# SOLAR DEVELOPMENT IN MEXICO: WHAT IS THE BEST STRATEGY?

Business Case Study

By

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*This case examines a renewable energy company's strategic analysis of expansion opportunities in an uncertain regulatory climate.*

## Introduction

Jim Kurts President of RER Energy Group (RER) picked up his pace as he headed back to the conference room. Through the glass he could see that Carla Ortiz the company's Director of Business Development was already back. Their six-person team had just concluded a very productive, but lengthy meeting discussing the company's expansion opportunities in Mexico. Jim and Carla needed to sort through the remaining choices and pick the one that would give RER its best opportunity over the coming year. Unfortunately regulatory uncertainty in Mexico was forcing the company to make some difficult choices. Solar development opportunities faced more challenges than when RER had initially targeted Mexico for expansion almost a year ago.

## RER Energy Group

Founded in 2009, RER Energy Group (RER) is a renewable energy developer. RER's founder and president Jim Kurts was a financier on Wall Street prior to returning to Reading, Pennsylvania to run the family business Reading Electric in 2008. As CEO, Kurts targeted renewable energy as a favorable growth opportunity for Reading Electric and in 2009 set up RER within Reading Electric to capture some of this market. RER was so successful; it became independent a year later with Kurts as president.

Today RER is a regional company that operates in the Northeastern U.S. with a focus on distributed solar energy development. RER has installed more than 75 solar systems totaling more than 25 megawatts (MW) while accessing over 15 million USD in state and federal grants for these projects. In 2013 Solar Power World named RER one of the top 100 U.S. Solar Developers (Kershner 2013). The company has strong partnerships with several groups of investors, which allows it to provide innovative financial solutions to their clients.

Beginning in 2013, RER included international markets in its growth strategy, hoping to offset any loss in business from a potential U.S. market contraction expected in 2017 when the U.S. federal tax credit for solar will be reduced from 30% to 10% (Kann 2012). After casting a net for opportunities across Latin America, Jim and Carla focused their attention on Mexico.

## Mexico Overview

Mexico is known for having a growing steady economy; in fact, it is often referred to as one of the best countries to invest in throughout Latin America. In 2012 Goldman Sachs promoted it along with other fast track economies in their new investment portfolio acronym (MIST) - Mexico, Indonesia, South Korea, Turkey (Martin, 2012), garnering foreign investment attention (Martin, 2012).

From a solar perspective, Mexico was an ideal investment opportunity. The country is classified as the third among all countries with the most potential for Solar (EPIA 2011). It has an irradiation average of 5.5 $kWh/m^2/day$ (kilowatt hours per square meter per day). Germany, by comparison (the country with the most solar per capita in the world), has an average of just 3 $kWh/m^2/day$ (Shahan, 2013).

In addition to its huge solar resource, Mexico was also becoming more attractive from a policy perspective. A regulatory framework established in 2010 allowed net metering

(where solar producers get credit on their energy bill for extra production returned to the grid). Power produced in one region of the country could be transported to other regions using the existing grid. Also tax incentives allowed for 100% accelerated depreciation of the development costs in the first year (Gonzalez, 2014). Additionally some states (such as the Federal District) had additional incentives such as a property tax reduction (Gonzalez, 2014). One structural advantage Mexico has over the US is that most laws are federal eliminating a hodgepodge of regulations in the different states within Mexico. Also in 2013 the Mexican government announced its goal to reduce greenhouse gases (GHG) by 30% by 2020 and by 50% by 2050, and reach 33% of renewable energy generation by 2018 (SENER, 2013).

The economics also looked promising for solar development: the country was suffering from high electricity rates, with prices increasing 9.5 % annually on average for the past 10 years (CFE, 2013). In comparison, in the US they increased 3.5% annually on average from 2003 to 2013 (EIA, 2014).

While all of the factors mentioned above contributed to heightened interest in energy development in Mexico, the culminating factor in drawing international attention was the highly anticipated structural reforms the Mexican government was working on for the energy sector (Austria, 2014). News reports indicated that the reform package could pass the legislature within the year and Jim wanted to have prospects in place so that RER could hit the ground running when that happened.

## The Energy Reform

The Energy Reform of 2013 was key factor for RER's investment interest because it promised to create a competitive electric market in Mexico. Key parts of the legislation included requiring a larger percentage of electricity from renewable energy (Arreola, 2014) while at the same time opening the market for large-scale private investment.

With the exception of a law passed in 2008 that allowed limited private investment under certain conditions, for the past 74 years the government had been the only entity allowed to generate, produce, and distribute electricity (Olson, 2013). The "Ley del Servicio Público de Energía Eléctrica 2008" established that the private sector can generate electricity for its own consumption or sell it to CFE (the government-owned national utility) for the following purposes: cogeneration, small production, auto-consumption, exports, and independent production (Salazar, 2010). It incentivized the development of renewable energy primarily through power purchase agreements (PPAs)[1], although investors had to own at least one share of the system to fulfill the "auto-consumption" clause).

By no longer limiting the sale of renewable energy to PPAs or small production permits, the Energy Reform was set to revolutionize the renewable energy market, making it possible to sell electricity on an open market. No longer would the Mexican government be the only player in the energy markets (Exhibit 1). To accommodate these structural changes, the government created new agencies (CENACE and CENAGAS) to administer the new markets (Forbes, 2014).

Unfortunately, as with any fundamental change, it was also anticipated that Mexico would go through a period of adjustment. How painful that initial period would be was highly dependent on the rules and regulations known as secondary laws that would codify the Energy Reform. The renewable energy sector however, was especially optimistic about the secondary laws considering new incentives like "Certificados de Energías Limpias"

[1] A Power Purchase Agreement (PPA) is a contract between two parties guaranteeing the purchase of electricity generated by a supplier under certain conditions. Given the high price of electricity in Mexico, PPAs that lock in electricity prices are very attractive.

(Certificates of Clean Energy) commonly known as CELs were being discussed. CELs would have a monetary value and improve the economics of renewable energy developments.

## Secondary Laws

The issuance of the Secondary Laws in December 2014 created chaos within the power markets. Not only did the new rules lack clarity, they opened up a regulatory gap that paralyzed the renewable energy sector.

One fundamental problem was the Secondary Laws defined "clean energy" to include both nuclear and hydroelectric power (Luege, 2014). By incentivizing established energy providers along with nascent renewable sources such as wind and solar power, the rules distort competitiveness in the market. This also has the potential to limit the adoption of solar and wind into Mexico's energy portfolio, as Mexico could achieve their targeted 35% of "clean energy" by 2024 by increasing nuclear and hydropower. Nuclear and large hydroelectric power currently account for 21.4% of Mexico's electricity production (POISE 2012-2026).

However the most difficult issue was that the Secondary Laws were not compatible with the Electric Law of 2008 that regulates renewable energy creating a gap in regulation (Table 1).

**Table 1: Comparison of Incentives Before and After the Energy Reform**

| INCENTIVES | |
|---|---|
| **Before Energy Reform** | **After Energy Reform** |
| - 100% Depreciation in year 1<br>- Energy Bank (Net metering)<br>- Postage stamp wheeling rates for transmission | - 100% Depreciation in year 1<br>**Net metering rules unclear***<br>**Wheeling rates unclear***<br>- (CELs) Certifcates of Clean Energy |

* Will be defined in the Law of Electric Transition and Renewable Energy.

Once it was clear to Jim and Carla that the Secondary Laws had not improved the market uncertainty and that they would need to wait for the next set of regulation, they needed to evaluate whether to continue to pursue growth opportunities within the country. The lack of clarity with the secondary reforms had increased the level of uncertainty for both investors and clients. However, positioning the company in the market during hard times might bring great advantages in the future.

The day Carla and Jim met to discuss the strategy RER should pursue, they were 8 months into the venture and had evaluated over 22 projects. Of these 22 projects, a few were not going to go forward, but most were on hold hoping an additional secondary law[2] expected in mid-2015 would clarify the remaining regulatory issues. Only one of the projects was moving forward despite the uncertainty in Mexico. Three areas of uncertainty were particularly offsetting for investment. These included: not knowing which incentives would be available, how long the new permitting process would take, and whether the Energy Reform would decrease CFEs electricity prices overall making it more difficult to develop solar projects? (Exhibit 2)

[2] The additional secondary law is known as the Law of Electric Transition and Renewable Energy. The anticipated publication date is the end of the first quarter 2015 (EGADE, 2014).

# Solar Market in Mexico

## Solar Large Scale vs. Distributed Generation

The solar market in general can be divided in two categories: large-scale (also known as centralized or utility-scale) and distributed generation (WIE, 2010). Large-scale solar installations are typically located far away from where the electricity is consumed and sell power directly to utilities. Distributed generation refers to projects where the energy is generated at the same location where it will be consumed. Distributed solar can be residential, commercial, and industrial.

Large-scale installations (solar farms) benefit from economies of scale and can be built at a lower cost per unit of electricity than distributed solar, often translating into higher economic benefits for their customers. However, the profitability of solar farms is also completely dependent on electricity transportation costs and infrastructure costs (how far is the connection to the grid from the farm location).

The development of the large-scale solar market is in its early stages. To-date in Mexico, approximately 120 MW have been installed in projects larger than one MW in size (GTM Research 2014). According to the PV Latin America Playbook up until 2013 there was only one large-scale farm: Aura Solar at 30 MW which sold electricity directly to CFE. Prior to The Energy Reform solar farms developed by the private sector were capped at 30 MW (LSE, 2008).

The distributed generation market in Mexico is in an even earlier stage of development with only anecdotal data available on current and future projects. The largest planned project announced by the commercial developer Soriana will be 30 MW in size at over 200 locations (Lopez and Cobb 2014). Currently small distributed-generation projects have an advantage over large-scale projects because of the regulatory gap. Projects smaller than 500 kilowatts (kW) do not require generation permits (CRE, 2014). Generation permits will take at least a year and a half to be issued.

## Market Segments by Type of Customer

Mexico has one national utility company, yet customers pay different prices for electricity depending on their activity, consumption, and location. There are 43 different energy billing rates, called "tariffs," some of which, like the agricultural and residential tariff, are subsidized by the government (CIDAC, 2013). We can explore this further by understanding each market segment. In table 2, we can see that the industrial and commercial sector represents 64% of the market. Also, these are the only two profitable sectors for CFE. With the profit from these rates, the government subsidizes residential and agricultural rates.

**Table 2: Energy Demand by Energy Tariff in Mexico.**

| Use | Percentage of Total National Demand | Ratio (Price/Cost) | Subsidized |
|---|---|---|---|
| Industrial | 57.80% | 1.04 | No |
| Residential | 26% | 0.42* | Yes |
| Commercial | 6.80% | 1.11 | No |
| Agricultural | 5.40% | 0.33* | Yes |
| Services | 4% | 0.91* | No |

*These tariffs have a lower price than what costs CFE to provide the service.
*Tariff 2 and Tariff 3 can be residential or commercial and it is also subsidized.
*Source: CIDAC, Luz a la competitividad nacional, 2013.

Table 3 shows the main energy tariffs for each sector and an estimated average price per kWh. These averages are based on CFE's prices for 2014 (CFE, 2014). Small commercial establishments and residences with high energy consumption have the highest electricity tariffs. These two rates represent a great area of opportunity for solar players. As a comparison, the average electricity price in the U.S. is $0.10 dollars per kWh (EIA, 2014). With rates that are double the price, the value of having solar and not paying for electricity is higher. The only issue is that both of these markets consist of many small locations distributed all over Mexico. Therefore, installation prices are higher, and many projects are required to have a significant revenue stream. See Appendix 2 for more information about market segments and their behavior.

**Table 3: Information about Energy Rates Mexico.**

| | Commercial (Small) | Commercial (Medium/Large) | Industrial | Residential | Resiential High Consumption | Agricultural |
|---|---|---|---|---|---|---|
| **Predominant Tariff** | *Tariff 2/Tariff 3* | *HM/OM* | *HM/HS* | *01* | *DAC* | *09* |
| **Avergace Price per kWh (USD/kWh)** | $ 0.18 | $ 0.11 | $ 0.09 | $ 0.07 | $ 0.24 | $ 0.05 |
| **Large Scale/Distributed Generation** | Distributed Generation | Both | Both | Distributed Generation | Distributed Generation | Both |

*Note: Prices have been converted to US dollars using an exchange rate of 14 MXP/USD.
*Source: CFE, 2014, http://app.cfe.gob.mx/Aplicaciones/CCFE/Tarifas/Tarifas/tarifas_industria.asp

## Commercial & Industrial Market

As the largest electricity consumers the combined commercial and industrial market are attractive market segments for solar development, however their electricity tariffs HM/OM and HS are not as high as the small commercial and high consumption residential tariffs. All are hourly variable tariffs meaning that the price varies depending on the hour of the day with designated base, intermediate, and peak rates. Variations also happen depending on the day of the week and the regional location of the customer.

Development targeted at industrial and commercial facilities include contracts with off-site solar farms, or in some cases, onsite solar farms, especially if they are very large. Medium-sized customers referred to as the "mid-market" (REW, 2014) pay electricity rates (around $0.11 USD per kWh) similar to U.S. averages, and therefore, just as in the US, require governmental incentives to make the financial returns attractive to investors and clients. Most of the projects RER evaluated for the near term in the mid-market market segment were for distributed generation, with some having the potential to be large-scale in a second phase. Projects were sized in the 200 kW to 5MW range, but were designed not to surpass 500 kW at each site (electricity meter) so as not to require generation permits.

## Residential (high consumption) & Small Commercial

Small commercial establishments and high consumption residential markets have the highest electricity tariffs (Tariff 2/Tariff 3 – 0.18 USD per kWh) making these market segments a great area of opportunity for solar, attracting investors even without government incentives. As a comparison, the average electricity price in the US is 0.10 USD per kWh (EIA, 2014). As mentioned before, the downside is that both markets consist of many small locations distributed all over Mexico, which translates into higher installation prices.

Targeting the residential market would also require selling smaller systems individually to homeowners requiring a large sales force and large operations and logistics to achieve economies of scale. The small commercial could be less complicated from a sales standpoint (one client many locations, but logistics and operations are as complex. Another downside is that RER has little experience in this market segment having focused its U.S.

operation on the mid-market segment. Keeping this limitation in mind, the three residential projects RER evaluated were either mixed used buildings or low income housing with closely spaced buildings making the project construction and operation similar to the commercial and industrial mid-market.

## RER Development Strategy Analysis in Mexico

As RER was considering entering the Mexican market, the company considered the different market segments on which it could focus; in addition, the company considered different financial and partnership strategies to pursue. Consequently, RER wanted to test out with a series of different development strategies with four main variables, which are shown in Table 4.

**Table 4: Project Development Analysis Variables**

| Market Size | Market Segment | Financial Options | Partnership Structure |
|---|---|---|---|
| Large Scale | Commercial (Small) | Cash Purchase | Channeled Developmet |
| Distributed Generation | Commercial (Medium/Large) | Bank Financing | Integrated Direct Development and Construction |
| | Industrial | PPA | Direct Development Outsource Construction |
| | Residential | Leasing | |

It was in this climate of both optimism and uncertainty that Jim and Carla first tested the different development strategies. They built strategies by analyzing each of the four variables: type of market, market size, financial options and partnership structures trying to find the best combination of variables to optimize their prospects.

### Variables

#### Market Size and Segments

As mentioned before, most of the projects evaluated for the short term were distributed generation; nevertheless, some of these had the potential to be large scale in a second phase. Regarding the market segment, 86% were either commercial or industrial, only 14% were residential. Of the commercial and industrial projects, approximately 89% were in the mid-market sector (size of 200kW-5 MW). In practice, the projects were designed not to surpass 500 kW in each location (electricity meter) in order to fall under the regulation gap so they could be installed without generation permits. The remaining 11% were small commercial sites.

#### Partnership Structures

Jim and Carla were debating on what partnership strategy to pursue. They were evaluating three possibilities; direct development and EPC (Engineering, Procurement, and Construction), direct development and outsource EPC or channeled development.

Table 5 outlines RER's responsibilities in each strategy.

**Table 5: RER Responsibilities in Each Partnership Strategy**

| Stage | Integrated Direct Development and EPC | Direct Development & Outsource Construction | Channeled Developmet |
|---|---|---|---|
| **Development** | Find a project/lead<br>Design the project<br>Financial Analysis<br><br>Sales Process<br>Direct Contact with Client<br>Due Dilligence<br>Obtain Financing<br>Permitting/Legal | Find a project/lead<br>Design the project<br>Financial Analysis<br><br>Sales Process<br>Direct Contact with Client<br>Due Dilligence<br>Obtain Financing<br>Permitting/Legal | Design the project<br>Financial Analysis<br><br>Support Sales Process<br><br><br>Obtain Financing |
| **EPC** | Engineering<br>Procurement<br>Construction | Supervision | Supervision |
| **O&M** | Monitoring & Maintenance | Monitoring | Monitoring |

* The channeled development strategy has flexibility so responsibilities might change from project to project.

### *Strategy 1: Integrated Direct Development and EPC*

An integrated direct development and EPC strategy means that RER will not have partners and instead would perform every activity in the process of finding a project and implementing it. These activities include: finding a potential client or lead, selling the project to the client, obtaining financing, performing due diligence, EPC, and performing monitoring and maintenance of the installed system.

Benefits of this strategy include having control of the entire process, ensuring company quality standards are met, managing the relationship with the client, easier management of the project and receiving 100% of the profits. The downsides of this strategy are that it requires a lot of investment by RER; hiring of specialized personnel and a robust sales force. Another downside is that given the company lacks experience in Mexico; its early projects would almost certainly be more costly as RER worked through issues as part of its learning process. The last downside is that the entire risk of developing a new market falls on RER.

### *Strategy 2: Direct Development and Outsource EPC*

A direct development strategy with EPC outsourcing means that RER would partner with a company who has experience with solar engineering, procurement, and construction in Mexico. Benefits include not having to hire a team of experts in the field, ability to profit from the experience of a local partner, and avoid learning curve mistakes. This is RER's typical partnership strategy in the U.S. Disadvantages are that a share of the project's profits will pass to the EPC partner and ensuring quality standards and meeting timeframes are not under the control of RER.

It is important to note that this strategy still has a high initial cost and scale issues because the entire development process is in hands of RER requiring large initial investments in marketing and sales in order to have constant leads and a significant share of the market.

### *Strategy 3: Channeled Development*

Channeled development strategy with one or more partners is the most flexible of the three, as development roles can be divided among partners according to each partner's strengths. Channeled development also makes it easier to achieve market penetration. For example, RER could have many partners bringing in clients from across Mexico and grow at a faster pace while expending fewer resources. Also, the initial investment is much lower, as costs are spread between partners, all of whom have their own labor force.

Nevertheless, there are three major downsides. First, RER loses control of the relationship with the client, making it harder for the company to share their values with the client and ensure a long-term relationship. Second, partners have to unify their visions and agree in the decision-making process making the development process slower and more complex. Third, development profits or fees will be shared among partners.

## Financial Options

The financial structure options are cash purchase, bank financing, PPA, and leasing. The summary information about the financing options are found in Table 6 below. The table shows averages derived from the financial analyses of the 22 projects evaluated. Some of the 22 projects were not eligible for leasing or bank financing, so they were not included in the average.

RER works with all eligible financial options available to its clients allowing them to choose the best financial option. The company has had success with all of the financial options and by making financial innovations. RER attributes its success to its transparency in handling the relationship between the client and the investor. This transparency helps the client choose the option that best matches their needs, and as a result, RER builds good long-term relationships.

**Table 6: Financing Information Based on the Average of the Projects Analyzed**

| | Cash Purchase | Bank Financing | PPA | Lease |
|---|---|---|---|---|
| Who is the investor? | Client | Client & Bank | RER or RER's Investor Partner | Bank |
| Percentage of Capital Required | 100% | 35% | - | - |
| Contract Period | - | 12 years | 25 years | 15 years |
| Interest Rate in 2014-2015 | - | 9% | 6%[1] | 8% |
| IRR after tax for Investor[2] | 14% | 25% & 9%[3] | 9% | 8% |
| Average payback time for client | 9.5 years | 2 years | NA | NA |

[1] The PPA has a fixed annual escalation for the PPA term, the average is 6%.

[2] The expected IRR is calculated for a period of 25 years.

[3] The returns are for the client and for the Bank respectively.

### *Cash Purchase*

Cash purchase is the simplest structure options that RER offers. In this case, the client is the investor and pays 100% of the project development costs (EPC and Development Costs) in cash.

### *Bank Financing*

Bank financing can be obtained by the client (often yielding better interest rates), or RER can search for financing for the client. The availability of the financial option will depend on the client's credit rating and credit access. Interest rates in Mexico are higher than in the

U.S. The best rate that RER found this past year was a 5% rate and it was for a very large company that had great lines of credit. Most of RER clients were eligible for loans with 9-12% interest in 2014. Rarely would a bank lend 100% of the capital required. In RER's experience, banks institutions will lend 50-70% of the capital with the rest of the equity provided by the client.

There is a loan provided by a Mexican government agency, FIDE (Fidecomiso para el Ahorro de Energía Eléctrica), but they will not cover the entire amount; up to 350,000 Mexican pesos the equivalent to $23,000 USD approximately (FIDE, 2015). A problem with these loans is that the issuance process might take a long time. The interest rate depends on the client's profile, though the lowest rate available is TIIE +5 points. TIIE is the Equilibrium Interbank Interest Rate, used as a national reference and calculated by the Mexican Bank on a daily basis. The TIIE rates averaged 3.29% in 2014, resulting in FIDE's minimum average interest rate around 8.29% (Banco de Mexico, 2014). Table 6 suggests that bank financing has the best return, but there are cases where the client might prefer another option even though it would yield lower returns.

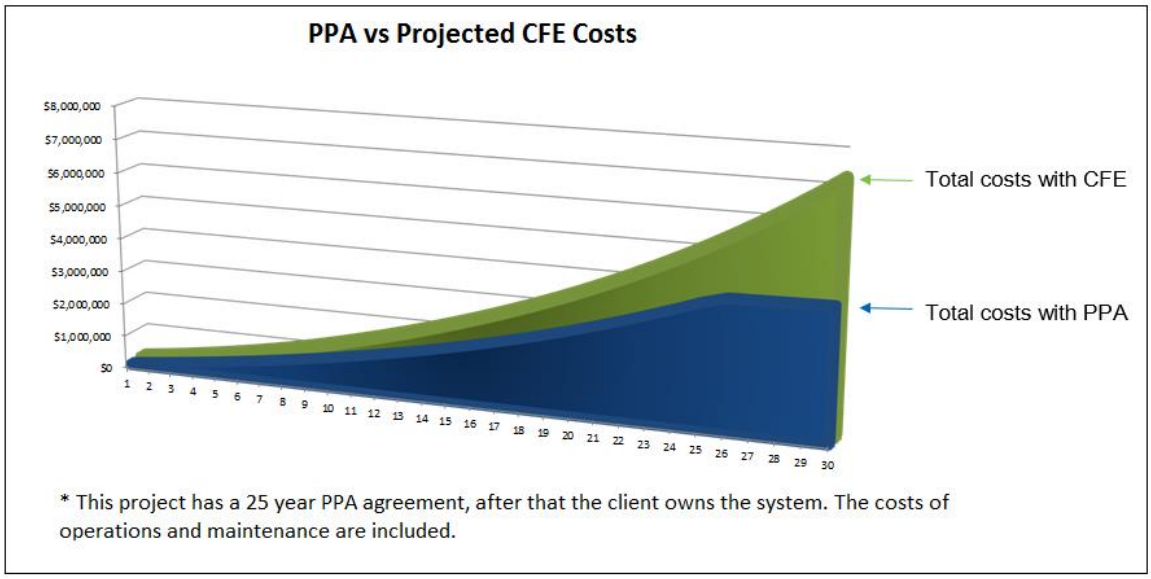
### *PPA (Power Purchase Agreement)*

The PPA is a contract between two parties to purchase power. The consumer agrees to pay a specified price for the electricity it consumes to the power developer/investor for a specified period of time. The price might be variable in reference to CFE's price, it might be fixed, or it might be fixed with a certain annual escalation. This escalation might also be either fixed or variable in reference to some national or international benchmark. The PPA structure RER is offering in Mexico consists of a fixed price with a fixed escalation.

RER's experience with financial markets and PPAs in the U.S., differentiated them from the majority of other solar developers in Mexico. This gave RER a leg up on other developers as clients often prefer PPAs over bank financing, because with a PPA they have the potential for saving without risking any capital. Under RER's structure, the PPA's base fixed price is based on the price the client is currently paying to CFE with a discount that varies from 5-15%. In most of the cases RER offers a 10% discount. This fixed price increases every year at a fixed rate of 3.5%-6%. In most cases, RER offered a 6% escalator. This escalation rate is higher that Mexico's annual average inflation over the past 5 years which is 4.01% (INEGI, 2015), but still much lower than CFE's annual average price inflation which is 9.5% over the past 15 years (CFE, 2014).

The client's savings are calculated from the difference of the discounted initial PPA price and CFE's current price, added to the difference from the PPA's fixed escalation rate and the projected CFE's annual increase in energy prices. RER estimates that CFE's rate will continue to increase for the next 5 years as in the past. After five years, the projected escalation decreases to 6%. An example of how the savings look for the client under these scenarios is found in Graph 3 below.

**Graph 1: Example of PPA vs Projected CFE Costs**




RER has found that there are three problems with PPA contracts in Mexico. First, it is a new concept in this market. Second, PPA consist of long-term contracts (15-30 years). Most of RER's clients in Mexico are not used to thinking in such a long term; this is likely a cultural issue. Third, clients expect CFE's energy prices to fall, based on the government's promises. For these three reasons, RER and other developers have faced great resistance from their clients to enter into these contracts.

The discount rate and escalation rate that RER offers to their clients varies depending on the electricity rate the client currently has and on the complexity of the project. With higher electricity prices, RER can offer better rates to the client and still meet investor's expected rates of return. The law of electric markets, to be released in the next few months, might improve the project economics which will let RER offer better discounts and lower escalation rates to their clients.

### *Leases*

Leasing is another form of financing that RER offers their clients. There are two types of leases: capital lease and operative lease. In Mexico RER only works with capital leases. With a capital lease, the client will pay a "rent" for the solar equipment to a lease provider for a certain period of time and after that they will own the equipment. With the projections RER made for CFE's prices (Exhibit 2), the client would pay an overall rent that is lower than what they would pay CFE for the electricity generated by the solar panels.

Until today RER has only one capital lease partner in Mexico, the terms for most of the projects evaluated consist of a 15 year lease with an 8% annual rate. These terms will change after the electric law is enacted.

## Analysis

In order to determine the best development strategy for RER Jim and Carla analyzed:

- Market segment
- Partnerships
- Economics of each project

The other variables, financing options and market size (utility scale vs. distributed generation), were not analyzed because they do not depend on RER. The current regulatory situation only allows short term distributed generation projects (smaller than 500 kW) and the financing options will be chosen by the client. Therefore, RER only have to choose a market segment and partnership strategy.

RER used a proprietary financial model to analyze the economics of each project. T the following quantitative parameters were examined to analyze the Mexican development strategies: IRR for investor; client benefits; and percentage of profit for RER.

In addition to the quantitative parameters the team evaluated qualitative measures such as market growth potential and the partnership strategy. The partnership strategy was measured with three parameters: mission and vision alignment; growth potential; and quality of development process.

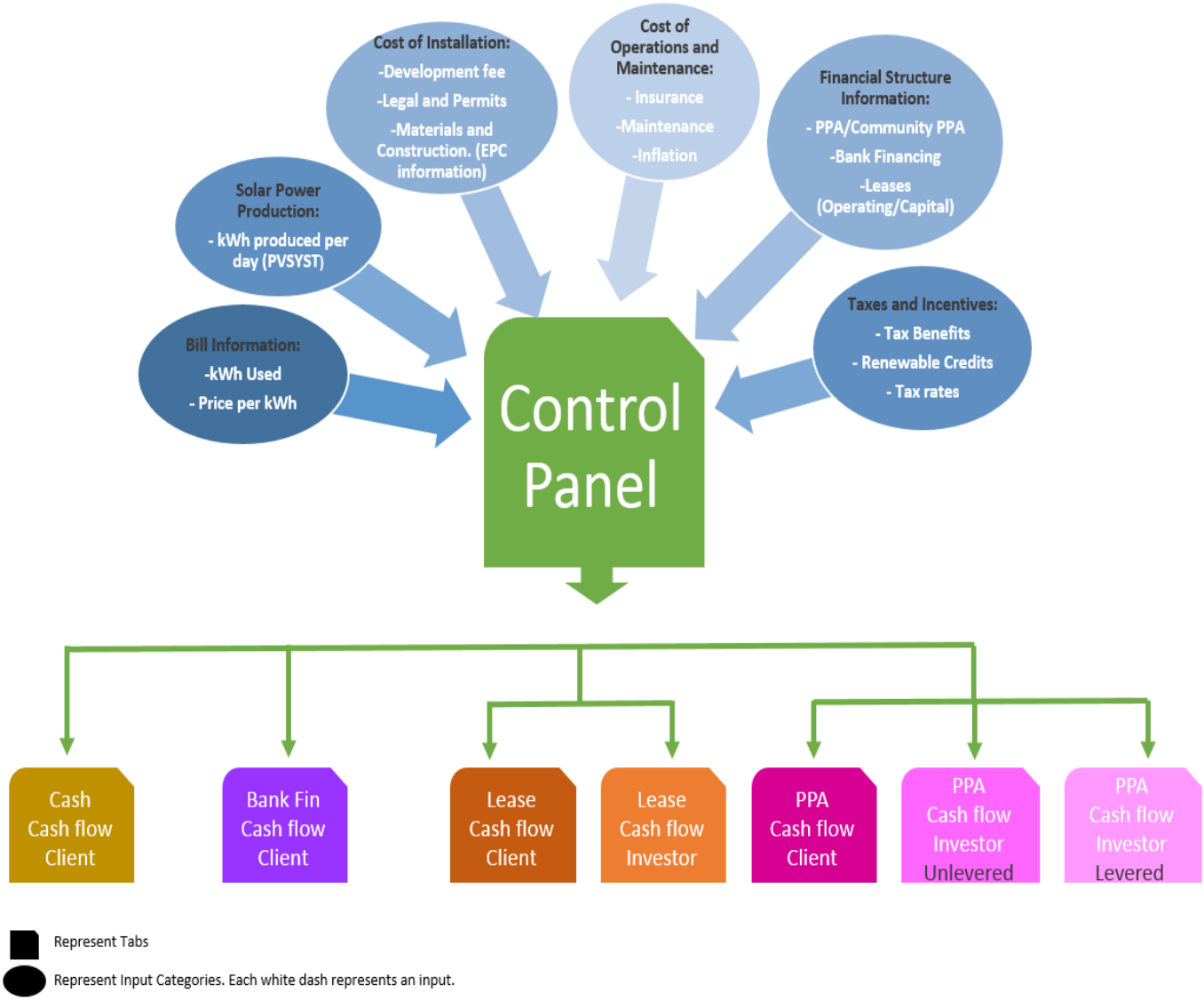
## Financial Analysis

Regardless of the partnership strategy that RER decides upon, the company always does a preliminary design of the project. The company performs this design because the results will define the inputs of the financial analysis. The financial analysis shows if the project is profitable for the investor, attractive for the client, and profitable for RER. These three parameters are key for the project to be successful, if one of them is not met the project will not move forward.

RER already had a financial model for their US projects that would require modifications to be used in Mexico. The model was modified to include currency changes, Mexican incentives, and Mexican tax law.

Figure 1 shows a schematic of the model (with more details in Exhibit 3). The inputs are characterized with circles, they are all imputed or modified in the control panel, which is represented by the green box. The financial model has eight outputs, each one in a different tab. The outputs represent the financial results for either the client or the investor depending on the specific financial structure. The investor could be the same as the client if the project is a cash or bank loan transaction. Otherwise the investor is either RER or one of RER's financial partners.

**Figure 1: Financial Model Inputs/Outputs**




## Case Studies

From the 22 projects that were in RER's pipeline, Jim and Carla decided to carry out a detailed analysis of three project examples that represent the main development strategies tested in the past year.

### 1. Technology Manufacturer and Service Provider: Industrial Mid-Market

This is an industrial mid-market project of 800kW. The client is a technology manufacturer and service company for the energy industry. It is a multinational corporation with offices in Mexico City. The solar power system will be located in two of their manufacturing facilities near Mexico City, each one of 400 kW approximately.

The development strategy RER is pursuing for this project is "Direct Development & Outsource Construction." Therefore, RER would be in charge of the development but would bid several EPC's to handle the actual installation of the system. The project lead was internal, since Carla pursued this client and built the relationship.

Carla first met the CEO of the Mexican office in August of 2014, since then, there has been back and forth contact to come up with a proposal. Carla found that this client was motivated to install solar not only to have energy savings, but also because of the sustainability goals of the company. This motivation is key to understand why the company is committed to moving forward with the solar project, regardless of the regulation uncertainty.

The company is not traded publically, but they do have access to good lines of credit. Nonetheless, they are investing in a new company branch, so prefer either a PPA or a lease. For the past six months RER has been evaluating the PPA possibility. Overall, the CEO seemed to agree to a 10% initial discount over the rate they are paying which is HM (approximately 10.5 cents of a dollar), with a 6% fixed escalation over a period of 25 years.

Due to the uncertainties concerning the actual incentives available in Mexico, RER is partnering with a solar company that is doing leases in Mexico. If this structure moves forward this partner would provide the capital and charge a fee.

## 2. Mining Company: Mid/Large Industrial

This is an industrial project for a mining company and it consists of two phases. In the short-term, 500 kW will be developed on-site. Provided that this pilot phase works as planned, the second phase will be of a size of 5-20 MW also on-site. This project size is possible because of the large energy consumption of the client.

Mining companies are great clients because of their high energy consumption and high bankability. In most cases it is a very profitable industry that stays in the same location for a long time, these conditions make this client ideal for the solar investors.

The strategy that RER is pursuing in this project is "Channeled Development." This means that this project was brought to RER by one of their partners and they maintain the direct contact with the client.

Last May, Carla met this EPC Company, called SolarAP,[3] in a conference. This is a small EPC with experience mainly in residential solar development in Mexico. Conversely, the owner had many leads and contacts in Mexico, so the partnership strategy made sense. RER could bring the expertise and capital and SolarAP would bring the clients. It was established that the development profit or fee would be split half and half between RER and SolarAP. Potentially SolarAP would be in charge of the EPC as well, but if this company could not be cost efficient the project would be bid to other EPCs.

## 3. Gas Stations: Small Commercial

This is a commercial distributed generation project for a gas station management company. The market is denominated small commercial because each gas station would not produce more than 50 kW. This company has more than 200 gas stations contracts with PEMEX (Oil & Gas Company owned by the Mexican government) for operation and management. The project consists of installing solar in the roof of the gas stations that have contracts with at least 7 years remaining. The gas stations are located in Mexico City and 3 more states adjacent to Mexico City.

[3] SolarAP is a fiction name used for the real EPC in which this case is based.

After the gas station evaluations, 50 stations were found with adequate conditions for solar. Each one holds 30 kW of solar approximately, resulting in a total project size of 1.5 MW.

The partnership strategy for this project is "Channeled Distribution." The project was brought to RER by one of their partners. Carla first met STW Consulting[4] through one of her connections in Mexico. STW Consulting was a newly formed sustainability consulting firm in Mexico venturing into solar development. The company partner's had vast experience in the energy industry in Mexico, but were new to the solar development process. It seemed like a great fit, they would provide their knowledge about the Mexican market and the clients and RER would bring the solar development experience.

# Case Studies: Analysis & Results

## Markets & Partnerships: Qualitative Analysis

The qualitative analysis of markets and partnerships is found in Table 7. The grading system goes from 1-5, one being the lowest and five the highest. The projects are graded relative to each other; one of the projects has the highest score and the others have a lower score relative to the highest option.

**Table 7: Results Market & Partnership Strategies**

| Project | Market | Partnership Strategy | | | Total |
|---|---|---|---|---|---|
| | Expansion Potential | Mission and Vision Alignment | Expansion Potential | Quality of Development Process | Score |
| **1. Technology Company** | **4** | **5** | **2** | **5** | **16** |
| | -58% of National Electricity Demand | -Fully Integrated Model | -High investments | -Full control of project | |
| | -Mid Market Difficult to Scale | | -Slow growth | -Learning curve | |
| **2. Mining Company** | **5** | **1** | **5** | **1** | **12** |
| | -58% of National Electricity Demand | -Training required | - Many partners | -No control of relationship w/Client | |
| | -Small Scale and Large Scale | - Difficult partner | - Slower process | -No agreements | |
| **3. Gas Station Company** | **1** | **4** | **5** | **3** | **13** |
| | -7% of National Electricity Demand | - Similar vision | - Many possible partners | -No control of relationship w/Client | |
| | -Larger projects when bundled. | - Similar work dynamic | - Slower process | | |

In the market section (highlighted in grey), the mining company project has the highest score. This is because the industrial and large commercial sector represent 58% of the national electricity demand. Even though the technology company project also falls under this category, the mining company project has a higher score because of its potential to scale. This project is 500 kW in the short term, but could grow to 20 MW in the long-term which is about the 25% of the current installed capacity in Mexico.

Even though the gas station project achieves an attractive size by the bundle of several small projects (1.5 MW), it has low growth potential because small commercial only represents 7% of the national electricity demand. This is the reason why it has such a low score. Also, this is a complex project as a consequence of having so many different locations.

Determining a partnership strategy is fundamental to RER, for this reason there are three categories in this section. The partnership strategy analysis (section in blue) consists

[4] STW Consulting is a fictional name of this company, one of RER's developing partners. .

of three sections: mission and vision alignment, expansion potential, and quality of development process.

Two partnerships were evaluated; direct development vs. channeled development. The technology company project is a "direct development" strategy, where RER has had direct contact with the client. In contrast, both the mining company and the gas station project represent a "channeled development" strategy, where there is a partnership with another developer who brought the client and with whom fees are going to be split 50%-50%.

The technology company project (direct development) is an example of a successful development process. Even though it has been a learning experience for RER, Carla and the team have been able to build a strong relationship with the client; addressing any issues and managing expectations. As a result, the client is ready to move forward and a letter of intent (LOI) has been signed. Both indicators (mission & vision alignment and quality of development process) have the highest scores, this is because RER had full control of the development process and was able to transmit the value added of the company to the client. As a result RER created a relationship based on trust and transparency.

The downside of this "direct development" strategy is that in order for the company to grow, it has to invest large amounts of capital to build and train a sales team who would bring future clients to RER. For this reason, under the category of expansion potential this strategy only has a score of two. In contrast, the "channeled development" strategies score five; since RER is partnering with other developers who already have clients, this strategy is not capital intensive. Also, expansion could be fast if many partnerships are stablished.

Nonetheless, both the mining company project and the gas station project score lower in the other two partnership categories (mission & vision alignment and quality of development process). This is because when two companies partner, time has to be spent to align the companies under the same goal and approach; determine how tasks and benefits should be split and merge the companies' cultures, sales pitches, and marketing materials. In many cases, training will be required

The mining company project, in which RER is partnered with SolarAP, has a difficult development process. After six months this project is still not moving forward. There have been training efforts, joint marketing materials, and many months of interaction, but the companies have very different work dynamics and there have been communication issues. Even though an agreement has been reached on how to split profits, there are still questions about how to split tasks. RER lacks control of the relationship with the client, so is not certain about the reason why this project is not moving forward, but Jim and Carla believe that the lack of a solid partnership between RER and SolarAP is affecting the client's decision.

The gas station company is an example of a great partnership. The values of STW Consulting and work dynamic are very similar to RER's. Also, both companies bring different skills and knowledge to the table. However, this project is not moving forward and RER is not clear on how to improve the case for the client. This project is greatly affected by the Energy Reform since the gas station market is changing, but RER faces the same problem as with the mining company project; it lacks control and communication with the client which makes finding a solution complicated.

## Financial Results: Qualitative Analysis

The second indicator of success for a development strategy are the financial results. The financial results are measured in three categories as shown in Table 8. Each represents the level of satisfaction of one of the three main actors in any development process; client, investor, and developer (RER). If one of these three actors is not satisfied the project will not

move forward. Unfortunately, the financial results are proprietary information. Therefore, instead of showing the results, a grading system based on the results is used below.

**Table 8: Grading System Financial Results**

| Grading System | Client | Investor | RER |
|---|---|---|---|
| 5 | Achieves Expected Savings | Achieves Targeted IRR | 100% Fees |
| 4 | 75% Expected Savings | 75% Targeted IRR | 75% Fees |
| 3 | 50% Expected Savings | 50% Targeted IRR | 50% Fees |
| 2 | 25% Expected Savings | 25% Targeted IRR | 25% Fees |
| 1 | Not moving Forward | Not moving Forward | No Fees |

The grading system reflects the level of satisfaction of each actor measured in different parameters. The measure for the client is the percentage of savings achieved in reference to their initial expectations. For the investor is the percentage of the initial targeted return on investment (IRR) and for RER the percentage of total fees (profit).

**Table 9: Financial Results**

| Project | Client | Investor | RER | Total |
|---|---|---|---|---|
| | Satisfaction | Satisfaction | Profit | **Score** |
| **1. Technology Company** | 4 | 4 | 4 | **12** |
| **2. Mining Company** | 3 | 4 | 1 | **8** |
| **3. Gas Station Company** | 3 | 4 | 3 | **10** |

Overall, the technology company project has the highest score. The client has moderate savings expectations because they are also motivated by other reasons such as achieving their sustainability goals. For RER, this is a profitable project but not as profitable as projects in the US, or other projects evaluated in Mexico. This is because their electricity rate is relatively low (HM tariff: 10.5 cents per kWh, approximately). Therefore, in order to meet both the clients and the investor's requirements, RER has to sacrifice a high development fee. The client agreed to a PPA with a 10% discount from the base CFE price with an escalator of 6%. However, RER want to explore other options such as a lease because it might be a better option for the client. Either way this project will move forward.

The economics of the mining company project are unfavorable. This results from a combination of high expectations from the client and very low electricity prices. The client has an excellent financial profile (is publically traded and has a triple AAA rating) and a great growth potential; so their savings expectations are very high. They want a PPA discount higher than 10% and escalation close to US inflation. Which is not achievable with an electricity rate of 9-10 cent per kWh, not even if RER made no profit. RER will have to explore other options such as leases and/or wait for the new regulation to see if the economics of this project could be improved to meet the client's requirements and make profit.

The economics of the gas station company project are more favorable. This small commercial market segment has one major advantage; high electricity prices. Most of the gas stations are Tariff 2 or Tariff 3, so on average the client pays around 18 cents of a dollar per kWh. This makes the economics of the project very attractive. However, small systems in different locations translate to higher installation and operation costs. Still profits are higher

than with HM/HS tariffs. STW and RER decided to split profits 50%-50% (the reason why RER scores 3 in profits) and they also decided to bid the EPC to the best company (quality and price). The investors find that short term PPA agreements are less risky and the required 9% IRR for the investors in this project are met, partly because of high electricity prices. However, with these conditions the client is not moving forward. The question remaining is: if the economics of the project can be improved would the client be willing to move forward. Nevertheless RER lacks clarity on the client's perspective and how to address their concerns.

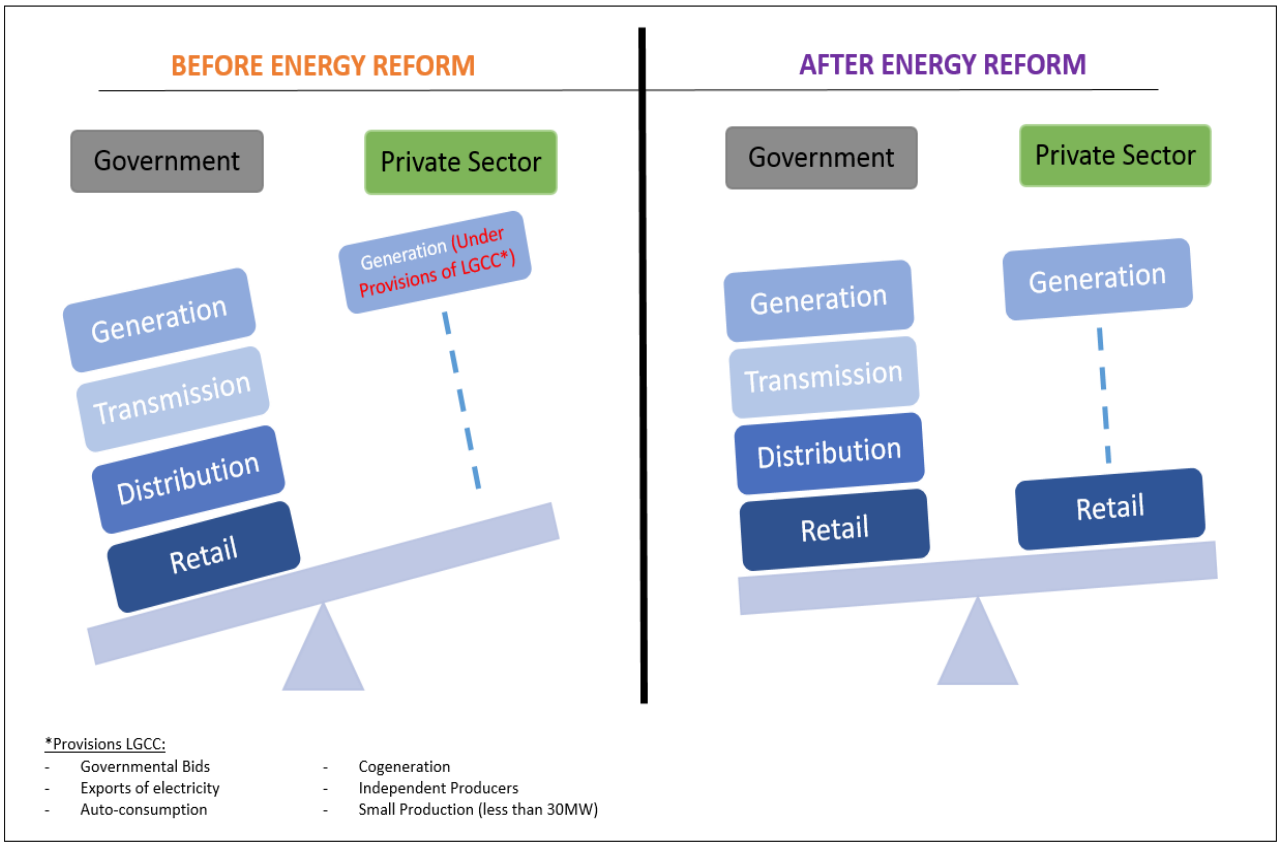
## Conclusions and Questions

Jim and Carla looked again at the Mexican outlook, their forecast, and at the analysis results from the different strategies they had explored. Now they have to answer a few questions and decide which strategy to pursue.

- Considering the political and regulatory context for solar in Mexico, should RER continue to pursue this market, if so considering risks which development strategy should they follow?
- What partnership strategy should RER follow in Mexico?
- Should RER change its core business and focus in the Residential Sector?
- Should RER keep focusing in distributed generation or should it focus in large scale solar?
- What is more convenient, a direct development strategy or a channel development strategy?

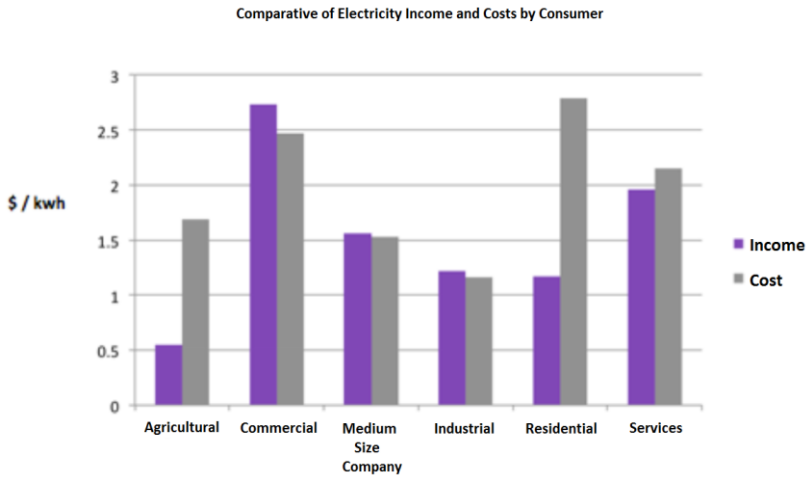
# Appendix

**EXHIBIT 1: Implications of the Energy Reform in the Energy Sector**

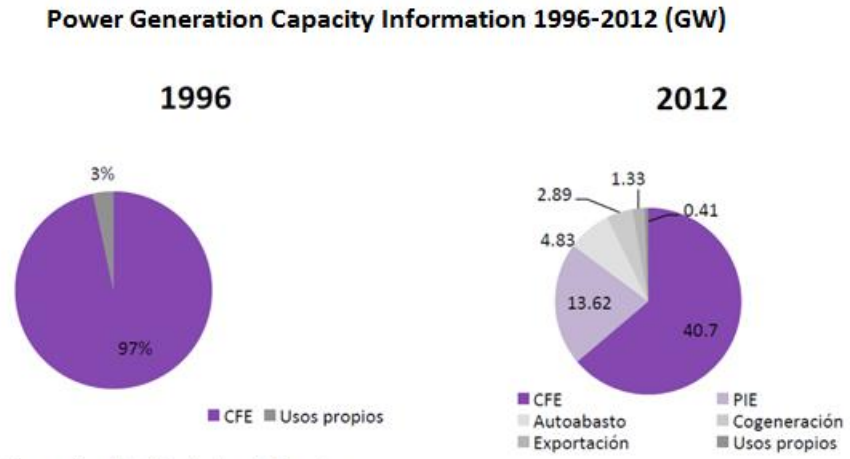



* Source: CRE 2014

**EHIBIT 1A: Energy Use in Mexico in 2013**




*Source: CIDAC, Luz a la competitividad nacional, 2013.




Fuente: Comisión Reguladora de Energía

**EXHIBIT 2: Energy Reform Uncertainties – Paralysis of Solar Developments**

As we mentioned before, during 2013-2014, the Mexican Solar Market had been receiving increasing international attention. Several companies such as RER Energy Group were doing developing efforts in the country. Yet, after the Secondary Laws were released by the end of 2014, the industry was paralyzed. What happened?

The lack of clarity of the secondary reforms increased the level of uncertainty for both investors and clients. Three major questions remain:

1. What are the incentives for Renewable Energy?

Investors are not willing to allocate funds to projects and establish parameters for PPA agreements because regulation is not clear. Therefore, until this law is published, it is impossible to derive a final investment return rate (IRR) and a payback period, which are their primary financial measures in this industry,

2. How long will permitting process take?

Today the internal structure of the renewable energy industry is changing. New regulatory divisions are under creation, therefore the permitting process could take at least a year and a half. The industry wonders how long it will take the government to have the agencies in place and functioning properly. Also, once they are in place, it wants to know how long the permitting process is going to take.

3. Will electricity prices decrease?

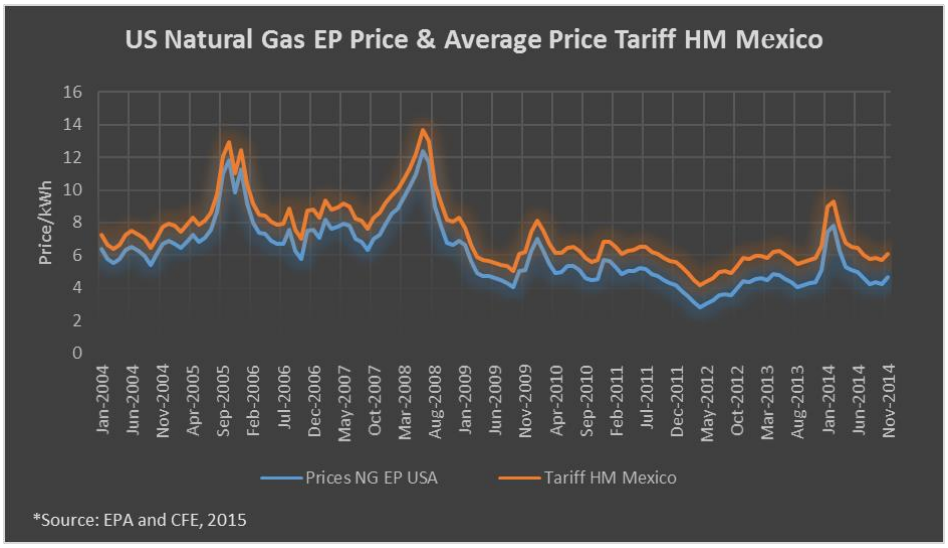
Clients, especially commercial and industrial, are reluctant to invest in solar or enter a long term PPA agreement because of the governmental promise that electricity prices will decrease. This is one of the major reasons for the industry paralysis.

RER made an analysis of the behavior of HM tariff in the past 10 years to address this question with their clients. Graph 2, shows that the variation trends of tariff HM prices is very similar to the price trend of electric power of Natural Gas in the US (EPA, 2015). Also, looking at CFE's price calculation formula we find that the major fuel component is Natural Gas (SHCP, 2007). Based on this information RER believes that by looking at the projections of Natural Gas in the next 3 years, an estimated behavior of the HM tariff can be derived.

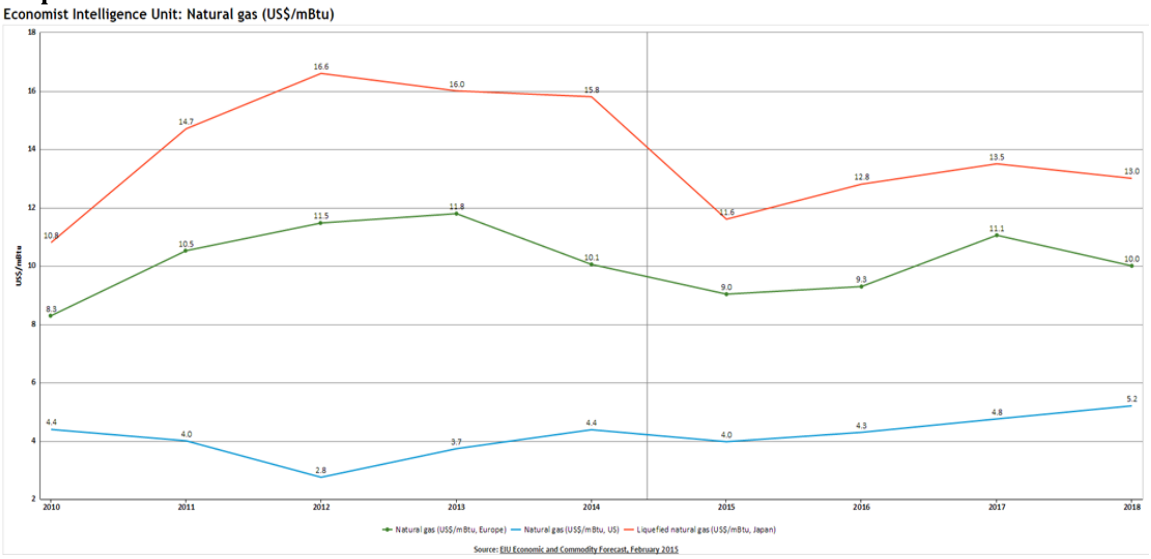
An EIU Economic and Commodity Forecast made in February 2015 (Graph 3) shows that US Natural Gas projected prices have an increasing tendency. The price is projected to

increase 30% in 3 years, therefore RER assumes that the HM tariff will increase at a similar pace.

**Graph 2: US Natural Gas EP Price & Average Price Tariff HM Mexico**




**Graph 3: US Natural Gas Price Forecasts**




## EXHIBIT 3: Financial Model Inputs Descriptions

Financial Inputs:

- **Bill information**: This refers to the client's current energy bill information, including the price per kWh that the client is currently paying. It is used as a reference for the payback analysis. It is also important to know the average number of kWh the client consumes in a year, as this helps to determine the system size. The system size is a result of the relationship of the current kWh consumed and the solar power production as explained below.

**Inputs**:
- Average kWh consumption
- Price per kWh currently paid

- **Solar Power Production:** It is important to know how much electricity (kWh) the solar system is going to produce. The electricity produced will depend mainly on the latitude and the weather at the installation location. RER calculates system power output using PVSYST, software that estimates the solar production in certain locations around the world, based on mathematical models and data collection (PVSYST, 2015).

  **Inputs**:
  - Average kWh consumption

- **Costs of Installation:** The costs of installation are a one-time occurrence. Once the system is up and running, the client will not incur them again. These include all of the necessary costs to have the system installed, containing RER Energy Group's fee or profit.
- **Costs of Operation and Maintenance:** The O&M (Operations and Maintenance) costs consist of all the costs required to keep the system functioning after installation. These include: insurance, module cleaning, system monitoring, maintenance, repair, and service provider fees. In the U.S. RER Energy Group has found that O&M are very low—around 10% of the client's expected annual savings. In Mexico they are higher depending on the site location, because insurance is higher in places where theft is a possibility. O&M expenses are paid by the investor, so the client only pays O&M when they chose a cash or bank financing structure. If the client chooses a lease or a PPA structure, they will pay O&M only once the contract period is done.
- **Financial Structure Information:** In the control panel it is important to specify which financial structure is going to be used and the information about this structure. This includes interest or PPA rates, contract periods, etc. Once this information is completed, the results will automatically show in the corresponding tab.
- **Tax and Incentives:** Finally, it is important to input in the control panel tax and incentive information. Tax laws in Mexico are national, so this information does not vary from project to project unless there are regulatory changes. Most incentives are national as well, except for a property tax that is available in the D.F. (Federal District). Therefore, these premises will not vary unless there is a change in regulation, such as the new energy laws, which will be published in mid-2015.

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