Energy Reform implementation brings plenty of opportunities for private investors to participate in the expansion and modernization of the Mexican Electricity Sector in every link of the industrial chain. In addition, the reform presents tangible opportunities for consumers as well.

Global Strategy Group services in the electricity sector

For any supplier seeking to enter or expand within the Mexican electric industry, it is imperative to carefully assess various key factors. There are many benefits and advantages, but there are also potential risks that merit gaining full understanding of the environment and requirements before initiating a relocation or expansion.

An analysis of regional differences (in costs, quality, and availability) of transport, infrastructure, skilled work force, and government/regulatory requirements, among others, can materially impact potential outcomes of an investment. Thus, a careful assessment of all these variables, combined with a strong understanding of the local environment on the ground, is the key for a successful entry.

KPMG in Mexico´s Global Strategy Group (GSG) Team of experienced professionals can assist with various key topics relevant to strategic and operational planning. Our core service offering consists of:

Wholesale Electricity Market		
Suppliers and final users	**Investors and Private Equity**	**Generators**
• Commercialization strategy	• Project / Commercial diligence	• Market analysis
• Energy efficiency strategy	• Site location	• Regulatory framework analysis
• Niche market definition	• Target screening	• Product placement strategy
• Energy sourcing strategy		

Market analysis

Used to determine the size of the market, understand the regulatory environment, market shares of your competitors and main drivers of growth, our assessment can also provide insight into competitors´ strategies and growth projections for each one of your products and services. We have supported many clients by preparing a Market Assessment analysis, especially at early stages of a strategic business decision, considering the particular situation and prices at every node.

Regulatory framework analysis

We advise our clients regarding the existing regulatory risks and their translation into economic benefits for the organization, interpretation of the normative framework, and the development of proposals with a strategic fit to the company's growth policy.

Product placement strategy

We support electric utility generators in the design of strategies to place their products on the different markets available after the energy reform, such as long-term and mid-term auctions, as well as short-term markets, in order to determine the optimal product mix that maximizes our clients' profit while reducing risk.

Energy efficiency strategy

We conduct analyses on load centers for large energy consumers to detect energy efficiency opportunities, reducing unnecessary consumption and analyzing the hourly price curve of the market in order to secure lower tariffs.

Energy sourcing strategy

We support our clients to decide the most efficient ways to source their energy needs. Starting from the definition of the amount allocated through every mechanism (long-term auctions, mid-term auctions, short-term markets) to the management and definition of the Request for Information Process, to obtain optimal offers from energy merchants.

Niche market definition

We help our clients develop a strategy to determine the most adequate niche market to supply electricity (large, medium, or small consumers), through long-term, and mid-term auctions, as well as short-term market. We identify opportunities for suppliers to define a market not yet supplied by other large suppliers or design strategies to acquire already contracted customers.

Project due diligence

An analysis of projects in pre-construction, construction, or ready to operate, in order to determine if the project is attractive to receive investment. We analyze every stage of the project and conduct grounded recommendations to private equities through a red/yellow flag analysis.

Site location

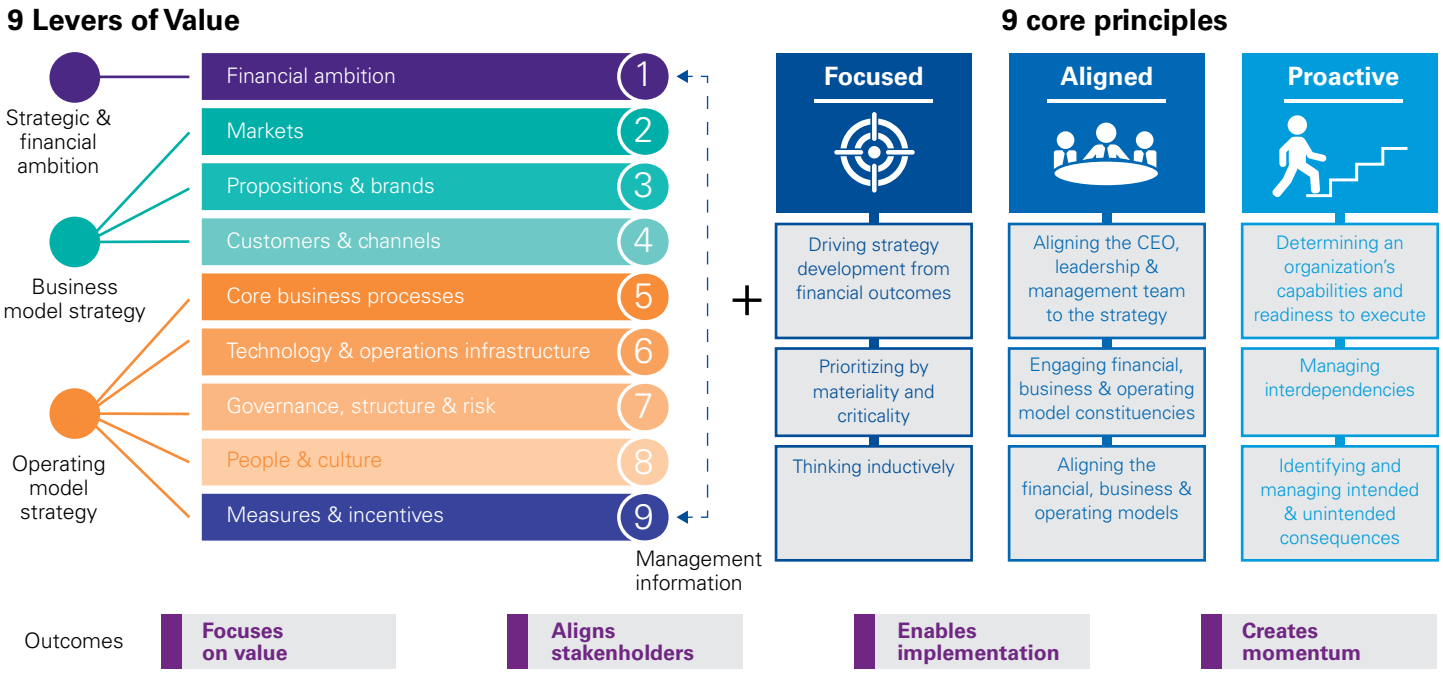
If a player is based outside Mexico and is looking to enter the market (or relocate existing facilities), there are many factors to take in to account for the future success of the business. KPMG´s GSG Team can assist in first defining criteria relevant to their strategy, and then identifying locations and options which best fit these criteria. Analysis can include variables such as vicinity to current and future client base, land costs, construction costs, labor costs, skilled labor availability, transportation costs and routes, raw material availability, as well as benefits and incentives available at both state and federal levels. Furthermore, we analyze variables relevant to the electric utility, such as availability of the required inputs in the region (natural gas, solar radiation, wind, geothermal deposit, etc.)

Target screening

In the case of a client looking to enter to or expand within Mexico via a merger or an acquisition (but also a partnership or joint venture), we can assist in locating a suitable target. According to the needs of our client, we can help to establish strategic criteria; and develop a list of desirable targets and negotiate partnerships or acquisitions on client´s behalf (if required).

About GSG

We partner with clients from the private, public, and not-for-profit sectors in all regions to develop their strategy and deliver results. Our clients operate in highly competitive environments, and, in many cases, strong disruptive forces, such as technology and regulation, mean that market places are evolving rapidly and financial, business, and operating models need to be redesigned. We work shoulder-to-shoulder with our clients to identify and address their most critical challenges and valuable opportunities that enable their organizations to develop capabilities and transform. Our proprietary approach is customized to each client to help the CEO and management team design and execute to create an enduring competitive advantage. We generate ideas for and with clients to drive growth, both organically and inorganically, improve efficiency, and work alongside them through implementation. Our Value Delivery begins with our own strategy framework **The 9 Levers of Value**, summarized below. Together they form a holistic framework for strategy, structuring the business model and how we approach our scope, how we identify interdependencies, and how we blueprint for high-level design of your operating model.



We invite you to learn more about the Global Strategy Group and work with us.

About ENR

How can we help

Based on our knowledge of the best practices of international business, which gives us local and global experience, our multidisciplinary teams (fiscal, legal, and technological) are ready to help you meet your business goals by providing added value to all activities involving the energy industry. To seize the opportunities of this context, we offer the following services:

- Technologies and control mechanisms, considering geographical factors
- Structure and alignment of business processes
- Risk management
- Regulatory compliance
- Planning and strategic alliances

kpmg.com.mx
01 800 292 KPMG (5764)
asesoria@kpmg.com.mx


KPMG MÉXICO


@KPMGMEXICO


KPMG MÉXICO


KPMGMX

Contacts

Oscar Silva
Partner, Global Strategy Group
E: osilva@kpmg.com.mx

Lina Angelov
Senior Manager, Global Strategy Group
E: linaangelov@kpmg.com.mx

Ruben Cruz
Lead partner, Energy & Natural Resources
E: rubencruz@kpmg.com.mx

Arturo Saavedra
Director, Energy & Natural Resources
E: arturosaavedra@kpmg.com.mx

Contributors

Diego Bojorquez
Global Strategy Group

Alfonso Piza
Global Strategy Group