



# Mexico: Renewable Energy

## Solar, Wind, Mini-Hydroelectric, Geothermal

John Verdieck  
August 08

### Summary

Renewable energy used for the generation of electricity, including mini-hydroelectric, biomass, photovoltaic-solar, wind power, and geothermal energies, has experienced slow growth in Mexico. The existence of state owned oil and electricity companies has led to little innovation beyond fossil fuels. To this point, hydroelectric and geothermal energy have been Mexico's most prolific renewable sources, and its geothermal production is the third largest in the world.

But the market looks to be changing as the Mexican Government has recently proposed new renewable energy goals. The increasing level of pollution, higher costs of fossil fuels, difficulties in the reform of the state oil company, and heightened awareness of global warming have all led the government to press for the adoption of more clean energy sources. The recent addition of several new wind turbine plants in Oaxaca shows promise, and as prices for renewable resources continue to fall we can expect the market to open even further. The electricity generated in Mexico by hydroelectric and geothermal plants already represents 25% of the capacity and 15% of the total generation of the National Electric System, but the government has expressed a desire to further increase other renewable sources.<sup>1</sup>

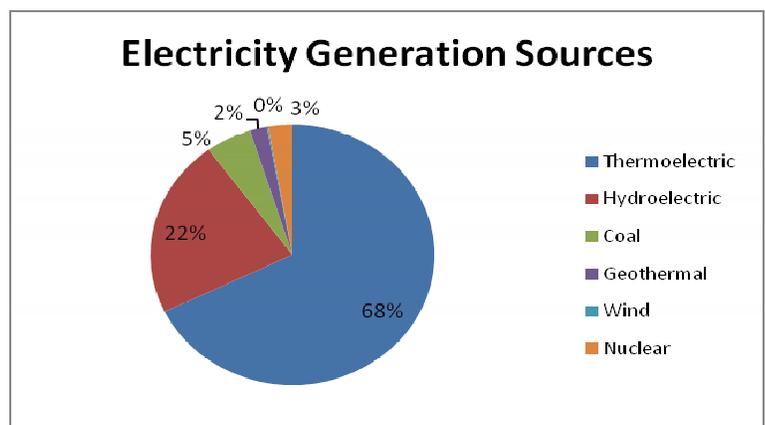
### Market Demand

Although the Mexican energy market has been slow to open to new renewable technologies, there is movement in the government towards the establishment of renewables as part of the National Energy Plan. In 2007, President Felipe Calderon established the National Strategy for Climate Change, in which the government proposed that 8% of all electricity would come from renewable energies, excluding large hydroelectric projects, by 2012.<sup>2</sup>

This plan continues upon the Initiative of Law for the Use of Renewable Sources of Energy (LAFRE), passed by the Mexican Congress in 2005. The Initiative estimates a public investment of \$55-70 million dollars for the generation of electricity using competitive technologies like wind, and an additional \$37 million dollars to promote less mature technologies like solar and hydrogen.<sup>3</sup>

This goal could be reached with the government's plans to install 7,000 MW of renewable energy capacity to generate 16,000 GWh per year by 2012, excluding the El Cajon and La Parota hydroelectric plants. In 2007, renewable sources, excluding large hydroelectric plants, only constituted about 2% of total effective capacity. If the government's plans are actualized, the renewable energy market will see strong growth in the future.

Mexico's constitution will make it difficult to obtain much of the investment needed to move forward on renewable energy. It prohibits private companies from generating, transmitting or distributing electricity as a public service. These activities are reserved for Mexico's two state-owned electric power utilities, the Federal Electricity



Type of Generation	Effective Capacity (MW)
Thermoelectric	22404.69
Hydroelectric	11054.9
Coal	2600
Geothermal	964.5
Wind	85.48
Nuclear	1364.88
Thermoelectric (Independent Producers)	11456.9
<b>Total</b>	<b>49931.34</b>

Source: CFE

Commission (CFE) and the Central Light and Power Company (LyFC). The exceptions to these rules are for Independent Power Producers and Self Supply Generation plants, which are covered below.

Mexico's proven oil reserves of around 12 billion barrels are estimated to last the country about 9 more years at current production levels, a fact which has allowed for slower transformation to renewable sources. The state oil company PEMEX has experienced a daily decline of 300,000 barrels per day<sup>4</sup> since 2005, however high international oil prices have allowed it to continue offering subsidized energy to the public. PEMEX provides about a third of the government's revenue<sup>5</sup> making its reform a high priority for President Calderon. These reforms could further open the energy market to renewables.

**Opportunities to Supply**

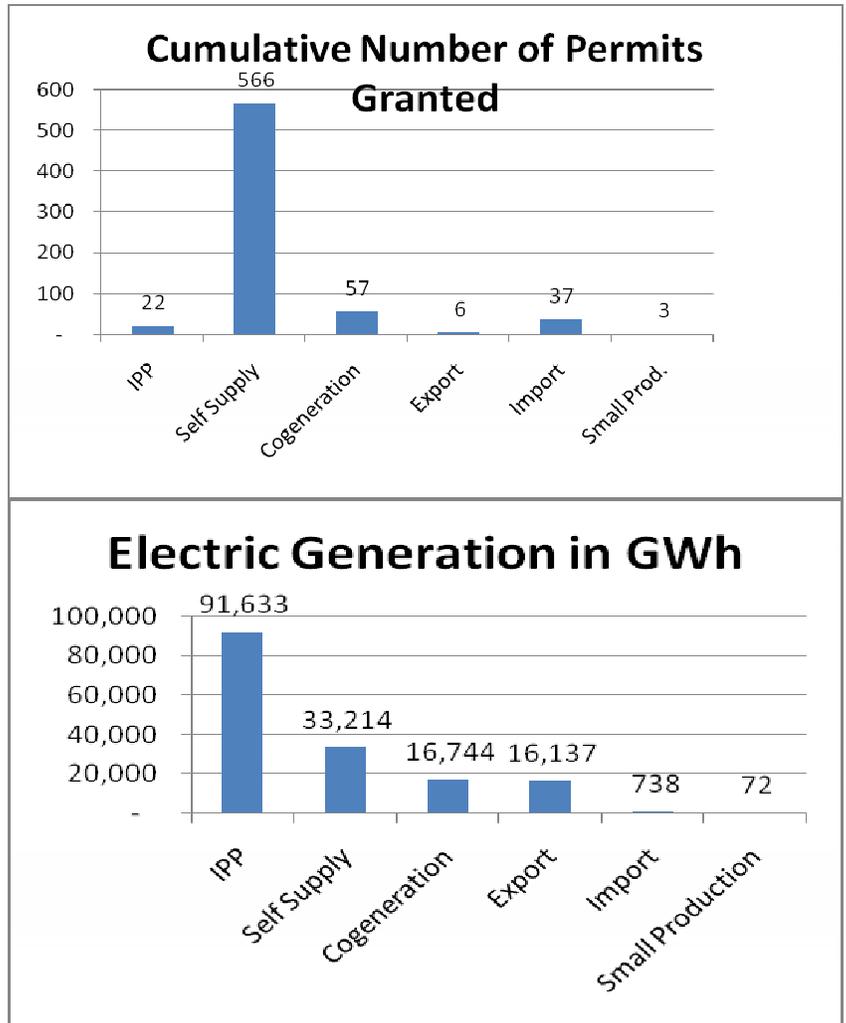
Although the Mexican energy market can be difficult to enter due to the constitutional requirements and existence of PEMEX, there are other methods a private firm can follow to produce energy or supply parts in the country.

Private Power Generation

Mexico's Independent Power Producers (IPP) - plants privately financed, built, and owned - are plants permitted to produce electricity for exclusive sale to the Federal Electricity Commission (CFE) or for export abroad. The IPP refers to plants with over 30 MW, although they often constitute over 200MW, of capacity and is allowed under the Public Service Law of Electric Energy. Independent Producer status is granted by the CFE after a bidding procedure.

Self Supply Generation

Another option for private power generation is through the "self supply" category. A business, industry, or community may apply to utilize self supplied energy. Again, licenses for this type of production must be procured from the CRE. In 2007, the CRE granted the state oil company CEMEX and the supermarket chain Soriana self-generation permits for their wind-energy plants. These plants will initially produce 250 and 120 MW respectively, and additional electricity may be sold back into the grid at a reduced price if unused. Many companies are looking into this possibility in order to reduce their long-term electric bills and carbon footprints alike.



Source: CRE

According to the Energy Regulation Commission (CRE), as of June 2008 there have already been over 13,000 MW worth of contracts awarded between Private Power Generation, Self Supply Generation, Cogeneration, and other methods outside of the electric grid since these contracts began.<sup>6</sup> The graphs above also show the number of permits granted by the CFE, by type, and the number of GWh these independent electric sources are producing.

## Wind Energy

The National Renewable Energy Laboratory (NREL) in the United States mentions that conservative estimates of the wind-energy market in Mexico are in the range of 5,000 MW, but NREL's own estimates of the potential just within the La Ventosa region of Oaxaca are around 33,000 MW.<sup>7</sup> In March of 2007, President Calderon inaugurated the 80 MW La Venta II wind farm co-built by Spanish firms Gamesa Eolica and Iberdrola, increasing the capacity of the previous 1.5 MW La Venta I pilot farm in the La Ventosa area. In addition to these two plants, the Guerrero Negro plant in Baja California produces around 1 MW and raises Mexico's current total installed capacity to over 85 MW.<sup>8</sup>

### Energy Production by Source (MWh)

Description	2004	2005	2006	2007	%Growth 04-07
Thermal	136,216,313.820	144,046,057.230	132,852,459.590	142,922,623.200	5%
Wind	6,146.724	4,999.271	44,197.561	241,865.774	3835%
Hydroelectric	24,906,337.174	27,609,019.525	30,085,307.137	26,240,577.821	5%
Total	161,128,797.718	171,660,076.026	162,981,964.288	169,405,066.795	5%

Source: SENER

Following its previous success, the Mexican Government has begun a new 100 MW La Venta III project, utilizing a 25 million dollar grant from the World Bank.<sup>9</sup> The Federal Commission of Electricity also plans on the installation of six new wind farms in the La Ventosa region by the end of 2014 with a total capacity of around 590 MW.<sup>10</sup>

The regions considered to have the best potential for wind power, besides La Ventosa, are in the Coast of the state of Quintana Roo, around Pachuca, Hidalgo, in the south of the state of Coahuila, in the south of the Baja California peninsula, and in the Northeast of the state of Zacatecas.<sup>11</sup>

### Planned Wind Power Projects

Location	Capacity (MW)	Completion Date
La Venta II	85	2006
La Venta III	101	2008
La Venta IV	101	2009
La Venta V	101	2010
La Venta VI	101	2011
La Venta VII	101	2012
Total	590	

Source: Prospectivas del Sector Eléctrico 2005-2014, SENER

## Solar Energy

The Mexican solar energy market has been slower to develop than the wind sector. No large scale government production exists like the La Venta plants to help the nascent sector along, but it has created demand through its promotion of solar energy in rural areas. With the government's help, multiple opportunities are becoming available in the Mexican market today. The Thermal Solar sector has increased due to the additions of solar water heaters both in rural areas and in urban areas like Mexico City. The Photovoltaic market has also increased, mainly in rural communities not covered by the electric grid. Opportunities for growth in both of these markets exist in Mexico given its abundant year round sunshine.

### Growth Opportunities

Federal Electricity Commission (CFE) statistics<sup>12</sup> show that in 2006 electricity service was provided to only 97.33% of the population, leaving 53,321 communities unserved. Of those communities without service, almost all had populations under 100. These small rural communities and ranches, often far from the electric grid, represent opportunities for both Thermal and Photovoltaic markets.

Mexico's abundant sunlight makes the solar market's capacity for growth very enticing. Mexico's solar possibilities are among the best in the world, with a gross solar potential estimated at over 5 KWh/m<sup>2</sup> and over 2 million km<sup>2</sup> of territory.<sup>13</sup> The states with the best solar potential are Baja California, Chiapas, Quintana Roo, and Sonora.

Thermal Solar

The thermal solar market has increased due to the growth of solar water heaters throughout Mexico. U.S. exports in the market grew at around 60% each year from 2005-2007 and had already crossed that benchmark by April of 2008 according to the most recent statistics available from the World Trade Atlas.<sup>14</sup> See charts in the “Best Prospects” section below for more details. One reason for this increase is Mexico City’s passing of new norms in 2006 that all new business establishments are to install water heaters driven by solar energy.<sup>15</sup> With a population estimated at over 8 million within the city limits, and estimated around 25 million in the greater metro area, this new law will offer significant growth opportunities for solar water heaters in the future.

Photovoltaic

The current opportunities in the photovoltaic market often exist in smaller-scale projects, providing electricity to rural communities living large distances from the electrical grid. Their main uses are for telecommunications, refrigeration, water heaters, schools, and to farmers for water pumps. The Mexican Secretary of Energy, SENER, hopes to have 30 MW and 18 GWh/year of photovoltaic capacity installed by 2013.<sup>16</sup> This is up from the approximately 20 MW that exist today. They estimate the needed investment for this expansion to be around 24 to 36 million dollars.

One application of PV technology is in progress in Mexicali. The Baja California government sponsored an initiative to construct 500 low income houses with a grid-connected array of 1 kW each. The first phase of the project built 220 houses. With Mexicali’s location in a desert valley, the PV arrays are expected to provide relief from peak electricity rates from the grid. Each house will have the ability to use “net metering”, where stored electricity can be sold to the grid when there is extra and purchased when they are lacking.<sup>17</sup>

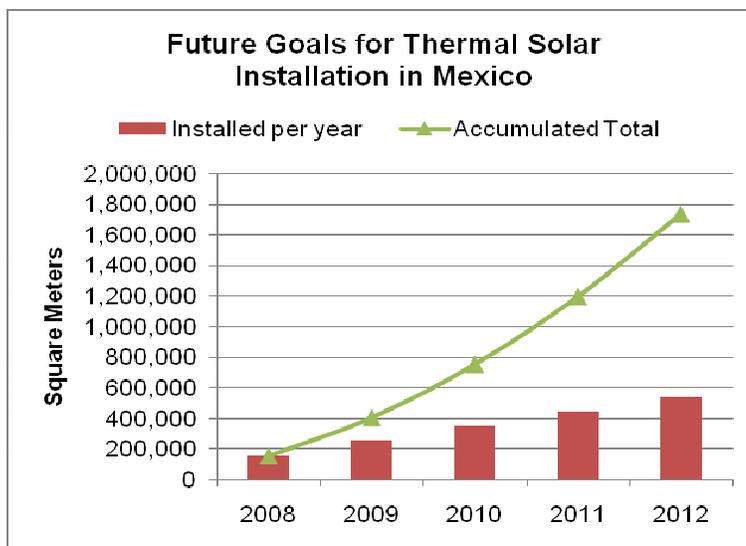
Another application for PV in Mexico is through hybrid generating plants. CFE currently has a hybrid plant in Juanico, Baja California, powered by 17 kW of PV array, a 70 kW wind turbine cluster, and an 80 kW diesel generator. The CFE of Mexico, the Arizona Public Service Company, and the National Renewable Energy Laboratory were all instrumental in the design of this system.

This should not be the last PV project the government supports for low-income housing, and the future possibilities in this market look bright.

**Future Goals for Thermal Solar Installation in Mexico  
(In squared meters)**

Concept	2008	2009	2010	2011	2012
Installed per year	155,485	251,275	347,065	442,855	538,645
Accumulated	155,485	406,760	753,825	1,196,680	1,735,325

Source: CONAE (PROCALSOL 2007-2012)



## HYDROELECTRIC

### Energy Production by Source (MWh)

Description	2004	2005	2006	2007	%Growth 04-07
Thermal	136,216,313.820	144,046,057.230	132,852,459.590	142,922,623.200	5%
Wind	6,146.724	4,999.271	44,197.561	241,865.774	3835%
Hydroelectric	24,906,337.174	27,609,019.525	30,085,307.137	26,240,577.821	5%
Total	161,128,797.718	171,660,076.026	162,981,964.288	169,405,066.795	5%

Source: SENER

The total capacity of all hydroelectric power produced for SENER in Mexico increased by 5% from 2006 to 2007, and 14% since 2004.<sup>18</sup> The actual production, as seen above, has grown at a slower rate. The government's goal, using the World Bank's financial financing, to produce small-scale renewable energy has led to multiple new mini-hydroelectric projects recently. And with CONAE's estimate of a possible 15,000 MW remaining unexplored<sup>19</sup>, hydroelectric power offers a strong future market.

Since 2006, the CRE has authorized 9 new hydroelectric projects throughout Mexico. These new plants are situated in Baja California, Jalisco, Puebla, Veracruz, and are intended for a range of uses from industry to small-producer, to municipal power. These new producers range between a 1.6 MW plant in Veracruz to a 30 MW facility still under construction in Puebla. They are to be constructed with a total authorized capacity of 90 MW and 585 GWh/year.<sup>20</sup>

The installation costs vary for these projects. SENER estimates the investment ranges to be between 800 and 1,800 dollars per installed KW with generation costs ranging between 3 to 20 cents (U.S.) per KWh.<sup>21</sup>

Although the total potential of mini-hydroelectric has yet to be determined, CONAE has identified over 100 sites for its use. In the region where the states of Veracruz and Puebla meet for example, CONAE sees a possible generation of up to 3,570 GWh/year, an equivalent of 400 MW.<sup>22</sup>

### Additional Capacity to Explore: 15,000 MW and 140,000 GWh/ Year

Source	% of Remaining Capacity
Grijalva-Usumacinta	30
Balsas	12
Papaloapan	7

Source: CONAE

### Distribution of Installed Hydroelectric Capacity

River	% Total Potential
Grijalva	52.3
Balsas-Santiago	20.6
Ixtapatongo	16.3
Papaloapan	6.4
Yaqui-Mayo	4.4

Source: CONAE

with a total authorized capacity of 90 MW and 585 GWh/year.

### Location of Mexico's Hydroelectric facilities



Source: CRE

**GEO THERMAL**

**Energy Production by Source (MWh)**

Description	2004	2005	2006	2007	%Growth 04-07
Thermal	136,216,313.820	144,046,057.230	132,852,459.590	142,922,623.200	5%
Wind	6,146.724	4,999.271	44,197.561	241,865.774	3835%
Hydroelectric	24,906,337.174	27,609,019.525	30,085,307.137	26,240,577.821	5%
Total	161,128,797.718	171,660,076.026	162,981,964.288	169,405,066.795	5%

Source: SENER

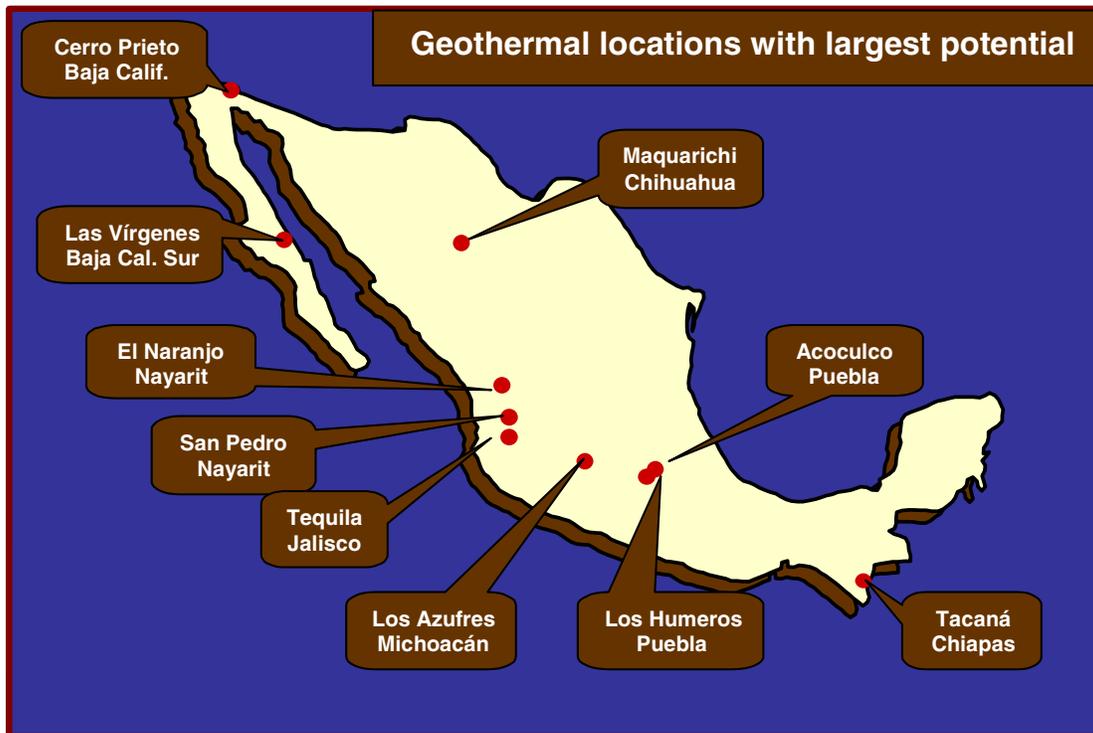
Mexico is the world's third largest producer of geothermal energy, but there has not been much growth in the sector for some time. Due to the government's desire to increase electricity production and geothermal's potential, the sector offers significant possibilities in the future. Mexico currently has 960 MW of installed geothermal capacity, which produces just over 3% of the country's electric energy.<sup>23</sup>

**Geothermal Plants of the National Electric System**

Plant	Location	Capacity (MW)
Cerro Prieto	Baja California	720
Tres Virgenes	Baja Calif. Sur	10
Los Azufres	Michoacan	190

Source: CRE

The Energy Regulation Commission (CRE) has identified over 1,400 sites in 50 different geothermal zones where new geothermal plants can be built. According to the CRE, Mexico has around 1,300 MW of proven reserves and 4,500 probable reserves remaining.<sup>24</sup> Possible future plans include both the construction of new plants and the amplification of existing sites.



Source: CRE

## BIOMASS

The Mexican market for biomass production should benefit from the recent passing of the bio-energy law (Ley de Promocion y Desarrollo de los Bioenergeticos)<sup>25</sup> in early 2008. The law is intended to help diversify Mexico's energy portfolio, the majority of which consists of oil from the state oil company PEMEX. In article 5, the law creates a market for ethanol by mandating that in principle urban areas, at least 10% of gasoline must be ethanol based. Article 7 speaks of the application of fiscal and economic stimuli to make biomass productive and competitive. The government's new support for the industry should prove very beneficial for multiple sectors in the biomass market.

### Energy Production by Source: (petajoules)

Description	2003	2004	2005	2006	2007
<b>TOTAL BIOMASS</b>	337.982	340.169	351.431	344.159	346.315
Bagasse	89.417	92.063	103.780	96.956	99.561
Fire Wood	248.566	248.105	247.651	247.202	246.754

Source: SENER

While the growth in the overall energy produced by the biomass industry for SENER has been slow in recent years, the market for sugar cane and sorghum (bagasse) based fuel has increased. A CRE report sees the possible capacity of sugar cane reaching 1,000 MW.<sup>26</sup>

Another biomass sector with a good possibility for growth is the incineration or gasification of solid wastes and sewer gases. Many metropolitan areas in Mexico have already begun to study the possibility of establishing incineration plants to produce energy and help with their waste management. So far the municipalities of Monterrey, Mexico City, Tlalneptla, Cancun, Naucalpan, Puebla, Queretaro, Aguascalientes, Guadalajara, and Tijuana have either constructed incineration plants or are looking into doing so. The CRE estimates a possible gain of 400 MW in Mexico City, and another 150 MW in Guadalajara from these processes.<sup>27</sup>

Other possibilities in the biomass sector revolve around both plants using landfill waste, where the CRE estimates possible capacity of 150MW, and methane plants generating energy from bovine waste.<sup>28</sup> Unlike in the wind and solar sectors, the CRE has authorized very few self-generation or IPP plants in recent years using any type of biomass. Contacting the individual municipalities is recommended for further information.

### Potential of Biomass in Mexico

State	Potential
Aguascalientes	Very Good
Chiapas	Good
Chihuahua	Very Good
Coahuila	Very Good
Durango	Very Good
Hidalgo	Very Good
Jalisco	Very Good
State of Mexico	Very Good
Michoacán	Very Good
Morelos	Very Good
Nuevo León	Very Good
Quintana Roo	Very Good
San Luis Potosí	Good
Tamaulipas	Very Good
Veracruz	Very Good

Source: CONAE

### Best Prospects

#### Mexico - Imports 850231 Wind-Powered Millions of USDollars

Country	2006	2007	2008	%Growth 07-08
World	0.177719	0.026943	0.379396	1308.14
United States	0.140624	0.019289	0.27743	1338.28
Spain	0.003992	0.002528	0.098828	3809.34

\*2008 Statistics include January through April

Source: World Trade Atlas

#### Wind

The Mexican market for wind powered turbines, blades, and other wind-powered equipment has experienced solid growth through the first four months of 2008. U.S. exporters continue to control the market with a 75% share.

**Mexico - Imports**  
**854140 Phtosen Semicon Dvc**  
**Millions of US Dollars**

Country	2006	2007	2008	% Growth 07-08
World	127.881513	130.346195	156.019108	19.7
Japan	40.26922	49.550334	59.259652	19.59
United States	32.797765	30.268899	34.977075	15.55
Malaysia	16.446544	11.995313	17.905301	49.27
China	16.541945	13.198462	16.107899	22.04

\*2008 Statistics include January through April

Source: World Trade Atlas

**Mexico - Imports**  
**854190 Diod/Transtr/Et Pts**  
**Millions of US Dollars**

Country	2006	2007	2008	% Growth 07-08
World	8.23612	7.056235	32.46223	360.05
United States	6.183614	5.574259	31.103441	457.98
Germany	0.506324	0.402114	0.464394	15.49
Italy	0.015479	0.336359	0.435104	29.36

\*2008 Statistics include January through April

Source: World Trade Atlas

**Mexico - Imports**  
**841919 Ot Wtr Heat Nt In G**  
**Millions of US Dollars**

Country	2006	2007	2008	% Growth 07-08
World	4.5572	5.001621	6.818674	36.33
United States	2.820397	2.689075	4.48274	66.7
China	0.456993	0.669402	1.565011	133.79
Israel	0.313283	0.390399	0.469363	20.23

\*2008 Statistics include January through April

Source: World Trade Atlas

Solar

The market for Photovoltaic energy in Mexico has seen sustained growth for years. In this market, PV assembly plants have been around the U.S.-Mexico border for years, but there is no domestic production of PV cells in Mexico.

The largest amount of imports in dollar terms is in the sector of HTS Code 8541.40. These are solar PV cells and systems, including panels and modules, Light Emitting Diodes, dice, wafers and chips. Through the first four months of 2008, this sector has already increased its exports to Mexico by over 15% from 2007.

The HTS Code 8541.90 also shows promise for growth. This section includes PV parts, including diodes and transistors. Through the first four months of 2008, U.S. exports in this sector increased over 400% from 2007.

The HTS Code 841919, which encompasses solar water heaters and instantaneous water heaters, is also experiencing strong growth through the first four months of 2008.

**Key Suppliers**

Wind

Major turbine suppliers in the Mexican market are: Gamesa (Spain), Endesa (Spain), Iberdrola (Spain), Vestas (Netherlands), GE (U.S.), Clipper (U.S.), and Mitsubishi (Japan).

Solar

Major solar suppliers to Mexico include: Applied Power Corporation (APC); A.Y. McDonald Mfg. Co., Dankoff Solar Pumps, Direct Power and Water, Grundfos Pumps Corporation, Morningstar Corporation; PVPortal, SoListo, Sunwise Technologies, BP Solar; Kyocera Solar Inc. (Japan but with U.S. production), Genersys and Conergy (Germany), Suntech (China).

## Prospective Buyers

Export and procurement opportunities in the renewable energy sectors in Mexico are generally project driven. Equipment such as turbines, solar arrays, and generators are purchased only once a project has been approved and given the go ahead. The majority of the renewable equipment is procured by private companies and developers who have won particular contracts. The government is not generally involved in purchases.

While the exclusive permission to provide electricity to the Mexican public is given to the CFE and LyFC, the recent trends towards allowing Self-Supply and Independent Power Producer status is allowing for many new possibilities. Self-Supply buyers will generally consist of the private sector installing its own power sources. IPP plants will need to negotiate an agreement with the CFE and develop a long-term power purchasing agreement. CFE has placed a higher priority on wind and mini-hydroelectric energy in recent years due to the lower cost they represent compared to PV and hydrogen.

Some states and local municipalities have taken it upon themselves to develop new energy sources. These municipalities will generally contract the job out and allow the private sector to take the risk. Both municipal and industrial end-users generally procure equipment directly from a turnkey or long-term build and operate scenario. Biomass plants are the main prospects here, with PV getting some interest from the housing sectors in Northern Mexico.

Many developers are also manufacturers' representatives. In order to ensure their product is included in developers' plans, U.S. suppliers are advised to seek out long-term contracts and relationships with developers. These relationships may take the form of representation, supply agreements, or a project specific joint venture. In many cases, the U.S. partner will supply the equipment, expertise and project financing while the Mexican partner will provide project development and the ability to work through the government's policies.

A U.S. firm can increase their chances of success if they are willing to provide low-cost and long-term financing. Financing can be a formidable barrier to growth in Mexico.

In addition to contacting the U.S. Commercial Service, good sources of competitive intelligence and contact information for distributors and representatives in the Mexican renewable market include: the Mexican Renewable Energy Program website ([www.re.sandia.gov/index.html](http://www.re.sandia.gov/index.html)); the Mexican Solar Energy Association – ANES ([www.anes.org](http://www.anes.org)), the National Commission for Energy Savings – CONAE ([http://www.conae.gob.mx/wb/CONAE/CONA\\_629\\_fabricantes\\_y\\_distri](http://www.conae.gob.mx/wb/CONAE/CONA_629_fabricantes_y_distri)) and the Renewable Energy Source Guide (<http://energy.sourceguides.com/index.shtml>).

## Market Entry

For U.S. firms there are various ways to enter the Mexican market. Depending on the amount of market knowledge, financial resources and human capital, market entry can range from establishing a Mexican subsidiary to partnering with a local firm. Some companies that are very new to selling in Mexico prefer to sell directly and provide service from their U.S. headquarters. The companies most willing to develop the renewable energy sector are generally small and medium-sized developers.

### Tax Incentives

Mexico's federal taxing authority, Hacienda, has in place two tax incentive programs that may be utilized by the renewable industry wishing to invest in environmental infrastructure and equipment.

The most well-know provision allows for accelerated depreciation of up to 100% of purchases of environmental equipment. Under the tax law, companies not earning a profit can also use the incentive to offset the Mexican Asset Tax for up to ten years. To deter major polluters from locating in Mexico's three largest and most polluted urban centers, Mexico City, Guadalajara and Monterrey, this tax benefit is limited to firms with no more than USD 1 million in earnings and USD 2 million in assets. Hacienda officials in charge of the program revealed, however, that the

provision is very difficult to apply and therefore has not been taken advantage of to its potential. This is due to the fact that no clear definition of “environmental equipment” has been issued.

Hacienda and CONAE offer companies the chance to immediately deduct 100% of the investment cost in renewable energies. Like the environmental equipment provision, however, no definition of renewables has been established and thus Hacienda has effectively blocked the implementation of the program.

Another incentive implemented through the Procuraduria Federal de Proteccion al Ambiente (PROFEPA) - Mexican Environmental Protection Agency – is the policy that allows industries that are fined for not following environmental regulations to spend the money on environmental protection equipment (including renewable) rather than paying it to the government.

States are also free to promote environmental compliance through fiscal incentives. In Mexico City, for instance, companies may reduce payroll tax payments by one-half and property tax payments by one-quarter by deducting 100% of environmental expenditures. The Mexico City authorities, however, must sign off on the investment as indeed constituting an “environmental improvement” before it is made and again three years later, and not until then may the deduction be taken.

#### *The Renewable Energy Regulation—Intermittent Power*

Under the 2003 modified Renewable Energy Regulation, self- and co-generation power plants producing electricity from intermittent energy sources (“Renewable Energy Sources”) may enter into favorable interconnection contracts with CFE that allow the generator to “bank” with the CFE all or a portion of the electricity generated at any given time. In other words, the generator may “deposit” the electricity during high efficiency times (when the plant is generating more than the off-takers require) or non-peak hours (when the off-taker prefers to purchase from CFE because the latter’s non-peak rates are lower than the self-generation supplier’s rates) and later “withdraw” the electricity during low efficiency times (when the generator cannot meet its customer’s demand) or during peak hours (when the generator can sell the power at a significant profit margin).

The Renewable Energy Source electricity may be sold to the grid at the marginal cost corresponding to the particular time of day (peak, non-peak, etc.) in which it is sold and purchased back from the grid at the marginal cost corresponding to the particular time of day in which it is purchased. According to the CRE, the highest marginal cost paid by the plant would be no greater than 80% of the lowest marginal cost received. On the other hand, the electricity rates charged to the end-user by CFE (the plant’s only competitor) may vary by up to 300% depending on the particular time and rate. In effect, then, this scheme would enable the plant to continuously sell the power it produces during non-peak hours, buy it back during peak hours, and sell it to the customer at the peak hour at a substantial profit.

The U.S. Commercial Service offers customized services to help U.S. firms promote their exports and enter local markets worldwide. These include matchmaking services, Single Company Promotions, Customized Market Research Reports, Business Facilitation Services, International Partner Search, among others. CS Mexico has 4 offices in the main cities in the country: Mexico City, Guadalajara, Monterrey and Tijuana. For additional information, please visit: [www.buyusa.gov/mexico/en](http://www.buyusa.gov/mexico/en). CS Mexico can support U.S. firms by coordinating promotion in other Latin American markets through its Trade Americas Regional Program [www.buyusa.gov/tradeamericas](http://www.buyusa.gov/tradeamericas).

In addition, CONAE, Mexico’s National Commission for Energy Savings has a promotion board for renewable energy companies at [http://www.conae.gob.mx/wb/CONAE/CONA\\_629\\_fabricantes\\_y\\_distri](http://www.conae.gob.mx/wb/CONAE/CONA_629_fabricantes_y_distri). To add your company to this list, contact them at: [cofer@conae.gob.mx](mailto:cofer@conae.gob.mx).

### **Market Issues & Obstacles**

The availability of financing is a very important issue influencing sales of all renewable energies. Mexico has made strides to combat these barriers by enrolling in multiple World Bank and Global Environmental Fund (GEF) projects throughout the years. The first loan of \$445 million dollars was granted to Mexico in 1998 to improve the incomes and productivity of the rural poor and farmers. This program was run by the Mexican Renewable Energy Program

(MREP), the Sandia National Laboratories, and FIRCO, a Shared Risk Trust. While the timeframe on the first loan has run out, the World Bank and other donor organizations have given Mexico over \$100 million dollars in loans and grants since then.

### Direct Import Cost Template

	US Firm	Non-NAFTA Firm
Base Price	\$100.00	\$100.00
Freight (estimated 8.0%)	8	8
Insurance (1.5% of C&F)	1.62	1.62
Dutiable base =CIF	109.62	109.62
Ad Valorem Duty (3.0%)	0	3.29
Value Added Tax (15.0%)	16.44	16.94
Total	\$126.06	\$129.85
Port Costs (Unloading, storage, Est 6.0% CIF)	7.56	7.79
Freight forwarder fee (Est. 1.5% CIF)	1.64	1.64
Bank charges (2.0% of FOB price)	2	2
<b>GRAND TOTAL</b>	<b>\$137.26</b>	<b>\$141.28</b>

Source: U.S. Commercial Service

There are no barriers to importing PV energy equipment. However, the Mexican import law is very strict on the required documentation. While it is not required, it may be advantageous when selling equipment to use a reputable customs broker to properly prepare the paperwork needed. The basic documents required include:

- 1) Import petition
- 2) NAFTA Certificate of origin
- 3) Commercial bill
- 4) Insurance and freight bills

The products qualifying as North American must use the NAFTA Certificate of Origin in order to receive preferential treatment. The exporter or broker may issue such a certificate. It does not have to be validated or formalized. Other entities that may issue a Certificate of Origin include government agencies, producers, exporters, industrial and commercial chambers of commerce, and associations that are legally authorized in the United States. Like the U.S., Mexico uses the Harmonized Tariff System (H.T.S.). However, Mexico uses only eight digits while the U.S. uses up to ten digits. The first six digits used under the HTS system are identical for all countries, the rest may vary.

The first thing step a company must take before exporting to Mexico is to make sure that the buyer is registered with the Importers' Registry. This registry is filed with the Secretaria de Hacienda y Credito Publico (Hacienda – Treasury Ministry) and only Mexican companies may obtain it. Thus, the importers' license is the principle obstacle for foreign suppliers who wish to sell and deliver merchandise directly to an end-user who is unwilling or unable to comply with product importation rules.

U.S. exporters must also ensure that the Mexican importer has submitted all the necessary information regarding packing, labeling and quality standards certification, Mexican Official Standards (NOMs), and health and safety regulations to the appropriate Mexican Customs officials.

## Trade Events

8<sup>TH</sup> INTERNATIONAL CONGRESS OF THE MEXICAN SOCIETY OF HYDROGEN

September 24<sup>th</sup> - 26<sup>th</sup>, 2008

Mexico City, Mexico

For more information, please contact: [hidrogeno2008@uacm.edu.mx](mailto:hidrogeno2008@uacm.edu.mx)

POWER MEX CLEAN ENERGY & EFFICIENCY 2008

16<sup>th</sup> Seminar on the Saving of Energy, Cogeneration and Renewable Energy

October 14<sup>th</sup> – 16<sup>th</sup>, 2008

World Trade Center, Mexico City, Mexico

For more information, please see: <http://www.ejkrause.com/enviropro/>

NATIONAL ASSOCIATION OF SOLAR ENERGY

October 20<sup>th</sup> – 24<sup>th</sup>, 2008

Merida, Yucatan

For more information, please see: <http://www.anes.org/snes/registro2008.html>

15<sup>TH</sup> BORDER ENERGY FORUM

October 23<sup>rd</sup> and 24<sup>th</sup>, 2008

Monterrey, Nuevo Leon

To register, and for more information, please see: <http://www.amdee.org/>

The Commercial Service – Mexico maintains a comprehensive list of yearly trade shows and is happy to help your business with the logistics of attending one that fits your needs.

## Resources & Contacts

<sup>1,2,7,10</sup> *National Strategy for Climate Change.*

[http://www.semarnat.gob.mx/queessearnat/politica\\_ambiental/cambioclimatico/Documents/enac/070525%20ENA\\_CC\\_F.Calderon.pdf](http://www.semarnat.gob.mx/queessearnat/politica_ambiental/cambioclimatico/Documents/enac/070525%20ENA_CC_F.Calderon.pdf)

<sup>3,24,26,27,28</sup> Energy Regulation Commission - CRE - *Legislación y Regulación Económica de Energías Renovables en México*, M. C. Francisco X. Salazar Diez de Sollano. Madrid, 1 de marzo de 2007.

[www.icex.es/ProtocoloKIOTO/GENERA%202007/MEXICO/CRE%20MEXICO.ppt](http://www.icex.es/ProtocoloKIOTO/GENERA%202007/MEXICO/CRE%20MEXICO.ppt)

<sup>4,5</sup> *Country Analysis Briefs.* U.S. Energy Information Administration, 2007

<sup>6,20</sup> CRE – *Permisos Administrados.* [www.cre.gob.mx/documento/1285.xls](http://www.cre.gob.mx/documento/1285.xls)

<sup>9</sup> World Bank: “Mexico: World Bank Approves \$25 Million for Renewable Energy Development”.

<sup>8,11</sup> SENER. *Prospectiva del Sector Eléctrico 2004-2013.* Secretaría de Energía. México

[http://www.energia.gob.mx/webSener/res/PE\\_y\\_DT/pub/Prospectiva%20Sector%20Electrico%20FINAS.pdf](http://www.energia.gob.mx/webSener/res/PE_y_DT/pub/Prospectiva%20Sector%20Electrico%20FINAS.pdf)

<sup>12</sup> Federal Electric Commission - CFE. <http://www.cfe.gob.mx/>

<sup>13,16,21,22</sup> SENER. *Energías Renovables: Para el desarrollo sostenible en Mexico.*

[http://www.sener.gob.mx/webSener/res/PE\\_y\\_DT/fe/e\\_renovables\\_mexico.pdf](http://www.sener.gob.mx/webSener/res/PE_y_DT/fe/e_renovables_mexico.pdf)

[http://www.sener.gob.mx/webSener/res/PE\\_y\\_DT/pub/FolletoERenMex-SENER-GTZ\\_ISBN.pdf](http://www.sener.gob.mx/webSener/res/PE_y_DT/pub/FolletoERenMex-SENER-GTZ_ISBN.pdf)

<sup>14</sup> World Trade Atlas®. Trade Information System

<sup>15</sup> Official Gazette of Mexico City:

<http://www.sma.df.gob.mx/sma/download/archivos/nadf-008-ambt-2005.pdf>

<sup>17</sup> International Energy Association: <http://www.iea.org>

<sup>18,19</sup>National Commission for Energy Savings - CONAE.  
[http://www.conae.gob.mx/wb/CONAE/CONA\\_631\\_energia\\_minihidraulic](http://www.conae.gob.mx/wb/CONAE/CONA_631_energia_minihidraulic)

<sup>23</sup>Energy Regulation Commission. *Las Energías Renovables en México*, Francisco Barnés de Castro, México City, 2006

<sup>25</sup>"Ley de Promoción y Desarrollo de los Bioenergéticos",  
[http://www.sener.gob.mx/webSener/res/Acerca\\_de/SENER01022008.pdf](http://www.sener.gob.mx/webSener/res/Acerca_de/SENER01022008.pdf)

Organization for Economic Co-operation and Development:  
<http://www.oecd.org/dataoecd/45/32/36420527.pdf>

National Renewable Energy Laboratory: <http://www.nrel.gov>

"Fostering Renewable Electricity Markets in North America", Commission for Environmental Cooperation. April 2007.  
[http://www.cec.org/files/PDF/ECONOMY/Fostering-RE-MarketsinNA\\_en.pdf](http://www.cec.org/files/PDF/ECONOMY/Fostering-RE-MarketsinNA_en.pdf)

## For More Information

The Commercial Service in Mexico City/Mexico can be contacted via e-mail at:  
Arturo Dessommes, Trade Specialist, e-mail: [arturo.dessommes@mail.doc.gov](mailto:arturo.dessommes@mail.doc.gov); Phone 011(52-55) 5140-2638; Fax 011 (52-55) 5566-1111 or visit our website: [www.buyusa.gov/](http://www.buyusa.gov/).

## The U.S. Commercial Service — Your Global Business Partner

With its network of offices across the United States and in more than 80 countries, the U.S. Commercial Service of the U.S. Department of Commerce utilizes its global presence and international marketing expertise to help U.S. companies sell their products and services worldwide. Locate the U.S. Commercial Service trade specialist in the U.S. nearest you by visiting <http://www.export.gov/eac>.

**Comments and Suggestions:** We welcome your comments and suggestions regarding this market research. You can e-mail us your comments/suggestions to: [Customer.Care@mail.doc.gov](mailto:Customer.Care@mail.doc.gov). Please include the name of the applicable market research in your e-mail. We greatly appreciate your feedback.

*Disclaimer: The information provided in this report is intended to be of assistance to U.S. exporters. While we make every effort to ensure its accuracy, neither the United States government nor any of its employees make any representation as to the accuracy or completeness of information in this or any other United States government document. Readers are advised to independently verify any information prior to reliance thereon. The information provided in this report does not constitute legal advice.*

*International copyright, U.S. Department of Commerce, 2008. All rights reserved outside of the United States.*