

CLEAN ENERGY AND PHOTOVOLTAIC PROJECTS

¿How can a successful business model be devised for clean energy generation using photovoltaic systems?

If one reflects on the fact that new technologies have been developed in the last decades to replace traditional fossil fuel electric power sources, and that efforts have been made both at the domestic and international levels to establish mechanisms to foster clean-energy consumption, the question that arises is why have we not switched more rapidly to these new environmentally-friendly energy sources, when their benefits to ecosystems and the population in general are so obvious.

The answer to this question seems to be a somewhat simple one. We have not yet devised successful business models to enable us to make the shift.

Since the topic of clean energy is vast, I will address only photovoltaic (PV) energy projects, their evolution, various applications and regulation in Mexico, and will strive to point out certain actions which could speed up their development and propose certain guidelines to attain a successful business model.

The International Scene

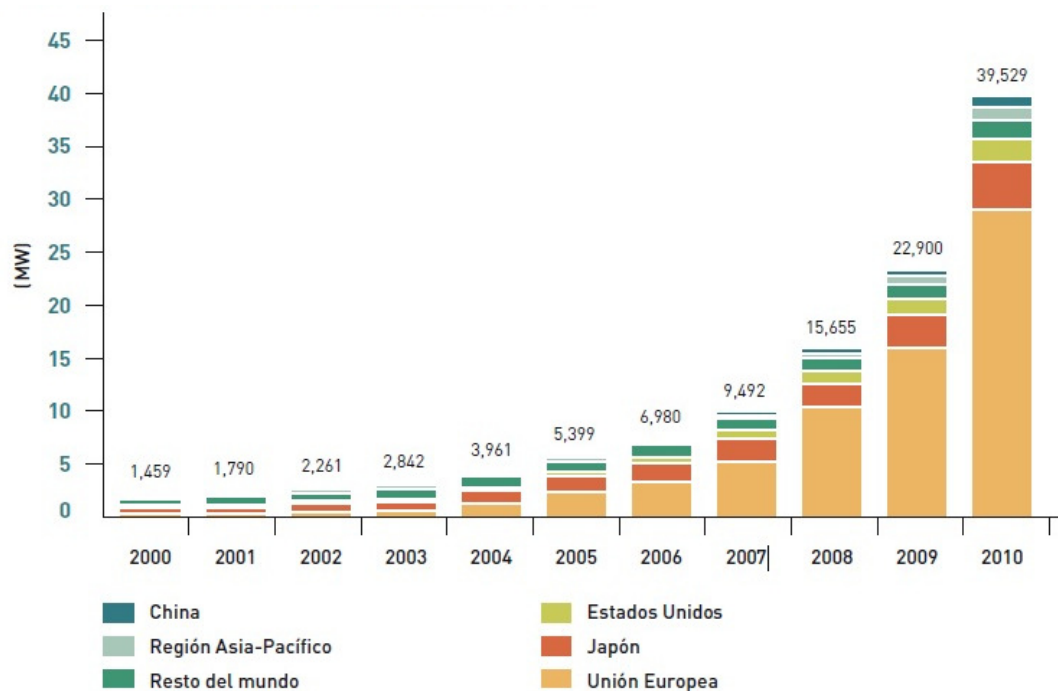
The development of photovoltaic projects started in the 50's in various regions around the world where solar energy is plentiful, in countries such as the United States, Mexico, Germany, Spain, Italy, Japan and China, among others.

Several countries, including Mexico, have established courses of action and long-term goals (to be achieved in the next forty years) to considerably increase the supply of clean energy, as in the case of the United States, that intends to increase its total solar thermal power installed capacity from 400MW to 859 MW by 2030, and Japan that seeks to have solar panels installed in 30% of all Japanese homes by this same year.ⁱ

Furthermore, the European Photovoltaic Industry Association (EPIA) reported that at the close of 2010 cumulative installed capacity of PV energy worldwide was approximately 40000 MWp, from which 29000 MWp (around 72%) corresponds to the European Union. It should be pointed out that growth in this region has been spurred by promotion mechanisms which, as in the case of Spain, have fostered a considerable increase in the global capacity to manufacture, distribute and install this technology.ⁱⁱ

In this regard, 52% of the cumulative installed capacity of PV energy in the EU belongs to Germany and Spain, Italy being the country recording the fastest growth rate in recent years.ⁱⁱⁱ

WORLDWIDE TOTAL CUMULATIVE INSTALLED CAPACITY



Fuente: EPIA

As expected, there has been considerable progress in the research and development of new technologies allowing for greater efficiency of solar cell energy production. International cooperation in the field is starting to bear fruit. A case in point is the 900 million dollar project announced in June 2012 between China and Chile intended to implement PV projects in the South American country to supply power to more than 17 million people, which involves several multinational and domestic companies as well as the China Development Bank.

The countries that have achieved greater growth in projects of this type are those where government support has played a major role in the form of tax incentives, research and development grants, soft loans or other forms of financing that contribute to improve the cost-benefit ratios that are the concern of investors.

There are various factors that bear on the likelihood of these projects being by themselves sustainable from the financial perspective. The first of these is undoubtedly the cost of the technology and the infrastructure needed to carry out the projects; the second, the geographical location where they are to be implemented - that is, not all regions are suitable - and even those where solar radiation is plentiful there is no "guarantee" of protection against weather-related events (cloudy periods or rainy seasons) allowing for continuous production and supply of electric power; the third is the requirement of large tracts of land; the fourth, the various legal complications that may be faced, given that in many countries electric power generation is an activity that is totally

or partially state-controlled, not forgetting to mention that all levels of government are involved in the granting of environmental permits and zoning restrictions; the fifth, is their power generation capability which when compared to other sources is not sufficient to meet the demand of large population centers; the sixth, is connectivity to the power grid.

PV technology can be used not only in electric power generation for a whole country or large industrial and business sectors, for example by using solar panels to light department stores or supplement the needs of a manufacturing plant, but to power SOS antenna arrays, bus-stops, urban signage, and for domestic consumption, or by having each home equipped with solar panels to satisfy their power requirements partially or in full.

In any of the foregoing cases, it is essential to ensure there are suitable legal, technical and financial conditions that will allow sustainability. In Mexico there are certain factors which may act, in consonance with upcoming technological developments, as true catalysts to accelerate use of these technologies.

Electric Power Production in Mexico

Public electric power supply

In Mexico public electric power supply is reserved to the state, and it is the *Comisión Federal de Electricidad* (CFE, Federal Electricity Commission) a state-controlled entity, that is in charge of the generation, transformation, distribution and supply of electric power throughout the country. The CFE is a constitutionally allowed legal monopoly and therefore, private electric utilities cannot provide any related services directly to the population.^{iv} Nevertheless, the regulatory provisions governing electric power supply services allow private entities to engage in activities in this sector when entailing generation for self-supply, cogeneration, small-scale production (up to 30 MW), or independent production of electricity for sale to the CFE, including importation for self-consumption and for export, provided a state-authorized permit is obtained from the Ministry of Energy (the Ministry), the governmental entity responsible for establishing and conducting national energy policies.^v

Private sector participation

Private sector participation is restricted to the following modalities:

a) Self-supply

Intended to satisfy self power consumption needs of individuals or legal entities. Permits are granted provided that in the opinion of the Ministry this does not affect the country's interests, in the understanding that the power may be produced in the country or be imported for self-supply purposes.

b) Cogeneration

Cogeneration implies producing electric power jointly with steam or other secondary thermal energy, or both, when non-utilized thermal energy is used directly or indirectly to produce electric power or when process-produced fuels are used to directly or indirectly generate electric power, provided any electricity so produced is used to satisfy the power requirements of the facilities involved in such cogeneration and contribute to increase the energy and financial efficiency of the process as a whole.

In the two modalities described above the permit holder is under the obligation of making any excess power generated available to the CFE.

- c) Independent production
This modality entails producing electric power to be sold to the CFE, the CFE being under the legal obligation of acquiring such production under the terms and conditions set forth in long-term agreements, or such being the case, to export all or part of the electric power produced. As regards this modality, the projects involved must have been included in the CFE's plans and programs.
- d) Small-scale production
The purpose of projects of this type is to sell all production to the CFE, provided total capacity does not exceed 30MW and the projects are carried out in the regions defined by the Ministry.

Foreign Investment

Under Mexican law, direct or indirect foreign investment in electric power public utilities is not allowed. Nevertheless, companies with foreign capital may engage in the production modalities described above if they obtain the required specific permits.^{vi}

In this regard, it is worth mentioning that the projects that have attracted most foreign investment are those for self-supply and small-scale production. In the first instance they have adopted the form of wind-farms, such as the Piedra Larga wind farm in the State of Oaxaca, and in the latter of solar-panel arrays installed in different states in Mexico.

Although there are no restrictions imposed on foreign investment participation for independent and small-scale production projects, it is required that the permit applicant be however a Mexican individual or legal entity domiciled in Mexico, a common requirement that does not have a negative impact on this type of investment. Nevertheless, all Mexican tax requirements and all provisions relating to the payment of dividends or returns to foreign holding companies and all provisions contained in international treaties for the avoidance of double taxation must be observed.

Development of PV Parks

PV parks may take the form of self-supply, independent and small-scale production projects. However, it must be kept in mind that independent utility level production projects must be inserted within the CFE's plans and programs and therefore,

the CFE will be the entity that decides on the project's type, capacity and geographic location. For this reason, the self-supply and small scale production modalities are better suited to this type of project. Although the capacity of small-scale production projects has a ceiling of 30MW, it is possible to set up several parks in one region which would in fact add up to a much greater installed capacity and can therefore be more profitable.

As of June 30, 2012, there are four PV park projects in Mexico, located in the states of Aguascalientes, Jalisco and San Luis Potosí. The Jalisco project is a small-scale production project with an authorized capacity of 29.8 MW.^{vii}

There are several requirements to obtain permits for self-supply and small-scale production projects, some of which have to be met at the time the application is submitted and others at the time the permit is issued. Once an application is submitted, the Ministry has a term of 10 work days to review and start its processing, in which case it will request the CFE's non-binding opinion on the project's technical capabilities as set forth in the application. The CFE must answer this request within 30 work days following the date it is received, and in the case of small-scale production projects, within a term of only 10 work days.

In processing applications, the Ministry shall take into account the energy sources used to produce electricity, the characteristics of the region and CFE's existing infrastructure in the area, if any, in order to assess the possibility of connection to the national power grid.

Any changes or restrictions to be imposed on the project as described in the application that arise as a result of the CFE's opinion shall be communicated to applicant to allow him to state his case within a term of 10 work days, it being understood that the Ministry shall hear what the applicant has to say in order to decide on any possible modifications or adjustments.

Once a file that includes all the technical features and rationale of the project (description, annual generation estimates, fuel consumption, water use, and compliance with environmental and zoning laws) and the above mentioned processing have been completed, the Ministry will have a 30 work-day term to resolve on the application and if authorized it will issue the permit.

All permits shall be issued for open terms except for those issued for small-scale production which will be issued for 30 year terms with the possibility of renewal.

In acquiring excess power, the CFE will enter into long-term agreements with permit holders. These agreements shall set forth the commitments assumed in regard to capacity and acquisition of excess power, and their term will under no circumstance exceed that of the permit. Among the essential terms that must be included in these agreements are those setting forth the formulas to calculate the consideration to be paid by the commission, any incentives and updating factors. Another important aspect is that of defining the grid connection point and the technical aspects to do so.

In order to guarantee legal certainty, the CFE has model agreements for the purchase of electric power that set forth the terms and conditions governing such acquisitions, and specify the formulas to determine prices to be applied to such acquisitions.

Government financial assistance

Mexico has important financial support mechanisms from the federal government available for PV projects, one of which is that of obtaining resources from the National Infrastructure Fund (*Fondo Nacional de Infraestructura, FNI*), since its operating rules contemplate granting loans for clean energy projects.^{viii}

These support mechanisms have different purposes and are basically divided into two categories, refundable loans and grants and non-refundable grants. The former are grants or loans to conduct studies or for investment in public works or investment-dependent subsidies that provide for surplus-sharing conditions to be met; the latter cover a wide spectrum of purposes ranging from financing studies, granting subordinated loans, granting different types of security, guarantees or collaterals, performance bonds, political risk coverage, risk capital contributions and loans in general.

Certain legal, technical and financial requirements that depend on the nature of the project have to be met to have access to these support mechanisms, and consideration is given not only to the projects' profitability but also to their social impact.

Tax Incentives

Tax laws generally provide for tax incentives that may be applied to clean energy projects, one of these being that permits granted for the generation of clean energy are exempted from paying governmental fees.^x Moreover, as regards income tax, tax laws provide for ceilings on deductions for investments; however, no such ceilings are imposed on deductions for investments made in machinery and equipment used for power generation from renewable resources.

Fostering and financing renewable energy

In addition to the incentive mechanisms mentioned in the preceding sections, Mexican laws contain various provisions which in one way or another serve to foster clean energy consumption. Such is the case of comprehensive sustainable urban developments (*Desarrollos Urbanos Integrales Sustentables*) known by the Spanish acronym "DUIS", which are being promoted by a special entity going under the name of *Grupo de Promoción y Evaluación de DUIS*, whose members are designated by the Mexican Ministries of the Environment, Energy and Social Development, one of the Mexican banks for development, and three Mexican housing and mortgage agencies. This entity is in charge of evaluating the projects and deciding whether they are eligible to receive governmental financial support provided they meet certain requirements, among which is that of evidencing that alternative energy sources shall be used in housing projects.^x

Furthermore, in November 2008 the Law on the Use of Renewable Resources and the Financing for Energy Transition (*Ley para el Aprovechamiento de Energías Renovables y el Financiamiento de la Transición Energética*) was enacted. This law governs and is intended to foster the use of renewable energy sources and clean technologies by entities other than public utilities and establish the mechanisms to finance the energy transition that the country requires.

As a result and on the basis of the above mentioned statute, a fund has been established (the *Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía*) that will be in charge of managing, allocating and distributing financial resources to attain the goals contemplated in the national strategy for energy transition and sustainable energy consumption. This agency, which operates under the Ministry of Energy, is in charge of coordinating all actions geared towards the use of clean and renewable energy sources and of promoting actions regarding the optimal use and savings of all kinds of energy. This fund contemplates, as does the FNI, the allocation of non-refundable financial resources to grant loan guarantees and other types of financial support for projects that meet national strategic goals.

Finally, in June 2012, the General Law on Climate Change was enacted. This statute establishes the coordinating mechanisms among the different levels of government in order to meet and overcome the adverse effects of climate change and define the actions and policies required to achieve its stated purposes. One of these actions is that of fostering the gradual substitution in the use and consumption of fossil fuels and electric power generation by renewable energy sources.

This statute led to the creation of the Climate Change Fund, whose purpose is that of obtaining and channeling public, private, domestic and international financial resources to implement actions geared towards overcoming the adverse effects of climate change and will operate by means of a public trust created by the Mexican Ministry of Finance and Public Credit. It also provides that the different levels of government are, within the scope of their respective attributions, under the obligation of designing, developing and applying all economic, financial and tax incentives found to be required to comply and attain climate change objectives as contemplated in the national policy on the matter.

Closing remarks

The global trend as regards energy use and consumption in the next few decades is oriented towards the gradual substitution of non-renewable energy sources by clean energy from renewable sources.

The development of the new technologies required to make better use of renewable resources is one of the forces driving such trend and, as regards electric power, it is necessary to make better use of renewable sources and significantly increase energy efficiency. In the meanwhile, it is essential for the public and private sectors to act jointly in the design of public policies and programs, and for the government to provide

financial support to devise business models that make the development of clean energy projects, in particular PV projects, attractive for investors.

In the case of Mexico, the country has everything that is required to increase its energy production capabilities by the use of new technologies, provided government policies and the interests of the private sector are brought into alignment, not only to achieve the transition to clean energy, but to have attractive and successful business models to speed up the change that will provide the country with a new energy production, generation and distribution system that will contribute to the country's competitiveness.

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ⁱ See "Prospectiva del Sector Eléctrico 2010-2025" issued in 2010 by the General Bureau of Strategic Planning of the Mexican Ministry of Energy at http://www.sener.gob.mx/res/1825/SECTOR_ELECTRICO.pdf.

ⁱⁱ See "Plan de Energías Renovables 2011-2012" issued by the *Instituto para la Diversificación y Ahorro de la Energía*, Madrid, Spain, 2011; pp. 365 and ss.

ⁱⁱⁱ Just in 2010 Italy's cumulative installed capacity reached 2,300 MW. *Ibid*.

^{iv} See paragraph six of article 27 of the Mexican Constitution which states that: "The Nation is exclusively in charge of generating, conducting, transforming, distributing and supplying electric power as a public service. No concessions shall be granted to private persons to do so and the Nation shall make use of all property and natural resources required to achieve this purpose". Similar provisions are contained in article 1 of the Law on the Electric Power Public Service (*Ley del Servicio Público de Energía Eléctrica*).

^v See articles 3 and 36 of the Law on the Electric Power Public Service (*Ley del Servicio Público de Energía Eléctrica*), and Article 33, section I of the Organic Law of the Federal Public Administration (*Ley Orgánica de la Administración Pública Federal*).

^{vi} See article 5 section III of the Mexican Foreign Investment Law (*Ley de Inversión Extranjera*).

^{vii} See "Tabla de Permisos de Generación e Importación de Energía Eléctrica administrados al 30 de Junio de 2012", published by the Mexican Energy Regulatory Commission at www.cre.gob.mx, consulted on August 2, 2012.

^{viii} See rule 28.4 of the *Reglas de Operación del Fideicomiso número 1936. Fondo Nacional de Infraestructura*.

^{ix} Article 56 Bis of the Federal Law of Government Fees (*Ley Federal de Derechos*).

^x See the assessing criteria used in evaluating DUIS issued by the *Grupo de Promoción y Evaluación de DUIS* in May, 2012.