

Study

# MARKET INFO MEXICO – PHOTOVOLTAICS

dena-Market Information System

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# IMPRINT

## **Publisher**

Deutsche Energie-Agentur GmbH (dena) - German Energy Agency  
Renewable Energies  
Chausseestraße 128 a  
10115 Berlin  
Phone: + 49 (0)30 72 61 65-600  
Fax: + 49 (0)30 72 61 65-699  
Email: [info@dena.de](mailto:info@dena.de)  
Internet: [www.dena.de](http://www.dena.de)

## **Creation/Editing**

Thomas Wenzel, Felix Schmid

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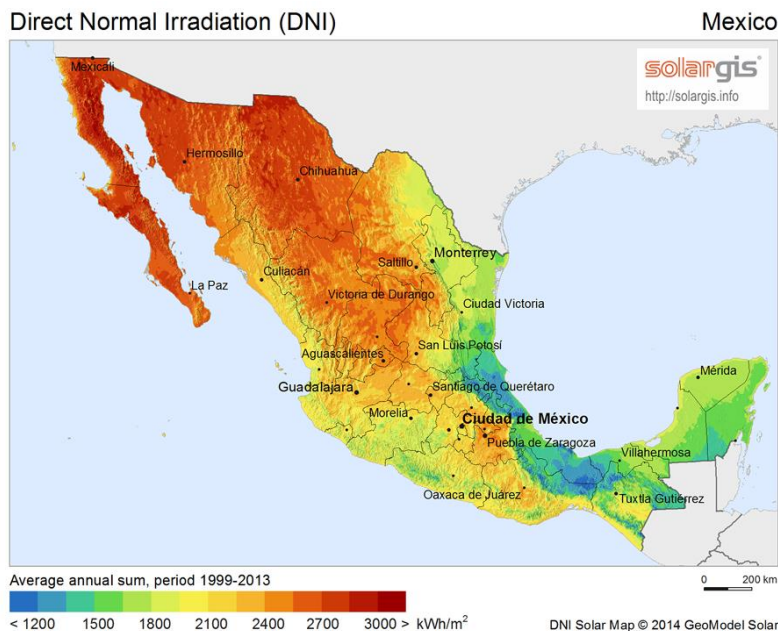


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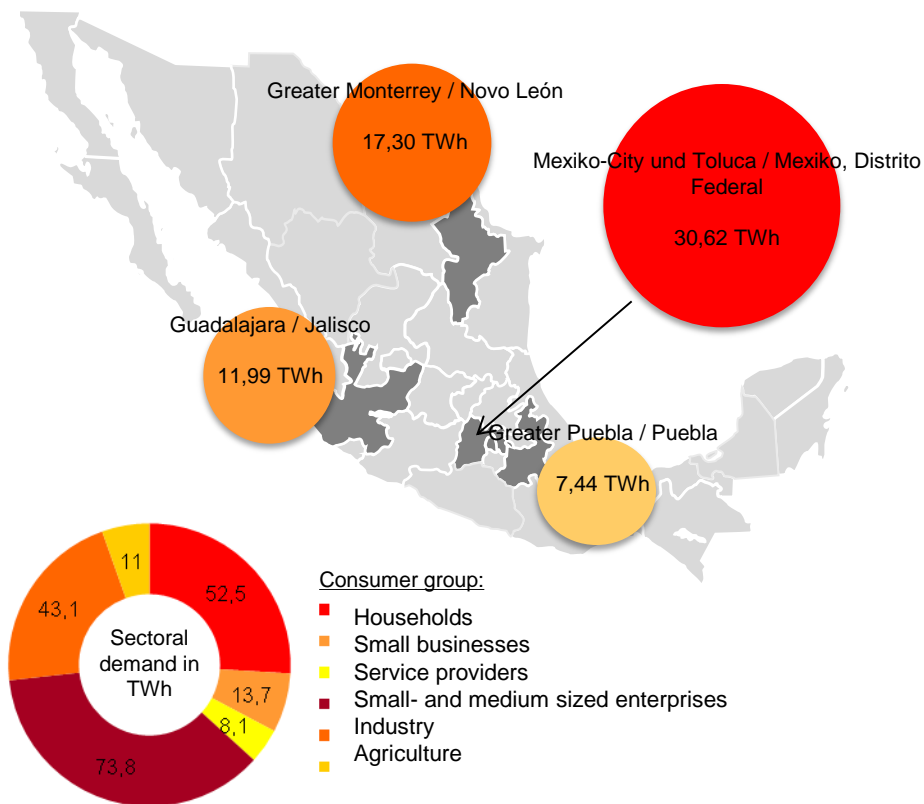
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# SOLAR IRRADIATION & POPULATION DENSITY

## Annual average solar irradiation



## Population density: regions with high electricity demand



Source: SolarGis (2014)

Source: dena (2012a)

# BASIC DATA

General basic data (2014)			
Area	1,964,375 km <sup>2</sup>	GDP (est.)	17,071 bn MXN (~ 941.9 bn €*)
Population	116.9 m	GDP per capita (est.)	142,754 MXN (~7,877 €*)
Language	Spanish	GDP growth (est.)	3 %
Government type	Federal republic	Inflation (est.)	4 %
Administrative division	31 states and one federal district	Unemployment rate (est.)	4.5 %
Basic energy market data (2013)			
Electricity consumption (total/per capita)	235.17 TWh / ~ 2,000 kWh		
Net electricity exports	5.7 TWh		
Average electricity price residential (September 2014)	1.13 MXN / kWh (~6.2 € ct / kWh*)		
Average electricity price service companies (September 2014)	2.34 MXN / kWh (~12.9 € ct / kWh*)		
Average electricity price commercial (September 2014)	3.06 MXN / kWh (~16.8 € ct / kWh*)		
Average electricity price industrial SMEs (September 2014)	1.75 MXN / kWh (~9.6 € ct / kWh*)		
Average electricity price industrial (September 2014)	1.41 MXN / kWh (~7.8 € ct / kWh*)		
Share of renewable energy (electricity consumption 2011)	22 %		
Increase of electricity consumption (2012 – 2016)	14 %		
Annual average global solar irradiation	1,825 kWh / m <sup>2</sup> a		

Average annual exchange rate 2013: 1 Euro = 17.118 MXN , \*Exchange rate April 2014 (GTAI): 1€ = 18.123 MXN

# PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (annual installed capacity)	2012: 12 MW	2013: 60 MW	2014e: 97 MW	2015e: 300 MW
National PV target 2020	2020: 5 % of electricity generation		2050: 10 % of electricity generation	
Main market drivers 2014	<ul style="list-style-type: none"> <li>▪ Profitability/competitiveness of PV power</li> <li>▪ High solar irradiation, in particular in the northern regions of Mexico.</li> <li>▪ Many households pay an unsubsidized electricity price for large-scale consumption, so that their electricity bills can be reduced with the help of PV.</li> <li>▪ Net metering rules since 2009, details see following slide.</li> <li>▪ Possibility to receive an authorisation for exporting PV electricity - cross border PV projects are planned with the USA.</li> <li>▪ Possibility to receive an authorisation for rural electrification: PV system prices are competitive with conventional power solutions in off-grid areas.</li> <li>▪ Farms, commercial or industrial customers are interested in self-consumption solutions based on or combined with PV.</li> </ul>			
PV support scheme 2014	<ul style="list-style-type: none"> <li>▪ A net metering program for small scale PV installations <math>\leq 30</math> kW exists with grid access and grid connection to the low voltage grid of utility CFE.</li> <li>▪ Marketing/sale of electricity from large-scale PV power plants.</li> <li>▪ Details on all support programmes see next two slides.</li> </ul>			
Recent changes to the PV support regulation	<ul style="list-style-type: none"> <li>▪ There is no information on changes in government support concerning the general support framework for renewables or for the implementation of further financial PV support.</li> <li>▪ Efrain Villanueva Arcos, Director of Sustainability Division at the Department of Energy (SENER), stressed the new opportunities for private households arising from the energy reform at an event in Mexico City on 15<sup>th</sup> May 2014. In the future it will be possible to sell the electricity produced by PV directly to end customers. (For details on the electricity market reform in 2014, see the following slide)</li> </ul>			

# OVERVIEW OF PV SUPPORT SCHEMES (1/3)

Category	Details
<b>Net metering for small-scale PV</b>	<p>Net metering (the so called Esquema de Interconexión para fuente de Energía Solar a pequeña escala) for small-scale PV systems <math>\leq 30</math> kWp with grid connection to the low-voltage grid of CFE:</p> <ul style="list-style-type: none"> <li>▪ Private households: eligible system capacity <math>\leq 10</math> kWp</li> <li>▪ Companies: eligible system capacity <math>\leq 30</math> kWp</li> <li>▪ Industrial companies: with grid connection to a medium voltage grid <math>&lt; 500</math> kWp</li> </ul>
<b>Marketing / commercialising of electricity from large-scale PV until August 2014</b>	<ul style="list-style-type: none"> <li>▪ In December 1992 the law Ley del Servicio Público de Energía Eléctrica (LSPEE) was amended to allow private participation in the power generation sector in Mexico. Article 3 of the Act lists several activities that are open to private participation concerning PV:</li> <li>▪ Self-consumption (for PV systems <math>&gt; 500</math> kWp) - power generation for captive use</li> <li>▪ Small production / Small Scale Producer for PV systems <math>&gt; 500</math> kWp: <ul style="list-style-type: none"> <li>▪ PV power generation for rural electrification in off-grid systems (<math>&lt; 1</math> MWp)</li> <li>▪ PV power generation and sale to the CFE with a maximum of 30 years or possibility of electricity exports for operators of PV plants <math>&lt; 30</math> MWp</li> </ul> </li> <li>▪ Independent Power Producer (IPP) for PV plants <math>&gt; 30</math> MWp: production and sale to the CFE maximum of 30 years and possibility of exports.</li> <li>▪ With the energy market reform in August 2014, operating PV electricity generators had to decide within 60 days, whether they would like to continue to sell PV electricity to CFE or to sell it at the wholesale electricity market that is still to be established.</li> </ul>

# OVERVIEW OF PV SUPPORT SCHEMES (2/3)

Category	Details
<p>Energy market reform since August 2014</p>	<ul style="list-style-type: none"> <li>• In Mexico the energy market reform, subject to agreement by June 2014, opened up the possibility for private investments in nearly all sectors of the electricity industry.</li> <li>• The Mexican president Enrique Peña Nieto sent a draft package of nine new laws (including a new Electricity Law, Ley de la Industria Eléctrica (LEI)) and other proposed changes in several existing laws to the Mexican Congress at the end of April 2014. The debate and vote on the legislative package in Congress was scheduled for mid-June. Changes to the law package have already been discussed among the political parties. The bills from December 2013 make changes to the Mexican Constitution and with the new law the state-dominated electricity, oil and gas sector are now open for private participation.</li> <li>• 11<sup>th</sup> August, the law Ley de la Industria Eléctrica (LEI) was amended to allow more private participation in the power sector. The reform opened up private and foreign investments in the whole electricity sector (except electricity transport). The former state-dominated electricity sector will be liberalized. The monopoly in the wholesale and in the retail electricity market will end.</li> <li>• A wholesale electricity market will be established in the near future. Furthermore, a renewable portfolio standard with tradable clean certificates (approx. 20 US-Dollar per MWh - traded on the new whole sale electricity market ) will be introduced in 2015. There is no binding schedule for these issues.</li> <li>• The process of liberalization enables the bilateral sale of electricity, which used to be prohibited (former state-owned Comisión Federal de Electricidad (CFE) was a single-buyer and contracted all private electricity generators since 1992).</li> <li>• Qualified (industrial) customers will be able to purchase directly from power generators.</li> </ul>
<p>Marketing of electricity from large-scale PV since August 2014</p>	<ul style="list-style-type: none"> <li>▪ Self-consumption: PV power generation for captive use</li> <li>▪ PV electricity producers:             <ul style="list-style-type: none"> <li>▪ PV power generation for rural electrification in off-grid systems.</li> <li>▪ PV power generation and sale 1) to electricity traders 2) at the new power market or 3) directly to customers.</li> </ul> </li> </ul>

# OVERVIEW OF PV SUPPORT SCHEMES (3/3)

Category	Details
Exemption of import and export duties	<ul style="list-style-type: none"> <li>Systems and components, which comply with the guidelines of the Ministry of Environment, are exempt from import and export duties.</li> </ul>
Accelerated depreciation	<ul style="list-style-type: none"> <li>Investments in plants and machinery for electricity generation from renewable sources may be entirely offset against tax.</li> </ul>
Fund to promote energy transition	<ul style="list-style-type: none"> <li>Fund (the so called Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía) offers 3 bn MXN annually for projects providing sustainable energy supply (for specific electricity generation projects and for R&amp;D projects).</li> <li>SENER grants money from this fund for newly defined programs each year. Companies can participate with relevant projects in public tenders. More information on current programs and tenders are available at the website <a href="http://www.sener.gob.mx">www.sener.gob.mx</a> (category „Incentivos y Financiamiento“).</li> </ul>
Fund to promote sustainable energy use	<ul style="list-style-type: none"> <li>The so called Fondo Sectorial de Energía-Sustentabilidad Energética (SENER-CONACYT) is used to finance R&amp;D projects in the field of renewable energies, which are managed by Mexican institutes.</li> <li>The allocation passes three steps:               <ul style="list-style-type: none"> <li>40 % with signature of contract</li> <li>50 % with evaluation of the first project phase</li> <li>10 % with completion of project</li> </ul> </li> <li>The fund is financed by tax earnings out of crude oil and natural gas revenues.</li> </ul>

\* Exchange rate according to Oanda.com 22/11/2012: 1 € = 16.68 MXN

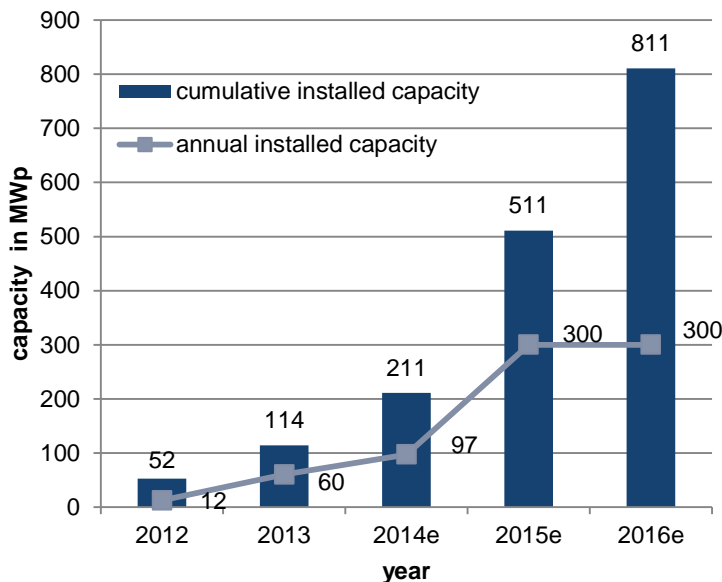


Details of each support program can be found in the [dena pv-subsidy overview 2014](#) and also in dena's Market Report Mexico Photovoltaics 2014 (published in December 2014).



# MARKET DEVELOPMENT AND BARRIERS

## Development of installed PV capacity



Sources: IEA (2014), projection until 2016 (dena)



## The main barriers in the Mexican PV market

### Dominance of domestic fossil primary energy in energy mix:

- Based on enormous oil resources renewable energies do not play an important role at the moment.
- The President focusses on the development of the gas grid instead of promoting the use of renewable energy. US natural gas imports is supposed to secure the energy supply in the north of the country. Increase in the exploitation of shale gas.

### Property acquisition:

- Most of Mexico's rural areas are subject to a legal regime of property, called Ejido. Under an ejido structure, the residents are the actual owners of certain plots. Since a Ejido is jointly owned, it complicates to agree with the owners of the land on their purchase. In addition, there are many legal requirements regarding the negotiations leading..

# MARKET NEWS (1/4)

Date	Topic	Source
01/10/2014	<p><a href="#">Latin American solar markets explode in 2014, 2015</a></p> <p>The latest report by GTM Research predicts that 805 MW of solar PV will be installed across the region in 2014, a six-fold increase over 2013. The company forecasts another 2.3 GW of new PV in 2015. This includes Mexico, which is poised to install 97 MW in 2014, and which GTM predicts will be the largest PV market in the region after 2015.</p>	PV-Magazine
04/09/2014	<p><a href="#">Mexican PV project to light up Chihuahua</a></p> <p>The 33 MW-AC plant is being developed by SDC Energreen Aljaval, a joint venture between Mexico's Energreen and Spanish group Aljaval, which is developing more than 300 MW of PV across the country.</p>	PV-Magazine
14/08/2014	<p><a href="#">Mexican energy reforms to benefit solar</a></p> <p>On 11<sup>th</sup> August, Mexican President Enrique Peña Nieto signed into law landmark energy reform legislation. While media coverage focused on the opening of the nation's oil and gas sector to foreign companies eighty years after nationalization, the legislation also included a number of significant changes to the electricity sector. Secondary legislation in the package includes a new independent role for grid operator CENACE, requirements to procure renewable energy, enables companies to directly sign electricity contracts with renewable energy generators, and mandates the creation of a system of renewable energy certificates.</p>	PV-Magazine

## MARKET NEWS (2/4)

Date	Topic	Source
30/07/2014	<p><a href="#">California Joins Mexico in Clean-Energy Pact</a> California and Mexico have signed a bilateral pact aimed at advancing cross-border investments in clean energy. Signed 29<sup>th</sup> July by California Gov. Jerry Brown (D) and Mexico's Secretary of Energy Pedro Joaquin Coldwell during the governor's trade visit to Mexico City, the agreement calls for the two governments to work together in developing and deploying renewable energy, biofuels and other clean energy technologies.</p> <p>The agreement also includes a commitment to explore integrating Baja California Norte into the California energy market and to support expanded markets for clean and energy-efficient technologies, including manufacturing and transportation. "By this agreement, we intend to work together to dramatically increase solar, wind and other renewable investments," Brown said in a written statement.</p>	Bloomberg
28/05/2014	<p><a href="#">Intersolar Summit Mexico: Industry experts expect a positive development of the Mexican photovoltaic market in the near future</a> Participants of the Intersolar Summit in Mexico City, which took place on 15<sup>th</sup> May 2014, were very optimistic about the future of the Mexican solar market due to advantageous legal framework conditions, a high domestic energy demand and a high solar irradiation.</p>	globalsolartechnology.com
12/03/2014	<p><a href="#">Mexico moves up to third in IHS Emerging Market Report</a> Boosted by the 300 MW of PV capacity under construction, IHS ranks the Central American nation third behind South Africa and Turkey.</p>	PV-Magazine

## MARKET NEWS (3/4)

Date	Topic	Source
27/02/2014	<p><a href="#"><u>Mexico – building a renewable energy market without conventional feed-in-tariffs</u></a>            In the past, PV has been used to electrify off-grid regions in Mexico reaching annual installation levels of just 5–15 MW up until the end of 2012. In 2013 we saw 60–80 MW installed, including one 38 MW utility project in Baja California developed by Gauss and Martifer. In 2014 we expect annual installations of the size of 200 MW reaching 250 MW in 2015. This growth will be based on three different regulatory regimes: Net metering scheme, self-supply scheme and small-scale producer scheme.</p>	Apricum Group
20/12/2013	<p><a href="#"><u>Mexico to lead Latin America PV in 2014, say GTM Research</u></a>            The analysts forecast that the Mexican solar market will grow to 240 MW next year, outstripping its neighbours in South America. Mexico's solar market will more than quadruple in 2014, making it the frontrunner for Latin America according to a report published this week by GTM Research. The report, titled Latin America PV Playbook, predicts Mexican installed PV to reach 240 MW for 2014, up from 60 MW currently. The country's solar growth is likely to be driven by an extremely supporting regulatory body, with a number of schemes given the backing of the Small Power Producers Program – a government-backed incentive to increase small-scale solar installations.</p>	PV-Magazine
06/10/2013	<p><a href="#"><u>Biggest PV plant with 30MW opened</u></a>            In mid-September, the Mexican company Gaus Energía has commissioned the largest PV plant in Latin America with a capacity of 30 MW (Aura Solar I). Furthermore, other companies, e. g. First Solar Inc., are entering the Mexican market.</p>	El Financiero

## MARKET NEWS (4/4)

Date	Topic	Source
17/09/2013	<a href="#">Tax reform sees cancelling tax breaks for renewable systems and components</a> The current President of Mexico, Enrique Peña Nieto, has recently published a draft for tax reforms which eliminates tax breaks (ISR) for wind and solar systems and their components.	CNNExpansión
18/03/2013	<a href="#">Land of the Sun: Solar PV in Latin America</a> With the slowdown in growth and contraction in European PV markets in 2012 and 2013, many in the solar industry have been wondering where the next big market will develop, and many have been considering the potential of Central America, Mexico, the Caribbean and particularly South America. The region offers strong market fundamentals, including high retail electricity prices, growing populations and economies which drive the need for more electricity generation, and in areas like Northern Chile and Northern Mexico, some of the best natural solar potential in the world.	SolarServer
09/03/2013	<a href="#">Permit for 27 MW solar park issued</a> The Comisión Reguladora de Energía (CRE) has issued a permit to the company Grupotec Energy de México to install solar parks with a capacity up to 27.56 MW. The plant is supposed to be build in La Paz in the state of Baja California.	Energias Renovables

## CONTACT INFORMATION

Category	Name	Website
Ministry of Energy	Secretaría de Energía (SENER)	<a href="http://www.sener.gob.mx">www.sener.gob.mx</a>
Ministry of Economics and Industry	Secretaría de Economía (SE)	<a href="http://www.economia.gob.mx">www.economia.gob.mx</a>
German-Mexican Chamber of Commerce	Deutsche- Industrie- und Handelskammer in Mexico (AHK)	<a href="http://www.mexico.ahk.de">www.mexico.ahk.de</a>
Solar Energy Association	Asociación Nacional de Energía Solar (ANES )	<a href="http://www.anes.org">www.anes.org</a>
National Energy Authority	Comisión Nacional Para El Uso Eficiente De Energía (CONUUE)	<a href="http://www.conuee.gob.mx">www.conuee.gob.mx</a>
Operator of new electricity wholesale market	Centro Nacional de Control de Energía (CENACE)	-
Major State-owned Utility	Comisión Federal de Electricidad (CFE) Luz y Fuerza del Centro (LFC)	<a href="http://www.cfe.gob.mx">www.cfe.gob.mx</a> <a href="http://www.lfc.gob.mx">www.lfc.gob.mx</a>
National Transmission Grid Operator	Comisión Reguladora de Energía (CRE)	<a href="http://www.cre.gob.mx">www.cre.gob.mx</a>
Energy Research Institute	Instituto de Investigaciones Electrica (IIE)	<a href="http://www.iie.org.mx">www.iie.org.mx</a>

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