Study

MARKET INFO BRAZIL – PHOTOVOLTAICS

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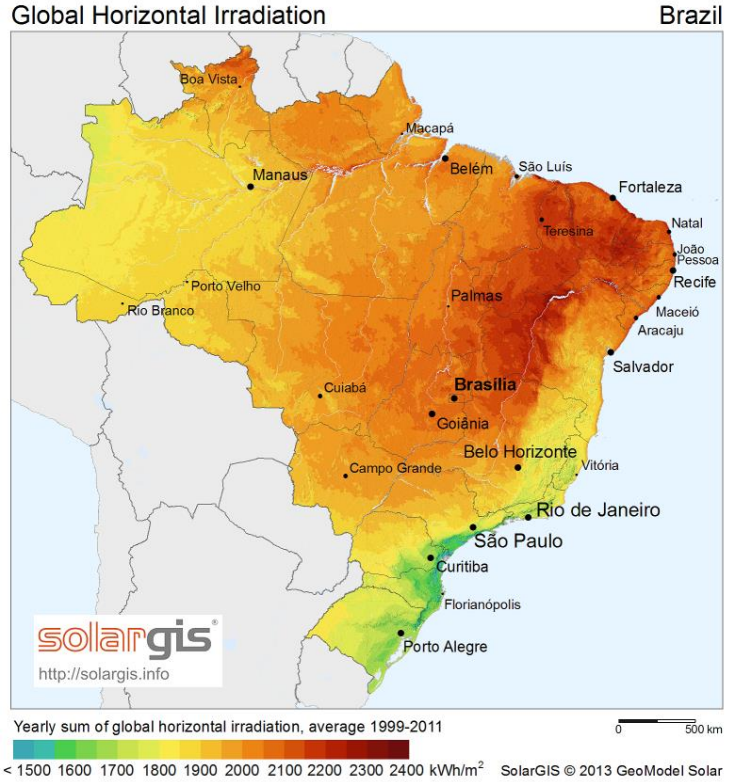
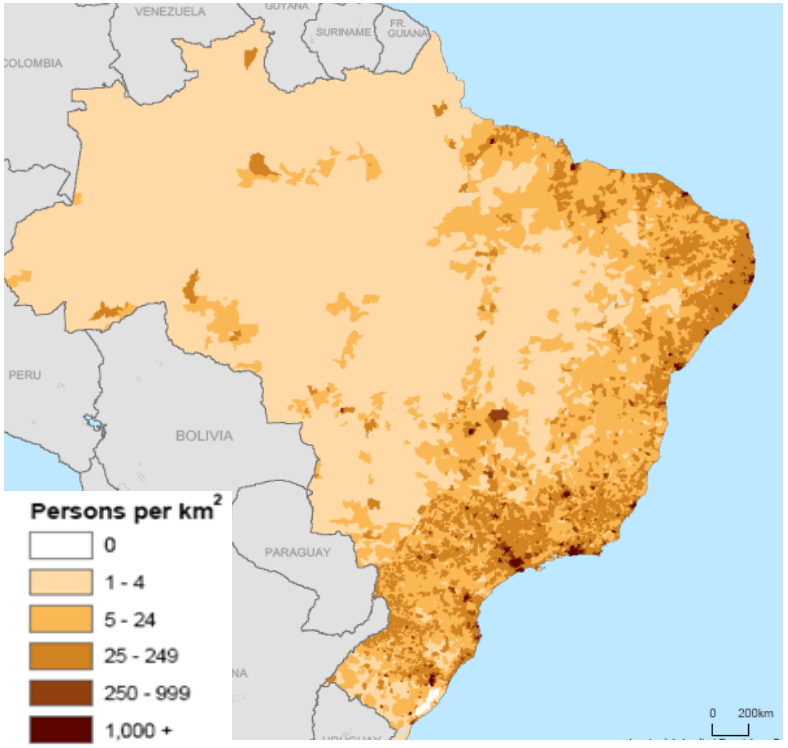
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGIS (2013)

Population density



Source: SEDAC (2012)

BASIC DATA

General basic data (2014)			
Area	8,514,877 km²	GDP (est.)	5,231.2 bn R$ (~ 1,686.9 bn €**)
Population (est.)	200 m	GDP per capita (est.)	26,156 R$ (~ 8,435 €**)
Language	Portuguese	GDP growth (est.)	1.8 %
Government type	Federal republic	Inflation (est.)	5.9 %
Administrative division	26 states, 1 federal district	Unemployment rate (2013)	5.8 %

Basic energy market data (2012)	
Electricity consumption (total)	545 TWh
Total electricity import (2011)	40 TWh
Electricity price (residential) net	0.33 R$ / kWh (~ 0.13 €ct / kWh*)
Electricity price (industry) net	0.26 R$ / kWh (~ 0.10 €ct / kWh*)
Share of renewable energy (electricity consumption 2011)	88.8 %
Estimated increase in electricity consumption (2011 - 2021)	+ 4.5 % p. a.
Annual average global solar irradiation	1,857 kWh / m² a

*Annual average exchange rate 2012 of the European Central Bank (ECB): 1 Euro = 2.51 R$, ** exchange rate April 2014: 1 Euro = 3.101 R$

Sources: ANEEL (2013), CIA (2014), dena (2012), EZBI (2013), IHA (2013), IMF (2014), GTAI (2014c)

PHOTOVOLTAIC MARKET INDICATORS

Indicators					
Market size (annual installed on-grid capacity)	2012: 2.6 MW	2013: 0.7 MW	2014e: 25 MW	2015e: 100 MW	2016e: 250 MW
National PV target	▪ 3.5 GW by 2023				
Installed PV capacity (2012)	▪ 22.5 MW off-grid, ▪ 7.6 MW on-grid (9.9 MW on-grid in June 2014)				
Main market drivers 2014	▪ In comparison to international benchmarks there are high electricity prices in Brazil. ▪ Brazil has a net metering regulation (for details see slide 7). ▪ Grid parity has been reached in many regions and market segments. ▪ A boom of new PV power plants is expected with regard to current and upcoming large-scale sport events like the World Soccer Cup 2014 and the Olympic Games 2016. ▪ Capacity auctions and further PV support in several Brazilian states (see slide 6 and 8).				
Net metering	▪ There is no FIT for PV projects. ▪ However, for excess electricity produced by PV power plants of less than 1 MWp capacity, the power plant operator can receive a credit for the electricity fed into the grid. These electricity credits can be used to offset power consumed from the grid in the following 36 months.				
Recent changes to the PV support regulation	▪ Net metering: distribution grid operators had to prepare to be able to handle connection requests for mini- and micro-generation units from 15th December 2012 onwards. (ANEEL's Normative Resolution No. 482 of 17th April 2012 as amended by Normative Resolution No. 517 of 11th December 2012) ▪ A first national tender is open until 10th July 2014 for reserve power plant capacity ,with a specific category (exclusively) for PV plants for the first time. Awarding contracts is scheduled for October 2014 (see slide 6). ▪ On 12th August 2014, the Brazilian Development Bank BNDES announced local content rules for PV in case of awarding loans to developers of PV power plant projects.				

Sources: ANEEL (2013), CIA (2014), dena (2012), EZBI (2013), IHA (2013), GTAI (2014c)

MAIN PV SUPPORT SCHEME: CAPACITY AUCTIONS

Category	Details	
Empresa de Pesquisa Energetica (EPE) Tendering	▪ On 18th November 2013, the national energy agency (EPE) held the so-called A3-auction, where contracts for electricity producing power plants have been allocated. The Ministry of Mines and Energy announced in September 2013 that contracts for PV systems will be allocated by the EPE in the same manner as the A5-auction, which took place on 13th December 2013. ▪ For the first time, PV systems were admitted to the auction. ▪ Another auction for reserve power plant capacity with a specific category (exclusively) for PV plants was officially announced on 2nd June 2014 . Until 10th July 2014, wind-, PV-, und biomass projects could be submitted. To facilitate participation the same documents, which have been submitted during the A3- and A5 auction in 2013, could be used for the current PV auction. The auctions for reserve power capacity were held specifically for each renewable technology in 2014 for the first time. The first solar PPAs with the Brazilian Chamber of Commercialization of Electric Energy (CCEE – Camara de Comercializaçao da Energia Eletrica) are awarded through EPE. PV projects have to come into operation no later than 1st October 2017.	
	Scope	▪ PV power plants which produce electricity latest 1st October 2017.
	Remuneration	▪ Allocation of guaranteed contracts for 20 years.
	Process	▪ The Brazilian National Electric Energy Agency (ANEEL) had placed a ceiling price of 262 Reais /MWh (~84,48 €/MWh) for the PV auction. ▪ Afterwards bidders haggled the price down in a reverse auction, until the offers with the lowest prices were awarded with the respecting electricity supply agreement.
	Results	▪ A3-auction 2013: 31 participating PV projects with a capacity of 813 MW in total - no PV projects were awarded. ▪ A5-auction 2013: 88 participating PV projects with a capacity of 2.02 GW in total - no PV project were awarded. ▪ At the reserve energy auction on 31st October 2014, 31 PV projects totaling 889.7 MW out of 400 PV projects (10,79 GW in total) were granted approval.

Further information on auction s can be found on the EPEs site: www.epe.gov.br

Sources: EPE (2013)), MME (2014), EPE (2014), PV-Tech (2014), Bloomberg (2014)

MAIN PV SUPPPORT SCHEME: BRAZILIAN NET METERING

Category	Details	
Net metering regulation*	The Brazilian electricity regulator (ANEEL) passed a net metering regulation on 19th April 2012. The conditions are as follows:	
	Power plant scope	▪ Small- and medium-scale PV power plants (<100 kw) and large-scale PV power plants (>100 kW – 1 MW).
	Payment	▪ The electricity produced by PV power plants has to be used primarily for self-consumption. Public facilities and private enterprises can pass the electricity produced by their own PV power plants on to their sub-facilities. ▪ Excessive electricity may be fed into the electricity grid. ▪ PV power plant operators may receive a credit on their bill for the excess electricity fed into the grid. This electricity credit can be used to offset power consumed from the grid by the power plant operator within the following 36 months.
	Guaranteed power grid access	▪ Brazilian distribution grid operators are obliged within 240 days after the publication of the amendment to the standardisation regulation from 19th April 2012 to develop and publish new technical standards. These technical standards should enable PV power plant operators to use net metering for operating small PV power plants.
	Costs	▪ In Brazil the electricity end-consumer has to pay for the net metering equipment. The grid operator, however, has to bear the maintenance costs.

* Net metering regulation in accordance with the standardisation regulation no. 482 of the Brazilian electricity regulator ANEEL of 17th April 2012 in its amended version of 11th December 2012.

More detailed information on the Brazilian net metering regulation can be found on the website of ANEEL: www.aneel.gov.br or in the dena-Market Report Brazil – Photovoltaics.

Sources: dena (2012), dena (2012a), ANEEL (2012, 2013b)

OTHER PV SUPPORT SCHEMES

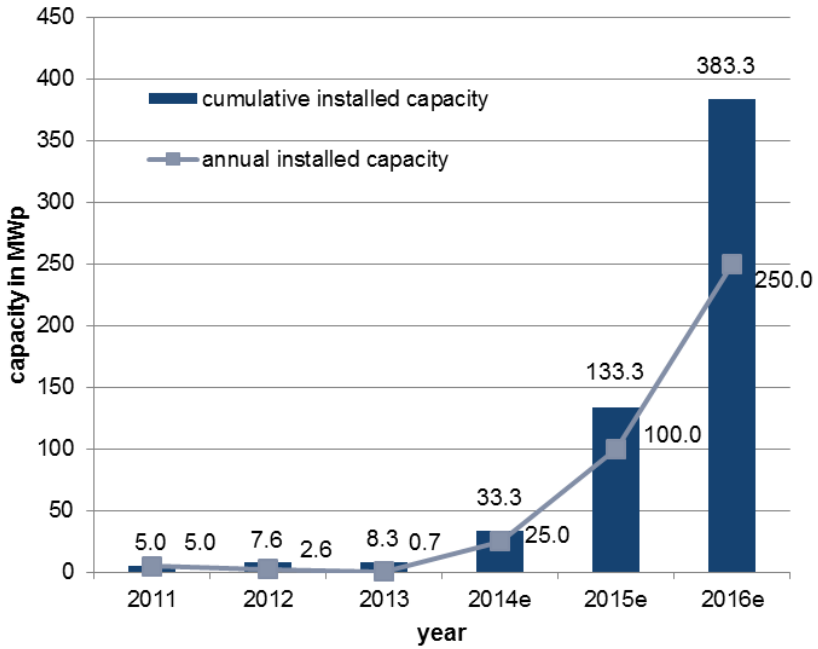
Category	Details
Tax rebates	▪ PV modules benefit from an exemption from the Brazilian sales tax (ICMS) until the end of 2015 . ▪ (Certain PV modules and cells also benefitted from an import tax reduction of 2 % instead of 12 % until 31 December 2012.)
Reduced power grid charges	▪ The Brazilian electricity regulator ANEEL offers reduced power grid charges to PV power plant operators for using its distribution grid (TUSD) and its transmission grid (TUST). ▪ While, in general, power plant operators (including PV operators) are charged for using the Brazilian distribution and transmission grids, PV plant operators (PV plant capacity ≤ 30 MW) can benefit from an 80 % reduction on the power grid charges for the first ten years. These PV plants have to be connected to the grid by 31st December 2017. ▪ After the initial ten years the reduction on the power grid charges is reduced from 80 % to 50 %. PV plants, which are connected to the grid after 31st December 2017 will receive a reduction on the power grid charges of 50 %.
Regional support schemes	▪ The Brazilian Federal State of Ceára has implemented an investment fund of 10 Mio. R$ (4.4 Mio. €*) to promote the implementation of PV projects. ▪ The Federal State of Minas Gerais has decided to introduce the program “Energia de Minas”, which includes tax breaks for PV systems and inverters. However, financial details have not been disclosed yet. ▪ In December 2013, a first PV auction in the state of Pernambuco was held. 20-year PPAs were awarded for PV capacities of123 MW. Further tender s are expected. In the state of Piauí a similar tender is planned. ▪ In the state of Paraíba a net metering regulation is planned for applications within the state’s domestic building programme. ▪ In certain cases the state of São Paolo is granting value-added tax exemptions for PV equipment. ▪ In the state of Tocantins a value-added tax exemption for PV-generated electricity and PV equipment is planned.
Off-grid program „Luz para todos"	▪ The program has existed since 2003. The second phase of the program is running from 2011 to 2014. ▪ The program is coordinated by the Brazilian Ministry for Mining and Energy, but is carried out by Brazilian electricity utilities and cooperatives for rural development. ▪ As part of the extended “Luz para todos” program until 2014, ANEEL will tender off-grid PV systems.

Sources: dena (2012), dena (2012a), ANEEL (2013b), PV-Magazine (2014a)

*Annual average exchange rate 2012 of the European Central Bank (ECB): 1 € = 2.51 R$

MARKET DEVELOPMENT AND BARRIERS

PV market development (on-grid)



Sources: ANEEL (2014), GTAI (2013), projection 2016: dena (2014)

Main barriers in the Brazilian PV market

Technology competition

- Large-scale hydro power currently dominates the power sector in Brazil.
- The primary renewable energy technologies so far have been wind power and biomass (especially bioethanol), which have had a strong support by the government.

Costs for power grid access

- Developers of PV power plants wanting to connect to the grid struggle with the poorly developed grid infrastructure in the North, North-East and Central Brazil.
- The relatively high costs for power grid access have to be borne by the PV power plant operator. Moreover, the approval process for grid access can be time consuming and bureaucratic.

Financing barriers and local content

- The interest rates for borrowing money in Brazil are high in comparison to international benchmarks.
- The Banco Nacional de Desenvolvimento Econômico e Social (BNDES) offers soft loans for PV and other renewable energy projects. However, there is a local content requirement of 60 % on the equipment.

Sources: dena (2012), dena (2012a)

MARKET NEWS (1/5)

Date	Topic	Source
01/11/2014	Brazil's first PV power auction sets very low US$86.78/MWh mark The 6th Reserve Energy Auction, conducted by the Brazilian National Electric Energy Agency (ANEEL) and operated by the Electricity Trading Chamber (CCEE) was said to have generated intense bidding from a massive oversubscription. After the longest auction Brazil has undertaken, 31 out of 400 PV project opportunities totalling 889.7 MW were granted approval at providing electricity at the fixed price of US$86.78/MWh for 20 years, beginning on 1st October 2017. CCEE had originally placed an aggressively low ceiling price for PV of US$105.69/MWh, but interest in the Energy Auction Reserve was significant with only one obvious outcome, a significant 17.9% discount to the ceiling price. CCEE noted that the state of Bahia had the most projects, without providing further details. The remaining projects approved were spread over the states of São Paulo, Rio Grande do Norte, Ceará, Minas Gerais, Pernambuco, Piauí and Goiás.	PV-Tech
17/09/2014	Brazil State to Have Solar Auction as It Seeks Local Panel Plant Brazil will hold its second regional solar energy auction amid an effort to spur local panel manufacturing. Minas Gerais, in southeastern Brazil, is finalizing the rules for the November auction, Guilherme Augusto Duarte de Faria, superintendent of the state's Economic Development Secretary, said in a phone interview yesterday. The state will set a ceiling of about 260 reais ($111) a megawatt-hour for the auction, which will involve 15-year contracts for power. "We want to take advantage of the improving environment for solar energy development in Brazil," said Faria. "The idea is to have solar panel manufacturing plants in the state." Brazil gets less than 1 percent of its electricity from solar power and the government wants to diversify its energy mix. Pernambuco state held the nation's first solar energy auction last year. On 31st October, Brazil will hold the first national energy auction with a specific category for photovoltaic projects, for which developers applied to sell more than 10 gigawatts of capacity. Developers must buy photovoltaic modules made in Minas Gerais for the November auction. According to Faria, five developers have expressed interest in participating and three panel manufacturers are in advanced talks to build a plant in the state. Brazilian utility Cia. Energetica de Minas Gerais will buy the solar energy.	Bloomberg

MARKET NEWS (2/5)

Date	Topic	Source
13/08/2014	Brazilian local content rules could spur domestic industry A key hurdle for projects participating successfully in Brazil's first solar-only national energy auction may be one step closer to being met. On 12th August, the National Bank for Economic and Social Development (BNDES) published an accreditation methodology and local content rules for financing solar projects. Eligible projects will include those in the nation's reserve auction, which will be held on 31st October 2014. The solar-only portion of the auction has attracted over 400 projects, with a total capacity of more than 1 GW. Until 2017, the rules stipulate that projects receiving funding must use PV modules assembled in the nation using locally produced frames, with additional requirements and methodology to be introduced in 2017.	PV-Magazine
01/08/2014	Brazilian bank aims to boost domestic solar manufacturing Brazilian development bank, the Banco Nacional de Desenvolvimento Economico e Social (BNDES), is set to announce details of low-cost financing to boost solar development in the nation. According to a Bloomberg report yesterday, the bank will boost a BRL560 million ($247.4 million) cash injection from the government's Fundo Clima anti climate change fund with its own reserves, to give the solar industry a much-needed leg-up. According to the Bloomberg report, any solar projects developed with BNDES money up to 2017 will have to combine panels with Brazilian-made frames as well as some, unspecified, locally sourced electronic components. For the following two years, bank-funded schemes will have to include further system products manufactured in Brazil and the domestic content requirement of the loan scheme will demand the use of Brazilian cells from 2020 onwards, with the bank offering additional help – unspecified in the Bloomberg report – to developers who use additional locally-made components. Brazil is preparing for its first national solar auction in October amid hopes of developing 3.5 GW of projects within four years.	PV-Magazine

MARKET NEWS (3/5)

Date	Topic	Source
04/06/2014	Brazil's first PV auction set for October For the first time ever, PV projects will be included in a specific category in a national auction in Brazil. Successful projects are to start operation on 1st October 2017. The Brazilian Ministry of Energy and Mines has set the date of the first auction that will have a specific category for PV projects for 10th October. This reserve energy auction, in which there is also a category for wind and a category for biomass, is open to projects with more than 5 MW in the PV category. According to a resolution from the ministry published on Monday, successful projects are supposed to start operations on 1st October 2017. The contracts that are closed for PV projects as part of the auction will last for 20 years. The government has set 10th July as the application deadline. The providers that would like participate in the auction need to apply for the authorization at the Brazilian federal energy planning company Empresa de Pesquisa Energética (EPE). Projects that are already registered to obtain technical authorizations for the A-3 and A-5 auctions this year – the A-5 auction that takes place in September is open to solar projects – can obtain an easier registration at the EPE. The Brazilian government has not yet set the maximum price for PV in the auction.	PV-Magazine
19/02/2014	Tax break paves way for 6.5 MW PV plant in Brazil A 6.5 MW PV power plant is to be built in Brazil with the help of a sales tax break that was announced last year. The project will be built in Votuporanga in the north west of São Paulo state, with shopping centre developer SG Par agreeing to purchase power from the site. At the end of 2013, São Paulo's state government announced a moratorium on sales tax for solar energy equipment. The sales tax can climb as high as 25 % for some products.	PV-Tech

MARKET NEWS (4/5)

Date	Topic	Source
02/01/2014	Brazilian state approves 123MW of solar developments in energy auction The Brazilian state of Pernambuco has approved 122.82 MW of solar projects after hosting the country's first solar-only tender auction. Competing in the auction were 34 project bidders – six from Brazil along with others based in China, Germany, Italy and Spain. The largest of this six successful tenders was won by Sowitec for a 30 MW solar plant, closely followed by Sun Premier Holding Participações, which won a 29.75 MW bid, and Kroma Comercializadora de Energia, which won 29.25 MW. Concierge Cone S/A has been commissioned to build 22.82 MW and Enel Green Power two 5 MW projects.	PV-Tech
19/12/2013	No successful solar bids in Brazil's latest energy auction No solar PV projects were selected in the long awaited A-3 energy tender auction in Brazil on Monday. The first government energy tender auction to allow the participation of solar energy projects was unanimously dominated by wind, with 39 wind farms totaling 867.6 MW commissioned at the auction. The auction took place yesterday, 18 November at the headquarters of the Chamber for Commercialisation of Electric Energy (CCEE) in Sao Paulo. There were 31 unsuccessful PV projects with a generation capacity of 813 MW participating in the A-3 energy auction, of which 12 projects were planned in the Bahia region amounting to 309MW, four projects in Minas Gerias totaling 115 MW, nine in Paraiba totaling 253 MW, four projects in Piauí accounting for 91 MW and two projects in Rio Grande do Norte with a capacity of 45 MW. In September, a much higher 2.7 GW of PV projects were being considered in the preliminary round for the A-3 auction. In total, 429 renewable energy projects, from biomass and hydro, participated in the A-3 auction with a total of 10.46 GW in proposed energy projects all competing for tenders. A ceiling price of BRL126 per MWh (US$54) was set for all power sources, which industry observers previously said could prove be too low for solar projects in Brazil to be financially viable, and would prevent solar projects being selected in the A-3 auction. By the end of the auction the average price for the wind energy bids was BRL124.43 MWh (US$54.92). Just before the auction a consortium of Brazilian energy companies called for solar-only auctions, claiming a reasonable price to offer PV projects would be between BRL190 (US$83) to BRL200 (US$87) per megawatt hour, far higher than the A-3 ceiling price.	PV-Tech

MARKET NEWS (5/5)

Date	Topic	Source
17/12/2013	No solar PV, CSP awarded in Brazil's A-5 auction Brazilian national utility EPE did not select a single solar project among the 119 projects totaling 3.5 GW of capacity awarded in its A-5/2013 energy auction. Wind represented the majority of successful projects, with 97 projects representing 2.34 GW of capacity approved.	SolarServer
09/12/2013	Hanergy to build thin-film plant in Rio Grande, Brazil The local government of Rio Grande do Sul has announced that Chinese firm Hanergy plans to build a thin-film solar PV module factory in the Brazilian state. A preliminary agreement was signed in Beijing on 4 December between Hanergy directors, regional Science, Innovation and Technological Development (SCIT) secretary Cleber Prodanov and Susana Kakuta, director of Tecnosinos Technological Park, Sao Leopoldo, where the production line will be built. Financial terms of the deal have not been disclosed. The capacity of the production line at the planned thin-film facility has also not been revealed.	PV-Tech
14/10/2013	Developers file for 729 MW of solar PV projects in Brazil The Brazilian electricity board (ANEEL) is permitting 30 PV projects with a total capacity of 729 MW to the A3-auction from the EPE. In total 109 PV-projects applied with a total capacity of 2,729 MW. The projects that failed to be permitted are offered the opportunity to apply for the A5-auction in December 2013.	Solarserver
14/10/2013	40MW array for dairy farm in Brazil Energy Team Brazil, a branch of the European renewable energy developer Energy Team is planning to install a PV system with a capacity of 40 MW on the rooftop of a dairy farm in the state of Rio Grande do Sul.	PV-Tech
07/08/2013	Brazil Rooftop Solar Power Seen Reaching 1,400 MWs by 2022 This goal will most probably be included in the Ministry of Mining and Energy ‘s energy plan for 2014. Currently, the rooftop systems have a total capacity of eleven MW. The expected increase is due to lower material cost. Further projects, exceeding the volume of 1,400 MW by 2020, are to be expected.	Bloomberg

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy and Mining Ministry of Environment	Ministério de Minas e Energia (MME) Ministério do Meio Ambiente (MMA)	www.mme.gov.br www.mma.gov.br
Ministry of Economics, Industry and Trade	Ministério do Desenvolvimento, Indústria e Comércio Exterior (MDIC)	www.desenvolvimento.gov.br
German-Brazilian Chamber of Commerce	Câmara de Comércio e Indústria Brasil-Alemanha Brasília (AHK)	www.ahkbrasil.com
Solar Industry Association	Associação Brasileira de Refrigeração , Ar Condicionado, Ventilação e Aquecimento (ABRAVA)	www.abrava.com.br
Association of Independent Power Producer	Associação Brasileira dos Produtores Independentes de Energia Elétrica (APINE)	www.apine.com.br
Electrical and Electronics Industry Association	Associação Brasileira da Industria Electrica e Eletronica (ABINEE)	www.abinee.org.br
National Electricity Regulator	National Agency of Electrical Energy (ANEEL)	www.aneel.gov.br
Major Brazilian Electricity Utility	Eletrobrás	www.eletrobras.com
National Transmission Grid Operator	Operador Nacional do Sistema Elétrico (ONS)	www.ons.org.br
National Renewable Energy Research Association	Empresa de Pesquisa Energética (EPE)	www.epe.gov.br
National Development Bank for Financing Renewable and Solar Energy Projects	Banco Nacional de Desenvolvimento Econômico e Social (BNDES)	www.bndes.gov.br

Source: dena (2012)

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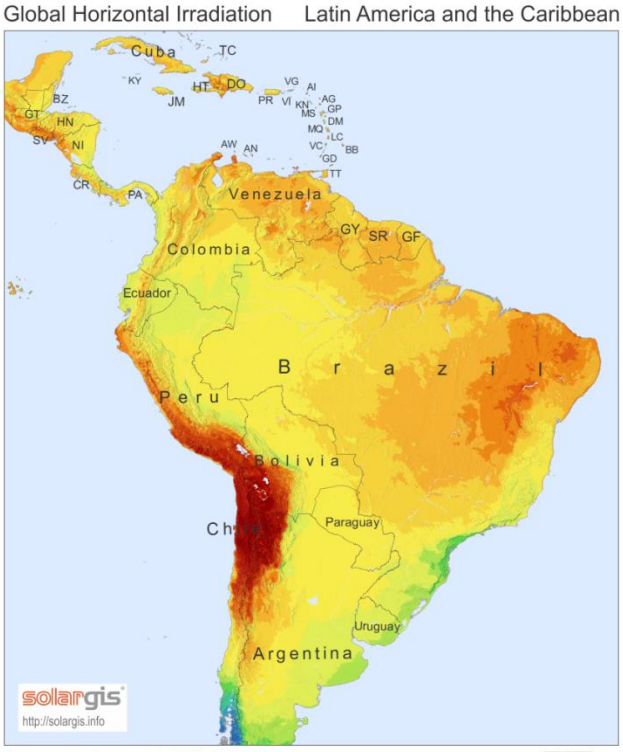
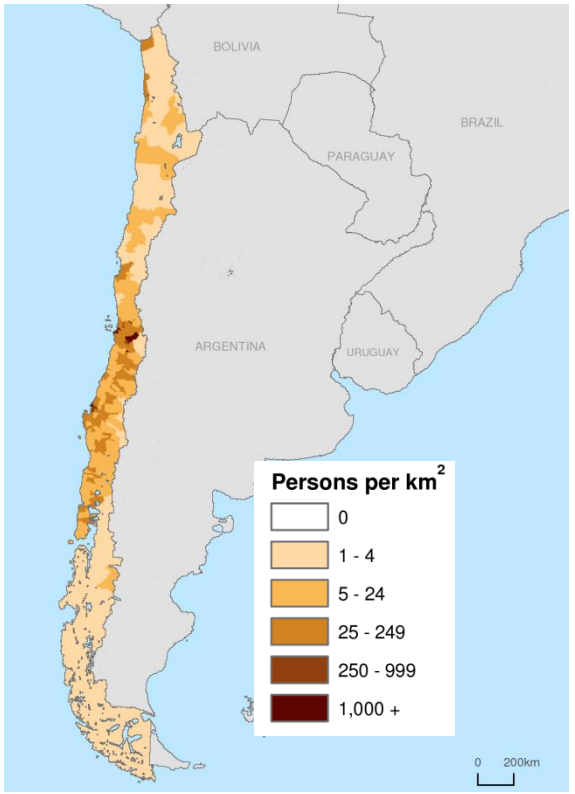
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGIS (2014a), SolarGIS (2014b)

Population density



Source: SEDAC (2005)

BASIC DATA

General basic data (2013)			
Area	756,102 km²	GDP	137,109 bn chil$ (~ 208.2 bn €**)
Population (2014)	17.4 m	GDP (per capita)	7.8 m chil$ (~ 11,865 €**)
Language	Spanish	GDP growth	+4.2 %
Government type	Republic	Inflation	1.8 %
Administrative division	15 regions, 54 provinces	Unemployment rate	6.4 %

Basic energy market data (2013)	
Electricity consumption	68.8 TWh
Total electricity import	-
Electricity price 2012 (residential) gross	90.08 chil$ / kWh (~ 14.43 €ct / kWh*)
Electricity price 2012 (industry) gross	61.56 chil$ / kWh (~ 9.86 €ct / kWh*)
Share of renewable energy (gross electricity generation)	36 % (5.85 % , without hydro power generation)
Estimated increase in electricity consumption (2012 - 2030)	+ 6-7 % p. a.
Annual average global solar irradiation	2,048 kWh / m² a (north), 1,475 kWh/m² a (south)

* Annual average exchange rate 2012: 1 Euro = 624.330 chil$, **Annual average exchange rate 2013: 1 Euro = 658.6 chil$

Sources: CIA (2014), EZB (2013), IEA (2014), WB (2014), GTAI (2014), ME (2014c), CER (2014a, 2014b)

PHOTOVOLTAIC MARKET INDICATORS

Indicators					
Market size (on- and off-grid capacity installed per year)	2010: n/a	2011: n/a	2012: 2.6 MW	2013: 4.1 MW	2014e: 400 MW
Installed PV capacity (08/2014)	244 MW				
Expansion targets at national level	▪ In 2008, the so-called Non-Conventional Renewable Energy Law (Ley 20.257) introduced a quota for the feed-in of non-conventional renewable energies (ERNC*). Since 2010, companies producing commercially available energy must provide an annual share of 5 % coming from ERNC sources. From 2015, this percentage will be increased each year to a total of 10 % by 2024. The law also introduced tradable renewable energy certificates as well as penalty payments that parties need to pay in case of non-compliance. ▪ In 2013, the binding quotas were increased with the coming into force of a new law: the share of ERNC in the overall electricity mix is to be increased to 20 % by 2025 (Ley 20.698 from 2013). ▪ No concrete expansion targets for PV.				
Most important market drivers since 2013	▪ Chile offers excellent conditions for the use of solar energy, especially in the North. Given the high solar irradiation, the Atacama desert is one of the most suitable areas for the generation of solar energy. ▪ Chile is one of the countries with the highest energy prices in Latin America. Here, the energy prices have doubled within the past seven years, according to Energy Minister Maximo Pacheco. Even in an international comparison the prices in Chile can be considered as high. ▪ Due to a dynamic economic development, the energy demand is expected to double by 2020 as compared to 2010. ▪ The Chilean government count on their national energy strategy 2012 to 2030, giving high priority to an expansion of ERNC. ▪ Net metering/billing has been in force since October 2014. A growth in the market segment of small-scale installations is possible.				

* ERNC - Energías renovables no convencionales: wind, solar, micro-hydropower, wave and geothermal energy as well as energy from biomass.

Sources: dena (2012), CAMCHAL (2013), CER (2013), CER (2014a, 2014b), ME (2012), DB Research (2014)

NET METERING/BILLING

Category	Details	
Net Metering Regulation*	On 22 April 2012, the "Regula el Pago de las Tarifas Eléctricas de las Generadoras Residenciales" law on net metering (Ley 20.571**) was published. After two years of work on the technical details of regulation, Chile's net metering scheme was issued on 6th September 2014 and thus came into law.	
	Scope	▪ End customers participating in the regulated energy market (customers with demand of ≤ 500 kW). ▪ Generation capacity of up to 100 kWel from non-conventional renewable energies (solar, micro-hydropower, wind, geothermal energy, biomass) and CHP. ▪ Priority electricity generation for personal use; the surplus energy is fed into the public distribution system.
	Remuneration	▪ The monthly energy input is set off against the actual energy consumption. ▪ A possible surplus can be made available in the following months. ▪ If the accumulated surplus cannot be balanced within a period of six months, the utility company must pay the difference. ▪ The remuneration for an energy surplus is stipulated in the amount of the reference rate minus distribution losses and grid charges; a higher remuneration for small installations is being discussed.
	Guaranteed connection to the supply system	▪ The operators of the distribution system are required to provide a connection to the grid.
	Costs	▪ End customers must pay for the net metering equipment (meter etc.) and for the grid connection costs themselves.

* Net Metering Regulation according to Ley 20.571 from 22 April 2012 available at http://www.leychile.cl/Navegar?idNorma=1038211
** A German translation of the law 20.698 can be found at the website of the German Chilean Chamber of Commerce: http://chile.ahk.de/fileadmin/ahk_chile/Dokumente/Formular/GesetzEE.pdf

Further information on the Net Metering Regulation is available at the Energy Ministry's website: www.minenergia.cl

Sources: CAMCHAL (2013), dena (2012), dena (2013), ME (2013), Suelo Solar (2013)

DIRECT MARKETING AND TRADABLE RE CERTIFICATES

Category	Details
Direct marketing of RE	▪ The Ley Corta I law from 2004 gives every electricity producer access to the spot market irrespective of their capacity. Here, they can sell electricity at a marginal cost and the power provided at a local marginal price. ▪ System operators are required to provide a connection to the grid and have the right to supply electricity from power plants below 9 MW. ▪ The Ley Corta II law from 2005 provides the possibility to issue an invitation to tender for long-term supply contracts between electricity generation and power distribution companies. Within these contracts, the rates are fixed for a period of up to 15 years and can be determined independently by the negotiation partners.
Tradable RE certificates	▪ ERNC producers will receive tradable RE certificates per MWh of electricity generated. ▪ Electricity generation companies can buy additional certificates in order to comply with the ERNC quota (see slide 5). ▪ The average price for tradable certificates for electricity generating company was 6,426 US$/MWh in 2010; in 2011 the price was 6,667 US$/MWh. ▪ Penalty payments that parties need to pay in case of non-compliance with the ERNC quota are approx. 30 US-Dollar US$/missing MWh.
Exemption of network charges	▪ According to Ley Corta I, ERNC producers are fully exempt from transmission charges up to a capacity of 9 MW and partially exempt between 9 and 20 MW.

Sources: dena (2012), CAMCHAL (2013), CER (2011), CAMCHAL (2014)

OTHER SUPPORT SCHEMES (1/2)

Category	Details
Rural electrification efforts	▪ Within the framework of the programme on rural electrification efforts (Programa de Energización), individual projects in the fields of decentralised power generation and energy efficiency have been granted support since 1994. ▪ By the end of 2011, PV installations with a total capacity of 527.5 kWp have thus been installed. ▪ Further information: http://cer.gob.cl/presentaciones/talleres/2013/santiago_diciembre/Subdere%20Financiamiento%20-%20Julio%20Cuadra.pdf
Tax concessions	▪ With the implementation of Ley 19.420* from 1995, tax concessions for companies located in the northern provinces Arica and Parinacota were introduced. ▪ When they invest in PV installations, the concessions on assets in kind (building installations , machines and equipment) are 30 % for the province of Arica and 40 % for the province of Parinacota; they are set off against the VAT the operator has to pay for the installations once they are in operation. ▪ At the beginning of 2013, the law was amended; it now covers investments that are made by 31 December 2025. Originally, tax concessions were only granted until 31 December 2011, so the law had expired for some time.

Chile's Renewable Energy Centre (CER) published a manual on the development of RE projects (in Spanish), which can be downloaded from the following link: http://issuu.com/cerchile/docs/guia_de_gestion__01/1?e=5566222/6107363

*The current version of the Ley 19.420 law can be found on the website of the library of the Chilean National Congress at: http://bcn.cl/19ith

Sources: dena (2012), CAMCHAL (2013), CER (2011)

OTHER SUPPORT SCHEMES (2/2)

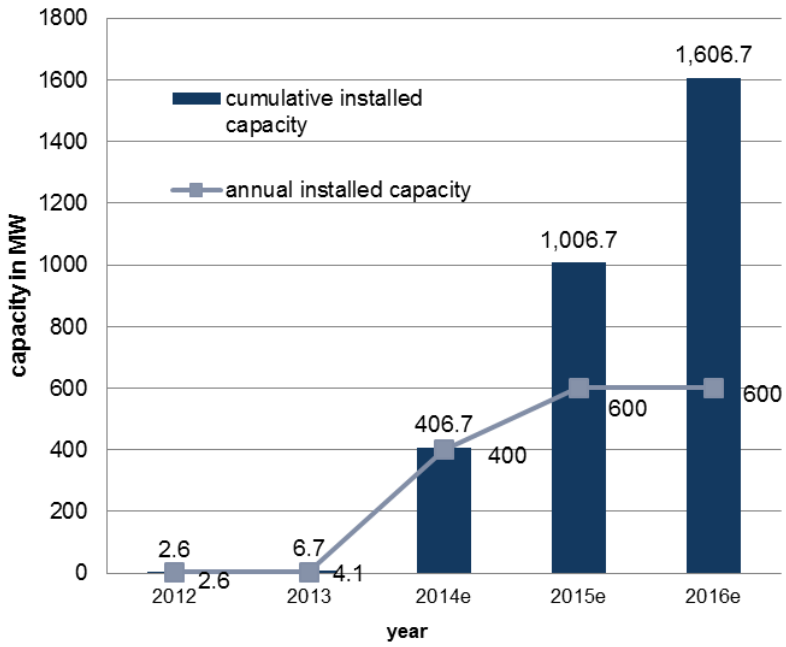
Category	Details
Calls for tenders	▪ Small-scale calls for tenders frequently occur for building RE power generation installations both for personal and public use. All public calls for tenders are regularly published at http://www.mercadopublico.cl. ▪ Information on the calls for tenders for solar energy projects (CSP & PV) can also be found on the website of the Chilean Economic Development Agency CORFO at http://www.corfo.cl/sobre-corfo/licitaciones. ▪ The Ministry for Public Properties (Ministerio de Bienes Nacionales) calls for tenders for land use rights for public properties as part of PV power plant projects on their website http://licitaciones.bienes.cl. ▪ The law 20.698* (see slide 5) provides for additional public calls for tenders for ERNC capacities by the Energy Ministry if the annual expansion targets are not met.
Energy 2014 agenda	In their energy agenda from May 2014, the new government announced the following PV-relevant measures: ▪Solar roof programme for public buildings ▪New financing instruments for PV projects ▪Lighthouse project "solar city" in the city of Calama ▪Information campaigns to promote PV for commercial and industrial use

* A German translation of the law 20.698 can be found at the website of the German Chilean Chamber of Commerce: http://chile.ahk.de/fileadmin/ahk_chile/Dokumente/Formular/GesetzEE.pdf

Source: ME (2014b)

MARKET DEVELOPMENT AND BARRIERS

PV market development (on- and off-grid)



Main barriers in Chilean PV market

Obstacles in electricity marketing
There is no compensation arrangement for RE producers so far (since October 2014, the net metering system has been in force).
Commercialisation only via bilateral electricity supply contracts with major customers or marketing on the spot market possible.

Financing obstacles
Provision of borrowed capital from Chilean banks to finance projects is virtually impossible without a long-term energy supply contract (PPA).

Insufficient electricity grid infrastructure
An expansion of already existing grid infrastructures is necessary; however, the merger of the two major transmission grids SIC and SING is delayed.
Load distribution centres are still inexperienced with non-constant load flows.

Sources: CER (2014), * Development DB Research (2014)

Sources: CAMCHAL (2013), dena (2012), DB Research (2014)

MARKET NEWS (1/4)

Date	Topic	Source
01/10/2014	Pattern Development signs PPA for 104 MW solar project in Chile Energy Group LP has expanded into the solar power market, signing a 22-year power purchase agreement (PPA) with an affiliate of Antofagasta Minerals SA for its Conejo Solar photovoltaic power project in Chile. The 104 MW Conejo Solar project, which will be constructed some 30 kilometers east of Taltal in Chile's Atacama Desert, was originated by Pattern Development, which expects the facility to be the largest solar energy project in Chile with a PPA upon completion.	PV-Magazine
29/09/2014	Solarpack inaugurates 25 MW PV plant in Chile Spanish solar developer Solarpack has inaugurated its largest solar PV project in Chile – the 25 MW Pozo Almonte Solar development, which is located in Tarapacá, the First Region of Chile. The project has become the largest solar PV plant to be interconnected to the country's Northern Interconnected System (SING), and will generate 13% of the annual power required by local mining firm Doña Inés de Collahuasi, which has signed a power purchase agreement (PPA) with the plant.	PV-Magazine
15/09/2014	Chile environment agency adds 392MW to national PV pipeline Two more large-scale PV plants, with a combined generation capacity of 392MW, have been approved for Chile by the country's environmental authority. The newly announced 112 MW project, Llanta Solar Project, will be built in Chile's Atacama Desert region. Llanta Solar Project will require around US$235.2 million of investment. The other project to be approved, Alfa Solar, will also be located in the north of Chile, in Antofagasto. The 280 MW project will require US$560 million of investment,	PV-Tech
04/09/2014	SunEdison to supply solar power to Chilean copper mine SunEdison has signed a 20-year solar power supply deal Los Pelambres copper mine from its 69.5 MW Javiera solar plant in Chile's Antofagasta region. The Javiera power plant is currently under construction and is expected to be connected to the grid in the first months of 2015. The project will deliver all of its electricity to the Central Interconnected System (SIC) and will supply Los Pelambres, a copper concentrate and molybdenum mine located in the Coquimbo region.	PV-Magazine

MARKET NEWS (2/4)

Date	Topic	Source
24/06/2014	Chilean Environmental Protection Agency approves 369 MW PV project The Environment Agency of Chile (EIS) has approved the construction of a solar photovoltaic (PV) power plant with a nominal capacity of 369 megawatts (MW) in the north of the country. The Chilean subsidiary of First Solar, Inc. (Tempe, Arizona, U.S.), project developer Parque Fotovoltaico Sol del Desierto SpA, plans to start working on the "Desert solar farm" in the province of Antofagasta in June 2015.	SolarServer
05/05/2014	JinkoSolar to supply 100 MW of solar PV modules for projects in Northern Chile JinkoSolar Holding Co. Ltd. (Shanghai) has signed contracts to supply 100 MW of solar photovoltaic (PV) modules for two projects in Northern Chile. Enel Green Power SpA (Rome) is building the first 60 MW phase of the Lalackama PV plant in the Antofagasta Region. The plant will be 129 MW-DC when complete. The other is a 40 MW PV plant in the municipality of Diego De Almagro in the Atacama Region.	SolarServer
29/04/2014	CER: Chile reaches 173 MW-AC of installed solar PV Chile's Center for Renewable Energy (CER) reports that the nation has reached 173 MW-AC of installed solar photovoltaic (PV) capacity, as well as 170 MW-AC under construction, in its April 2014 report. Additionally, CER estimates that Chile's PV plants generated 32 gigawatt-hours (GWh) of electricity during the month of March 2014, a dramatic increase from 1.8 GWh generated in the previous month.	SolarServer
15/04/2014	Chile debates green tax that can make solar more competitive Within the tax reform that is currently under debate in Chile´s parliament, there is a plan to tax the CO2 emissions from thermoelectric plants over 50 MWt.	PV-Insider

MARKET NEWS (3/4)

Date	Topic	Source
01/04/2014	Grid connectivity in Chile to unlock solar potential The connection of the two biggest electric systems (named SIC and SING) has recently been approved in Chile. This game-changing decision will create a balance between the energy supply and demand in the country, helping the installation of solar power plants in the north where solar radiation is higher.	PV-Insider
20/03/2014	Chile reaches 150 MW of installed solar with further 225 MW under construction Installed photovoltaic power saw remarkable growth in Chile last month. During February, the San Andres SunEdison solar park in the Atacama region began operation with a capacity of 48.2 MW, increasing the country's cumulative PV capacity to 149.8 MW. The volume of solar projects under construction increased from 128 MW in January to 225 MW in February.	PV-Magazine
20/03/2014	Chile to add two new solar PV plants totaling 240 MW First Solar's Chilean subsidiary, First solar Energia Ltda., has been granted permission to develop a 162.3 MW solar project in the country's Atacama region, and Irish solar energy developer Mainstream Renewable Power will enter the Chilean market in 2015 after securing approval for its 88 MW Solar Estancia project in the Coquimbo region.	PV-Magazine
21/02/2014	Chile reports that the 100 MW Amanecer solar PV plant is online SunEdison Inc. (St. Peters, Missouri, U.S.) completed and commissioned its 100 MW Amanecer CAP solar photovoltaic (PV) plant in Northern Chile during the month of January 2014, according to a statement from the nation's Center for Renewable Energy (CER). SunEdison has not confirmed this, and did not return Solar Server requests for comment by press time. The plant is the largest in Latin America, and will supply electricity to CAP SA's (Santiago, Chile) mining operations under a power purchase agreement.	SolarServer

MARKET NEWS (4/4)

Date	Topic	Source
20/01/2014	Etrion to build 70 MW Chile PV plant Switzerland-based renewable energy specialists Etrion have commenced construction of a 70 MW PV power plant in Chile's Atacama region. The project – titled Project Salvador – is part of Etrion's wider 100 MW solar pipeline in the country, and will be completed in collaboration with Total S.A. and local solar energy company, Solventus Energias Renovables. Completion is expected by the end of the first quarter of 2015. Initially, Project Salvador will operate on a spot market basis, calculated in US dollars. There will also be the possibility for utility companies to secure future power purchase agreements for the plant.	PV-Magazine
12/12/2013	1.26 MW PV plant to power Chile's mining operations French solar energy company SolaireDirect has completed a 1.26 MW PV plant in northern Chile in conjunction with local mining company Minera Dayton. Northern Chile's Coquimbo region, an area regarded as the world's largest for copper production, will be home to the plant.	PV-Magazine

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy Ministry of Environment	Ministerio de Energía Ministerio de Medio Ambiente	www.minenergia.cl www.mma.gob.cl
Ministry of Economics	Ministerio de Economía, Fomanto y Turismo	www.economia.cl
Center for Renewable Energies	Centro de Energías Renovables - CER	cer.gob.cl
Energy Market Regulator	Superintendencia de Electricidad y Combustibles - SEC	www.sec.cl
National Energy Commission	Comisión Nacional de Energía - CNE	www.cne.cl
(Trade promotion organisations) Chilean Economic Development Agency	Corporación de Fomento de la Producción - CORFO German Chilean Chamber of Commerce - CAMCHAL	www.corfo.cl chile.ahk.de
Solar Industry Association Renewable Energy Industry Association	Asociación Chilena de Energía Solar - ACESOL Asociación Chilena de Energías Renovables - ACERA	www.acesol.cl www.acera.cl
National Authority for the Environment	Servicio de Evaluación Ambiente -SEA	www.sea.gob.cl
Electricity Utility Association	Asociación de Empresas Eléctricas A.G. - ASEL	www.electricas.cl
Chilean Dispatch Center	Centros de Despacho Económico de Carga – CDECs	www.cdec.cl
Major Chilean Electricity Utility	Endesa Chile S.A.	www.endesa.cl
Major Transmission Grid Operator	Transelec Chile S.A.	www.transelec.cl
Major Distribution Grid Operator	Chilectra S.A.	www.chilectra.cl

Sources: CAMCHAL (2013), dena (2012)

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Study

MARKET INFO CROATIA – PHOTOVOLTAICS

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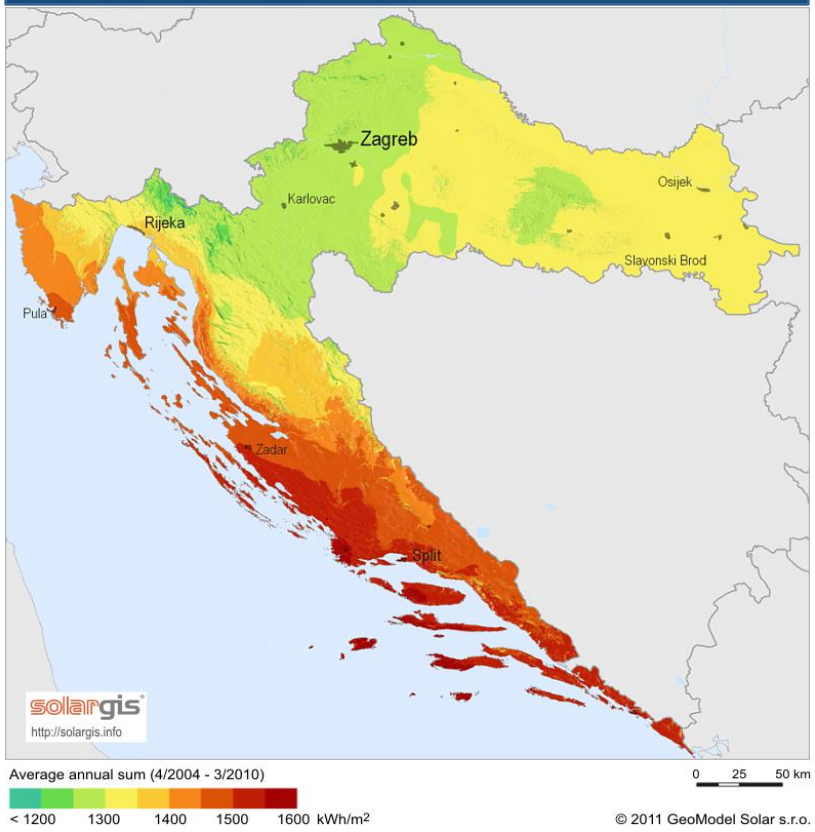
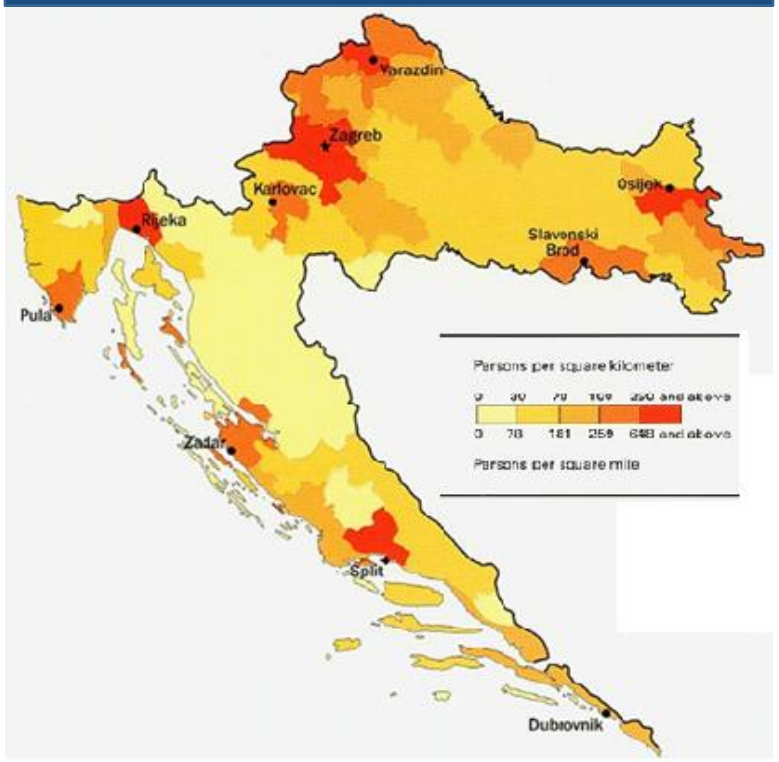


Source: Solargis (2012)

Population density



Source: Nationmaster (2012)

BASIC DATA

General basic data (2014)			
Area	56,594 km²	GDP (est.)	328.4 bn HRK (~42.75 bn €*)
Population	4.3 m	GDP per capita (est.)	76,703 HRK (~9,986.07 €*)
Language	Croatian	GDP growth (est.)	0.5 %
Government	Unitary parliamentary constitutional republic	Inflation (est.)	0.8 %
Administrative division	20 counties and the capital city	Unemployment rate (est.)	18 %

Basic energy market data (2012)	
Electricity consumption (total)	17.5 TWh
Total electricity import	13.1 TWh
Total electricity generation	9.89 TWh
Electricity price 2013 (industry, 500 – 2,000 MWh/a)	0.094 € /kWh (excluding taxes)
Electricity price 2013 (residential, 2,500 – 5,000 kWh/a)	0.137 € /kWh (including VAT etc.)
Proportion of renewable energy (electricity consumption)	2 % (without hydro power)
Increase of electricity consumption (since 2005)	+ 1 %
Global solar irradiation	1,350 kWh/m²a

*Average exchange rate March 2014: 1 Euro = 7.681 HRK

Sources: CIA (2014), dena (2012), Eurostat (2013), EZB (2013), IMF (2013), HEP OPS (2013), Mingo (2009), GTAI (2014), BDEW (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (annual installed capacity)	2011: 0 MW	2012: 0.2 MW	2013e: 6.4 MW	2014e: 50 MW
National PV target	2020: 52 MWp			
Main market drivers 2014	▪ FIT system since June 2012 for renewable energy sources and cogeneration ▪ High solar radiation levels around the coastal region of Split (about 1,600 kWh / sqm / a) ▪ Cheap loans for PV projects through the Croatian Bank for Reconstruction and Development (HBOR): Interest rate of 4 % per annum and repayment periods of up to twelve years (up to 75 % of the planned investment)			
FIT 2014	▪ Support scheme: 1.54 HRK / kWh - 1.91 HRK/kWh (from 0.203 € / kWh to 0.252 € / kWh*) for rooftop PV systems (duration: 14 years). See next slide for details. The implementation of the FIT system is carried out by the electricity market operator HROTE and the grid operator HERA.			

Recent changes in PV regulation 2014	▪ At the end of 2013, a revised FIT scheme (see above) was announced.
	  ▪ Remuneration rates for PV systems were reduced.
	  ▪ New rules for self-consumption were introduced.
	  ▪ A PV market cap of 12 MW for the new FIT rates was introduced.
	▪ The approval procedures for solar rooftop systems have been extremely simplified:
	  ▪ A duration of the procedure of 6 months from project planning to grid connection
	  ▪ Only two permits are required for systems <10 kW and those permits can be issued within 60 days.
	  ▪ In order to feed electricity into the grid private households need the approval of the distribution network operator HEP-ODS and a power purchase agreement with the electricity market operator HROTE.			

*Annual average exchange rate 2013 from the European Central Bank (ECB): 1 Euro = 7.5786 HRK

Sources: EPIA (2013), dena (2013), HROTE (2013), HROTE (2014a)

MAIN PV SUPPORT SCHEME: FIT 2014

PV FIT (Official Gazette 133/2013, 151/2013)		
Ground-mounted	**Roof-top installations**	**PV / solar thermal combined systems**
Systems ≤ 5 MWp: Reference price in Official Gazette 116/2013 (average generation costs for electricity)	≤ 10 kWp: 1.91 HRK/kWh (25.20 € ct / kWh*)	≤ 10 kWp: 2.29 HRK / kWh (30.21 € ct / kWh*)
	10 ≤ 30 kWp: 1.70 HRK/kWh (22.43 € ct / kWh*)	10 ≤ 30 kWp: 1.87 HRK / kWh (24.67 € ct / kWh*)
Reference price** in 2014: 0.53 HRK /kWh (~ 7 € ct / kWh).	30 ≤ 300 kWp: 1.54 HRK/kWh (20.32 € ct / kWh*)	30 ≤ 300 kWp: 1.59 HRK / kWh (20.98 € ct / kWh*)

Further regulations under the framework of the Renewable Energy Act	
Self-consumption	For the produced electricity that is being consumed on-site the payment is the FIT 2014 as shown above. For the surplus electricity that is fed into the grid the payment is 80 % of FIT. The PV system requirements for self-consumption are roof-top installations with capacity of ≤ 300 kWp.
Market cap	Roof-top installations ≤ 300 kWp: 5 MWp, plus 2 MWp on public buildings Ground-mounted installations ≤ 5 MWp: 5 MW
Duration of	14 years

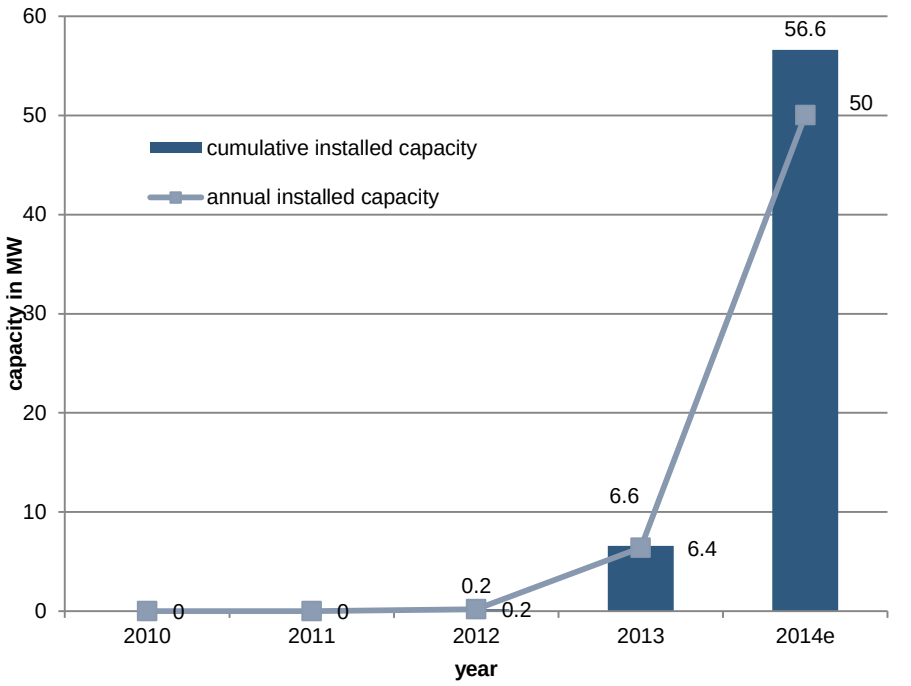
*Annual average exchange rate 2013 from the European Central Bank (ECB): 1 Euro = 7.5786 HRK; **Reference price (OG 116/2013)

With the introduced FIT of 2012, a PV capacity of 30.39 MWp was installed (as of 24th October 2014). Market operator HROTE has closed electricity purchase contracts for further PV capacity of 25.37 MWp in total (as of 24th October 2014).

Sources: dena (2013), EPIA (2014b), HROTE (2013), HROTE (2014a), HROTE (2014b), HROTE (2014c)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity (on-grid)



Sources: EPIA (2013), EPIA (2014a), HROTE (2014a), HROTE (2014b), HROTE (2014c), PV-Tech (2014)

The main barriers in the Croatian PV market

- The 45 MW cap, which had been set by the government, hindered a stronger market growth in 2013.
- The market cap included in the new FIT law of 2014 is set at12 MW.
- In July 2013, the Ministry of Economics introduced the draft of a “Renewable Energy Action Plan”. It sets a capacity limit for PV systems at 52 MW for 2015-2020. As it is expected that this limit will be reached by the end of 2014, the support for PV beyond 2014 is uncertain.

Sources: dena (2012), EPIA (2013), dena (2013)

MARKET NEWS (1/2)

Date	Topic	Source
13/10/2014	Croatia facing unsustainable energy development The European Union is making a radical shift in economic policy by adopting the circular economy model. The re-industrialisation renaissance of the economy will involve consuming less energy and the rational management of natural resources. However, despite these tendencies on the European level, Croatia is going in the opposite direction. A thermal power plant powered by imported coal would become ecologically unacceptable in the EU in less than five years. The Plomin C power plant has been declared as a strategic project this summer by the Croatian government.	The Parliament Magazine
07/10/2014	Wholesale grid parity for solar possible by 2020s, report finds Global energy consultants Pöyry have published a report this week suggesting that the cost of solar and wind power may soon drop to the same level as fossil fuels within a decade, bringing to an end renewable subsidies in Europe. Many southern European countries will achieve wholesale grid parity during the 2020s, including Croatia (2024-2025).	PV-Magazine
14/04/2014	Croatia doubles FiT connected solar capacity in two months At the end of March, an installed solar capacity of 23.8 MW was registered in Croatia under the feed-in tariff (FiT) scheme, according to the Mediterranean country's energy market operator, HROTE. Between February and March 2014 contracts on another 21.03 MW were closed. However, those systems are not yet in operation.	PV-Tech

MARKET NEWS (2/2)

Date	Topic	Source
06/06/2013	Croatia with a delay is banking on renewable energies By mid-2014 Croatia is planning to extend the renewable energy capacity up to 300 MW. In the beginning of 2013 200 MW were installed and connected to the grid. A law concerning the regulation of the electricity market has been adopted. By the end of 2013 a new law on renewables is said to follow. The further expansion of PV systems is controversial, however CHP plants in combination with biomass plants are said to have a future.	GTAI
05/02/2013	Upsolar enters PV markets in Serbia and Croatia with Plan-net Solar Upsolar today announced that the company will now offer its full suite of modules to customers in Serbia and Croatia through an exclusive distribution partnership with Plan-net Solar, an experienced solar services provider for customers across the Balkans. Entry into these regions enables Upsolar to further expand its reach within promising markets throughout Europe.	PV-Magazine
06/11/2012	Croatia increased the PV cap for 2013 (in German) Die kroatische Regierung hat Anfang November 2012 beschlossen, die Deckelung für förderfähige Photovoltaik-Anlagen nach dem kroatischen Einspeisetarifsystem in 2013 von 15 MW auf 45 MW zu erhöhen. Damit könnte bereits im kommenden Jahr das ursprünglich für 2020 vorgesehene Ausbauziel erreicht werden.	www.exportinitiative.de
13/06/2012	Croatia: Drastic reduction of FITs (in German) In Kroatien wird seit Anfang Juni Solarstrom geringer vergütet. Während der Preis für eine durch Photovoltaik-Freiflächenanlagen erzeugte Kilowattstunde zuvor noch bei 0.52 Euro/kWh lag, fiel dieser seit Anfang des Monats auf nur noch 0.15 Euro/kWh. Weniger drastisch sind die Kürzungen für Solarstrom aus Aufdachanlagen, der nunmehr mit 0.35 Euro/kWh bei einer Peak-Leistung von bis zu zehn kWp und 0.22 Euro/kWh für zehn bis 30 kWp Leistung vergütet wird. Gleichzeitig verlängerte die Regierung die Laufzeit der Einspeisevergütung von zwölf auf 14 Jahre. Zudem wird ein Bonus von 15 Prozent auf den geltenden Einspeisetarif gewährt, wenn für die Energieprojekte bestimmte Local-Content-Bedingungen eingehalten wurden.	www.exportinitiative.de

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy and Environment	Ministry of Environmental and Nature Protection (MZOIP)	www.mzoip.hr/default.aspx
Ministry of Economics	Croatian Ministry of Economy (MINGO)	www.mingo.hr
Ministry of Finance	Croatian Ministry of Finance (MFIN)	www.mfin.hr
German-Croatian Chamber of Commerce	Njemačko-hrvatska industrijska i trgovinska komora (AHK)	www.kroatien.ahk.de
Solar Industry Association	Croatian Solar Energy Association (HSSE)	www.hsse.hr/index_en.html
Energy Association	Croatian Energy Association (HED)	www.hed.hr
National Renewable Energy Research Association	Croatian Center of Renewable Energy Sources (CCRES)	www.solarserdar.blogspot.de
Energy Market Operator	Hrvatski Operator Tržišta Energije (HROTE)	www.hrote.hr

Source: dena (2012)

CONTACT INFORMATION

Category	Name	Website
National Electricity Utility	Hrvatska Elektroprivreda (HEP Group)	www.hep.hr/hep/en/group/default.aspx
National Transmission Grid Operator	Croatian Energy Regulatory Agency (HERA)	www.hera.hr
National Development Bank for Financing Renewable and Solar Energy Projects	Central Finance and Contracting Agency (CFCA) Croatian Bank for Reconstruction and Development	www.safu.hr/en www.hbor.hr/hrvatski

Source: dena (2012)

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Study

MARKET INFO FRANCE – PHOTOVOLTAICS

dena-Market Information System

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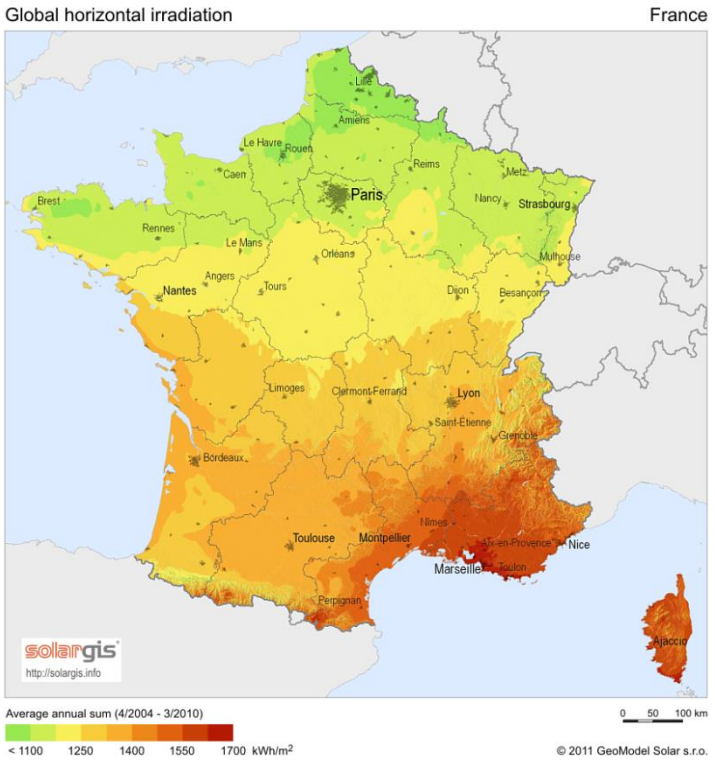
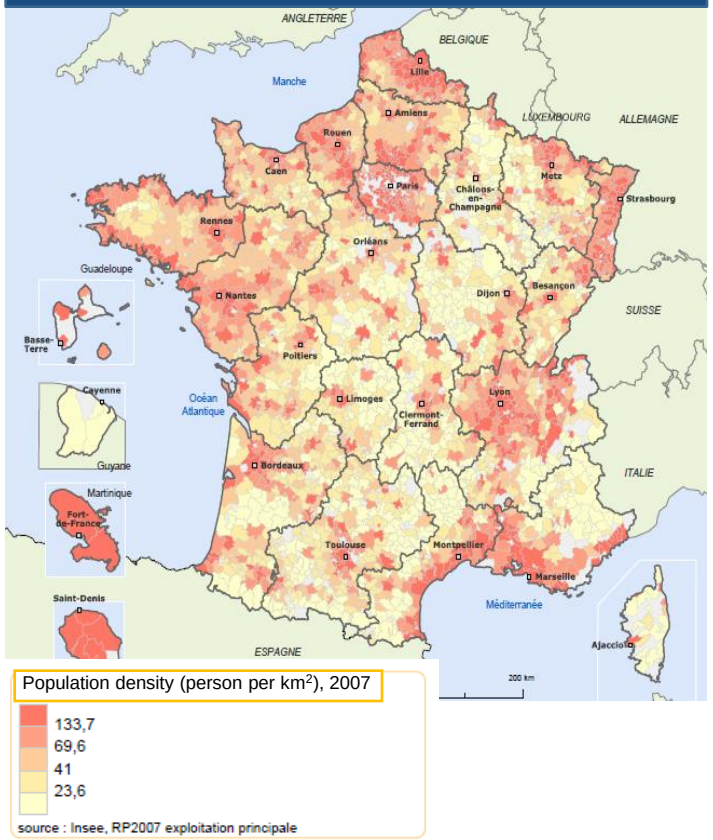
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGis (2011)

Population density



Source: INSEE (2011)

BASIC DATA

General basic data (2014)			
Area	643,801 km²	GDP (est.)	2,108.1 bn €
Population(2013 est.)	65,951,611	GDP per capita (est.)	32,964 €
Language	French	GDP growth (est.)	1 %
Government type	Unitary semi-presidential constitutional republic	Inflation (est.)	1 %
Administrative division	27 regions, 101 departments	Unemployment rate (est.)	10.4 %

Basic energy market data (2012)	
Final energy consumption (2013)	1,792.18 TWh
Total electricity consumption	489.5 TWh
Total electricity import	44 TWh
Total electricity generation	541.4 TWh
Electricity price 2013 (industry, 500 – 2,000 MWh/a)	0.0958 € / kWh (excluding taxes)
Electricity price 2013 (residential, 2,500-5,000 kWh/a)	0.1472 € / kWh (including VAT)
Share of renewable energy (electricity consumption)	16 %
Increase of electricity consumption (2010 – 2020)	8.7 %
Global solar irradiation	900 - 1,600 kWh / m² a

Sources: CIA (2013), dena (2012), EC (2010), Eurostat (2013), EZB (2013), IMF (2013), RTE (2013), GTAI (2014), INSEE (2014), EDF (2014), BDEW (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators						
Market size (annual installed capacity, on-grid)	2010: 688 MW	2011: 1,688 MW	2012: 990 MW	2013: 742 MW	2014e: 700 MW	2015e: 1,000 MW
National PV target	2015: 2,151 MW		2020: 5,400 MW			
Main market drivers 2013/14: national and regional level	▪ FIT and tender: Support for PV electricity in accordance with regulation 2009-252 and decree of 07th January 2013 about an increase of the electricity feed-in-tariffs for certain solar energy systems. ▪ Regional expansion plans for renewable energies: Schéma régional air climat énergie (SRCE): Different support schemes and technology focus by each region					
FIT 2014	▪ PV roof-top systems ≤ 100 kWp are supported by FITs: from 01st July to 30th September 2014 with 13.25– 27.38 € ct / kWh for 20 years (since March 2011, indefinite). ▪ Adjustment of the tariff depending on the number of requests for new installations with grid connection. ▪ Simplified variation of rates by type of building, construction and capacity of the system, see following slide. ▪ Roof-top installations > 100 kWp and ground-mounted systems are tendered quarterly since 2011 (tariff is 6.98€ ct / kWh in this case).					
Recent changes in PV regulation	▪ **New PV FIT:** Since April 2014 new tariffs apply for PV. ▪ The Decree of 25 April 2014 abolished the increased feed-in tariff (increase of up to 10%) for PV installations produced in the European Economic Area. The Decree applies to all PV installations for which an application for grid connection was submitted after 10 March 2014. ▪ **Tender:** Notice on special tenders for systems > 250 kWp, which was published in March 2013, and further existing quarterly tenders for systems from 100 to 250 kWp. These plants must be built on roofs, carports or fallow land such as former industrial land. The deadlines for project submission for the three tenders were 31st October 2013, 28th February 2014, 30th June 2014.					

Sources: ENR-EE (2012), EPIA (2012), PV Legal (2012), MEDDE (2014b)

MAIN PV SUPPORT SCHEME: TENDER

Kategorie	Details	
Tender of the Ministère de l'écologie, du développement durable et de l'énergie	The French Ministry of Ecology, Sustainable Development and Energy (MEEDDM) is auctioning PV capacities with a total of 520 MW.	
	Applicability	▪ 400 MW for large scale PV rooftop systems with a minimum capacity of 250 kWp were tendered. ▪ 120 MW in three rounds until 2015 for medium scale projects with a capacity of 100 to 250 kWp.
	Status/ Procedure timeframes	▪ Deadline for the 400 MW tender was 26th September 2013. ▪ There have been 396 project proposals with a total capacity of 1,968 MW, of which 355 proposals with a total capacity of 1,720 MW were deemed complete by the electricity board (CRE) and forwarded to the Ministry on 8th October 2013 for further evaluation. ▪ In March 2014, 212 projects with a total capacity of 380 MW were awarded. ▪ The deadline for the first tender of 40 MW for medium-scale PV projects was 31st October 2013. The winners were officially announced in March 2014. For the second and third round for medium-scale projects (100 to 250 kWp) the deadlines for project submission were 28th February 2014 and 30th June 2014.
	Remuneration	▪ Depends on the FITs for each system (see slide 7).
	Evaluation criteria	▪ MEEDDM and CRE are evaluating the different project proposals according to a weighted evaluation system (allocating points). ▪ Points are allocated for the price (10), environmental friendliness (10), and innovation (contribution to research and development purposes) (10). ▪ The maximum amount of points is 30, the projects with the most points will win the tender.

Further information on the tender can be accessed on the website of MEEDDM: http://www.developpement-durable.gouv.fr

Source: : MEDDE (2013b)

PV SUPPORT SCHEME: FIT 2014

FITs for electricity from PV systems **(valid between 01/07/2013 and 30/09/2014)**

System category / Tariff	Capacity	(01/07/2013–30/09/2013)	(01/10/2013–31/12/2013)	(01/01–31/04/2014)	(01/04–30/06/2014)	(01/07–30/09/2014)
Standard building integration ("integré au bâti" (IAB))*	0-9 kW	29.69 ct/ kWh	29.10 ct / kWh	28.51 ct / kWh	27.94 ct / kWh	27.38 ct / kWh
Simplified building integration ("integré simplifié joint au bâti" (ISB))**	0-36 kW	15.21 ct/ kWh	14.54 ct / kWh	14.54 ct / kWh	14.16 ct / kWh	13.95 ct /kWh
	36-100 kW	14.45 ct/ kWh	13.81 ct / kWh	13.81 ct / kWh	13.45 ct / kWh	13.25 ct /kWh
All other PV systems	0-12 MW	7.76 ct / kWh	7.55 ct / kWh	7.36 ct / kWh	7.17 ct / kWh	6.98 ct / kWh

*** A rooftop PV power system fulfills the "integré au bâti" (IAB) criteria under the following conditions:**

- A PV power system has to be installed on a fixed and stationary rooftop. The PV system should not threaten or hinder any persons, animals, objects, or related human activities.
- The PV system is installed in accordance with number 5 of the amendment, which came into force on 4th March 2011.
- The PV system is compatible with the rooftop elements, which borders and covers the entire roof. If the PV system or its modules are removed from the rooftop, the rooftop still has to be bordered and covered. Installing the PV power system should not impair proper functioning of the rooftop.
- If the PV system has fixed non-detachable modules, those modules have to be the main element of the rooftop sealing.
- If the PV systems have loose and detachable modules installed on the rooftop, those modules have to form one unit, pre-assembled by the manufacturer. The manufacturer has to render the PV system beforehand.

**** A rooftop PV power system fulfills the "integré simplifié joint au bâti" (ISB) criteria under the following conditions:**

- The PV system should not threaten or hinder any persons, animals, objects, or related human activities. The PV system has to installed in a plain manner on the rooftop.
- The PV system is compatible with the rooftop elements, which borders and covers the entire roof.

- 07/2014The Decree of 25 April 2014 abolished the increased feed-in tariff (increase of up to 10%) for PV installations produced in the European Economic Area. The Decree applies to all PV installations for which an application for grid connection was submitted after 10 March 2014.

Sources: dena (2014), MEDDE (2013a), MEDDE (2014b)

FURTHER PV SUPPORT SCHEMES

Support scheme	Details
Tax reduction	▪ Credit note to the income tax (from 01/2006 until 12/2015) ▪ Reduced VAT from 19.6 % to 7 % (as from 09/1999, unlimited) ▪ PV systems are exempt from property tax (as from 01/2002, unlimited) ▪ Exemption from property tax on real estate (as from 01/2008) ▪ Standardization of revenues for agricultural enterprises: Rating of the revenue from electricity generation as agricultural earnings (since 01/2008) ▪ Tax exemption for income from privately produced PV electricity (retroactively in force as from 01/2008) ▪ Newly established companies, which were established only for the production of electricity from PV systems and comply with certain requirements can be exempt from of the income or corporate tax for 23 months.
Support for the modernization of the electricity supply *	▪ Tenders, which were carried out to fulfill the capacity objectives that arise from long-term investment plans, take place at irregular intervals. ▪ On 1st August 2011 and on the 26th July 2013 PV roof-top installations with a capacity from 100 up to 250 kWp were tendered. ▪ Last deadline for applications: 31st October 2013, 28th February 2014 and 30th June 2014.

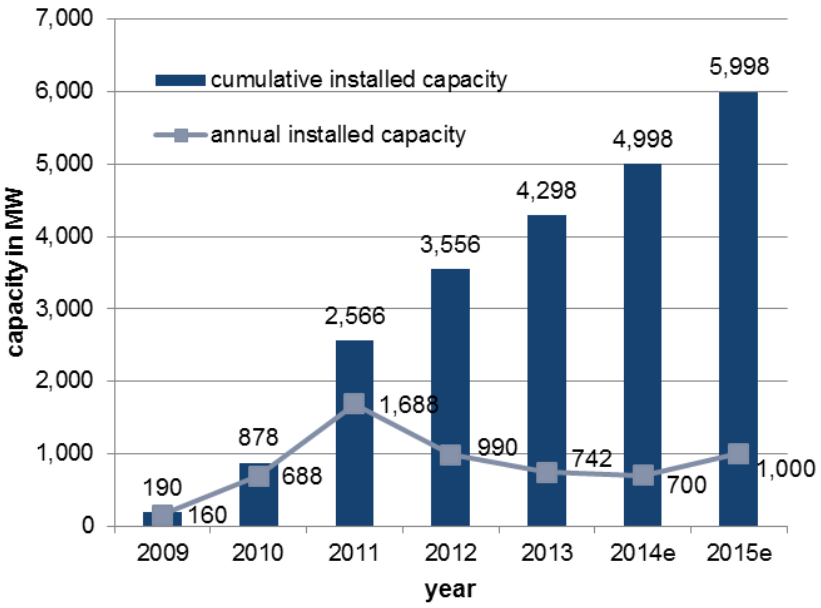
* Loi n° 2000-108 du 10 février 2000, Loi relative à la modernisation et au développement du service public de l'électricité

For more information on the tender procedure please refer to the dena-Subsidy Overview PV 2014

Source: dena (2014)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity (on-grid)



Sources: PV-Magazine (2013), NPD Solarbuzz (2014), dena (2013), RTE in SolarServer (2014)

The main barriers in the French PV market

Dominance of nuclear energy

- France's energy supply is largely dominated by nuclear power plants.
- The power grid is designed to supply power from large power plants to the consumer.
- Furthermore, government investments (especially R & D) are strongly focused on the nuclear energy sector.

Administrative barriers

- The development of renewable energies – primarily wind and photovoltaic – are hindered by the administrative processes and channelled by public tender.
- In particular, the grid connection process is a barrier to the implementation of projects due to lack of transparency and a multitude of actors involved.

Sources : EPIA (2012), ENR-EE (2012), PV Legal (2012)

MARKET NEWS (1/3)

Date	Topic	Source
13/10/2014	SunPower supplies 41 MW of panels for four French PV plants The La Compagnie du Vent projects include the 12 MW Langele Solar Power Plant in in France's Aquitaine region. The latest projects reunite SunPower and the GDF Suez subsidiary California's SunPower is supplying 41 MW of solar panels to La Compagnie du Vent for the construction of four solar power plants in France under the country's national tender program administered by the French Energy Regulatory Commission.	PV-Magazine
13/10/2014	France votes to cut nuclear reliance France has taken a historic decision to curtail the nation's reliance on nuclear energy while also approving an increase in renewable energy and energy saving targets. Members of the French Parliament voted on Friday to reduce the share of nuclear power in the country's electricity generation from 75% to 50% by 2025. The bill voted on Friday also includes a goal to increase the share of renewable energies in the country's electricity generation to 23% by 2020 and 32% by 2030.	PV-Magazine
09/07/2014	juwi builds agricultural solar park in Southern France The 25 MW ecological flagship project - the biggest solar park juwi has ever constructed in France - supports local wine growers, bee-keeper and sheep farmers. Located in the Pyrenees of Southern France near the Spanish border, the array comprises nearly 300,000 solar panels and spans 87 hectares, providing energy for some 10,000 households. The park will generate 35.5 million kilowatt hours of electricity annually.	PV-Magazine

MARKET NEWS (2/3)

Date	Topic	Source
14/05/2014	Sillia energy to take over Bosch solar plant in France The companies signed a purchase agreement in March. The French photovoltaic manufacturer has agreed to take over 128 of the approximately 230 employees and continue the production of solar modules.	PV-Magazine
03/02/2014	France's solar PV market falls again in 2013 to 743 MW France installed 743 MW of solar photovoltaics (PV) in 2013, according to a report by the nation's grid operator RTE (Paris). This is the second year of market decline from a high of 1.69 GW in 2011, and brings the nation to 4.3 GW of installed PV. RTE also reports that French PV generated 4.6 terawatt-hours (TWh) of electricity in 2013, meeting 0.97 % of the nation's electricity demand. This is a 15 % increase over 2012 PV output.	SolarServer
05/04/2013	France: 120 MW of medium sized rooftop installations by 2015 France announced it will tender 120 MW of medium sized rooftop PV installations by 2015. The installations concern non-residential buildings with a roof surface ranging from 700 to 2000 sqm. Each project can have an installed capacity of between 100 and 250 kW. Overall, there will be three tenders of 40 MW per year, the French Ministry of Energy, Ecology and Sustainable Development said. The deadline for submission of tenders for the first round of applications is October 31 and successful applicants will be announced in early 2014. The ministry also introduced a criterion for carbon assessment of the projects to enhance the contribution of the projects to climate protection. The carbon footprint criterion will count for a third of overall project ratings. The three tenders, the ministry said, will result in a cumulated investment of around €250 million (US$325 million). The announcement for the tendering of 120 MW of medium sized rooftop installations came only a few days after the ministry detailed a tender for 400 MW of PV plants 250 kW and larger. France has a 1 GW minimum PV installation target for 2013. This target was lifted in January from 500 MW last year.	PV-Magazine

MARKET NEWS (3/3)

Date	Topic	Source
05/04/2013	France: 120 MW of medium sized rooftop installations by 2015 While tendering 400 MW of PV projects in general, the Ministry of Ecology, Sustainable Development and Energy is also tendering 120 MW of PV capacity for medium-scale projects, which are to be installed on rooftops and have a capacity between 100 and 250 kW. Until 2015 there will be three rounds of tendering for 40 MW respectively. The deadline for applications is 31st October for the first round, the deadlines for the other two rounds will be announced in the beginning of 2014.	PV-Magazine
12/03/2013	France launches 400 MW tender for large solar PV plants The French Ministry of Ecology, Sustainable Development and Energy has announced the launch of a tender for 400 MW of solar photovoltaic (PV) plants 250 kW and larger. Plants incorporating both innovative ground-mounted technologies, including concentrated photovoltaic (CPV), as well as mature PV technologies on carports and roofs will be eligible. The requirement of bank guarantees before submission of tenders has been removed, to avoid disadvantaging small and medium-sized enterprises. The tender will also take into account the carbon footprint of projects and their contribution to research and development, emphasizing innovation, high efficiency cells, and facilities of high value. The deadline for project submission is 16th of September.	French Ministry of Energy, Ecology & Sustainable Development

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy / Environment	Ministère de l'écologie, du développement durable et de l'Énergie (MEDDE)	www.developpement-durable.gouv.fr
Energy Authority (a division of MEEDE)	Direction générale de l'energie et du climat (DGEC)	www.developpement-durable.gouv.fr/-Energie-Air-et-Climat-.html
Regional Environment Authorities	Direction régionale de l'environnement, de l'aménagement et du logement (DREAL)	Verzeichnis der Lokalen Behörden[1]
Regulatory Authority	Commission de Régulation de l'Énergie (CRE)	www.cre.fr
National Energy Supplier	Électricité de France (EDF)	www.france.edf.com
National Grid Operator	Réseau de Transport d'Electricité (RTE)	www.rte-france.com
French Energy Agency	Agence de l'Environnement et de la Maîtrise de l'Énergie (ADEME)	www.ademe.fr
Environmental Association	Comité de Liaison Energies Renouvelables (CLER)	www.cler.org
Solar Energy Associations	Institut National de L'Energie Solaire (INES RDI), Enerplan	www.ines-solaire.org www.enerplan.asso.fr
Renewable Energy Association	Syndicat des Energies Renouvelables (SER)	www.enr.fr

[1]http://www.environnement-annuaire.net/direction-regionale-environnement-amenagement-logement/dreal.php

Source: dena (2014)

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Study

MARKET INFO INDIA – PHOTOVOLTAICS

dena-Market Information System

www.exportinitiative.bmwi.de bzw. www.exportinitiative.de

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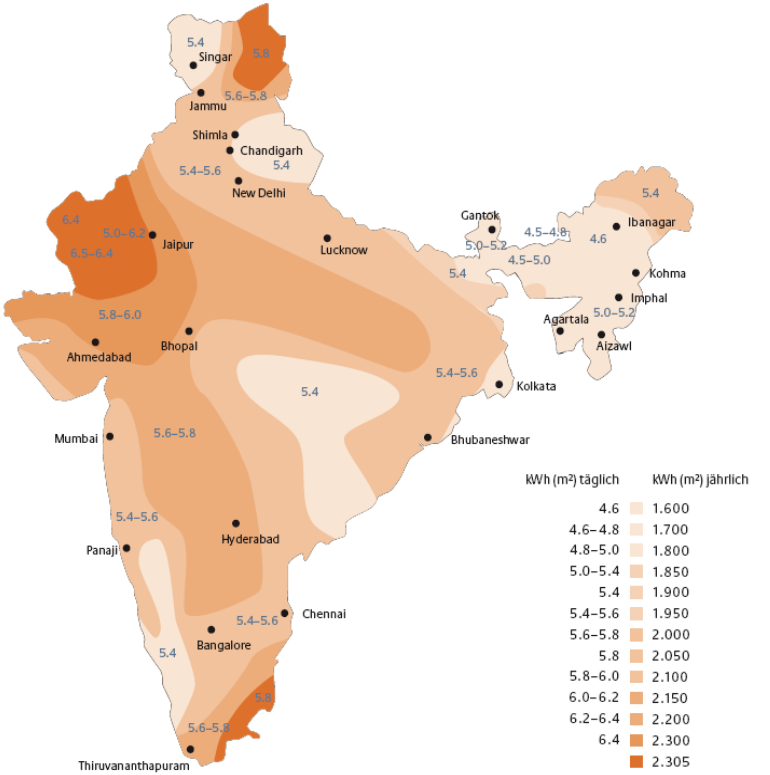
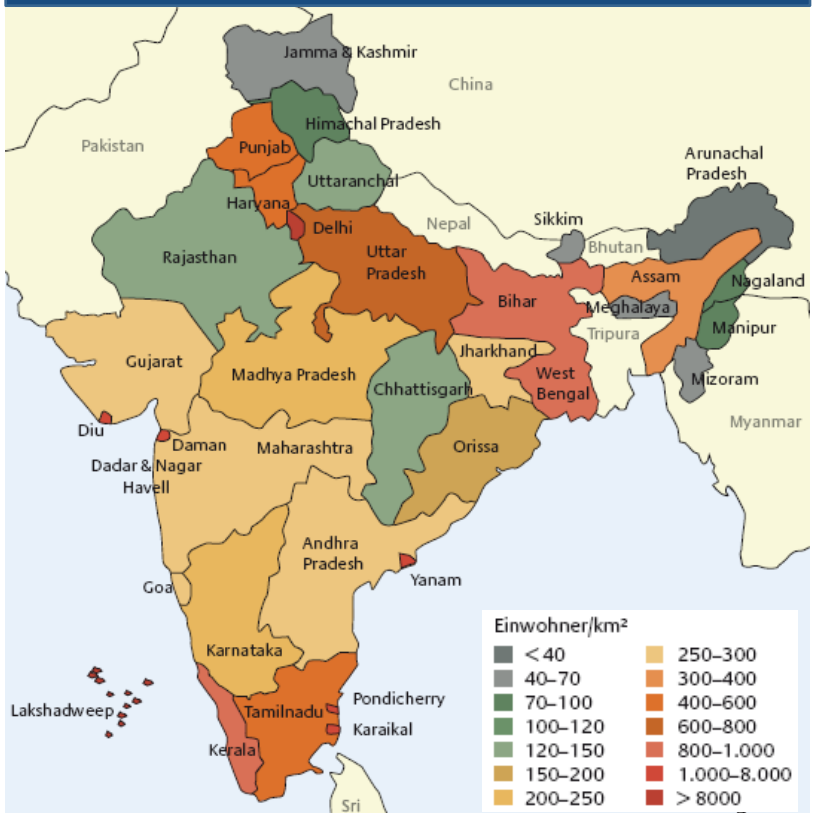
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: dena (2011/2012)

Population density



Source: dena (2011/2012)

BASIC DATA

General basic data (2014)			
Area	3,287,263 km²	GDP (est.)	127,938 bn INR (~1,642bn €*)
Population (2013 est.)	1,220 million	GDP per capita (est.)	101,563 INR (~1,303 €*)
Language	Hindi 41 %, Bengali 8.1 %, Telugu 7.2 %, Marathi 7 %	GDP growth (est.)	5.4 % (2014), 6.4 % (2015)
Government	Federal republic	Inflation (est.)	8 %
Administrative division	28 states and seven union territories	Unemployment rate	4.7 % (2012/13) official

Basic energy market data (2012)	
Electrictiy consumption (total)	772 TWh
Total electricity import (2009-2010)	5.61 TWh
Total electricity generation (2013/14)	967.2 TWh
Electricity price (industrial /Tamil Nadu 2012 - 2013) Electricity price (industrial /Karnataka 2012 - 2013)	6.38 INR / kWh (9.2 € ct / kWh*) 5.1 INR / kWh (7.4 € ct / kWh*)
Electricity price (residential /Tamil Nadu 2012 - 2013) Electricity price (residential /Karnataka 2012 - 2013)	3.79 INR / kWh (5.5 € ct / kWh*) 4.3 – 5.1 INR/ kWh (6.2 € ct / kWh – 7.4 € ct / kWh*)
Share of renewable energy (electricity consumption)	+ 11 %
Increase of electricity consumption (2010 - 2020)	+ 82 %
Global solar irradiation	2,000 kWh / m² a

* Annual average exchange rate 2013 of the European Central Bank (ECB): 1Euro = 77.93 INR

Sources: AHK (2012), CIA (2014), dena (2011/12), GTAI (2014), Powersector (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators					
Market size (annual installed capacity)	2011: 380 MW	2012: 650 MW	2013: 950 MW	2014e: 850 MW	2015e: 1,350 MW
National PV target (2022)	▪ 22,000 MW (thereof 20,000 MW on-grid and 2,000 MW off-grid) ▪ PV target by 2017: 10 GW, by 2019: 15 GW				
Main market drivers 2014/ 2015	▪ The Indian Government opts for large-scale PV power plants, which are promoted by the Jawaharlal Nehru National Solar Mission (also called National Solar Mission – NSM) and state policies that utilize either federal means of promotion or other alternatives to NSM (e. g. Rajasthan, Karnataka, Gujarat etc.). ▪ Since 2013, predominantly small and rooftop PV systems have been promoted through net metering, available for electricity consumers with a distribution network connection.				
PV support schemes 2014	▪ NSM: No more FIT-based reverse auctions or bidding rounds like in phase 1. In the first bidding round of phase 2 Viability Gap Funding (VGF) was introduced. The awarded grant was 1.7 million -13.5 million INR/MW in the "open" category and 13.5 million - 24.6 million INR /MW in the "Domestic Content" (DC) category (PV modules and cells with Indian production are mandatory). ▪ Renewable Purchase Obligation (RPO): Due to supply exceeding demand in the months from June to September 2013, the prices of solar certificates (solar REC's) went down to the minimum value of 9,300 INR/MWh (~120 €). Until June 2014, the price in trade has also only had the minimum value of 9,300 INR/MWh.				
Recent changes in PV regulation	▪ A revision of the NSM is in the pipeline, aiming to encounter the following obstacles in the market: very high cost of capital, site acquisition, lack of electricity infrastructure, the addition of capacity not proceeding as planned within the framework of Phase II of NSM (2013 to 2017 approx. 9 GW) ▪ Furthermore, the new Indian central government is planning on raising the expansion target of grid-connected solar capacities by 2017 and wants to push for 100 GW by 2022. ▪ Renewable energy electricity rates for power utilities of the different states, as well as bulk consumers (Renewable Purchase Obligation – RPO) generated a demand for PV projects. Nevertheless, there still are problems regarding the implementation of RPO projects in the Indian states.				

Sources: dena (2011/2012),,GTAI (2014),Greenpeace (2013), Reconnectenergy (2014)

NATIONAL PV SUPPORT SCHEMES (1/4)

Jawaharlal Nehru National Solar Mission (NSM): 3 Phases and installation targets of the National Solar Plan			
Market segment	**Phase 1 (2010-2013)**	**Phase 2 (2013-2017)**	**Phase 3 (2017-2022)**
Off-grid (PV only)	200 MW	800 MW	1,000 MW
On-grid	500 MW (PV) 500 MW (CSP) 100 MW (Roof and small scale systems)	Target: 10 GW of installed PV systems by 2017 (3 GW through the Renewable Purchase Obligation – RPO)	Target: 15 GW of installed PV systems by 2019

- Phase 1: Creation of an enabling framework for the use of solar technologies, rapid implementation of NSM, ensuring investment security and the participation of project developers in competitive biddings, incentives for the construction of production facilities in the country (see also local content requirements).
- Phase 2: Substantial increase in additional solar capacities (CSP and PV) to facilitate the technologies' competitiveness, improvement of investment security through long-term power purchase obligation for utilities, etc. (RPO) and reduced customs duties.
- Phase 3: The target capacity of 20 GW by 2022 for grid-connected solar power should be met through international participation and PV and CSP technology transfer.

Stages and targets of the NSM (November 2014) : MNRE

Sources: MNRE (2010), dena (2011/2012), Bridge to India (2012)

NATIONAL PV SUPPORT SCHEMES (2/4)

Jawaharlal Nehru National Solar Mission (NSM): Tendering procedure Phase 1 and latest status Phase 2 (2013)

Phase	Method	FIT (average bid price, etc.)	Minimum capacity	Local content rules
Phase 1	FIT / Reverse auctions	1. Bidding round: 11.2 INR / kWh 2. Bidding round: 9.8 INR / kWh 3. Bidding round: delayed in 2012 and then cancelled due to the start of Phase 2	Round 1: 5 MW Round 2: 20 MW	Round 1: crystalline modules Round 2: crystalline modules and cells; (thin-film modules are excluded)
Phase 2	FIT /"Viability Gap Funding" (VGF)	1. Bidding round: - 750 MW in total; ca. 375 MW manufactured locally - max. 100 MW per tenderer/ company Fixed FIT: 5,45 INR/kWh	Round 1: 10 MW (max. 50 MW with 10 MW each)	Round 1: crystalline modules and cells as well as thin-film modules for 375 out of 750 MW

- Awarding of PV support in Phase 2: The granted PV tariff for bidders has been set at 5.45 INR / kWh. The PV tariff is fixed for a period of 25 years. (No more FIT-based reverse auctions or bidding rounds like in Phase 1).
- The PV tariff will be reduced by 10 % to 4.95 INR / kWh for a PV project using the accelerated depreciation over 25 years.
- The bidder has to prove that he is fulfilling various requirements needed to receive support: The equity capital of the project developer has to be 15 m INR/MW (~ 208 EUR/kW) as part of the investment costs.
- The government offers 25 m INR / MW for PV projects. Those developers bidding need to make an offer including the funds needed. The bidder who needs the least support will be funded with the needed sum.
- Local content regulation: 375 MW of the 750 MW total support will be awarded only if the modules and cells are produced in India - which also applies for thin-film modules. (Tenderers, who apply for both support categories, can only be supported by the Indian government up to 100 MW.)
- Between 4th October and 29th November 2013, bids for the first auction in Phase 2 of the NSM could be handed in. In February 2014, the winners of the two bidding categories were published. Results of the first auction in Phase 2 can be found here.

Sources:dena (2011/2012) Bridge to India (2012), PV-Tech (2014)

NATIONAL PV SUPPORT SCHEMES (3/4)

Support	Information
Quota system / solar REC certificates	**Renewable Purchase Obligation (RPO)/ Renewable Energy Certificates (RECs)** ▪ Solar RECs have been introduced to facilitate the power purchase obligation (RPO) for state-owned utilities. The RPO targets will be set by the state electricity regulatory commission. RPO quotas for solar electricity for 2012/2013 in the different Indian states vary between 0.05 % and 1.00 %. ▪ A distinction is made between solar and non-solar RECs. Solar RECs can be generated through grid-connected PV and CSP power plants. Federal authorities issue one REC per MWh generated solar power. ▪ RECs can be traded at Indian energy exchanges like the "Indian Energy Exchange (IEX)" and "Power Exchange of India Ltd. (PXIL)". The trading takes place on the last Wednesday of each calendar month and within a defined price limit. The price limit has been set until 2017. ▪ Due to supply exceeding demand in the months from June to September 2013, the certificate prices went down to the minimum value of 9,300 INR/MWh (ca. 111 €). In September 37,028 certificates were offered, from which 5,880 were sold. By June 2014, the certificate price was still at its minimum value.
Tax incentives	**Taxation of income**: ▪ The Income Tax Act, 1961, (or the new Direct Tax Code (DTC)) stipulates that newly founded companies producing electricity are subject to a profit tax exemption for ten consecutive years within fifteen years. **Special tax depreciation:** ▪ Energy-saving machines and systems as well as machines and systems for renewable energies are allowed to be specially-depreciated by 80 % of their value. Power plants and systems may be linearly depreciated. Regressive depreciations of 25 % are stipulated for intangible assets. **Special economic zones**: ▪ Support conditions vary. Gradual income tax reliefs ("tax holidays") and reliefs from indirect taxes like customs duty and Central Service Tax (CST). The duration of the support is generally in between 10 to 15 years.

Sources: dena (2011/2012) Bridge to India (2012), Climate-Eval (2013)

NATIONAL PV SUPPORT SCHEMES (4/4)

Support	Information
Low-interest loans	▪ The Indian Renewable Energy Development Agency (IREDA) and some state-owned banks and financial institutions provide special interest loans for certain technologies and systems. ▪ The renewable energy sector has been identified as a priority industry by the Reserve Bank of India. Therefore, banks are required to provide a certain amount of capital for Indian project developers as well as for foreign investors and project developers; and grant loans on favourable terms.
Tariff incentives	▪ The federal and state regulatory authorities for the electricity industry have the power to determine the tariff for certain renewable energy technologies, and project-specific tariffs in its sole discretion. This collective bargaining allows to control the PV expansion in the individual states and the special promotion of projects according to geographical circumstances. ▪ Remuneration-based tariffs and power generation-based incentives (Generation-Based Inventive Scheme, GBI) for power generation with renewable energies: The GBI plan allows the state support of renewable energies through incentives that are determined for each project.
Other incentives	▪ Individual states grant public land for PV projects in return for a symbolic rent payment (see Market News). ▪ IREDA provides financial assistance to companies in the renewable energy sector, which invest in research and development projects. ▪ A formal approval by the Federal Authority for electricity industry does not have to be obtained for PV projects up to 1 bn INR (approximately 15 m €) anymore.

Sources: dena (2011/2012) Bridge to India (2012)

STATE PV SUPPORT SCHEMES (1/6)

State support instruments

Gujarat solar policy

Fixed feed-in tariff (without bidding procedure):

- The federal PV support scheme guidelines came into force in 2009 before the NSM.
- Application for the allocation of land areas and remuneration must be directed to the Gujarat Energy Development Agency (GEDA).
- By July 2014, within the scope of the Gurjarat solar policy project, a total capacity of more than 916 MW was commissioned.
- The choice of the accelerated depreciation (AD) allows a wide range of financing with regards to the tax incentives above.
- The 25 year PV tariff model in MW range aims at giving funds to projects particularly during the first twelve years of operation.
- An Indian local content bonus is not stipulated in Gujarat as a condition of the support.

PV support scheme over a period of 25 years (since 29 January 2012)

Project size	Accelerated depreciation (AD)	Years of operation 1 bis 12	Years of operation 13 bis 25	Average over 25 years
MW range	Yes	9.98 INR/kWh	7.00 INR/kWh	9.28 INR/kWh
	No	11.25 INR/kWh	7.50INR/kWh	10.37 INR/kWh
kW range	Yes	11.14 INR/kWh		
	No	12.44 INR/kWh		

Sources: dena (2011/2012) Bridge to India (2012), neue energie (2014)

STATE PV SUPPORT SCHEMES (2/6)

State support instruments		
Rajasthan solar policy 2011 and 2014	**Bidding procedure:** ▪ Grid-connected PV projects with a capacity of 5 to 10 MWp are eligible for support. ▪ The total possible installed capacity in the first stage is limited to 200 MWp (only PV) by 2013 and to 400 MW (only PV) by 2017 in the second stage. ▪ The long-term expansion goal is 10 GW (only PV) of capacity by 2022. ▪ The long-term expansion goal in 2013 is a total of 50 MW from small-scale systems and 1 MW from rooftop systems. ▪ In the first round of tendering, in November 2012, 100 MWp were tendered but only seven PV projects could be realised. These have a total capacity of 75 MWp for the minimum tariff of 6.45 INR/kWh (7.73 €ct/kWh). **Other support:** ▪ The government offers industrial land at a reduced price (up to 25 % of the market price) to rent for 25 years for solar projects. ▪ Applications for the allocation of land areas and remuneration should be addressed to the Rajasthan Renewable Energy Corporation Limited (RRECL). **Rajasthan Solar Policy 2014:** ▪ The state-government of Rajasthan has recently revised the solar policy and became effective on 8th October 2014. The policy and its revision aim at developing 25 GW of solar energy in the next five years to attain self sufficiency. Property owners can lease their land to solar power producers for 30 years. In addition, power plants up to 10 MW get approved through a simple procedure. The 2014 policy promotes the construction of all types of solar power generation – for example PV projects within the NSM, Renewable Purchase Obligation (RPO), for own consumption as well as decentralized systems or rooftop systems that are connected to distribution grids. Further exists a clause for the allocation of land for PV project plans, which was hitherto prevalent only in Rajasthan.	

Details on Rajasthan Solar Policy 2014

Sources: dena (2011/2012) Bridge to India (2012), Down to Earth (2014)

STATE PV SUPPORT SCHEMES (3/6)

State support instruments	
Karnataka solar policy 2011 and 2014	**Bidding procedure:** ▪ The support program stipulates the establishment of solar power plants with a total capacity of 350 MW by 2016. ▪ PV projects with a capacity of 3 to 10 MW are eligible for support. ▪ Applications for the allocation of land areas and remuneration should be addressed to the Karnataka Renewable Energy Development Agency Ltd. (KREDL). ▪ The support is awarded to project developers who can bid the lowest price under the proposed purchase price from the regulatory authority (Karnataka Electricity Regulation Commission (KERC)) of 14.5 INR / kWh (about 0.212 € at an exchange rate of 1 € = 68.18 INR on 10.10.2012). ▪ During the last round of bidding the lowest bid was 7.94 INR / kWh. ▪ Information about the next round of bidding is not yet available. ▪ Standard application forms are available at the Karnataka Energy Agency; In 2011 projects with a total capacity of 60 MW (PV only) were tendered. ▪ Out of the 60 MW from step 1 only 18 MW have been commissioned because of delays in the administration. The deadline for connecting the systems has been moved to third quarter 2014. ▪ The evaluation of the second round of auctioning has been stopped for now by the KERC for procedural reasons. **Karnataka Solar Policy 2014-2021** ▪ The Karnataka Solar Policy has been revised in June 2014 and now aims at the construction of solar plants with a capacity of 2 GW by 2022.Thereof, around 400 MW shall be realized as grid-connected rooftop systems. At the beginning of 2014, within the RPO, the industry and electric utilities in Karnataka were obliged to obtain 1.5 % of their electricity from solar energy. This share is to rise to 3 % by 2022.

Details zur Karnataka Solar Policy 2014-2021 : IREEED

Sources: dena (2011/2012) Bridge to India (2012, '14), Cleantechnica (2014)

STATE PV SUPPORT SCHEMES (4/6)

State support instruments		
Andhra Pradesh Solar Policy 2013	**Bidding procedure:** ▪ Grid-connected PV projects with a capacity of 1 GWp are eligible for support. ▪ In a first bidding round the granted PV tariff was 6.49 INR / kWh for 25 years. ▪ Status of procedure: 331 bids over 1,780 MW of PV capacities have been submitted through the electricity utility AP Transco by the beginning of May 2013. Only 13 bidders with 56 MW of capacity could submit prices under 7 INR / kWh, while 107 bids over a total of 593 MW submitted prices between 8 and 8.5 INR / kWh. 350MW out of 600MW have been approved (as of July 2014).	
Tamil Nadu Solar Policy 2013	**Bidding procedure:** ▪ Grid-connected PV projects are eligible for support. ▪ The total capacity supported is limited to 1 GW (PV only) in the first round. ▪ The PV tariff lies at 6.49 INR / kWh, however, it will increase by 5 % annually for the first 10 years of operation. As new installations did not meet the expectations in the past two years, the remuneration rate has thus been changed to 7,01INR / kWh for PV. ▪ Duration: 25 years	
Kerala Solar Policy 2013	▪ Kerala announced its solar policy in November 2013. According to this, a target has been set to install a PV capacity of 500 MW by 2017 and 2,500 MW by 2030. ▪ Since June 2014, it has been possible to install rooftop-systems between 1 kWp and 1 MWp. As set in the Grid Interactive Distributed Solar Energy Systems Regulations 2014, operators of PV installations require a connection to a distribution grid of 11 kV as an electricity customer.	

Details regarding the regulation for the operation of rooftop systems in the state Keralala are available here.

Sources: PV Magazine (/2013b), Natural Group(2013), PV-Magazine (2013d) Tnerc (2014)

STATE PV SUPPORT SCHEMES (5/6)

State support instruments		
Uttar Pradesh Solar Policy 2013/2014	**Bidding procedure:** ▪ With its "Uttar Pradesh Solar Policy 2013", the Indian state wants to install 500 MWp of new PV capacities by 31st May 2017. ▪ The first public tendering process (Power Purchasing Agreement, PPA) of 200 MW PV capacity was launched on 15th March 2013. ▪ In December 2013, the Uttar Pradesh Power Corporation Limited (UPPCL) signed PPAs with six developers (with a duration of 10 years) to build 110 MW of PV capacity. The granted purchasing tariffs are among the highest in India (8.01 to 9.33 INR/kWh). All PV projects will be set up in the region of Bundelkhand, which has the highest solar radiation in the state (close to the border to the adjacent state Rajasthan). On top of this, the cost of land is cheaper in this area than in Punjab. A second public tender process with more than 300 MW of PV capacity ended on 9th September 2014. **Net metering /net billing:** ▪ The state Uttar Pradesh aims to promote new PV rooftop systems with a total capacity of 20 MW on public and private buildings until March 31st 2017 with the Uttar Pradesh Rooftop Solar Photovoltaic Power Plant Policy 2014. ▪ For rooftop installations ≤ 50 kWp net metering applies ▪ For rooftop installations > 50 kWp net metering does not apply	

Details about the Uttar Pradesh Rooftop Solar Photovoltaic Power Plant Policy 2014 : UPNEDA

Sources: Bridge to India (2013), Resolve (2013a), Natural Group (2014), UPNEDA (2014)

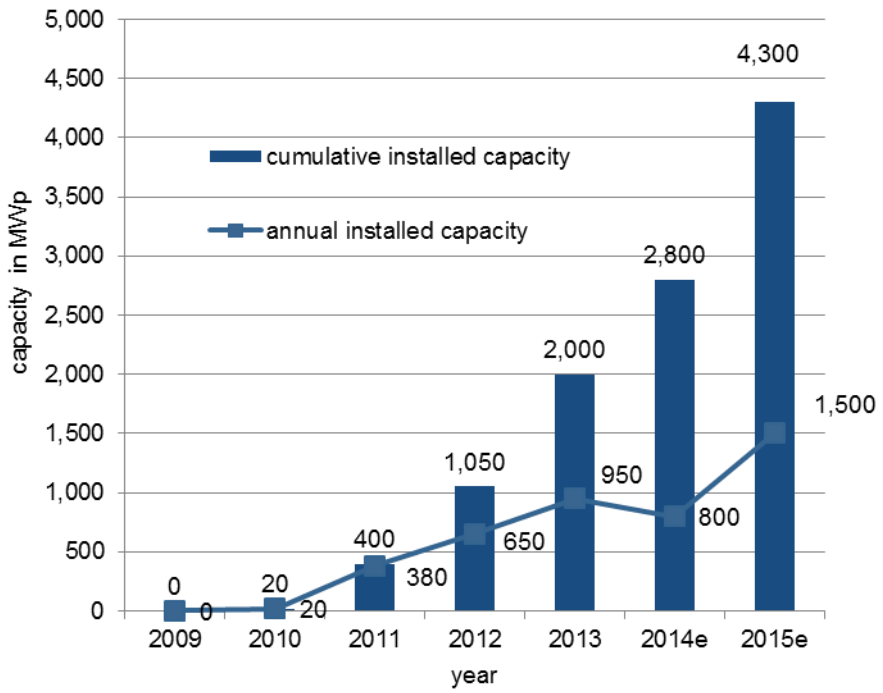
STATE PV SUPPORT SCHEMES (6/6)

State support instruments	
Punjab Solar Policy 2013	**Bidding procedure:** ▪ The state in the North wants to install 1 GW of new PV capacity as part of its energy policy program from December 2012 – the "New and Renewable Sources of Energy Policy 2012" – by 2022. At first,300 MW of PV capacity have been tendered. The PV projects can be built primarily on agricultural land, since a large part of the state is based on agriculture. ▪ Investors receive additional benefits: System components are exempt from VAT. ▪ The tender took place in two bidder categories: 50 MW have been allocated first to 19 investors and businesses, who wanted to build smaller PV power plants of a system size between 1 and 4 MW. Further 250 MW have been awarded to 8 out of 26 bidders, who will implement PV power plants with a capacity higher than 5 MW within 13 months. ▪ The fixed support for the advertised PV capacity should lie between circa 7.87 INR and 8.75 INR per kWh (ca. 0.12 - 0.13 €/kWh). For large-scale plants the lowest bids were between 7.67 – 7.97 INR per kWh for large-scale plants and 7.21 – 8.71 INR per kWh for small-scale plants. Potential bidders were required to have bank guarantee of at least 4 m INR per MW (ca. 615,000 €/MW). **Latest developments in 2014:** • According to recent statements, the state Punjab faces a deficit of power generation capacity of approx. 6 GW and plans to increase the PV target to 2 GW.

Sources: Bridge to India (2013), Resolve (2013b)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity up to end of 2015 (on-grid)



Main barriers in the Indian PV market

Site selection and project implementation

- Site-specific irradiation data is not available nation-wide.
- The electricity purchase obligation is not consistently implemented.
- Payment risk for operators of RE systems due to the partly poor financial situation of the state utilities (Discoms).

FIT granting and financing

- So far, aggressive bidding process with high price pressure
- High domestic interest rates in a growing economy lead to high capital costs for projects.
- Many project proposals under the NSM could not meet defined building deadlines due to financing difficulties and supply bottleneck of equipment. This resulted in penalties.
- Local content regulation: 375 MW of the 750 MW total, which are tendered until 29th November 2013 will be awarded only if the modules and cells are produced in India.
- The share of projects with proven Indian equipment will continue to rise.

Installed grid-connected PV power ordered by federal states and PV promotion (30.09.2014): MNRE

Sources: dena (2011/2012) Bridge to India (2012,'14, 14a)

MARKET NEWS

Date	Topic	Source
28/10/2014	SunEdison signs MoU with Rajasthan for 5,000 MW solar plants US-headquartered solar power major, SunEdison, on Tuesday signed a Memorandum of Understanding with the government of Rajasthan in which the company has said it would put up 5,000 MW of solar power plants in the state.	The Hindu Business Line
30/09/2014	India-U.S. Energy Talks to Focus on Renewables Investment The U.S.-India Energy Partnership, which takes place 30th September and 1st October during the visit of Indian Prime Minister Narendra Modi, will focus on investments in renewable energy, energy efficiency and "the road ahead for U.S.-India cooperation" on climate change.	Bloomberg
29/09/2014	India may ask US to transfer technology and provide finance for 100 GW of solar Following the U.N. climate week, India's Prime Minister, Narendra Modi, is meeting US President Barack Obama. One of the items on the agenda is to form a 'working group' that would plan the roll out of 100 GW of solar in India over the next ten years. Two key items on the agenda of this working group are likely to be: i) engagement with US institutions and companies to set up manufacturing capacities in India that will help meet India's future demand domestically; and ii) financing India's ambitious solar plans.	Bridge to india
25/09/2014	India plans PV installations of 15 GW by 2019 (in German) India differs from his previous plan from trying to install until 2017 3.6 GW of new PV capacity, and raised the target mid-September to 15 gigawatts by 2019. The new target for 2019 is nearly a five-fold increase of the currently installed capacity equal.	Exportinitiative
10/09/2014	India's PTC and Power Finance to Jointly Fund Renewable Plants India's biggest power trader and one of the nation's largest lenders to electric utilities have agreed to jointly finance clean-energy projects. A lack of affordable debt is one of the biggest constraints cited by developers in India, which has raised borrowing costs three times in the past year to combat inflation.	Bloomberg

MARKET NEWS

Date	Topic	Source
09/09/2014	India's MNRE proposes development of "ultra mega" solar PV power projects totaling 20 GW On August 8th, 2014 India's Ministry of New and Renewable Energy (MNRE) announced a new scheme for the development of solar parks and "ultra mega" solar photovoltaic (PV) projects totaling 20 GW. Through this scheme MNRE plans setting up 25 solar parks, each with a capacity of 500 to 1.000 MW; thereby targeting around 20.000 MW of installed solar power generation capacity. MNRE supports deployment through grants.	SolarServer
21/08/2014	Andhra Pradesh aiming for 5 GW of solar by 2019 The state government is expected to unveil plans in the coming weeks that would facilitate the installation of approximately 5 GW solar power and 4 GW of wind generation capacity by 2019. Last year the state government launched a series of tenders to set up 1.16 GW of solar power capacity across the state. Despite a strong response, the division of the state earlier this year, which resulted in the formation of the new state of Telangana, appears to have those projects in limbo.	PV-Magazine
31/07/2014	India Solar Manufacturing Base Could Save $42 Billion India could save itself $42 billion in solar equipment imports by helping turn its ailing manufacturers into a viable industry, according to KPMG. The findings come as India ponders whether to impose dumping duties on U.S. and Asian solar panel and cell suppliers in a bid to protect local competitors whose factories are operating at one-fifth of their capacity.	Bloomberg

MARKET NEWS

Date	Topic	Source
24/07/2014	Phase I target of 1.1 GW on-grid capacity exceeded (in German) From awarded 950 MW although only 420 MW were taken during the period in operation, but led projects under other central government programs totaling 161 MW , as well as federal incentives to a total installed capacity of around 1.4 GW (as of March 2013). For Phase II (2013 -2017) of NSM, an increase of on-grid PV capacity to 10 GW is target.	GTAI
01/10/2013	India has adopted new law for land acquisition The new Indian Land Acquisition Act is aimed at guaranteeing that land owners, in cases of state expropriation, will be compensated appropriately. Furthermore, the government is hoping that the herein included process will avoid putting large industry and infrastructure projects on halt for, sometimes, years. Landowners are mostly reacting positively but the private sector fears excessive costs and bureaucracy.	GTAI
24/04/2013	India: Guidelines for selection of 750 MW grid-connected PV projects The Ministry of New and Renewable Energy (MNRE) has released the draft guidelines for the second phase of batch 1 under the Jawaharlal Nehru National Solar Mission (JNNSM) to set up 750 MW of grid solar PV power projects.	PV-Magazine
04/04/2013	India: solar cheaper than grid power: Solar power is cheaper than grid power for commercial consumers in Maharashtra, Delhi and Kerala, even with no subsidies, according to a quarterly report published by consulting company Bridge to India.	PV-Magazine

CONTACT INFORMATION

Category	Name	Website
Ministry of Commerce and Industry	Ministry of Commerce and Industry(MoCI)	commerce.nic.in
Indo-German Chamber of Commerce	Deutsch-Indische Handelskammer (AHK)	indien.ahk.de
Ministry of Renewable Energy	Ministry of New and Renewable Energy (MNRE)	www.mnre.gov.in/
Database for the promotion of renewable energy	Indian Renewable Energy and Energy Efficiency Database (IREEED)	www.ireeed.gov.in/
Federal Regulator for Electricity Industry and Electricity Market	Central Electricity Regulatory Commission (CERC)	www.cercind.gov.in
National Renewable Energy Development Agency	Indian Renewable Energy Development Agency Limited (IREDA)	www.ireda.gov.in
Federal Solar Policy Federal Development Corporation	Jawaharlal Nehru National Solar Mission (NSM) Solar Energy Corporation of India (SECI)	www.mnre.gov.in/solarmission/jnnsm/introduction-2/ http://seci.gov.in/content/
National Network Operator	NTPC Vidyut Vyapar Nigam Ltd (NVVN)	www.nvvn.co.in/
Local Renewable Energy Development Agency	Odisha Renewable Energy Development Agency (OREDA)	www.oredaodisha.com/
Local Energy Development Agencies	Gujarat Energy Development Agency (GEDA) Maharashtra Energy Development Agency (MEDA)	http://geda.gujarat.gov.in/index.php www.mahaurja.com/
Local Renewable Energy Development Corporation	Rajasthan Renewable Energy Corporation Limited (RRECL)	www.rrecl.com/Index.aspx

Sources: dena (2010), dena (2011/2012)

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Study

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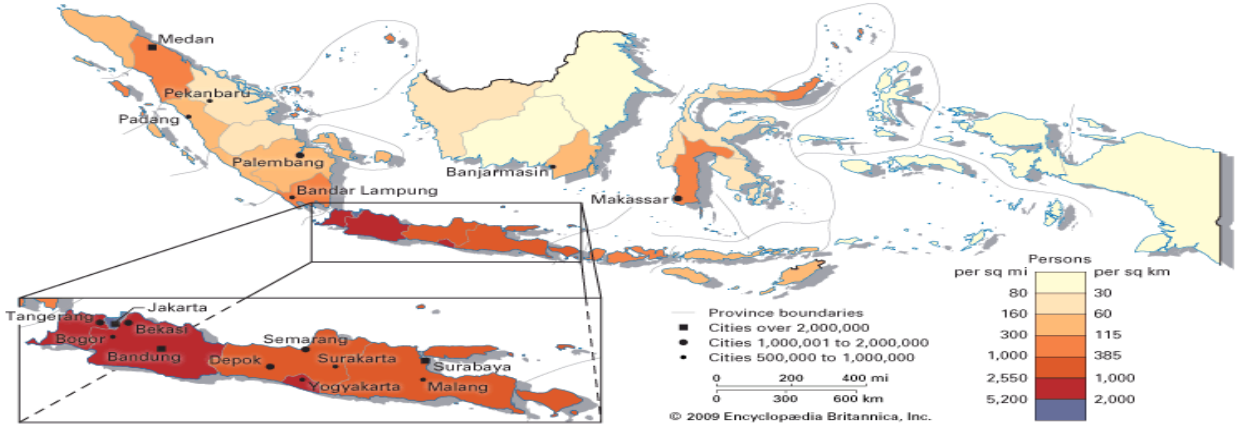
SOLAR IRRADIATION & POPULATION DENSITY

Population density



Source: Encyclopedia Britannica (2012)

Daily global solar irradiation

Source: The Sietch Blog (2011)

BASIC DATA

General basic data (2014)			
Area	1,904,569 km²	GDP	10,137,311 bn Rp (~643.51 bn €*)
Population (est.)	251.5 m	GDP per capita (est.)	40,308,988 Rp (~2,559 €*)
Language	Bahasa Indonesia	GDP growth	5.5 %
Government type	Unitary presidential constitutional republic	Inflation	7.5 %
Administrative division	29 provinces, special status region Yogyakarta, three provinces Aceh, West-Papua and Papua with special status, capital region Jakarta	Unemployment rate (est.)	5.8 %

Basic energy market data (2012)	
Electricity consumption (total/per capita)	173.9 TWh / 692.7 kWh
Electricity export	-
Electricity generation	200.2 TWh
Electricity prices in 2013 (2014**)	Industrial (< 200 kVA): 1,361 Rp / kWh (8.6 € ct / kWh*)
	Industrial (> 200 kVA): 1.124 (1,562**) Rp / kWh (~ 7.1 (~ 9.9**) € ct / kWh*)
	Industrial (> 30,000 kVA): 1,012 (1,667**) Rp / kWh (~ 7.9 (~ 10.6**) € ct / kWh*)
	Commercial (6.6 ≤ 200 kVA): 1,352 Rp / kWh (~ 8.6 € ct / kWh*)
	Commercial (> 200 kVA): 1,418 Rp / kWh (~ 9.0 € ct / kWh*)
	Luxury households (> 6.6 kVA): 1,352 Rp / kWh (~ 8.6 € ct / kWh*)
Share of renewables (electricity consumption)	13.3 %
Increase of electricity consumption (2010 – 2030)	+9 % p. a.
Annual average global solar irradiation	1,642 kWh / m² a

* Exchange rate March 2014: 1 € = 15,753.14 Rp

Sources: AA (2014), AHK Indonesien (2014), dena (2012), ESDM (2012), EZB (2014), GTAI (2014), GIZ (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators					
Market size (annual installed capacity)	2010: ca. 1 MWp	2011: ca. 1 MWp	2012: 8.7 MWp	2013: 42.8 MWp	2014e: 74.5 MWp
National PV target 2025	2025: 990 MWp	(390 MW off-grid, 600 MW on-grid), 15 % share in total generation			
Main market drivers 2014	▪ The development of rural areas is a priority of the government, which targets an electrification rate of 90% by 2020 (65 %, status: February 2012). ▪ Due to high diesel prices and the structure of the archipelago there is a big market potential for PV (stand-alone- and hybrid-systems) for electrification of grid remote areas (in particular the east of Indonesia). ▪ "1,000-Islands program", coordinated by state-owned utility PLN (details see next slide). ▪ Since May 2014, adjustments of electrictiy tariffs for medium-scale industrial customers and large industrial costumers as well as for large-scale household customers, medium-scale businesses, large-scale businesses and medium-sized government offices in combination with a net metering rule of PLN.				
PV support 2014	▪ Since 2009 a FIT exists for PV and other renewables. The tariff for PV varies between 5.36 -8.2 € ct / kWh (duration: 20-30 years; details see next slide). ▪ Large-scale PV projects supported by the government will be tendered by the state-owned utility PLN . ▪ Since November 2013, a net metering regulation for rooftop installations for customers of PLN has been in force.				
Recent changes in PV support	▪ Rural electrification: It is planned to install 2.2 MWp of decentralized PV systems by 2014. The target is the electrification of grid remote areas. ▪ Renewable investments: 15.7 bn US Dollars shall be allocated for development of renewable energies by 2025. ▪ Implementation of IPP-Program "1,000 Islands" and "One Solar Watt per Person" have started in 2013 (see next slide for details). ▪ July 2013: Indonesia's Finance Minister stated that a PV FIT of 0.25 US-Dollar/ kWh guaranteed for 20 years is planned. It is expected that up to 172.5 MW of PV capacity at 72 sites will be tendered. ▪ At the end of 2013 the Department of Energy (ESDM) introduced Regulation 17 to award PV capacity through a public bidding process. Details see slide 7.				

Sources: GIZ (2012), ESDM (2012), PV-Tech (2013)

OVERVIEW OF PV SUPPORT SCHEMES

Support Scheme	Details
Net metering for rooftop PV (PLN internal regulation)	▪ PLN Regulation (0733.K/DIR/2013) has enabled grid access and operation of rooftop PV for customers of PLN since November 2013. ▪ PLN installs necessary meters. Received and delivered electricity will be offset by PLN. ▪ If the amount of fed-in PV electricity is more than the energy delivered by PLN, the difference become deposits which will be taken into account in subsequent months thereafter. ▪ Customers have to pay a minimum charge according to installed PV capacity, which is connected with PLN.

IPPs defined in Energy-Law Nr. 30/2009	▪ The energy law Nr. 30/2009 opened the electricity market for Independent Power Producers (IPPs).
	▪ It defines the provisions for power purchase agreements (PPA) between IPPs and PLN.
	  ▪ Regions that are not yet covered by the service area of PLN and are not included in the current electrification plan of PLN can be supplied by private owned generation companies.
	  ▪ IPPs who generate electricity in the service area of PLN have to sell directly to PLN via PPAs.

1,000 Islands Program (2013 - 2016)	▪ PLN runs the "1,000-Islands-Program" and coordinates the awarding process of developers through tenders. ▪ At the same time the PLN will also be investor and operator of all installed systems.
	PV systems (50 up to 1,000 kWp)
	▪ 674 sites with cumulated capacity of119 MWp. ▪ Expected system price is: 2.69 up to 3.83 € /Wp.
	Large scale PV power plants (>1 up to 30 MWp)
	▪ 71 sites with cumulated capacity of 302 MWp, system capacity between 1 up to 30 MWp each. ▪ Expected system price is: 2.56 € / Wp.

Tenders of "1,000-Island-Program" were issued in 2014 and are available at the website of PLN: www.pln.co.id
It must be taken into consideration that for public tenders in Indonesia a local content of 40 % is mandatory.

Sources: dena (2012), GIZ (2014), AHK Indonesien (2014)

PUBLIC TENDER

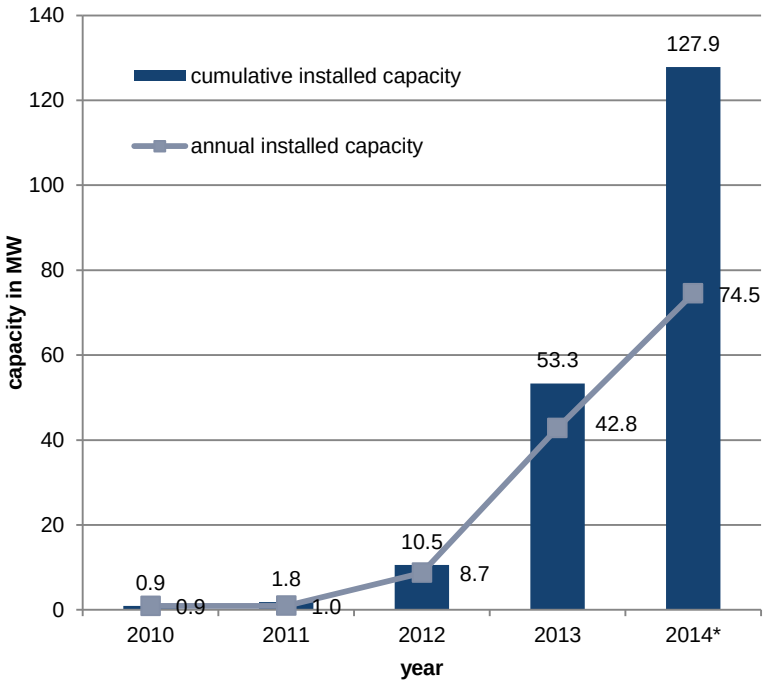
Category	Details	
Public bidding process for PV (Ministerial decree 17/2013)	In November 2013, the Department of Energy (ESDM) introduced Regulation 17 on tendering PV capacity through a public bidding process. 80 PV projects with a total capacity of 140 MW have already been defined to be tendered for the period 2013-2014. Power purchase for these PV projects is guaranteed by the state energy company PLN. Price caps are set for these PPAs.	
	Scope	▪ PV power plant projects that will be tendered are determined by the Department of Energy Directorate-General for new renewable energy and energy efficiency (NRE & EC). The location and capacity of each installation is predetermined. ▪ By the end of 2014, the tendering of 80 projects throughout Indonesia with a total capacity of 140 MW is planned. ▪ Foreign companies can only participate in the bidding process if a holding company is established and the share of the foreign company must not exceed 95 %. ▪ The exact terms are defined in the Investment Law 25/2007.
	Remuneration	▪ 20-year PPAs at the awarded price through the reverse auction.
	Process	▪ The ESDM sets a maximum price on how much is paid for a megawatt hour generated. Currently the price is 0.25 US-Dollar/kWh for a local content ratio of less than 40 % and 0.30 US-Dollar / kWh for a local content ratio of more than 40 %. ▪ The bidding mechanism is a reverse auction. For bidders whose projects have a local content ratio of more than 40 %, 0.05 US-Dollar / kWh will be deducted from the bidding price. However, if their projects are successful the remuneration will be the amount of the original bid. ▪ The power plant project s with the cheapest purchase prices in the reverse auction will be awarded with a PPA.

For detailed information visit the website of ESDM: www.esdm.go.id

Sources: ESDM (2014), PV-Magazine (2013)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity (on-grid)



* Forecast

Sources: PLN (/2012), IHS Solar (2013) in PV-Magazine (2014)

The main barriers in the Indonesian PV market

Insufficient liberalization and focus on establishing coal power plants:

- Major companies, such as energy suppliers and network operators (PLN), are state-owned.
- Government plans to install 35 GW of coal-fired power plants.

Financing barriers:

- Although there are several well-established private banks, few are ready to provide funds for technologies.
- The "Negative Investment List" of the country limits foreign investments to power plants < 10 MW.

Lack of spare parts / local acceptance

- Access to spare parts and to on-site specialists is currently difficult. So the local population is often not willing to accept projects that could fail in the long-run.

Competition from Asia:

- Strong economic links with ASEAN region along with the People's Republic of China involves a high level of competition.
- The companies, which do not originate from ASEAN countries and China, complain about a lack of transparency in procurement procedures, in particular in public tenders.

Infrastructural barriers:

- Lack of power grids make the implementation of grid-connected renewable energy projects difficult.

Sources: dena (2012), PV-Magazine (2014)

MARKET NEWS (1/3)

Date	Topic	Source
07/11/2014	Mega power plant planned Indonesia will build a 5,000-megawatt power plant in Cilacap, Central Java, as part of the new government's ambitious program to have at least an additional 35,000 MW of power within five years. Coordinating Maritime Affairs Minister Indroyono Soesilo said Thursday that development of the first stage of the huge power plant complex, which would be among the largest in the world, was expected to begin next year so that it could begin commercial operation by 2018.	Jakarta Post
19/06/2014	Indonesia restarts solar auction The government has relisted solar projects for a new renewable energy auction that has some $43 million slated for solar projects on the country's outer islands. Indonesia's Energy and Mineral Resources Ministry will restart its tender process for solar development projects on the country's outermost islands after bidders failed to submit the correct information in recent auctions, according to The Jakarta Post. "The repeat tenders are due to administrative matters. Bidders failed to submit proper data in the previous tenders," the newspaper quoted Alihuddin Sitompul, director for diverse new energy at the ministry's renewable energy directorate general. The new auction, which covers projects for 25 outer islands in the country, is scheduled to be completed by the middle of July, with winning bidders expected to complete the projects by December.	PV-Magazine

MARKET NEWS (2/3)

Date	Topic	Source
29/04/2014	Government Adjusts Electricity Tariff For Certain Customers Minister of Energy and Mineral Resources has enacted Ministerial Regulation Number 09/2004 on Electricity Tariff. The regulation contains of tariff adjustment for medium-scale industrial customers and large industrial costumers as well as for large-scale household customers, medium-scale business customers, large-scale business customers and medium-sized government offices. The adjustment will be implemented on a gradual basis starting 1st May 2014 to December 2014.	Ministry of Energy (ESDM)
07/11/2013	Indonesia presents new bidding process The maximum purchase price will be US$0.25 per kilowatt hour or US$0.30 per kilowatt hour if local components in a solar photovoltaic power plant amount to at least 40 %. The bids from project developers that meet a local content of 40 % will be reduced by 0,05 US$/kWh in the bidding process. When their bid was successful, the originally offered tariff will be applied. Foreign companies can not participate in the tender procedure.	PV-Magazine
11/07/2013	Indonesia is planning auctions for further expansion of PV (in German) The Director for Renewable Energy of the Ministry of Energy has announced that auctions are planned for already allocated electricity generating capacities in order to promote the expansion of PV. The auctions are aimed at project developers that can offer prices lower than 0.25 US Dollar per kWh. It is expected that up to 172.5 MW of PV capacity at 72 sites will be tendered.	Exportinitiative Erneuerbare Energien

MARKET NEWS (3/3)

Date	Topic	Source
17/05/2013	SGI-Mitabu agrees megawatt-scale solar deal in Indonesia SGI-Mitabu, a company formed by two Australian firms The Solar Guys International and Mitabu Australia, has entered into a partnership with the government of South Sumatra, Indonesia to develop megawatt-scale solar power projects. The partnership was sealed with the signatures of SGI-Mitabu directors Dane Muldoon and Dr. M. Rusydi, and the Governor of South Sumatra, Alex Noerdin.	PV-Tech
29/04/2013	Indonesia: 36 new solar plants planned for 2013 Director of Renewable Energy and Energy Conservation at the Ministry of Energy and Mineral Resources, Alihudin Sitompul, has stated that the Indonesian government was planning on increasing the number of solar plants in the country this year. With the 36 new solar plants that are in the pipeline for 2013, this goal can be achieved.	PV-Magazine
03/04/2013	Indonesia plans tender for PV projects with a total capacity of 150 MW (in German) Wie im März bekannt wurde plant die indonesische Regierung im Mai 2013 die Veröffentlichung einer Ausschreibung für PV-Projekte mit einer Gesamtkapazität von bis zu 150 MW. Interessierte Unternehmen werden dann vorrausichtlich zwei Monate Zeit haben, um entsprechende Angebote zu unterbreiten.	Exportintiative
23/03/2010	Government expects to remove electricity subsidy by 2014 “We hope we can fully implement the economic tariffs for electricity by between 2014 and 2015,” Energy and Mineral Resources Minister Darwin Zahedy Saleh said in Jakarta on Monday. Darwin said that this had been part of the government’s plan. “But ,we will keep protecting the low income people,” Darwin said. Currently, all types of customers pay for electricity at far lower than its market price. The current average electricity tariff is at about Rp 655 (7.19 US cents) per kilowatt hour (kWh), while the market price is about Rp 1,030 per kWh, Murtaqi Syamsuddin, a director at state power utility PT PLN, said.	Jakarta Post

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy	Ministry of Energy and Mineral Resources (ESDM)	www.esdm.go.id/index-en.html
Ministry of Environment	Kementrian Negara Lingkungan Hidup (MENLH)	www.menlh.go.id
German-Indonesian Chamber of Industry and Commerce	Perkumpulan Ekonomi Indonesia-Jerman (EKONID)	www.indonesien.ahk.de
Solar Energy Association	Solar Power Indonesia	www.solarpowerindonesia.com
Renewable Energy Society	Indonesian Renewable Energy Society (METI)	www.meti.or.id
Secretary for Alternative Energy	Secretary for Alternative Energy	www.energialternatif.ekon.go.id
State Utility and Network Operator	Perusahaan Listrik Negara (PLN)	www.pln.co.id
State Financing Institution for Renewable or Solar Projects	Badan Koordinasi Penanaman Modal (BKPM)	www.bkpm.go.id

Source: dena (2012)

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Study

MARKET INFO ITALY – PHOTOVOLTAICS

dena-Market Information System

www.export-erneuerbare.de or http://exportinitiative.dena.de

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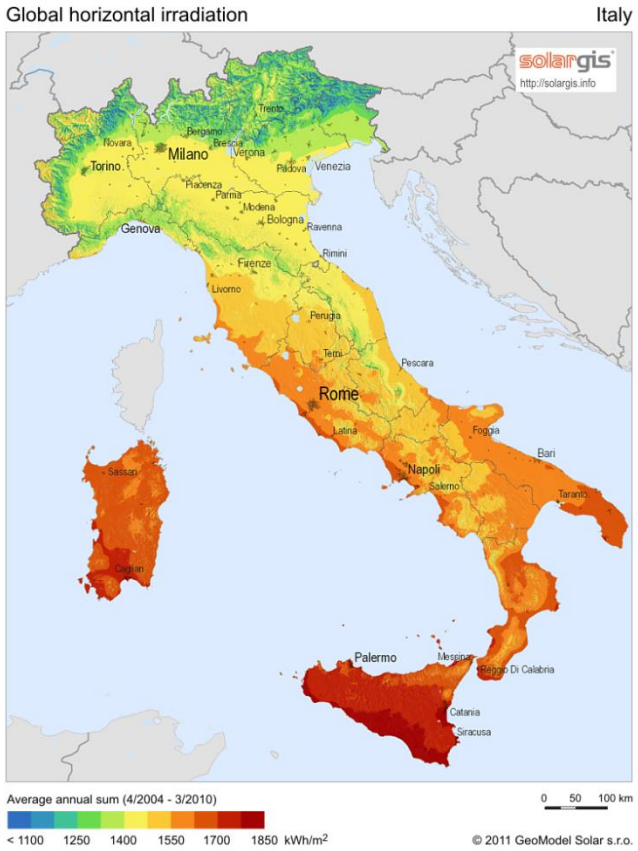
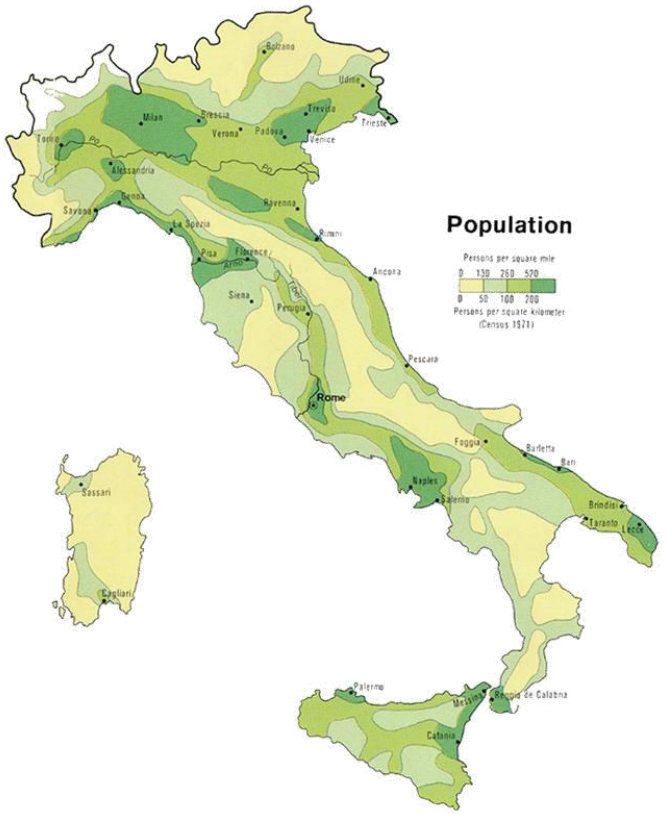
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGIS (2011)

Population density



Source: Italy Travel Escape (2012)

BASIC DATA

General basic data (2013)			
Area	301,340 km²	GDP	1,560 bn €
Population (2014 est.)	61,680,122	GDP per capita (est.)	25,700 €
Language	Italian	GDP growth	-1.9 %
Government	Unitary parliamentary constitutional republic	Inflation	1.3%
Administrative divisions	15 regions and 5 autonomous regions	Unemployment rate	12.2 %

Basic energy market data (2013)	
Electricity consumption (total/per capita)	(297.3 TWh / 4,955 kWh)
Net electricity import	42,153 TWh
Electricity price (industry) (500-2,000 MWh/a)	0.168€ / kWh (excluding taxes)
Electricity price (residential) (2,500-5,000 kWh/a)	0.229€ / kWh (including VAT)
Share of renewable energy (electricity consumption)	34.2%
Increase of electricity consumption (2011 - 2022)	+ 1.2 % p. a.
Annual global solar irradiation	1,100 kWh / m² a - 1,800 kWh / m² a

Sources: AEEG (2012), CIA (2013), ENTSO-E (2013), BDEW (2013), Eurostat (2014), IMF (2013), Terna (2014a), Terna (2014b), GTAI (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators					
Market size (annual installed capacity)	2011: 9,440 MW	2012: 3,580 MW	2013: 1,448 MW	2014e: 1,000 MW	2015e: 1,000 MW
National PV target	8.6 GW of installed PV capacity by the end of 2020 / The goal was already achieved in 2011.				
Main market drivers 2014	▪ High consumer electricity prices compared to the rest of Europe combined with the Scambio sul posto as a net metering system for PV systems up to 500 kWp. ▪ Tax depreciation of PV systems up to a maximum amount of 96,000 €. ▪ Well established PV value chain (in particular distribution and installation).				
FIT 2014	▪ The guaranteed minimum purchase price in the Ritiro Dedicato (see slide 7) is at 3.89 € ct / kWh for plants <1 MWp (applies for an annual production of 1.5 million kWh)				
Recent changes in PV regulation:	▪ July 2013: The budget cap of the Nuova Conto Energia V has been reached. Since 6th July 2013 the program is no longer available. ▪ June 2014: The Italian government has unveiled plans to impose retroactive cuts for feed-in tariffs for PV systems with capacities of more than 200 kW. ▪ Ritiro Dedicato**:** The guaranteed minimum price was standardised for plants ≤ 1 MW and is at 3.89 €ct / kWh. For PV electricity of plants with a capacity > 1 MW the feed-in electricity is compensated with the hourly area price ("prezzo zonale orario"). ▪ August 2014: A decree, adopted on 7th August 2014, introduces significant retroactive FIT cuts and new taxes for self-consumed electricity in Italy. The legislation retroactively modifies the way FITs will be paid as of January 2015 to existing PV installations of more than 200 kW. PV plant operators may choose within three options until 30th of November. For details see slide 7. ▪ The Italian parliament decided also in August to expand the net metering law covering more PV installations. Specifically, according to the 91/2014 law, the upper limit for net metering systems has been raised from 200 kW to 500 kW per installation.				

Sources: dena (2013b), GSE (2012), EPIA (2013), GSE (2014b), GSE (2014c), PV-Magazine (2014), Roedl & Partner (2014)

FURTHER PV SUPPORT SCHEMES IN 2014

Support scheme	Beneficiaries	Description
Net-Metering **(Scambio sul posto)**	Enterprises, private persons	▪ Support is applicable for PV-systems with a maximum capacity of 500 kWp. ▪ This support scheme is based on a balance between electricity that is fed into the grid and electricity used from the grid, both from the same person. Thus this person is at the same time producer and consumer of electricity and can bidirectional use the same line for feeding in and taking out of electricity. ▪ Net-Metering participants pay the electricity supplier for the electricity, which they use from the grid, and the GSE compensates the amount fed-into the grid. ▪ Once a year, the balance between feed-in and consumed electricity is calculated. In cases where this is negative, the participants has to pay the excess electricity and when it is positive receives credit in order to pay future negative balances.
Guaranteed power purchase by GSE **(Ritiro Dedicato)**	Enterprises, private persons	▪ For electricity generators utilising renewable energies the possibility exists to sell the generated electricity via the GSE. The GSE creates easier access for producers to the electricity market. ▪ Remuneration: For systems with capacity ≤1 MW an annual production of 1.5 million kWh a minimum purchase price of 3.89 € ct / kWh is guaranteed or will be remunerated at an hourly area price, if this is higher than the guaranteed price. PV plants >1 MW are generally compensated with the hourly area price (“prezzo zonale orario”) (Further information: ww.mercatoelettrico.org/En/Default.aspx). ▪ Participation in the system Ritiro Dedicato is possible for all plant operators, who do not participate in other support measures (FIT, net metering).
Tax depreciation	Private persons	▪ When installing PV-systems, 50 % of the costs until a maximum amount of 96,000 € can be depreciated via taxes. The tax depreciation has been prolonged until 31st December 2014.

Sources: dena (2013a), GSE (2014b), RES Legal (2013), GSE (2014c)

MAIN PV SUPPORT SCHEME IN 2013: FIT

The cap of the Nuova Conto Energie V has been reached. Since 6th July 2013 the program is no longer available.
The Italian legislation retroactively modifies the way FITs will be paid as of January 2015 to existing PV systems of more than 200 kW, meaning that system owners, who were granted tariffs for 20 years under the Conto Energia, now have to choose from one of three options: A 17-25 % reduction of the incentive over 24 years; a 5-9 % reduction of the incentive paid over the initially agreed period of 20 years. A third option involving payment of a lower incentive over an initial period, followed by payment of a higher FIT over a second period. The total FIT period remains 20 years.

Tariffs for the first half of 2013 / the second half of 2013 (in € / MWh)				
	Rooftop installation		**Other systems**	
Capacity	FIT	Self-consumption bonus	FIT	Self-consumption bonus
1 - 3 kWp	208 / 182	126 /100	201 / 176	119 / 94
>3 - 20 kWp	196 / 171	114 / 89	189 / 165	107 / 83
>20 -200 kWp	175 / 157	93 / 75	168 / 151	86 / 69
>200 – 1,000 kWp	142 / 130	60 / 48	135 / 124	53 / 42
>1,000 – 5,000 kWp	126 / 118	44 / 36	120 / 113	38 / 31
>5,000 kWp	119 / 112	37 / 30	113 / 106	31 / 24

Tariffs for the first half of 2013 / the second half of 2013 (in € / MWh)		
	Building integrated PV (BIPV) with innovative features*	
Capacity	FIT	Self-consumption bonus
1 - 20 kWp	288 / 242	186 / 160
>20 - 200 kWp	276 / 231	174 / 149
>200 kWp	255 / 217	153 / 135

*Increased support opportunities for 1. self-consumption, 2. fulfilment of local content regulation (usage of plants and plant components, which were mainly produced in EU and EEA member states), 3. usage of BIPV (building-integrated photovoltaics).
More information on the feed-in-tariff and support schemes can be found at Gestore del Sistema Elettrico (GSE) under www.gse.it or in a compact overview at dena-Subsidy Overview PV 2013.

Sources: dena (2013b), GSE (2012)

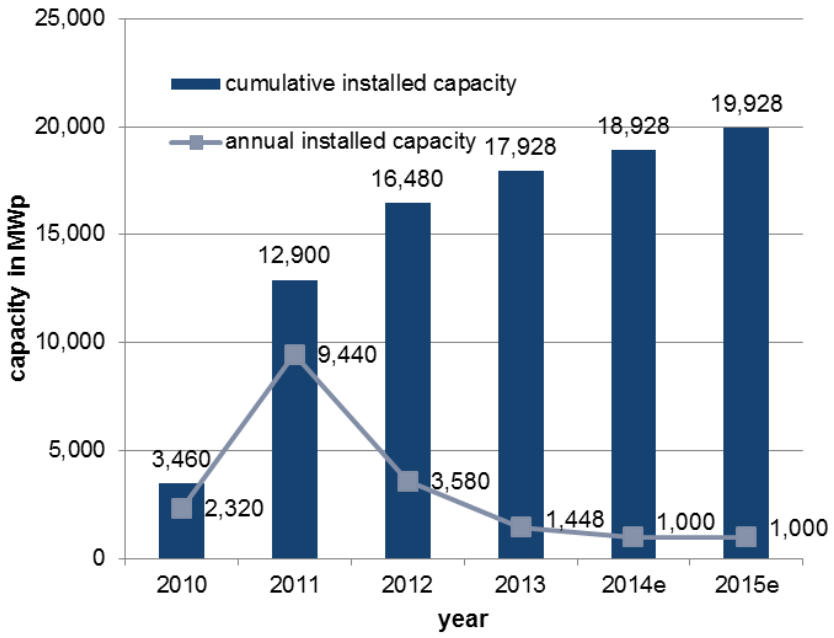
FURTHER PV SUPPORT SCHEMES

Support scheme	Beneficiaries and fields of application	Description
Construction guidelines	New buildings: obligation of structural integration of renewable energies for new buildings and essential renovations, as from an area of 1,000 m².	At least 50 % of primary energy demand must be covered by renewable energies.
	Schools: Grid-connected PV systems on school buildings up to 20 kWp (Tender "The sun in school" - "Il sole a scuola").	Reimbursement of up to 100 % of the eligible investment costs, max. 40,000 €.
Tax reliefs	The purchase of PV systems or their components are subject to a reduced VAT for both business and individuals.	The VAT is thus at 10 % instead of the usual 20 %.
	Municipalities may levy a lower tax rate for buildings with PV systems.	The reduced tax rate is less than 0.4 % of the cadastral income.
Loans (Kyoto Fund)	Only new projects are eligible for support. PV systems must be at least partially integrated into the building and have a nominal output of 1 to 50 kWp.	The credit period is 3 to a maximum of 6 years (15 for public bodies). The nominal annual interest rate is 0.5 %.

Source: dena (2013b)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity (on-grid)



Sources: : EPIA (2014), GSE (2014a), Politecnico di Milano (2014)

The main barriers in the Italian PV market

Rapid decline in PV development due to economic crisis:

- In 2011 the greatest growth in PV installations worldwide was in Italy with about 9 GW, followed by Germany (7.5 GW).
- The newly installed PV capacity rapidly decreased to approximately 3.5 GW in 2012.
- The development goes along with increased pressure from the Italian government to limit the solar support scheme due to the cost issue.

Lengthy approval procedures:

- Unclear administrative regulations at the regional level and development-inhibiting bureaucracy determine the market.

Difficult business practice:

- In international comparison there is a low labour market flexibility and a relatively low productivity.
- Corruption and organised crime, especially in the south, are among other damaging factors for PV businesses in Italy.

Sources: dena (2014), EPIA (2012)

MARKET NEWS (1/4)

Date	Topic	Source
02/10/2014	Martifer Solar acquires nearly 90MW of O&M contracts in Italy Martifer Solar, a subsidiary of Portugal's Martifer SGPS, has added close to 90 MW of new third party operations and maintenance (O&M) contracts in Italy. The company is overseeing the solar plants – located throughout the country – for several clients, including asset fund manager DIF and private equity fund Eland.	PV-Magazine
18/09/2014	Italy's PV sector considers legal actions According to the new law approved by the Italian parliament in August, PV plants bigger than 900 kW face minimum losses of about 8%. The legislation retroactively modifies the way FITs will be paid as of 1st January to existing PV installations.	PV-Magazine
16/09/2014	Solar PV sets new record in Italy Solar photovoltaic installations in Italy provided nearly 10% of the country's electricity demand from January to August. A ray of sunshine brightened up the country's gloomy solar PV sector after the parliament's decision last month to expand the country's net metering upper limit from 200 kW to 500 kW. The measure is expected to boost the commercial and industrial rooftop PV segment, although well informed sources say this will depend on the interest rates of banks financing the rooftop projects.	PV-Magazine

MARKET NEWS (2/4)

Date	Topic	Source
10/09/2014	Italian net metering expanded up to 500 kW Italy has raised the upper limit for net metering in the country from 200 kW to 500 kW per installation. The measure is set to boost the commercial rooftop PV sector.	PV-Magazine
08/09/2014	Italian FiT cuts destabilizing PV market, hurting Europe, says EPIA The PV industry association argues that the law will block "prosumers" from providing flexibility to the energy system and helping to avoid costly grid extensions. Italy's decree-law, adopted on August 7, introduces significant retroactive FiT cuts and new taxes for self-consumed electricity. The legislation retroactively modifies the way FiTs will be paid as of January 1 to existing PV installations.	PV-Magazine
14/08/2014	Italy FiT cuts are legally questionable Owners of PV plants bigger than 900 kW face minimum losses of about 8% as a result of new legislation passed by the Italian government last week. International law firm McDermott Will & Emery says new legislation passed by the Italian parliament last week could be in violation of the principles of the Italian Constitution, EU law and Italy's obligations under international treaties.	PV-Magazine

MARKET NEWS (3/4)

Date	Topic	Source
19/06/2014	Italian PV industry threatened by retroactive FIT cuts The Italian government has unveiled plans to impose retroactive changes in the feed-in tariff for PV systems with capacities of more than 200 kW. The new legislation would force operators to choose one of two options. The first option would mean that operators with a 20-year tariff period would have to accept a 10 % cut, while the second option would extend the 20-year term to 24 years and make the cut dependent on the remaining years in the initial guaranteed period. Operators have until November 30 to decide on one of the two options, which would then enter into force January 1, 2015.	PV-Magazine
13/05/2014	Italian PV plant owners 'tearing up existing FIT contracts' Some PV plants owners in Italy are walking away from their existing feed-in tariffs (FITs) in favour of power purchase agreements (PPA) as the market enters a new phase.	PV-Tech
14/03/2014	Italy met 4.8% of electricity demand with solar PV in February According to the latest figures from grid operator Terna (Rome), Italian solar photovoltaic plants produced 1.19 TWh of electricity in February 2014, to meet 4.8% of electricity demand. This is an increase from 4.6% in February 2013, and 2.8% in January 2014. Over the full year 2013, Italy met 7.0% of its electricity demand with PV, the highest portion of any mid-sized to large nation in the world.	SolarServer
27/01/2014	GSE informed about changing the minimum guaranteed prices for solar power (in German) GSE announced that the remuneration tariff for photovoltaic systems which market their electricity over the GSE´s "Ritiro Dedicato", in future correspond to the zonal market price. The previously applicable guaranteed minimum prices were abolished. For plant operators in most regions this meant a lower fee in 2014.	SolarServer
02/09/2013	Update: Italy reforms renewable energy incentives Italian minister of economic development, Flavio Zanon has announced reforms to Italy's renewable energy incentives. The minister aims to cap renewables incentives spending to 9 bn € annually for a 20 year period, extended from the current 18 year period, releasing 3 bn € to ease electricity bills.	PV-Tech

MARKET NEWS (4/4)

Date	Topic	Source
08/07/2013	Italy is implementing new support schemes for solar systems FITs will be substituted by tax breaks, which will provide incentives for the small scale PV-systems market.	GTAI
24/06/2013	Italian FIT payments to stop in July Subsidy limit of 6.7 bn € has been passed, triggering a halt to future FIT payments one month after the budget limit was reached. Italy is the third EU member state to halt its solar incentives.	PV-Magazine
24/04/2013	Enel to add 55 MW of PV capacity in Romania and 21 MW in Italy According to Enel's business plan published last week, the company started construction on 19 MW of PV installations in Romania at the end of February. Overall, the Italy-based power company plans to expand its Romanian photovoltaic portfolio to 55 MW by 2017. Meanwhile, in Italy, Enel has said it intends to start building 21 MW of new PV projects.	PV-Magazine
21/03/2013	Italy anticipates independent of state funding with an annual photovoltaic expansion of one gigawatt (in German) The Italian Ministry of Economic Development (MSE) has published a draft of a national energy strategy. According to this draft, regardless of PV support programmes, 1 GW of annual installed PV capacity shall be added until 2020.	SolarServer

CONTACT INFORMATION

Category	Name	Website
Ministry of Economic Development Ministry of Finance	Ministero dello Sviluppo Economico (MSE) Ministero dell'Economia e delle Finanze (MEF)	www.sviluppoeconomico.gov.it/ www.tesoro.it/en/index.html
German-Italian Chamber of Commerce	Camera di Commercio Italo-Germanica	http://www.ahk-italien.it/
National Electricity Grid Operator	Terna Group	www.terna.it
Market Regulatory Authority	AEEG (Autorità per l'Energia elettrica e il Gas)	www.autorita.energia.it/it/index.htm
Energy Market Operator	GME (Gestore Mercati Energetici)	www.mercatoelettrico.org/En/Default.aspx
Association of Renewable Energy Sources	Association of Producers of Energy from Renewable Sources (APER)	http://www.aper.it/
Solar Energy Association	Assosolare (Associazione Nazionale dell'Industria Solare Fotovoltaica) GIFI – Italian Photovoltaic Industry Association	www.assosolare.org www.gifi-fv.it
Renewable Energy Authority	Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA)	www.enea.it
National Financing Institution for Renewable Electricity (also PV) Projects	GSE (Gestore Servizi Energetici)	www.gse.it

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Study

MARKET INFO JAPAN – PHOTOVOLTAICS

dena-Market Information System

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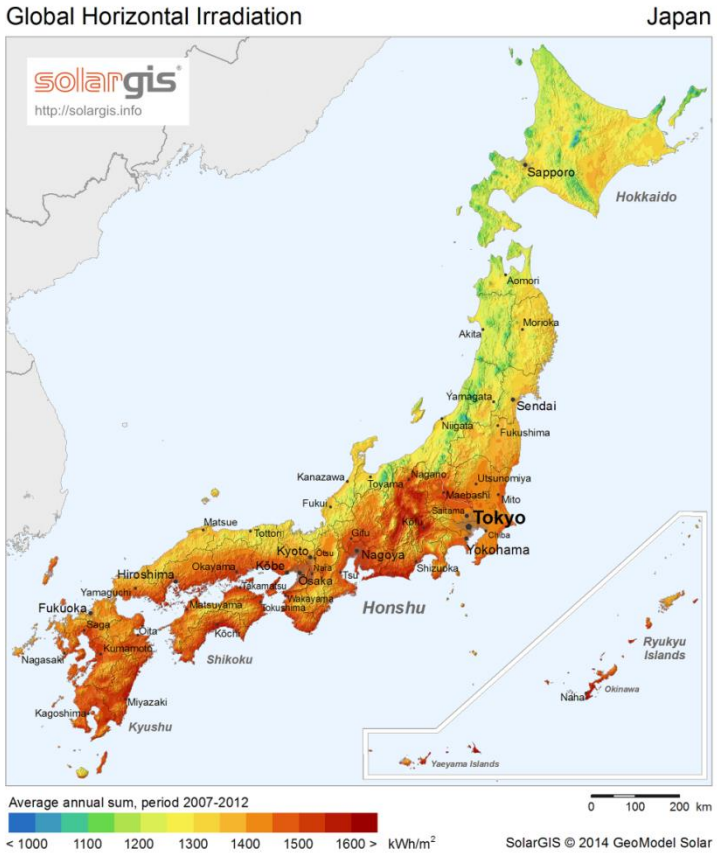
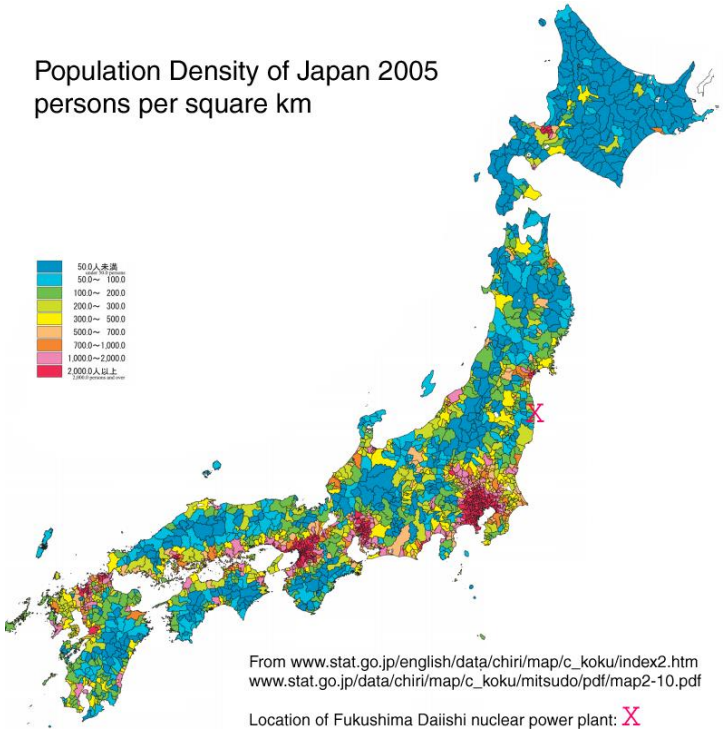
SOLAR IRRADIATION & POPULATION DENSITY

Annual Global Solar Irradiation



Source: SolarGIS (2014)

Population Density



Source:Statistics Bureau (2005)

BASIC DATA

General Basic Data (2013)			
Area	377,915 km²	GDP	478,368 bn Yen (~3,622.9 bn €*)
Population	127.37 Mio.	GDP (per capita)	3,756,589 Yen (~ 28,450 €*)
Language	Japanese	GDP growth	1.5 %
Government type	Constitutional monarchy, parliamentary democracy with two chambers	Inflation	0.4 %
Administrative division	Central administration; 8 regions with 47 prefectures and 20 major cities	Unemployment rate	4 %

Basic Energy Market Data (2011)	
Primary energy consumption	5,755.68 TWh
Electricity consumption (total/per capita)	894.8 TWh / approx. 7,046 kWh
Total electricity import	-
Electricity price (industrial) (2013)	18.85 Yen/kWh (14.28€ct/kWh*)
Electricity price (residential) (2013)	26.85 Yen/kWh (20.33 €ct/kWh*)
Proportion of renewable energy (electricity consumption)	9 %
Forecast electricity consumption (2035)	Between 976 TWh and 1,201 TWh
Global solar irradiation	1,307 kWh/m² a

* Average exchange rate 2013: 1 Euro = 132.04 Yen

Sources: AA (2012), CIA (2012), GTAI (2014), Trading Economics (2013), EIA (2012), IEEJ (2013), IEA (2013)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (annual installed capacity)	2012: 2 GW	2013: 6.9 GW	2014e: 8 GW	2015e: 6 GW
National PV target 2030	▪ PV share in electricity mix: 6 %		▪ RE share in electricity mix: 25 - 30 % (depending on scenario)	
Main market drivers 2013	▪ Highest PV feed-in tariff worldwide, therefore particularly relevant for large-scale plants (but limited availability of land) ▪ Shutdown of nuclear power plants after Fukushima disaster and growing interest in alternative forms of energy generation			
Tariff 2013	▪ Japan's support scheme is based on a feed-in tariff policy. Plants larger than 10 kW are receiving 32 Yen/kWh incl. tax and plants smaller than 10 kW receive 37 Yen/kWh (details on support since 1st of April 2014 see next slide).			
Changes to the PV support regulation	▪ At the beginning of the new financial year on 1st April 2014, the Japanese Government has cut feed-in tariffs for commercial PV plants (>10 kWp) by 11 % and for residential PV installations (≤ 10 kWp) by 2.6 %. The Ministry of Economy, Trade and Industry in Tokyo has implemented the reduction suggested by the Procuring Committee for Solar Energy in March 2014. The tariff for systems with a capacity of > 10 kWp (commercial installations) has been reduced to 32Yen/kWh (before 38 Yen), for rooftop-systems below 10 kWp (households) to 37 Yen (before 38 Yen). The tariff applies to PV plants, which are connected to the grid between 1st April 2014 and 30th March 2015, for a duration of 20 years (≤ 10kW: for 10 years).			

Source: METI (2014)

MAIN PV SUPPORT SCHEME: METI PV FEED-IN TARIFF

Support Scheme	Details

Act on Purchase of Renewable Energy Sourced Electricity by Electric Utilities	▪ Art. 6: Operators are receiving the applicable feed-in tariff for 20 years, if the Ministry of Economy, Trade, and Industry (METI) has issued permission by 30th March 2015. All documents for the permission must be handed in in Japanese.
	▪ Requirements for modules:
	  ▪ Monocrystalline or polycrystalline silicon: capacity factor of 13.5 % (average yearly load) or higher
	  ▪ Thin film semiconductors: capacity factor of 7.0 % or higher
	  ▪ Compound semiconductors: capacity factor of 8.0 % or higher
	▪ Next adjustment to the feed-in tariff are expected for March 2015.
	▪ Feed-in tariffs are generally valid for plants, which have or will receive approval from METI between 1st April 2014 and 30th March 2015.

	≤ 10 kW (private households)	> 10 kW (commercial installation)
Tariff according to capacity	37 Yen / kWh (28.02€ct / kWh*) Fixed for 10 years.	32 Yen / kWh (24.24€ct / kWh*) Fixed for 20 years.

* Average exchange rate 2013 : 1 Euro = 132.04 Yen

English version of the act http://k.lenz.none/LB/?p=6240

Sources: JETRO (2013c) , Baker & McKenzie (2013) und METI (2013)

OVERVIEW OF OTHER PV SUPPORT SCHEMES

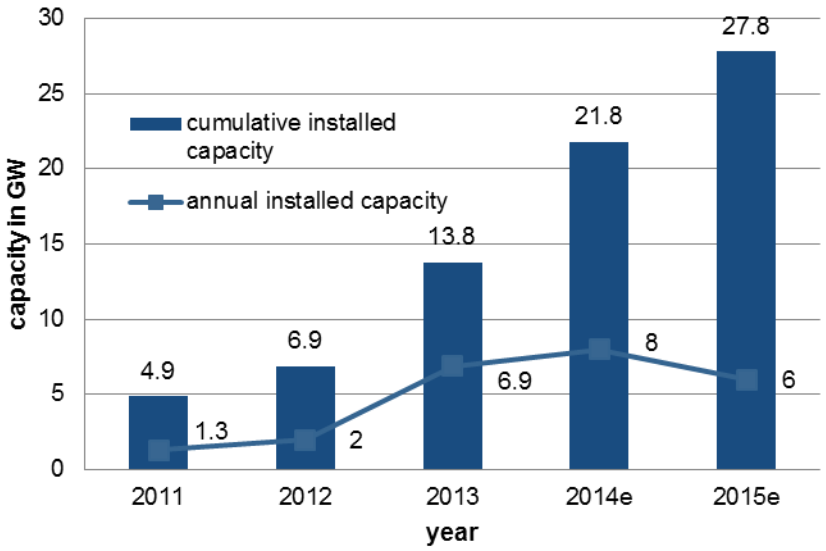
Institution	Support Scheme
METI	**Special depreciation of solar projects:** two options - 100 % depreciation of costs of solar components or 30 % depreciation of costs of solar components (remaining costs will be covered by the yearly depreciation).
METI	**Tax relief for SMEs** of more than 7 % for PV components, which will reduce the tax revenue. Contact: Green investment tax credit: http://www.enecho.meti.go.jp/greensite/green/index.html
METI	**Covers 10 % of implementation costs for PV-systems** (up to 80.000 Yen/kW) in the regions that suffered from the earthquake in 2011. The support applies to systems larger than 10 kW.
MoE	**Finances of up to 50 % of project costs** in order to support the reduction of greenhouse gas emissions. Funding is intended primarily for low-energy housing. The MoE provides the possibility to fund 50 % of the project costs when implementing rooftop systems. The "Law Concerning the Promotion of Measures to Cope with Global Warming" provides the legal basis for this.
MLIT	The **MLIT covers operation costs for greenhouse gas reduction projects** or provides lump sum payments for the implementation of these projects. PV projects can apply for these support schemes.
MAFF	**Support of PV systems in rural areas:** this support scheme covers e. g. PV systems on agricultural buildings, fishery buildings, and forestry establishments. The "Project for early establishment of renewable energy supply models in rural areas" started in 2012.

All programs and schemes are subject to verification by the respective Ministries and authorities. Therefore, the actual payment can vary. Furthermore, regional prefectures, counties, and municipalities offer schemes to promote renewable energies. In 2012 , according to the International Energy Agency 1,096 different support schemes were provided. In general, regional schemes are drafted on a yearly basis. In 2012, they were between10,000 and 50,000 Yen/kW installed capacity depending on the region. Further information can be found at local Invest Japan Business Support Center (IBSC) and banks.

Sources: IEA (2013) and Baker & McKenzie (2013) .

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity



The main barrier of the Japanese PV market

Scarcity of Areas
Based on Japan's topography exists a limited availability of areas for ground-mounted PV systems. Due to the rapid development of ground-mounted systems are large amounts of available sites already used.

Grid infrastructure
Japan is currently expanding its grid infrastructure in order to integrate more renewable power.

Sources: dena (2013), dena (2014), EPIA (2014), projection until 2015 based on GlobalData (2014) and BSW-Solar

Source: PV-Tech (2013)

MARKET NEWS (1/3)

Date	Topic	Source
07/10/2014	Tokyo Electric upgrading grid with 100-km-long transmission line Tokyo Electric Power Co. is building a 100-kilometer-long electricity transmission line in central Japan as part of the country's efforts to upgrade its grid infrastructure in view of surging renewable power.	PV-Magazine
01/10/2014	Japan May Apply Solar Brakes With Rate Overhaul, Yomiuri Reports Japan may revise its incentive program for clean energy to stem the rush of solar power producers trying to secure higher rates before the end of the fiscal year, the Yomiuri newspaper reported today. Under the current program, renewables producers qualify to sell their power at the fixed rate set at the time they win approval from the government. The rules may change so that solar developers will only be able to get the price at the time they begin producing power, which is typically lower, according to the newspaper, which did not say where it got the information.	Bloomberg
24/09/2014	Japan poised to top 8 GW solar installations this year Pro-solar initiatives laid down by Japan's Ministry of Economy, Trade and Industry (METI) will add more than 8 GW of solar PV capacity this year, according to research by consulting firm GlobalData.	PV-Magazine
11/09/2014	Japan's METI Says 1,820 Megawatts of Solar Projects Canceled Developers have canceled or abandoned 1,820 megawatts of solar power projects in Japan as the government investigates whether approved developments are moving ahead as planned. So far, 647 projects have been canceled or abandoned after getting approval in fiscal 2012, Yoichi Kimura, an official in charge of clean energy projects for the ministry of Economy, Trade and Industry, said at a taskforce meeting yesterday.	Bloomberg
01/09/2014	Utility scale projects boosting Japan's domestic solar sector According to data compiled by the Japan Photovoltaic Energy Association (JPEA), local solar shipments reached 1,882 MW in the three months up to June 30, representing a first quarter increase of 14% on last year, when shipments were 1,654 MW for the same period (In Japan, the first quarter of the year is calculated from the beginning of April).	PV-Magazine

MARKET NEWS (2/3)

Date	Topic	Source
20/05/2014	Japan's solar PV market falls slightly in February 2014 to 532 MW Japan installed 88 MW of residential and 444 MW of "non-residential" solar photovoltaics under its feed-in tariff during February 2014, according to statistics released by the nation's Ministry of Economy, Trade and Industry (METI). This is a 6.5 % fall from January 2014 installation levels, as the fourth month of decline from a peak of 655 MW in October 2013.	SolarServer
23/04/2014	Japan's largest PV plant powers up Commercial operations have begun on Japan's largest utility-scale PV plant to date. The 82 MW 'mega solar' plant is located in Oita City, in southern Japan, and was built by conglomerate Marubeni which recently moved in to large-scale solar project construction. Power from the plant will be sold to Kyushu Electric Power Company under a 20-year power purchase agreement, with annual output expected to total 87 million kWh.	PV-Tech
15/04/2014	Japan approved 475 MW PV project in the south of the country (in German) Japan's Ministry of Economy, Trade and Industry approved plans of Photovolt Development Partners GmbH (Berlin) and the U.S. company TeraSol to construct photovoltaic plants with 475 MW rated capacity in total. The plants are to be built at several locations on an island in southern Japan.	SolarServer
26/03/2014	METI approves feed-in tariff reductions Japan's Ministry of Economy, Trade and Industry (METI) has accepted the proposal of an expert committee and approved solar photovoltaic (PV) feed-in tariff reductions for the nation's fiscal year beginning 1st April 2014. Feed-in tariff levels for PV plants larger than 10 kW will fall 11 % to JPY 32 (USD 0.31) per KWh, and levels for plants smaller than 10 kW will fall 2.7 % to JPY 36 (USD 0.35) per kWh. The contract period for plants above 10 kW is 20 years, for smaller plants 10.	SolarServer

MARKET NEWS (3/3)

Date	Topic	Source
14/11/2013	Japan announces closing date for residential PV subsidy applications The Japanese Ministry of Energy, Trade and Industry (METI) has announced that applications for subsidies under the country's feed-in tariff programme for residential PV installations will close at the end of next March.	PV-Tech
27/09/2013	Market for large-scale solar in Japan to wane after 2014 fiscal year, Yano reports The Japanese Yano Research Institute is expecting a reduction in the PV market segment of ground-mounted and large-scale systems for the end of the financial year 2014. This is based on the reduction in tariffs as well as on the lack of available sites in the country.	PV-Magazine
02/09/2013	Eurus is planning 115-Megawatt plant in Japan Eurus Energy Holdings Corporation, a Japanese project developer, has presented plans for the construction of a large scale PV system with a capacity of 115 MW in the north of Japan. The system consists of two parts and will be constructed in the prefecture Aomori in the district of Konikita, according to a press release. The Japanese technology group Mitsubishi Electric Corporation as well as the Japanese subsidiary of the US manufacturer Sunpower will be delivering the modules. The completion of it is scheduled for November 2015.	http://eurus-energy.com

CONTACT INFORMATION

Category	Name	Website
Ministry for Economy	Ministry of Economy, Trade and Industry (METI)	www.meti.go.jp
Institute for Energy	Institute of Energy Economics Japan (IEEJ)	eneken.ieej.or.jp
Agency for Natural Resources and Energy	Agency for Natural Resources an Energy (ANRE)	www.enecho.meti.go.jp
Public R&D-Institution	New Energy and Industrial Technology Development Organisation (NEDO)	www.nedo.go.jp/english
AHK Japan – German-Japanese Chamber of Industry and Commerce	AHK Japan – Deutsche Industrie- und Handelskammer in Japan	www.japan.ahk.de
Office for the Certification of Systems	Japanese Industrial Standard (JIS)	www.jisc.go.jp/eng
Regulatory Authority	Electric Power System Council of Japan (ESCJ)	www.escj.or.jp
Government Financing Institution for Renewable or Solar Projects	New and Renewable Energy Division (NRED)	www.meti.go.jp
Federation of Energy Providers	Federation of Electric Power Companies (FEPC)	www.fepc.or.jp/english
Power Exchange	Japan Electric Power Exchange (JEPX)	www.jepx.org/English/index_e.html

CONTACT INFORMATION

Category	Name	Website
Solar Industry Association	Japan Photovoltaic Energy Association (JPEA)	http://www.jpea.gr.jp/index.html
Financing	Muziho Financial Group	www.mizuho-fg.co.jp/english/index.html
Support Scheme	Japan Photovoltaic Expansion Center (J-PEC)	http://www.j-pec.or.jp

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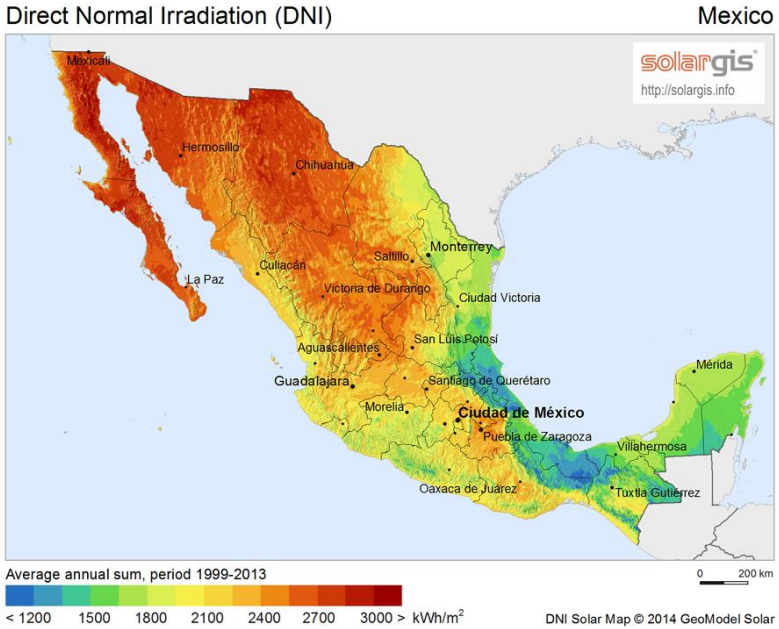
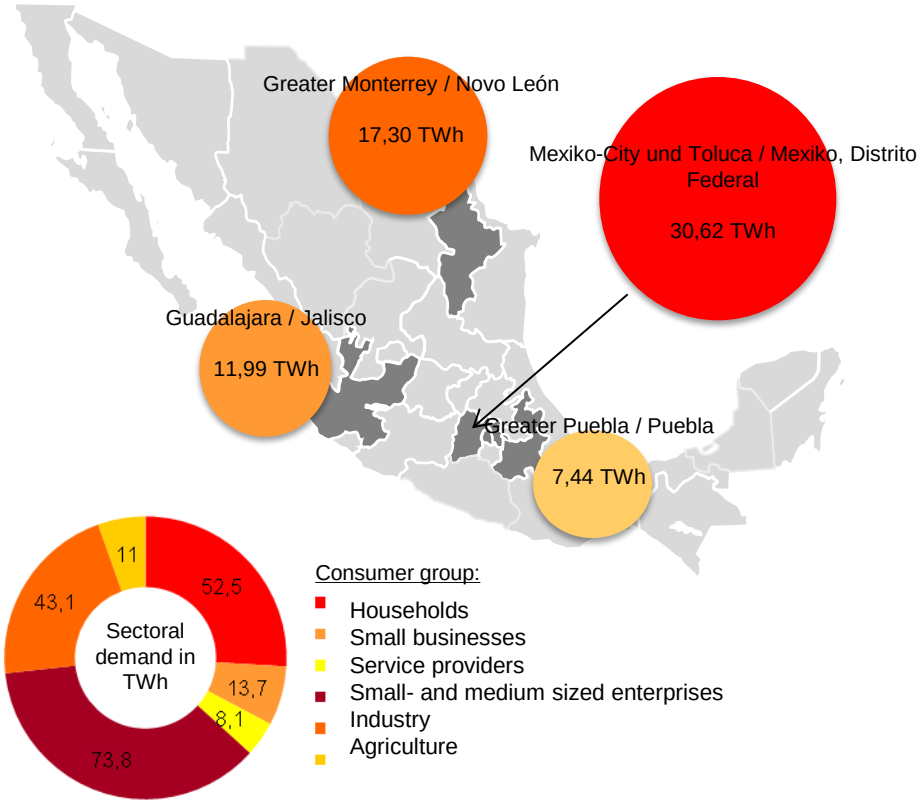
Annual average solar irradiation



Source: SolarGis (2014)

Population density: regions with high electricity demand



Source: dena (2012a)

BASIC DATA

General basic data (2014)			
Area	1,964,375 km²	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 / m² a

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

Sources: CIA (2013), dena (2012a), EIA (2013), EZB (2013), IMF (2013), SENER (2014a,b), GTAI (2014)

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	▪ Profitability/competitiveness of PV power ▪ High solar irradiation, in particular in the northern regions of Mexico. ▪ Many households pay an unsubsidized electricity price for large-scale consumption, so that their electricity bills can be reduced with the help of PV. ▪ Net metering rules since 2009, details see following slide. ▪ Possibility to receive an authorisation for exporting PV electricity - cross border PV projects are planned with the USA. ▪ Possibility to receive an authorisation for rural electrification: PV system prices are competitive with conventional power solutions in off-grid areas. ▪ Farms, commercial or industrial customers are interested in self-consumption solutions based on or combined with PV.			
PV support scheme 2014	▪ A net metering program for small scale PV installations ≤ 30 kW exists with grid access and grid connection to the low voltage grid of utility CFE. ▪ Marketing/sale of electricity from large-scale PV power plants. ▪ Details on all support programmes see next two slides.			
Recent changes to the PV support regulation	▪ 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. ▪ 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 15th 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)			

Sources: dena (2012a), EPIA (2012)

OVERVIEW OF PV SUPPORT SCHEMES (1/3)

Category	Details
Net metering for small-scale PV	Net metering (the so called Esquema de Interconexión para fuente de Energía Solar a pequeña escala) for small-scale PV systems ≤ 30 kWp with grid connection to the low-voltage grid of CFE: ▪ Private households: eligible system capacity ≤ 10kWp ▪ Companies: eligible system capacity ≤30 kWp ▪ Industrial companies: with grid connection to a medium voltage grid < 500 kWp
Marketing / commercialising of electricity from large-scale PV until August 2014	▪ 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: ▪ Self-consumption (for PV systems> 500 kWp) - power generation for captive use ▪ Small production / Small Scale Producer for PV systems > 500 kWp: ▪ PV power generation for rural electrification in off-grid systems (<1 MWp) ▪ PV power generation and sale to the CFE with a maximum of 30 years or possibility of electricity exports for operators of PV plants <30 MWp ▪ Independent Power Producer (IPP) for PV plants > 30 MWp: production and sale to the CFE maximum of 30 years and possibility of exports. ▪ 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.

Sources: dena (2013) Chadbourne & Parke LLP (2014), PwC (2014)

OVERVIEW OF PV SUPPORT SCHEMES (2/3)

Category	Details
Energy market reform since August 2014	• 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. • 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. • 11th 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. ▪ 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. ▪ 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). ▪ Qualified (industrial) customers will be able to purchase directly from power generators.

Marketing of electricity from large-scale PV since August 2014	▪ Self-consumption: PV power generation for captive use
	▪ PV electricity producers:
	  ▪ PV power generation for rural electrification in off-grid systems.
	  ▪ PV power generation and sale 1) to electricity traders 2) at the new power market or 3) directly to customers.

Sources: Chadbourne & Parke LLP (2014), PwC (2014), dena (2014)

OVERVIEW OF PV SUPPORT SCHEMES (3/3)

Category	Details
Exemption of import and export duties	▪ Systems and components, which comply with the guidelines of the Ministry of Environment, are exempt from import and export duties.
Accellerated depreciation	▪ Investments in plants and machinery for electricity generation from renewable sources may be entirely offset against tax.
Fund to promote energy transition	▪ 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&D projects). ▪ 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 www.sener.gob.mx (category „Incentivos y Financiamento“).

Fund to promote sustainable energy use	▪ The so called Fondo Sectorial de Energía-Sustentabilidad Energética (SENER-CONACYT) is used to finance R&D projects in the field of renewable energies, which are managed by Mexican institutes.
	▪ The allocation passes three steps:
	  ▪ 40 % with signature of contract
	  ▪ 50 % with evaluation of the first project phase
	  ▪ 10 % with completion of project
	▪ The fund is financed by tax earnings out of crude oil and natural gas revenues.

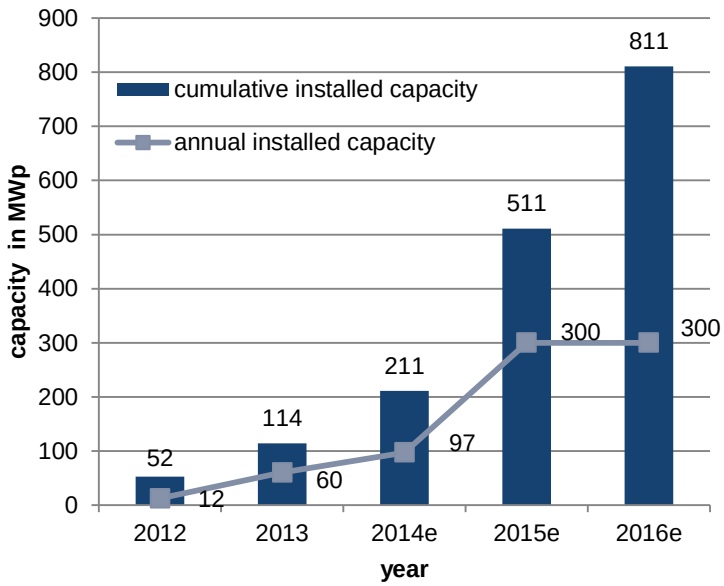
* Exchange rate according to Oanda.com 22/11/2012: 1 € = 16.68 MXN

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).

Source: dena (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..

Sources: EPIA (2012), IIE (2011), dena (2012), CNNExpansión (2013), Practical Law (2014)

MARKET NEWS (1/4)

Date	Topic	Source
01/10/2014	Latin American solar markets explode in 2014, 2015 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.	PV-Magazine
04/09/2014	Mexican PV project to light up Chihuahua 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.	PV-Magazine
14/08/2014	Mexican energy reforms to benefit solar On 11th 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.	PV-Magazine

MARKET NEWS (2/4)

Date	Topic	Source
30/07/2014	California Joins Mexico in Clean-Energy Pact California and Mexico have signed a bilateral pact aimed at advancing cross-border investments in clean energy. Signed 29th 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. 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.	Bloomberg
28/05/2014	Intersolar Summit Mexico: Industry experts expect a positive development of the Mexican photovoltaic market in the near future Participants of the Intersolar Summit in Mexico City, which took place on 15th 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.	globalsolartechnology.com
12/03/2014	Mexico moves up to third in IHS Emerging Market Report Boosted by the 300 MW of PV capacity under construction, IHS ranks the Central American nation third behind South Africa and Turkey.	PV-Magazine

MARKET NEWS (3/4)

Date	Topic	Source
27/02/2014	Mexico – building a renewable energy market without conventional feed-in-tariffs 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.	Apricum Group
20/12/2013	Mexico to lead Latin America PV in 2014, say GTM Research The analysts forecast that the Mexican solar market will grow to 240 MW next year, out-stripping 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.	PV-Magazine
06/10/2013	Biggest PV plant with 30MW opened 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.	El Financiero

MARKET NEWS (4/4)

Date	Topic	Source
17/09/2013	Tax reform sees cancelling tax breaks for renewable systems and components 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	Land of the Sun: Solar PV in Latin America 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	Permit for 27 MW solar park issued 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)	www.sener.gob.mx
Ministry of Economics and Industry	Secretaría de Economía (SE)	www.economia.gob.mx
German-Mexican Chamber of Commerce	Deutsche- Industrie- und Handelskammer in Mexico (AHK)	www.mexico.ahk.de
Solar Energy Association	Asociación Nacional de Energía Solar (ANES)	www.anes.org
National Energy Authority	Comisión Nacional Para El Uso Eficiente De Energía (CONUUE)	www.conuee.gob.mx
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)	www.cfe.gob.mx www.lfc.gob.mx
National Transmission Grid Operator	Comisión Reguladora de Energía (CRE)	www.cre.gob.mx
Energy Research Institute	Instituto de Investigaciones Electrica (IIE)	www.iie.org.mx

Sources: dena (2012), dena (2012a)

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Study

MARKET INFO MOROCCO – PHOTOVOLTAICS

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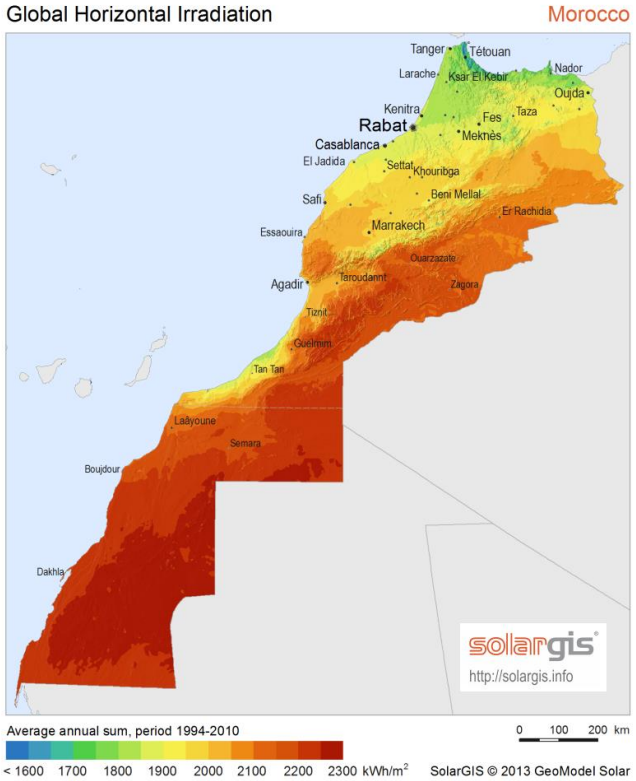
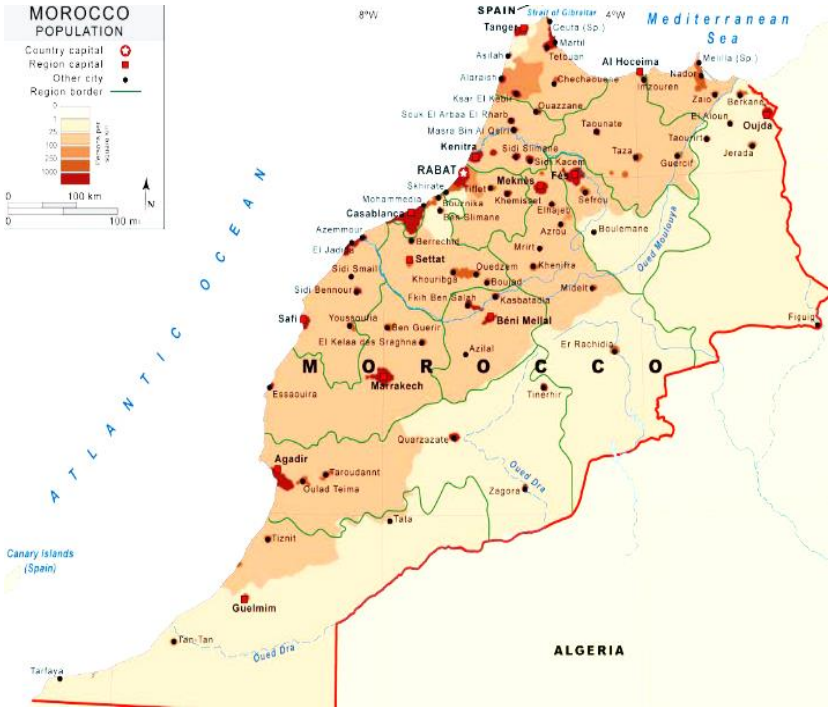
SOLAR IRRADIATION & POPULATION DENSITY

Annual average global solar irradiation



Source: SolarGis (2013)

Population density



Source: World Trade Press (2007)

BASIC DATA

General basic data (2014)			
Area	446,550 km²	GDP per capita (est.)	28,375 DH (~2,518€*)
Population (est.)	33.2 m	GDP growth (est.)	3.9%
Language	Arabic, Berber languages	State budget	Revenue: 26.07 bn US-Dollar Spending: 34.51 bn US-Dollar
Government type	Constitutional monarchy	Inflation	2.5%
Administrative division	15 regions	Unemployment rate (est.)	9.1%

Basic energy market data (2012)	
Electricity generation	26.49 TWh
Electricity consumption	31.05 TWh
Electricity import (net)	4.84 TWh
Electricity price (2014)	Industrial: 1.23 – 1.51 DH / kWh (0.109-0.134 € / kWh*) Residential: 1.37 -1.54 DH / kWh (0.122-0.137 € / kWh*)
Share of renewable energy capacity	9.65 % (2.76 % Wind, 6.89 % hydro power)
Increase of electricity consumption (2012 - 2020)	7.7 %
Annual average solar irradiation	approx. 2,000 kWh / m² a

*Average exchange rate March 2014 GTAI: 1 Euro = 11.265 DH

Sources: Bank al-Maghrib (2013), CIA (2013), IMF (2013), MEM (2012 / 2013), ONE (2013), ONEE (2014), GTAI (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (annual installed capacity)	2012: 5 MW	2013e: 3 MW	2014e: 4MW	2015e:55 MW
National PV target 2020	500 MWp			
Main market drivers 2014	▪ High dependency on imported fossil fuels, high electricity prices. ▪ The Moroccan Solar Plan of 2009 states that by 2020 large-scale solar power plants (mainly CSP, but also PV) with a cumulated capacity of 2,000 MW are going to be built. ▪ The first planned concentrated solar power plant (CSP) was awarded to a consortium of the Saudi-Arabic company Acwa Power in September 2012. The Moroccan Solar Plan sets the share of PV capacity at 20 % (400 MW), according to MASEN, which is coordinating the tender processes for new capacities. ▪ In August 2013, a capacity of approx. 128 MWp was in the PV project pipeline.			
Legislation and PV support in 2014	▪ Morocco released a renewable energy law in 2010 (law number. 13-09). ▪ However, this law does not define a comprehensive strategy for the implementation of renewable energy in Morocco. It enables renewable electricity generation in general, but hinders i. a. the feed-in of solar electricity into the distribution grids. ▪ According to the Ministry of Energy there are no plans to adopt a FIT system for renewable energy – not even in the long-run. But a revision of the law concerning the possibility of feeding electricity into distribution grids is currently being discussed.			

Newly established agencies	▪ The following institutions for the support of renewable energy were established:
	  ▪ National Agency for the Development of Renewable Energies and Energy Efficiency (ADEREE)
	  ▪ Moroccan Agency for Solar Energy (MASEN)
	  ▪ Société d'Investissements Energétiques (SIE), the National Agency for Investment and Renewable Project Financing			

Sources : MEM (2012), dena (2012), dena (2012b), PV-Magazine (2013), ClearSky (2013)

OVERVIEW OF PV SUPPORT SCHEMES

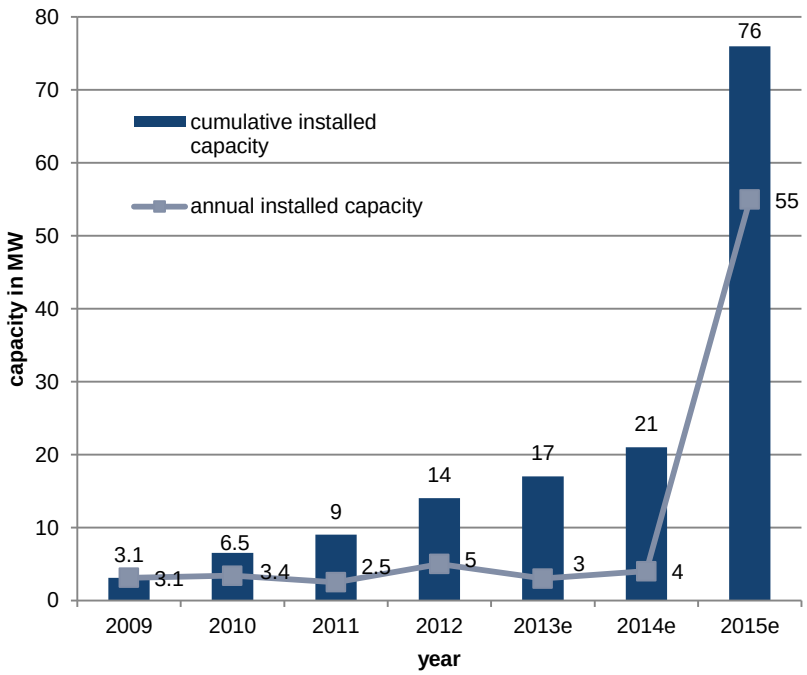
Support / Regulation	Details
Renewable Energy Law (Nr. 13-09)	▪ The renewable energy law (number 13-09) regulates the support of electricity generation, trade and export of renewable energies. ▪ Plants with a capacity > 2 MW need a pre-approval. ▪ Plants with a capacity between 20 kW ≥ 2 MW need an informal registration. ▪ Law Number 13-09 authorises commercial plant operators to generate renewable electricity and to transmit it through electricity grids of medium or high voltage or through maximum voltage grids.
Fonds Capital Carbone Maroc (FCCM)	▪ This fund was established to promote Clean Development Mechanism (CDM) projects in Morocco and to reach the carbon-reduction goals set by the Kyoto Protocol. ▪ Renewable energy, energy efficiency, waste management and reforestation projects were eligible. ▪ However, due to high administrative barriers only five CDM projects have been developed since 2008 (no solar project was registered).
Société d'Investissements Energétiques (SIE)	▪ Investor and co-developer during renewable energy project development: The agency supports projects within the Moroccan Solar Plan as well as other projects that increase the share of renewables and promote energy efficiency.

Moroccan Integrated Solar Plan	▪ In the 4th development phase of the project „NOOR - Ouarzazate Solar Power Station“ the first construction of a PV plant with a capacity of 50 MWp is scheduled.
	  ▪ Project awarding will be conducted via tender by MASEN.
	  ▪ Bids can be handed in from July until September 2014.
	  ▪ The awarding of the project developer is planned for November 2014.
	  ▪ The plant has to be operational by October 2016.
	▪ In 2012 Fraunhofer ISE suggested to MASEN to carry out the following tenders for new PV capacities in the coming years to fulfil the Moroccan Integrated Solar Plan:
	  ▪ 2013, 50 MW; 2014, 50 MW; 2015, 75 MW; 2016, 75 MW; 2017, 100 MW; 2018, 100 MW; 2019, 125 MW

Sources : dena (2012), dena (2012b) MASEN (2013), SEE (2014), Fraunhofer ISE (2012)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity



Sources: dena (2012), Forecast 2015: dena (2014)

The main barriers in the Moroccan PV market

Lack of liberalisation in the electricity market:

- ONEE, the state-owned energy and water supplier, is the main electricity grid operator and dominates the energy supply system.
- Generally electricity generation is only possible through power purchase agreements with ONEE.
- New generation capacities are only tendered through and awarded by ONEE.

Lack of political support for PV:

- The renewable energy law does not allow feeding electricity into low voltage grids. Large PV market segments (private households, small enterprises) can use PV electricity for self consumption only.
- Even in the long-run there is no FIT system considered.
- The Moroccan Solar Plan favours large-scale CSP plants, PV is marginally represented with 400 MW.

Administrative barriers:

- All plants with a capacity > 2 MW need an official approval of operation.
- Administrative processes are rather time-consuming, which is why developers should allow extra time in their planning.

Sources : dena (2012), dena (2012b) FIRM (2014)

MARKET NEWS

Date	Topic	Source
08/04/2014	Energy-saving measures for 15,000 mosques The Secretary of Energy and the Minister of Islamic Affairs presented the project "Green Mosque" and approved a related package of measures. The program foresees measures regarding efficiency and the use of PV systems for around 15,000 mosques in the country.	L'Agence France-Presse
13/05/2013	Morocco: German Government to participate in worlds largest CSP plant (in German) In a joint press release of 10/05/2013 , the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and the Federal Ministry for Economic Cooperation and Development (BMZ) have announced that the construction of the power plant Ouarzazate I in Morocco has started.	Exportinitiative Erneuerbare Energien

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy	Ministère de l'Énergie, des Mînes, de l'Eau et de l'Environnement	www.mem.gov.ma
German-Moroccan Chamber of Commerce	Deutsch-Marokkanische Industrie- und Außenhandelskammer (AHK)	www.marokko.ahk.de
Solar and Wind Energy Association	Association Marocaine des Industries Solaires et Eoliennes (AMISOLE)	www.amisole.com
National Energy Agency	National Agency for the Development of Renewable Energies and Energy Efficiency (ADEREE)	www.aderee.ma
National Solar Promotion Agency	Moroccan Agency for Solar Energy (MASEN)	www.masen.org.ma
State-owned Electricity Utility / Grid operator	Office National de l'Eau et de l'Électricité (ONEE)	www.one.org.ma
National Agency for Investment and Renewable Project Financing	Société d'Investissements Energétiques (SIE)	www.siem.ma

Source: dena (2012b)

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MARKET INFO PHILIPPINES – PHOTOVOLTAICS

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www.export-erneuerbare.de or http://exportinitiative.dena.de

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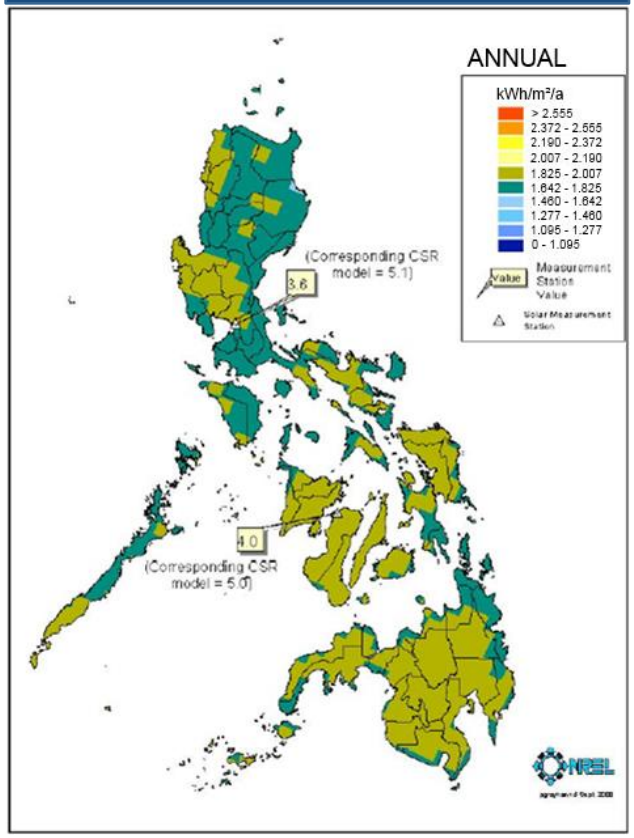
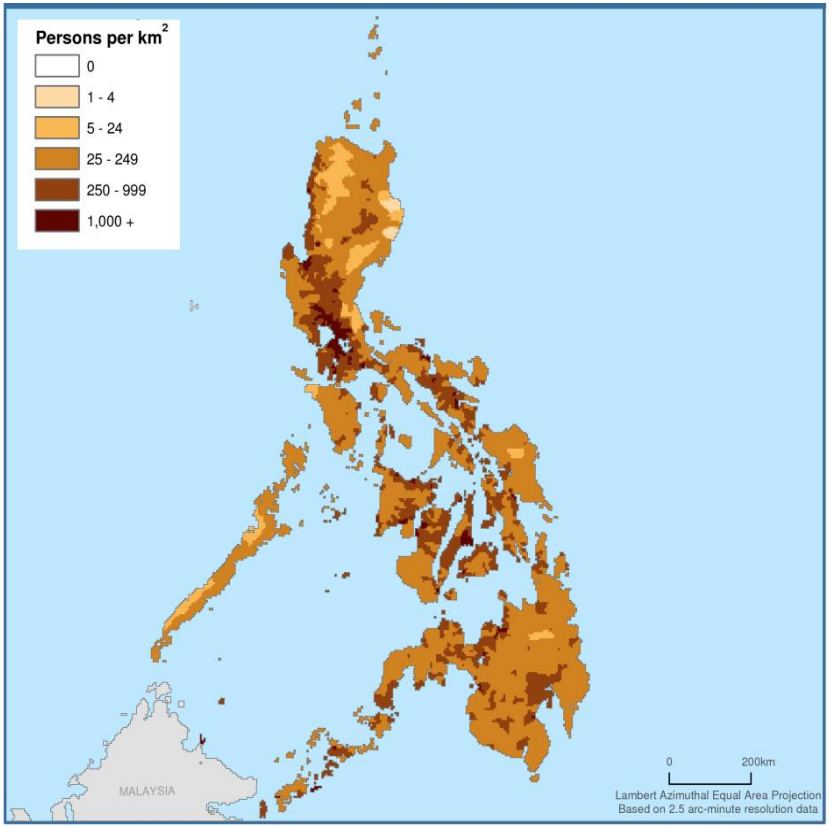
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: NREL (2000)

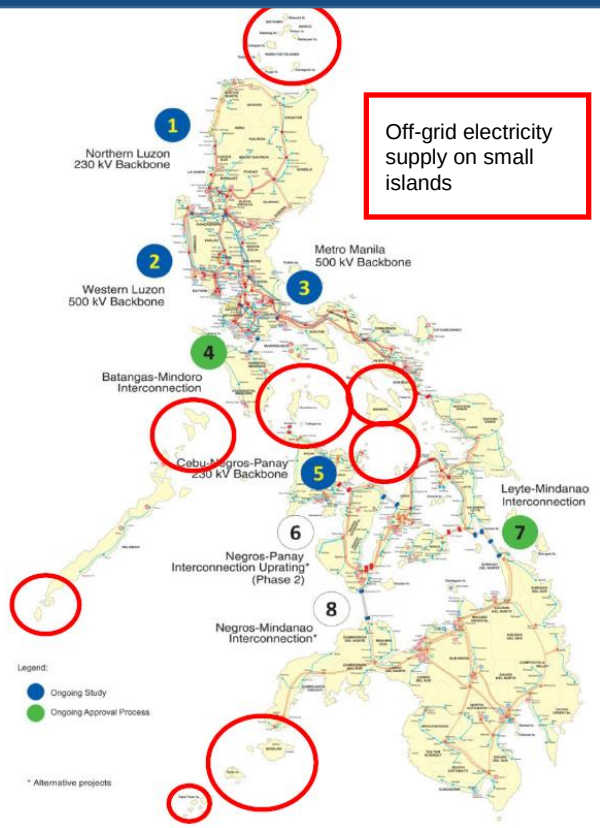
Population density



Source: SEDAC (2000)

OVERVIEW OF ELECTRICITY GRIDS

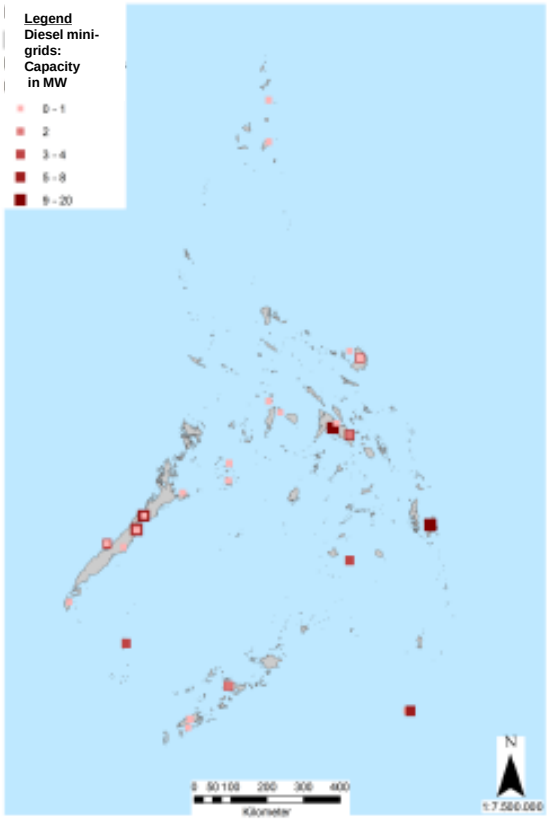
Three transmission grids and development zones



Off-grid electricity supply on small islands

Source: REINER LEMOINE STIFTUNG (2013)

Established diesel mini-grids on the archipelago



Source: REINER LEMOINE STIFTUNG (2013)

BASIC DATA

General basic data (2014)			
Area	299,764 km²	GDP (est.)	12,636 bn PhP (~202.3 bn €**)
Population (2013 est.)	97.5 m	GDP (per capita) (est.)	127,080 PhP (~2,035 €**)
Language	Filipino, English	GDP growth (est.)	6%
Government type	Unitary republic	Inflation (est.)	4.4%
Administrative division	80 provinces and 39 charta - cities	Unemployment rate	6.9% (est.)

Basic energy market data (2012)	
Electricity consumption 2011 (total/per capita)	69.17 TWh/ 734 kWh
Electricity price (industrial), Region Davao del Sur	0.29 PhP/ kWh (0.005 €/ kWh*)
Electricity price (residential), Region Davao del Sur	1.9 PhP/ kWh (0.035 €/ kWh*)
Electricity price / mini-grid (diesel), Balabac Island	30.3 PhP/kWh (0.56 €/kWh*)
Share of renewable energy (electricity consumption 2010)	26.1 %
Increase of electricity consumption (2002 - 2011)	+4.3 %
Electrification rate (households in 2011)	70.2 %
Annual average global solar irradiation	1,825 kWh/ m² a

*Annual average exchange rate 2012 of the European Central Bank (ECB): 1Euro = 54.24 PhP, **exchange rate March 2014: 1Euro = 62.449 PhP

Sources: CIA (2013), DOE (2013), EIA (2011), ERC (2012), IMF (2014), NGCP (2012), GTAI (2014)

PV MARKET INDICATORS

Indicators				
Market size (annual installed capacity) on-grid	2011: 0.256 MW	2012: 1.2 MW (off-grid: 3 MW)	2013: 14.6 MW	2014e: ~ 90 MW
National PV target 2011 - 2020	On-grid: 50 MWp by 2015 and 100 MWp by 2020 (national targets for renewable energies were defined in 2009 and updated in 2011)			
Main market drivers in 2014	▪ The Renewable Energy Act of 2008 defines the development of renewable energies and the ensuing support schemes. Within 20 years renewable electricity capacity shall triple from 5.438 GW in 2010 up to 15.304 GW in 2030. The Department of Energy announced an increase in the market cap for feed-in tariff systems from 50 MW to 500 MW in May 2014. ▪ Substantial market potential for stand-alone PV and PV hybrid-systems (electrification of remote off-grid areas) due to high diesel prices and the structure of the archipelago. ▪ Due to high electricity prices operating PV systems can be profitable even without a FIT. ▪ More and more big PV projects refinance via bilateral power purchase agreements (PPAs).			
PV support scheme since 2012	▪ In July 2012 a FIT has been introduced for PV and other renewable technologies. ▪ With a minimum of 100 kWp capacity on-grid PV installations can earn 9.68 PhP per kWh (~0.17 € / kWh). For details see next slide. ▪ In 2012 other support measures were offered by the Asian Development Bank (ADB) like fiscal supports (see slide 7) and soft loans. ▪ The off-grid market is supported by a generation-based incentive.			
Recent changes to the PV support in 2014 (on-grid)	▪ A net-metering regulation has been implemented in July 2013. ▪ In 2014 a Renewable Portfolio Standard / Renewable Energy Market came into force. ▪ Initially a tender process as an option for negotiation of FIT rates was rejected by the national Energy Regulatory Commission (ERC) because the authority first wants to monitor and develop the PV market with fixed prices for PV electricity.			

Sources: DOE (2012), ERC (2012b), GIZ (2013), PV-Magazine (2013)

OVERVIEW OF PV SUPPORT SCHEMES (1/2)

Support scheme	Details
FIT	▪ The first version of the FIT was released by the Energy Regulatory Commission (ERC) in July 2012 . ▪ PV systems with a minimum capacity of 100 kWp are eligible for the FIT. ▪ Systems with a smaller capacity are eligible for net metering. ▪ The PV tariff is 9.68 PhP per kWh (0.17 € / kWh). After the first year of plant operation the tariff is reduced by 6 %. ▪ The duration of the PV feed in tariff is 20 years. ▪ A limited cumulated PV capacity of 50 MWp will be supported by the FIT - raising the limit to 500 MWp is under discussion.
Tax rebates (on-grid and hybrid-systems)	**Income tax exemption for electricity generators** ▪ Income Tax Holiday (ITH): In the first seven years of running a PV system, the operator of a PV system is exempt from income tax. There are no taxes to pay for revenues of electricity sales, which are earned with PV electricity. Afterwards the income tax is limited to 10 %. The application for ITH has to be handed in before start of operation. **(Alternative) accelerated special depreciation** ▪ A PV system operator who does use the ITH has the possibility of accelerated special depreciation for plant components and equipment. The depreciation rate may not be more than twofold of the usual rate. **Exemption of VAT for sale of electricity** ▪ Electricity generated by a PV system is not subject to VAT. **Other fiscal support** ▪ The sum of property taxes, costs for equipment, material and other project related costs must not be more than 1.5 % of the asset cost. ▪ A PV system operator is exempt from taxes on tradable carbon credits.
Soft loans	▪ The Asian Development Bank (ADB) provides 2.25 bn US $ within the Asia Solar Energy Initiative for the development of solar based generation capacity in Asia and in the Pacific region. ▪ Within this initiative another 6.75 bn US $ of investments in solar technology is planned. The target is to add new solar capacity of 3,000 MWp by the end of 2013.

Sources: DOE (2008), ERC (2012b), ADB (2011)

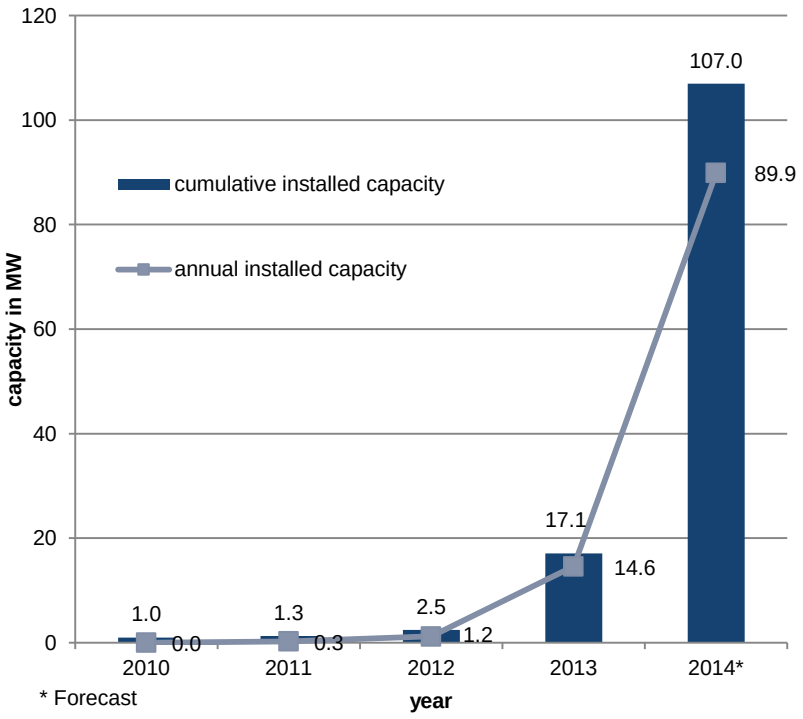
OVERVIEW OF PV SUPPORT SCHEMES (2/2)

Support scheme	Details
Net metering vs. FIT in 2013	▪ In July 2013 the accounting procedure for net-metering as a support for PV plants with maximum capacity of 100 kWp has been published. ▪ The framework for net metering for PV systems with a capacity up to 100 kWp was drawn up by the ERC. Systems with a higher capacity will be eligible for the feed in tariff. ▪ Net metering for off-grid systems should be possible by 2014.
Planned Renewable Energy Market and Renewable Portfolio Standard/ RECs by 2014	▪ Both the RPS and REM schemes are still in planning and are expected to come into effect in 2014. **Renewable Portfolio Standard (RPS)** ▪ The renewable electricity quota, which still has to be defined, will be mandatory for all stakeholders in the electricity industry . This means that every utility has to prove its share of renewables in the electricity sold through renewable energy certificates (RECs). ▪ For on-grid systems this standard should have been introduced in 2013, for off-grid systems in 2014. **Renewable Energy Market (REM)** ▪ The Renewable Energy Market shall be introduced in parallel with net metering and will be the market platform for tradable RECs. ▪ The Renewable Energy Act of 2008 declares that all RECs created through excess electricity via net metering pass into the ownership of the distribution grid operator. ▪ Moreover, a register for proof of origins and for electricity identification shall be introduced.
Generation based incentive for off-grid and hybrid systems	▪ Off-grid systems are supported by a generation based incentive (GBI). ▪ Off-grid system owners are supported by an incentive per generated kWh, which amounts to 50 % of the universal charge. The universal charge is paid by every customer as part of the electricity price and is used to finance electrification projects in the so called Missionary Areas of the state-owned utility NPC.
Exemption of import duties	▪ Machines, plant components and material for renewable technologies are exempt from duties for the first ten years of plant operation.

Sources: DOE (2008), ERC (2012b), GIZ (2013)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity (on-grid only)



Sources: PV-Magazine (2013), DOE (2011), IHS Solar (2013) in PV-Magazine (2014a)

The main barriers in the Philippine PV market

Extensive approval process

- The operation of a PV system requires a range of certificates and approvals.

FIT (FIT):

- The FIT introduced in July 2012 is not lucrative some industry members said.

PV cap

- The ERC determines that only a cumulated capacity of 50 MWp can be installed within the FIT rules, so the market declines in 2015.
- More than 1GWp are still in the project pipeline (legal uncertainty).
- The Department of Energy favours alternative renewable technologies for electricity generation like hydro and geothermal power plants, based on the enormous potential in the country.
- The current focus is largely on new coal and diesel power plants.

Lack of large scale reliable consumers / customers

- Project developers who try to use PPAs to refinance investments, have the problem of selling electricity due to a lack of reliable electricity customers.

Grid-infrastructure

- A lack of transport and distribution grids slow down or hinder the development of grid-connected renewable energy projects.

Corruption

- Even though corruption has been declining in the Philippines over the past years, it is still a problem. At local or regional level this leads to delays in project development.

Sources: ERC (2012b), PSPA (2013), PV - Magazine (2013), PV-Magazine (2013b)

OPPORTUNITIES: OFF-GRID

Criteria	Details
Early market status	▪ At the beginning of 2013 more than 70,000 off-grid solar home systems were installed. ▪ Most of these systems were installed by national utilities or through international development programs.
National Electrification Programme of NPC Operation costs of mini-grids	▪ The goal of the DOE is to increase the electrification rate of households to 90 % by 2017 . ▪ The state owned utility NPC - SPUG was obligated per mandate to be in charge of reaching this goal. ▪ Electrification is mostly achieved though the installation of mini-grids with diesel fired generators in so called Missionary Areas. ▪ Based on high electricity generation costs, the implementation of such mini-grids has to be supported through high subsidies– this often leads to high electricity prices for consumers. ▪ So far there has been hardly any participation of the private sector . ▪ These conditions offer good market chances for PV systems for diesel-grid hybridisation.
PV hybridization of islands grids	 ▪ Stand-alone PV systems can be uneconomic based on needed (cost intensive) back-up/storage technology. ▪ PV integration in existing mini-grids can achieve a drastic reduction of electricity generation costs. ▪ Effects of diesel price fluctuations are lower due the fact that the diesel generator will only be used as back–up power.
Changes of PV support 2013/2014	▪ Since 2011 off-grid systems are supported by financial subsidies. ▪ In 2014 net metering and tradable RECs shall be allowed for off-grid systems – detailed procedures still have to be defined. ▪ Off-grid systems are supported by a generation based incentive (GBI). ▪ Tax rebates (see slide 7) are also valid for hybrid systems.

Sources: DOE (2008), PSPA (2013), RLI (2013)

MARKET NEWS (1/2)

Date	Topic	Source
08/09/2014	Rooftop solar cheaper than coal, says Philippines' energy minister. The Philippines' secretary of energy, Carlos Jericho Petilla said 5th September that rooftop solar is cheaper than coal in the island state. The country relies on importing most of its energy from expensive fossil fuels, subject to price fluctuations. Electricity from a coal plant cost up to PHP5.50 per kWh (US$0.13) plus PHP6.50 (US$0.15) for distribution and transmission, totalling PHP12.00 (US$0.28). Whereas, rooftop solar costs PHP9.00 per kWh (US$0.21) for generation. There are no costs for distribution or transmission, said Petilla.	PV-Tech
02/09/2014	juwi enters Philippine market with utility-scale plant. The German company will provide complete EPC services for the 6.25 MW solar farm, which is replacing old diesel generators. The project is one of a number of projects in the company's pipeline. The solar farm is scheduled to be completed by early next year and will have an installed capacity of 6.25 MW. The plant's 20,500 PV modules will produce more than 9 million kilowatt hours of electricity a year. Amiram Roth-Deblon, juwi's regional director for Asia-Pacific, added that while the Mindanao plant was the company's first project in the Philippines, "there is already a well filled project pipeline and in the next weeks we are expecting to close several additional projects."	PV-Magazine

MARKET NEWS (2/2)

Date	Topic	Source
20/05/2014	Philippines Department of Energy plans to increase FiT cap by factor of ten The Philippine Department of Energy (DOE) has announced plans to raise its feed-in tariff (FiT) cap to 10 times more than the current rate. Mario C. Marasigan, the DoE's director for renewable energy, told local media: "We are working on it. Very soon, NREB (National Renewable Energy Board) will endorse the new installation target for solar." When asked if the new cap will be set at 500 MW – ten times the current 50 MW – Marasigan stated that the DOE and NREB were "working on that figure".	PV-Tech
15/05/2014	Conergy puts online the largest solar PV plant in the Philippines at 13 MW Conergy AG (Hamburg) has commissioned a 13 MW solar photovoltaic (PV) plant in the Philippines as the first phase of a 22 MW PV project, the San Carlos Solar (SaCaSol). This is the largest PV project in the nation to date, and Conergy expects to complete the second 9 MW phase by mid-2014. Through the Philippines' feed-in tariff, electricity from the plant will be sold at PHP 9.68 (USD 0.22) per kWh.	SolarServer
24/09/2013	Philippines to reach 5 MW solar capacity by year's end The Philippines are on course to more than double its solar capacity from 2 to 5 MW before the end of 2013, according to the Philippine Solar Power Alliance (PSPA).	PV-Magazine
19/07/2013	Approval for 30 MW project in the Philippines The 55 m US Dollar PV project in Ilocos Norte is the third to win a certificate of commerciality in the country. South Korean developers expect to be fully operational in late 2014.	PV-Magazine

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy	Department of Energy (DOE)	www.doe.gov.ph
National Energy Market Authority	Energy Regulatory Commission (ERC)	www.erc.gov.ph
State-owned Electric Utility	National Power Corporation (NPC)	www.napocor.gov.ph
National Transmission Grid Operator	National Grid Corporation of the Philippines (NGCP)	www.ngcp.ph
National Electrification Authority	National Electrification Administration (NEA)	www.nea.gov.ph
Renewable Energy Industry Association	National Renewable Energy Board (NREB)	www.comste.gov.ph/nreb
Solar Industry Association	Philippine Solar Power Alliance (PSPA)	www.phsolar.org
“Going-private” Authority in the Power Sector	Power Sector Assets & Liabilities Management Corporation (PSALM)	www.psalm.gov.ph

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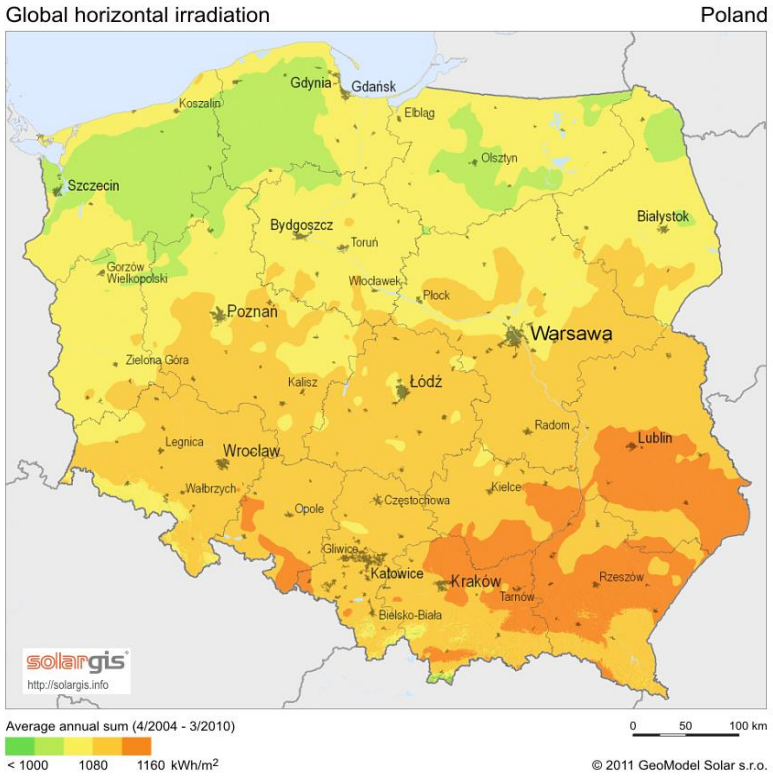
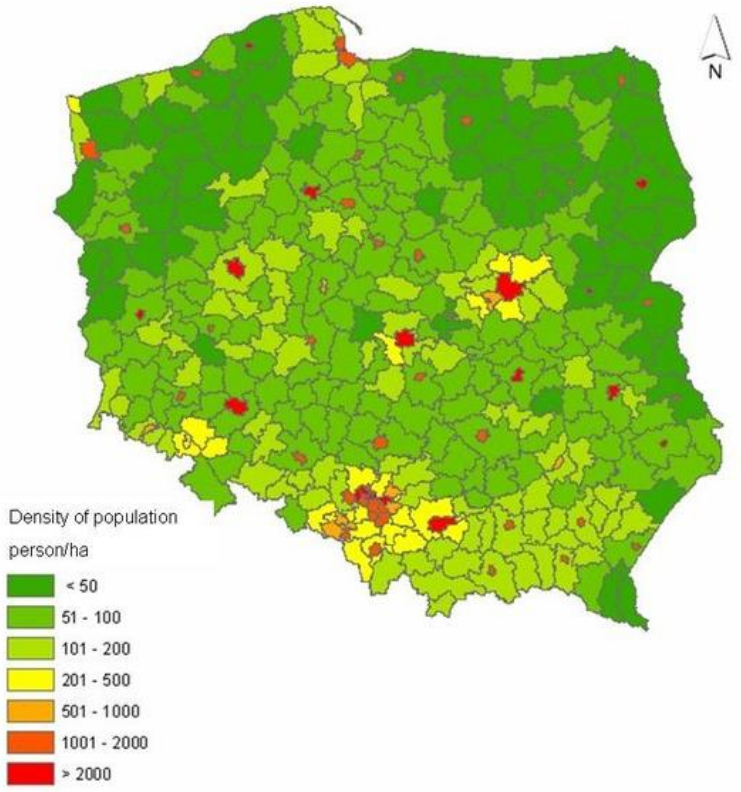
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGis(2014)

Population density



Source: EEA (2014)

BASIC DATA

General basic data (2013)			
Area	312,685 km²	GDP (est.)	814 bn €
Population (2014 est.)	38,346,279	GDP per capita (est.)	21,100 €
Language	Polish	GDP growth (est.)	1.3 %
Government	Federal republic	Inflation (est.)	1 %
Administrative division	16 provinces	Unemployment rate (est.)	10.3 %

Basic energy market data (2012)	
Final energy consumption	1,122 TWh
Electricity consumption	122.646 TWh
Total electricity import	9.803 TWh
Total electricity generation	162.139 TWh
Electricity price 2013 (industry, consumption 500 - 2,000 MWh/a)	9.31 € ct/kWh (~ 0.39 PLN*/kWh)
Electricity price 2013 (households, consumption 2,500 – 5,000 kWh/a)	14.8 € ct/kWh (incl. tax) (~0.62 PLN*/kWh)
Share of renewable energy (electricity consumption)	8.8 %
Increase of electricity consumption (2002- 2012)	25.74 %
Global solar irradiation	950 – 1,250 kWh / m² a

* Currency exchange: 1 € = 4.1975 PLN

Sources: CIA (2014), IEA (2014), Eurostat (2014), OECD (2014), AHK-Polen (2011)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (annual installed capacity)	2010: 0.1 MW	2011: 1.1 MW	2012: 1.4 MW	2013: 0.6 MW
National PV target	600 MW by 2020			
Main market drivers for renewable energy projects 2014	• The resolution "Energy Policy of Poland until 2030" (11/2009) describes the framework for the development of the Polish energy sector over the next 16 years. Here, the development of new RE electricity generation capacities and the possible construction of nuclear power capacities is forecasted. • Currently, the renewable power generation (including grid-connected PV) is supported by a quota system in combination with tradable green certificates (cf. slide 6). However, so far the operation of grid-connected PV systems using tradable green certificates is not profitable. A new RES Act, which has not yet been adopted, should change this (cf. slide 7).			
PV support till 2014	▪ Since 2005 renewable power generation is supported through trading so-called green certificates at the Polish energy exchange. Producers currently receive guaranteed € 50.34 / MWh from the Energy Regulatory Office (= one green certificate). Since the amount of certificates received per generated MWh is the same for all renewable electricity generating technologies, the operation of PV plants through direct marketing in combination with green certificates is currently economically not feasible. Instead, biomass and wind power plants have been built in Poland to date. Utilities have to prove their fulfilment of the renewables quota (2014: 13 % of sold electricity has to come from renewables) through green certificates or face penalty payments.			
Recent changes in PV regulation	▪ Draft act of Renewable Energy Sources Act (EEG): The final draft in version 6.3 was adopted on 28th March 2014 by the government and could probably come into force by the end of 2014 after approval by the Parliament, the Polish President and the notification to the European Commission. ▪ According to the draft, purchasing prices for renewable energy project proposals will be awarded in separate auctions for renewable energy plants <1 MW and larger. With the help of an agency (that still needs to be set up) the purchase price will be set and paid for over 15 years. Government promotion for renewable electricity generation, additional installations and the coordination of new capacity is determined by fixed auctions and carried out through individual regulations by the Polish government.			

Sources: IHK (2011), EPIA (2014), Energieagentur-NRW (2014), mg.gov.pol (2014), IEO (2014)

NATIONAL PV SUPPORT SCHEMES 2014

Class	Details	
Quota system incl. details	Currently the Polish government is promoting renewable energies with the help of a quota system combined with the trading of green certificates.	
	Regulations	▪ Utilities are obligated to fulfil a predefined quota of energy from renewable sources. This quota can be met with the help of certificates. ▪ Renewable energy producers have priority access to TSO (transmission system). ▪ Reduction of the connection fee by 50 % for small producers (<5MW) + no license fees
	Quota	▪ The quota refers to the amount of electricity sold annually in % and is defined as followed: 2014: 13 %; 2015: 14 %; 2016: 15 %; 2017: 16 %; 2018: 17 %; 2019: 18 %; 2020: 19 %; 2021: 20 %
	Certificates	▪ The Energy Regulatory Office (URE) issues certificates of origin for electricity produced from renewable power sources. ▪ Under the first RES Act the scheme ends in 2017. ▪ There is no differentiation based on technology for the so-called green certificates. This might be changed with the new RES Act (cf. slide 7).
	Penalty	▪ At the moment, a penalty of 286.74 PLN / MWh (69,02€*/MWh) incurs if utilities do not meet the predefined quota (of electricity sold annually).
Tax incentive	**Exemption from consumption tax**	▪ RE producers are exempt from consumption tax (sales / consumption of electricity).
Fund for Environmental Protection and Water Management	**Grant /soft loans**	▪ Investors can get grants or favorable loans from the Polish Fund for Environmental Protection and Water Management. ▪ The final application phase was from 01/04-30/09/2014 and subsidised PV installations with a max. capacity from 200 kWp-1 MWp (7.5 Priority Programme RES Storch) and projects with a maximum installation price of PLN 10 m per MW (8, no. 2.8 Priority Programme RES Storch).

*Reference currency exchange (ECB): 1 € =4,1543 PLN

Sources : S-GE (2014), AHK-Polen (2014), RES Legal (2014) , ECB (2014)

NATIONAL PV SUPPORT UNDER RES ACT DRAFT (1/2)*

Class	Details of the draft of 28th March 2014 (version 6.3)	
Tender model	With the new Renewable Act (last version dated 28th March 2014) a promotion by tender will be implemented.	
	Rules	▪ At least once a year RE electricity volumes for bidding will be announced by the president of URE. Separate auctions will be held for renewable energy plants with a capacity up to 1 MW or for installations above 1 MW. ▪ Detailed information about the auctions for one calendar year will be determined by decree by 30th November of the previous year by the Polish Minister of Economy. Only then technology-specific reference prices for renewable energy plants above and below 1 MW will be announced, corresponding to the maximum price in the auctions. Moreover, the Minister of Economy will set a target for the amount of electricity generated from plants < 1 MW.
	Existing trade of certificates	▪ The certificate trading remains valid for existing renewable electricity generation (for 15 years), but ends by 31st December 2035. ▪ Renewable energy plant operators can choose whether they want to receive support under the old certificate system or switch to the new system with fixed prices. ▪ Biomass co-firing in coal-fired power plants shall receive only 0.5 certificates up to 31st December 2035. ▪ Operators of hydropower plants with a capacity >5 MW will not get any green certificates anymore.
	Auctions	▪ Co-fired power plants, hydroelectric plants > 5 MW, biomass power plants as well as plants for electricity generation from biogas > 50 MW shall be excluded from participating in auctions for renewable electricity generation over 1 MW. ▪ The lowest price bid wins the auction. There is a 15-year guarantee on the purchase price, including adjustments for inflation. ▪ The power purchase agreement exists between auction winner and utilities (15 years) up to 31st December2035 (therefore the last purchase agreements will be concluded in 2020).

* renewable energy sources Act (RES Act), Effective draft March 28, 2014

Sources: S-GE (2014), AHK-Polen (2014), Energieagentur-NRW (2014)

NATIONAL PV SUPPORT UNDER RES ACT DRAFT (2/2)*

Class	Details of the draft of 28th March 2014 (version 6.3)	
Tender model	**Special scheme for small- and microplants**	▪ Utilities named by the URE are obligated to take off 80 % of the electricity fed into the grid by a natural person and 100 % of the electricity fed into the grid by companies for the electricity price of the previous year. ▪ Location, nature and grid connection of micro-systems (<40kW) must be reported to the distribution system operator. ▪ For small plants (40-200 kW) registration is required.
	OREO	▪ An administrative institution (OREO SA) is to be created for the settlement of purchasing tariffs between the winning bidders and URE.
	Additional rules	▪ The exemption from consumption tax and the various mentioned funding opportunities for building renewable energy plants will continue to exist. In addition, a tax and fees exemption and a reduction in fees for electricity generated from renewable energy plants are available (Art. 39 no. 2, para. 3).
	Targeted expansion of renewable energy plants <1 MW	▪ The aim is that with each auction at least one quarter of new renewable electricity is generated from plants < 1 MW.
	Current state	▪ According to the legal text, the new RES Act will come into force one month after its adoption and publication.* Green certificates could then be allocated specifically for PV systems and therefore make the operation of large-scale projects more profitable. ▪ However, Section 4 and other parts of the law only become effective on 1st January 2016 (Art. 201) . ** This means that auctions for new renewable energy quotas are expected to be held at the beginning of 2016.

* renewable energy sources Act (RES Act), draft of 28th March 2014, **Draft act for the Polish Parliament (issued on 7th July 2014)

Sources: S-GE (2014), AHK-Polen (2014), Energieagentur-NRW (2014), www.on-eco.pl

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity up to 2014

There is no detailed data available concerning off-grid and on-grid installations.
Total installed capacity has reached approximately 30 to 50 MW in 2014.

Main barriers in the Polish PV market

Availability of land:
Experts recommend early assurance of land, since delays in the allocation are suspected.

Grid capacity:
The power grid in Poland is only moderately expanded. Therefore it can be assumed that mainly investments in off-grid systems from the private sector will take place until the new RES Act has been implemented.

PV support:
The operation of grid-connected PV systems using tradable green certificates is not profitable so far. A new RES Act, which has not yet been adopted, should change this.

Sources: Energieagentur-NRW, Exportinitiative (2014)

MARKET NEWS

Date	Topic	Souce
20/05/2014	Solar technology vendors can continue enjoying the growing polish market Numerous new and large projects are about to start, predominantly in the area of PV, where actually Chinese products are dominating. In the market for solar thermal systems, currently Polish and German companies fight for costumers, whose demand could soon abate due to amending policies. Solar is like the rest of the renewable industry eagerly waiting for the new legislative package.	Gtai
10/04/2014	Polish Government released new version of RE Act The Polish Government approved a bill on long-term subsidies for renewable energy projects that aims to help meet European Union climate goals and lower electricity costs for consumers. If approved by parliament and the country's president, the law would allow developers and owners of new renewable installations to sell their energy at auctions for a fixed price that would be guaranteed for 15 years regardless of market prices.	PV-Magazine
11/11/2013	Coal precedes climate protection Ironically Poland, the country of the World Climate Conference inhibits climate protection by producing 90 percent of its electricity with lignite and coal. "Europe cannot be without coal" stated the polish environment minister Marcin Korolec as a guideline for his country, who is in charge for the climate conference in Warsaw.	Handelsblatt
05/08/2013	Poland - energy policy U-turn End of spring, an informal working group started meeting regularly at the Polish Prime Minister's Office to analyse the energy market situation and the promotion of renewable energy sources. The outcome: FITs in Poland and a support system that will probably be easier to handle.	PV-Magazine

CONTACT INFORMATION

Category	Name	Website
Ministry of Economics	Ministerstwo Gospodarki	http://www.mg.gov.pl
Environment Department	Ministerstwo Srodowiska (MOS)	http://www.mos.gov.pl/?j=en
Foreign Investment Agency	Polish Agency for Information and Foreign Investment AG	http://www.paiz.gov.pl/de?lang_id=3
Regulatory Agency	Energy Regulatory Office (Urząd Regulacji Energetyki)	http://www.ure.gov.pl/en/
National Energy Agency	Krajowa Agencja Poszanowania Energii S.A. (KAPE)	http://www.kape.gov.pl/EN/index.phtml
PV Association	Polish Photovoltaic Energy Association	http://www.psef.pl/
PV Association	Polish Society for Photovoltaics	www.pv-polska.pl
Institute for Renewable Energies	IEO – Institute for Renewable Energies	http://www.ieo.pl
National Fund for Environmental Protection and Water Management	Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej (NFOSiGW)	http://www.nfosigw.gov.pl/en/

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Study

MARKET INFO SOUTH AFRICA – PHOTOVOLTAICS

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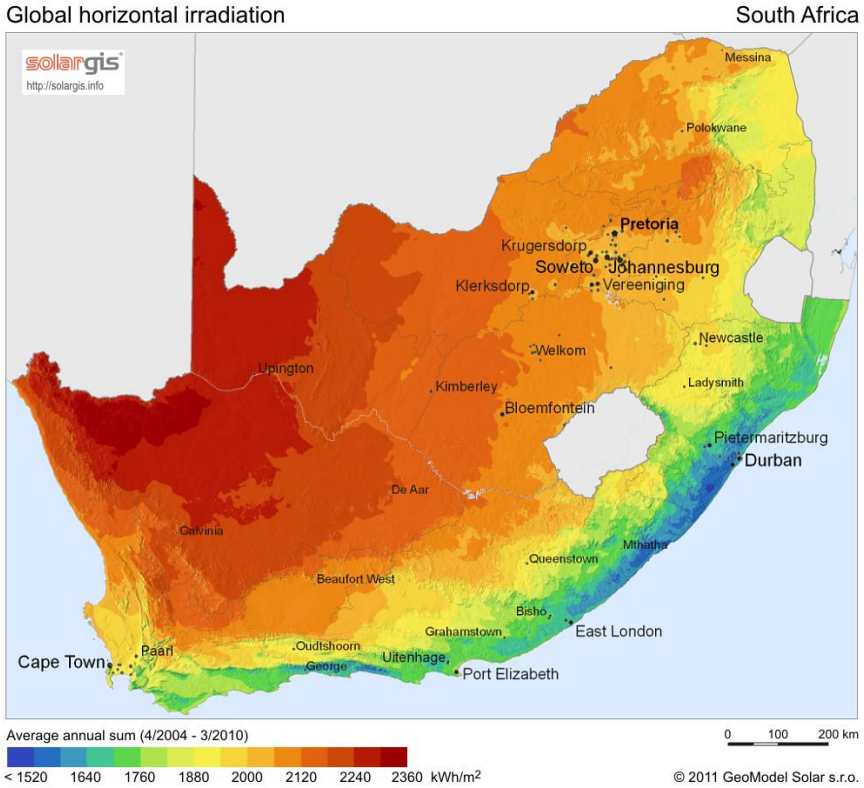
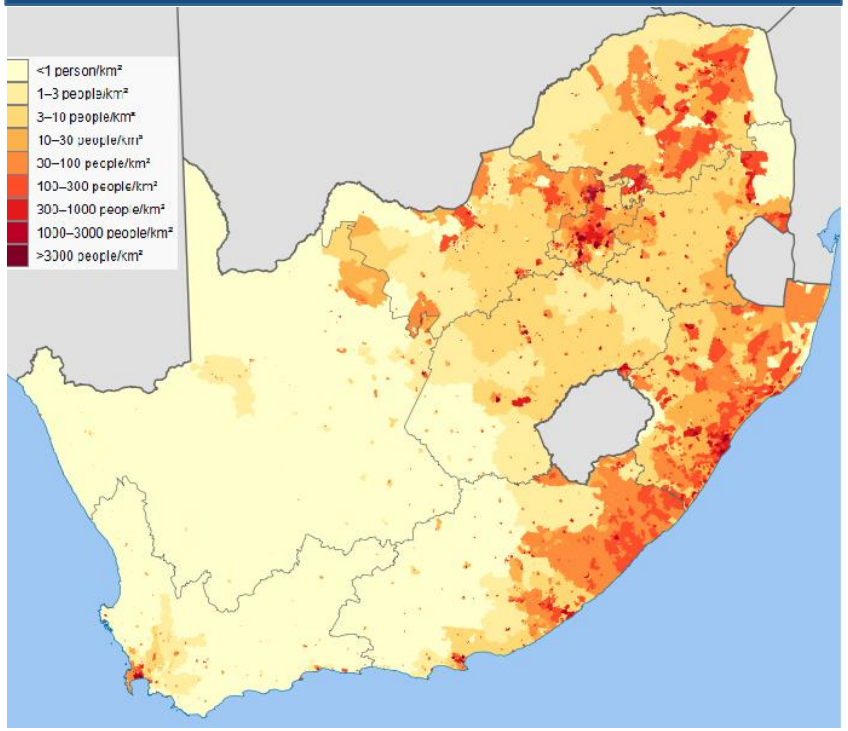


Source: dena (2012)

Population density



Source: SEDAC (2011)

BASIC DATA

General basic data (2014)			
Area	1.22 m km²	GDP (est.)	3,671.8 bn ZAR (~248.6 bn €**)
Population (est.)	53.7 m	GDP per capita (est.)	68,379 ZAR (~4,629 €**)
Language	English, isiZulu, Afrikaans (i. a.)	GDP growth (est.)	2.3 %
Government type	Republic	Inflation (est.)	6 %
Administrative division	9 provinces	Unemployment rate (2013)	24.9 %

Basic energy market data (2012)	
Final energy consumption (2010)	1,941,940 GWh
Electricity consumption (total/per capita)	234.7 TWh / 4,830 kWh
Net electricity import	5,029 GWh
Total electricity generation	238.3 TWh
Electricity price (industrial 2013)	0.69 ZAR / kWh (~0.059 €/ kWh*)
Electricity price (residential 2013)	0.75 ZAR / kWh – 1.21 ZAR / kWh (~0.066 €/ kWh* - 0.1 €/ kWh*)
Share of renewable energy (electricity consumption)	1.6 %
Increase of electricity consumption (2012 - 2022)	4 % p. a.
Annual average solar irradiation	2,000 kWh/m²a

Detailed information: ESKOM Tariffs & Charges in 2014/2015

* Annual average exchange rate 2012 of the European Central Bank (ECB): 1 € = 11.55 ZAR
** Average exchange rate march 2014 (GTAI): 1 € = 14.771 ZAR

Sources: CIA (2013), ESKOM (2013), EZB (2013), IMF (2013), STATSSA (2012), GTAI (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (annual installed capacity)	20010: 21.1 MW	2011: 23 MW	2012: 25 MW	2013: 98.25MW
National PV target	▪ 2014: 1,450 MW within the Renewable Energy Independent Power Producers Program (REIPP)			
Main market drivers 2013	▪ REIPP (Independent Power Producers) Program: In sum a capacity of 3,725 MW (all eligible renewable energy technologies) is granted. ▪ 1,484 MW of solar PV have been awarded through PPAs in the first three bidding procedures. There will be two more rounds of tendering, which will award an additional 1,041 MW until the target of 2,525 MW is reached. ▪ The South African "Integrated Resources Plan" sets the share of renewable resources in newly added electricity generation capacity at 42 %. ▪ Several provinces, e. g. Northern Cape, have a very high solar irradiation (approx. 2,300 kWh/m²a).			
Support for renewable projects 2012/13	▪ REIPP: Projects are selected depending on the offered price (70 %) and on local value creation (30 %). ▪ During the second bidding round (March - May 2012) a massive increase of bidding prices could be observed, especially for PV and wind capacity. The average offered price of PV project developer was 2.75 ZAR/kWh (23.8 € ct / kWh*) in the first round, which fell to 1.65 ZAR/kWh (14.2 € ct/kWh*) in the second round. ▪ Starting in July 2013, the 3rd bidding round within the REIPP programs (deadline August 2013) awarded the remaining PV capacity of 401.1 MW. For the 3rd round of tendering a price of 1.2 R/kWh (10.4 €ct) has been assumed. The main winner was Enel Green Power, which received 314 MW of PV capacity, followed by Total's SunPower with 86 MW.			
Recent changes to the PV support regulation/ Support in 2014	▪ The 4th and 5th round is expected for 2014. The deadline to hand-in proposals for the 4th round was 21st July 2014. ▪ The whole capacity of 200 MW for CSP has already been awarded. ▪ There will be a separate tender for small-scale RE projects (up to max. 5 MW),which will is opened since October 2013. Companies can hand-in proposals and a total of 100 MW will be allocated.			

* Annual average exchange rate 2012 of the European Central Bank (ECB): 1 € = 11.55 ZAR

Sources: DoE (2013), EPIA (2013), dena (2013) ,REIPP (2013), EScience Associates et. al (2013)

MAIN PV SUPPORT SCHEMES

Awarding criteria and recent bidding round	
Recent bidding rounds	▪ In the 3rd round of biddings under REIPPP 435 MW of PV have been awarded to six bidders. ▪ Financial arrangement with the six awarded bidders was not concluded – as scheduled – on 30th July 2014 . A new date will be announced soon. ▪ The deadline to hand-in proposals for the 4th round was 21st July 2014.
Awarding criteria & local content rules	▪ Apart from economic aspects, local content regulations set by the government play an important role in which projects are chosen. ▪ In connection with Black Empowerment those projects will receive a positive rating that enhance local economic development. ▪ Furthermore, companies with historically disadvantaged employees should be involved in PV projects – ideally – along the whole value chain. ▪ In addition to the lack of available capital this criteria is seen as a major barrier by bidders.
Involved institutions/ decision-making authority	▪ Department of Energy (DoE): renewables capacity planning
	▪ Department of Trade and Industry (DTI): local content, industry development
	▪ National Regulator of South Africa (NERSA): approval of granted tariff within the PPAs
	▪ Electricity Supply Commission (ESKOM): State-owned utility, grid operator
	▪ Department of Environmental Affairs (DEA): environment assessment study
	▪ Communities: distribution grid operator, land use

For detailed information concerning bidding rounds see following links:
- Renewable Energy IPP Program (REIPP): www.ipprenewables.co.za
- South African Photovoltaic Association (SAPVIA): www.sapvia.co.za

Sources: REIPP (2013), DoE (2013), dena (2013)

FURTHER PV SUPPORT SCHEME: FIT

Category	Details	
Eskom IDM Standard Offer Program	This program has been in place since June 2012. It forms part of ESKOM's Integrated Demand Side Management and aims at reducing electricity demand. PV systems with an installed capacity between 200 kW and 5 MW are subsidised for a period of three years. The program was put on hold in October 2013 due to significant financial constrains experienced by ESKOM. In October 2014, Eskom has launched a smaller and more restricted tariff scheme.	

	Applicability	▪ Applicants have to be clients of the governmental electricity provider Eskom.
		▪ The systems have to fulfill the following requirements:
		  ▪ Systems need to have a meter on the consumer site.
		  ▪ Systems have to be in line with latest technological standards.
		  ▪ None-grid connected systems have to replace a connection, meaning they generate electricity, which otherwise would have been supplied by the grid.

	Remuneration	▪ The FIT is 1.20 ZAR (ca. 8.55 € ct*) per kWh.

*Exchange rate from 14/10/2014: 100 ZAR = 7.12 €

Sources: dena (2014), ESKOM (2014)

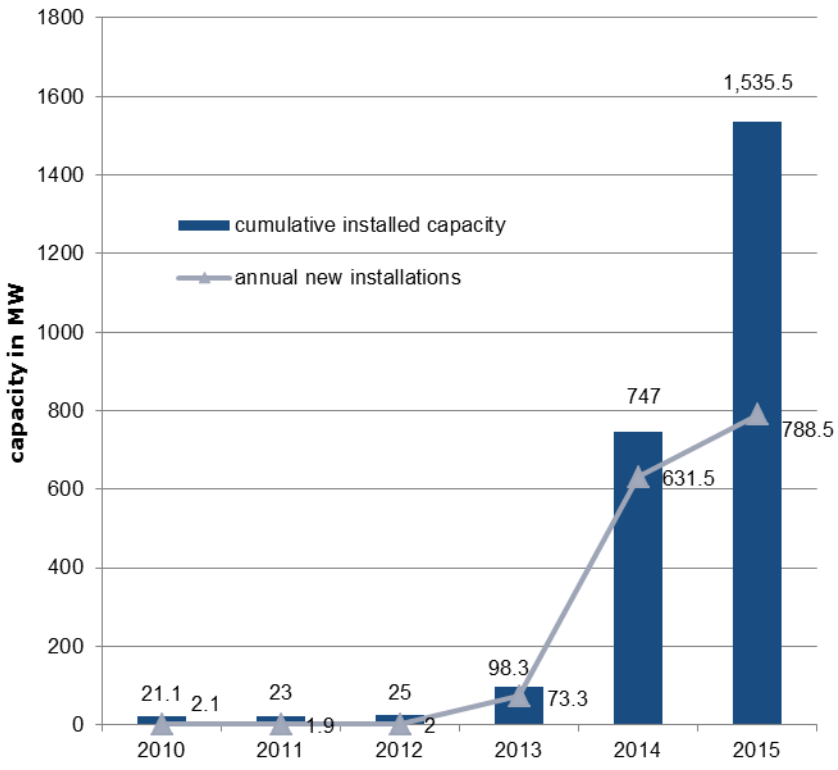
FURTHER PV SUPPORT SCHEMES

Programme	Information
Integrated Resource Plan (IRP) 2010 - 2030	▪ The IRP defines a 42 % share of renewable resources for newly added power generation capacity. ▪ Planned installation of approx. 17 GW capacity until 2030: 8 GWp PV, 1 GW of concentrated solar power plants, 8 GW of wind power ▪ The updated version of the IRP was published in December 2013. The target for installed PV capacity was increased from 1.33 GW to 9.33 GW.
Solar-roof-program	▪ At the moment, DoE and ESKOM are developing a Solar-roof-program, with the target to install PV systems on 300,000 South African roofs.
Clean-Technology Fund (CTF) (World Bank)	▪ CTF is co-financing projects for renewable electricity generation and for increasing energy efficiency with a total amount of 500 m US Dollars. ▪ With these projects a further sum of one bn US Dollars from bi- and multilateral lenders and private investors should be capitalised.
Energy and Environment Partnership Programme Southern and East Africa (EEP)	▪ The EEP is supported by the donor countries Finland, Austria and United Kingdom for renewable energy and energy efficiency projects. ▪ Technology: Every renewable technology can receive a project specific support. ▪ The call for proposals will be released on the following website: http://www.eepafrica.org/
SAGEN (South African German Energy Programme)	▪ Technical cooperation with the German governmental development institution GIZ in the area of renewable energy technologies. ▪ Support of solar energy through the facilitation of knowledge transfer. ▪ Support of energy efficiency.

Sources: Climate Investment Funds (2012), ESKOM (2012a),. EEP Africa (2012)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity



Sources: EScience Associates et. al (2013), GIZ (2013)

Main barriers in the South African PV market

Energy policy barriers:

- Enormous coal resources (which are the main source for electricity generation in the country) result in little interest and possibilities for on-grid renewable electricity generation.

Lack of financing through local banks:

- Little experience in financing renewable energy projects hinder local banks to issue loans. This caused massive delays in project development within the first bidding round.

Local content rules:

- Barriers for project development are time consuming bidding processes and the requirements within the local content rules.

Interconnection fees:

- Costs for interconnection (which are expensive in South Africa) and possibly needed power lines must be paid by the project owner.

Pricing pressure:

- During the first two bidding rounds a rapid decrease of bidding prices could be observed. In future more and more pressure on prices is expected.

Sources: EPIA (2012 / 2013), SESSA (2012a)

MARKET NEWS (1/2)

Date	Topic	Source
03/10/2014	South Africa Power Price to Rise 13% to Offset Eskom Costs South African power prices will rise more than first planned from April to help the state-owned utility recover 7.8 billion rand ($693 million) of unbudgeted costs, the regulator said. Electricity tariffs will increase by an average 13 percent, more than the 8 percent initially approved for the year through 31st March 2016, the Pretoria-based National Energy Regulator of South Africa said in an e-mailed statement today.	Bloomberg
25/09/2014	Blackouts Present Biggest Risk to South Africa's Economy South Africa has an electric bill coming due that's threatening everything from its swimming pools to its sovereign debt. Consumers are asked almost daily to switch off their water heaters, pool pumps and anything else that will save power during peak periods. Industrial customers are also asked to conserve energy, even if it means reducing production. And when that's not enough, Eskom Holdings SOC Ltd. orders managed blackouts.	Bloomberg
11/08/2014	JinkoSolar opens PV module factory with an annual production capacity of 120MW in South Africa Located in Cape Town, the factory covers an area of 5,000m² and has annual production capacity of 120 MW. JinkoSolar invested a total of approximately USD 7.5 million in the factory which is expected to create 250 jobs. First foreign solar manufacturer's PV module factory in South Africa modeled after Chinese standard.	SolarServer
30/07/2014	South Africa Faces Higher Power Fee as Eskom Claim Approved South Africa's energy regulator said Eskom Holdings SOC Ltd.'s costs exceeded projections in the three years through 2013, possibly enabling bigger power-price increases in April. The company that provides 95 percent of South Africa's electricity didn't recover 7.8 billion rand ($735 million) of spending incurred from 2010 to 2013, the Pretoria-based regulator said in an e-mailed statement today. Eskom in August asked that it be allowed to get back 18.4 billion rand. Nersa, which last year said the utility can raise fees by an average of 8 percent in each of the five years through March 2018, did not say by how much more tariffs will increase.	Bloomberg

MARKET NEWS (2/2)

Date	Topic	Source
13/03/2014	Lease finance initiative for rooftop PV Powerway PV SA and InnoVent, with the support of TÜV Rheinland, have developed a model where the consumer is paying a lower price for power generated from solar PV compared to conventionally generated electricity without a capital outlay being required by the consumer. The under the leasing model installed modules will be produced in the joint venture production facility from Powerway PV SA and JA Solar. The implementation date is not yet know.	www.esi-africa.com
05/02/2014	Hopes for a CIGS boom in South Africa The South African PTiP together with the German Singulus commissioned a CIGS production facility. This modern production and research facility will be able to manufacture and further develop CIGS modules with a seize of 1200 mm x 600 mm.	PV-Magazine
17/10/2013	Solar energy to undercut coal in South Africa According to a study of the South Africa Photovoltaic Industry Association (SAPVIA) the price for solar power could decline to 0.74-1.26 R/kWh (6.4-10.9 € ct/kWh) by 2020 and thus become the cheapest power in South Africa. Already by 2018 solar power could reach the price level of coal, which could go up to 1.69 R/kWh (14.6 € ct/kWh) by 2020.	PV-Tech

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Category	Name	Website
National Ministry of Energy	Department of Energy (DoE)	www.energy.gov.za/
National Market Regulator	National Energy Regulator of South Africa (NERSA)	www.nersa.org.za
State-owned Utility	Eskom Holdings Limited (ESKOM)	www.eskom.co.za
German-South-African Chamber of Commerce	Deutsche Industrie- und Handelskammer für das südliche Afrika (AHK)	www.suedafrika.ahk.de
Photovoltaic Industry Association	South African Photovoltaic Industry Association (SAPVIA)	www.sapvia.co.za
Renewable Energy Association	South African Renewable Energy Council (SAREC)	-
National Partner for Project Financing and Development	South African Renewables Initiative (SARI), Department of Trade and Industry	www.sarenewablesinitiative.wordpress.com

Source: dena (2012)

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Study

MARKET INFO THAILAND – PHOTOVOLTAICS

dena-Market Information System

www.export-erneuerbare.de or http://exportinitiative.dena.de

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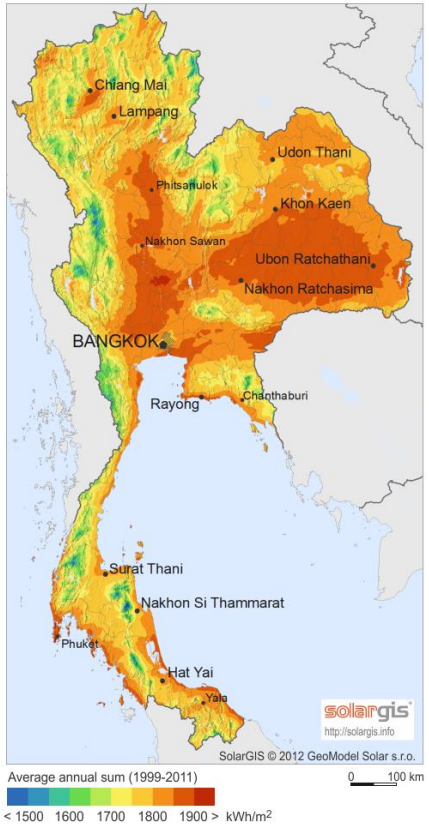
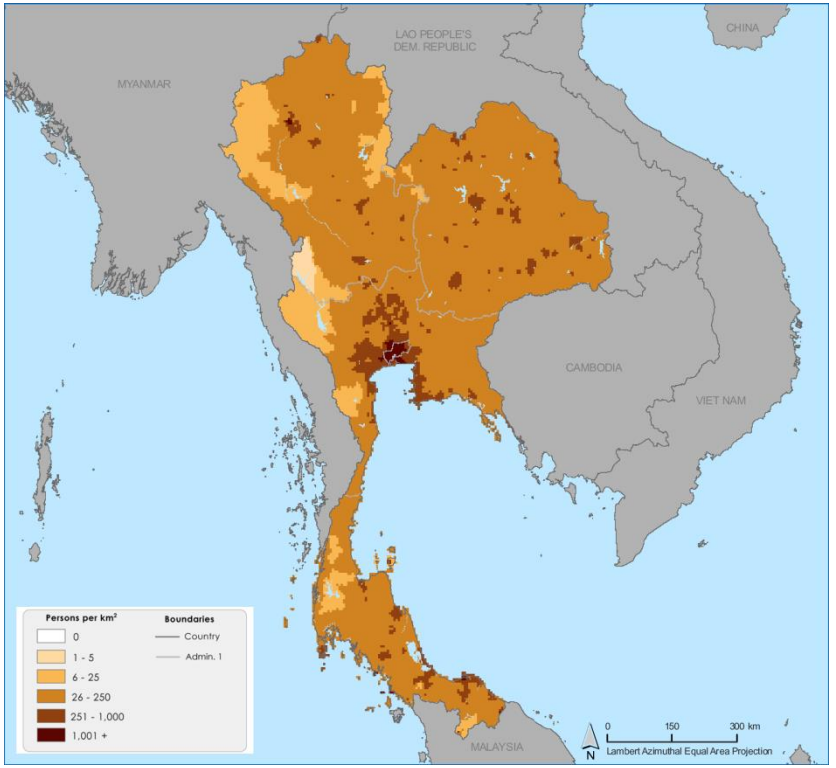
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGIS (2012)

Population density



Source:SEDAC (2012)

BASIC DATA

General basic data (2014)			
Area	513,120 km²	GDP (est.)	12,436 bn THB (~ 276.89 bn €**)
Population (est.)	68.6 m	GDP per capita (est.)	181,403 THB (~4,039 €**)
Language	Thai, English	GDP growth (est.)	2.5 %
Government type	Constitutional monarchy	Inflation (est.)	2.3 %
Administrative division	77 provinces	Unemployment rate (est.)	0.7 %

Basic energy market data (2012)	
Electricity consumption (total/per capita)	161.77 TWh/ 2,398.4kWh
Total electricity import	10.52 TWh
Total electricity generation	166.43 TWh
Electricity price (industrial / PEA) Electricity price (industrial / MEA)	2.71 THB/ kWh (~0.068 €/ kWh*) 2.68 THB/ kWh (~0.067 €/kWh*)
Electricity price (residential /PEA) Electricity price (residential/ MEA)	3.73 THB/ kWh (~0.093 €/ kWh*) 3.73 THB/ kWh (~0.093 € / kWh*)
Share of renewable energy (electricity consumption)	6.1 %
Increase of electricity consumption (2010 - 2030)	4.13 % p.a.
Annual average global solar irradiation	1,900 kWh/ m² a

* Annual average exchange rate 2012 of the European Central Bank (ECB): 1 € = 39.93 THB, ** Exchange rate March 2014: 1 € = 44.913 THB

Sources: CIA (2013), EIA (2010), EGAT (2012), EPPO (2013), EZB (2013), IMF (2013), MEA (2013), PEA (2013), GTAI (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators			
Market size (annual installed capacity)	2013: 691 MW	2014e: 50 MW	2015e: 700 MW
National PV target	Alternative Energy Development Plan (AEDP 2012 - 2021): 2,000 MW of installed PV capacity by 2021, half of this capacity should be smaller sized systems like PV rooftop systems for households, apartment buildings, industrial installations and public buildings. By the end of 2014 an additional 1,000 MW of PV capacity is going to be implemented within a new FIT programme.		
Main market drivers 2014	In 2013 the Asian Development Bank (ADB) started two new credit lines to co-finance and support the development of ground-mounted PV power plants. 1,000 MW of PV capacity are supposed to be added by the end of 2014. Market driver will be the FIT scheme from July 2013 (see next slide).		
Recent changes in PV regulation	• November 2014: The dissolution of the Thai government in early 2014 has halted residential rooftop solar installations. PV installers are waiting for regulations concerning selling energy to the grid and residential rooftop permits. Most recent data from July 2014 suggests that little more than 50 MW of rooftop solar PV applications have been approved so far due to the lack of permitting. In total, there are more than 6,000 residential PV applications awaiting approval. • July 2013: to support the PV market, the Thai Government has improved the policy framework as well as the investment incentives within the scope of the new FIT in 2013. • May 2013: The DoE revoked at the end of May approx. 500 MW of approved PV licenses and 700 MW of PV capacity will follow soon. • If all the PV licenses are revoked, the DoE will open the new FIT programme for new PV applications in 2013.		

Source: TPVA (2012)

MAIN SUPPORT SCHEME: FIT PROGRAM 2013

Support scheme	Details
FIT Program 2013	▪ The national Thai Energy Commission (NEPC) approved a FIT for PV systems at the beginning of July 2013. ▪ New installations of 1,000 MW (200MW rooftop systems by the end of 2013, 800 MW ground-mounted systems by the end of 2014) should be facilitated by this new incentive. So the PV goal is expanded to a capacity of 3,000 MW. ▪ Funding will be provided over a period of 25 years. ▪ The tariff for roof top system varies according to peak loads. System operators who wanted to receive the FIT for roof-top systems, had to commission these by the end of December 2013. ▪ Operators could apply for funding until 11th October 2013 with the Provincial Electricity Authority (PEA). ▪ The phased tariff for PV ground mounted systems varies depending on the year of operation and is applicable for projects with a capacity of up to 1 MWp, which are community owned. Per community max. 1 MWp will be funded. The regulatory framework for this tariff is currently being developed. It is aimed at commissioning all PV systems with a total capacity of 800 MW at the latest by the end of December 2014.

Tariff for roof-top systems up to 1 MWp

Systems capacity	Tariff
≤ 10 kWp	6.96 THB/kWh (0.17 €/kWh*)
11 - 250 kWp	6.55 THB/kWh (0.16 €/kWh*)
251 kW - 1,000 kWp	6.16 THB/kWh (0.15 €/kWh*)

Tariff community ground-mounted systems up to 1 MWp

Year of operation	Tariff
1-3	9.75 THB/kWh (0.24 €/kWh*)
4-10	6.50 THB/kWh (0.15 €/kWh*)
11-25	4.50 THB/kWh (0.11 €/kWh*)

* Exchange rate from 25th July 2013 : 1 € = 41 THB

Sources: dena (2013), enerdata (2013)

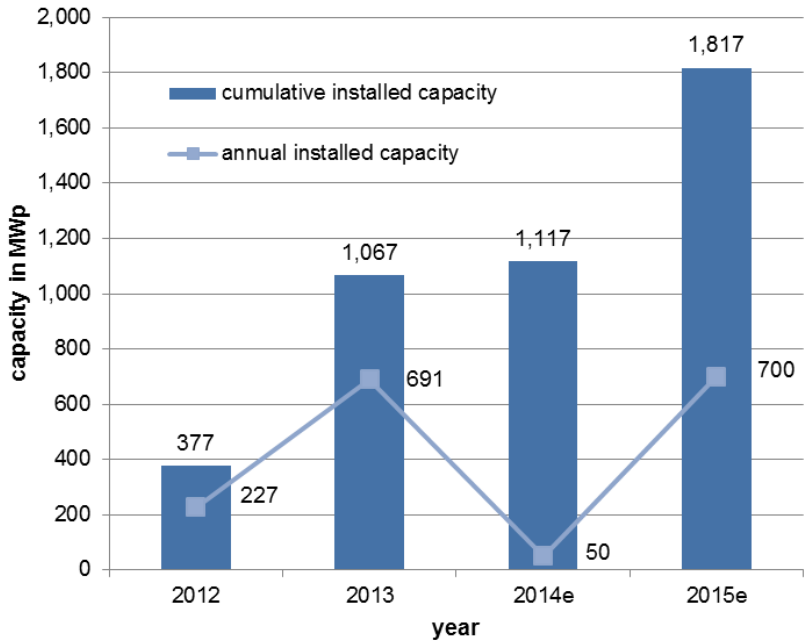
OVERVIEW OF OTHER PV SUPPORT SCHEMES

Adder tariff program (expired)	In 2010 the premium tariff (adder) was revised the last time: The recent adder is only effective for PV installations approved before 31st of December 2010. Since June 2010 no more application for PV projects were accepted. Operators of on-grid PV systems receive a premium tariff from the DoE. Annual revisions of premium tariffs will be approved by the National Energy Policy Committee (NEPC). Operators of PV systems with a capacity up to 10 MW receive an adder of 6.5 THB/ kWh (~ 0.16 €/kWh) for ten years as a premium in addition to the electricity price. The adder will increase by 1.5 THB/kWh (~0.03 €/kWh) for PV systems, which are installed in the southern provinces Yala, Pattani or Narathiwat or for hybrid systems with diesel generators.
Public tender & soft loans in 2013	In 2013 the Asian Development Bank (ADB) started two new credit lines to co-finance and support the development of ground-mounted PV power plants. With the "Central Thailand Solar Power Project" representing a credit volume of 87 m THB (~ 2,1 m €) 57 MW of new PV capacity shall be developed. This capacity will be tendered through public bidding rounds and will receive the fixed adder. With the "Provincial Solar Power Project" the ADB supports 50 MWp of new capacities in the provinces Chaiyaphum and Ayutthaya with a sum of 40.2 m THB (~1 m €). This capacity target will also be tendered in public bidding rounds and will receive the fixed Adder.
Exemption from import tariffs and company taxation	The Thailand Board of Investment (BOI) exempts companies from import tariffs, which import PV modules and PV system components. PV system operators receive an 8-year exemption from company taxation .

Sources: (TPVA) (2012); Asian Development Bank (2013)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity (on-grid)



Sources: TPVA (2012), IHS Solar (2013) in PV-Magazine (2014)

projection 2015: dena (2014)

Main barriers in the Thai PV market

PV support 2013 / dissolution of the Government

- Since June 2010 no more applications for PV projects were accepted (adder). Since then an approval stop for 3 GW of PV capacity was introduced. At the end of May 2013 the DoE revoked approx. 500 MW of approved PV licenses. With cancelling all PV licenses, the DoE opened the FIT programme 2013 for new PV applications.
- The FIT scheme from July 2013 for roof-top installations expired at the end of 2013. The approval of FITs for ground-mounted community-owned systems (which will be granted until the end of 2014) is uncertain. As things are now there will be no further promotion for PV in Thailand from 2015 onwards (lack of legal certainty).
- The dissolution of the Thai government in early 2014 has halted residential rooftop solar installations. PV installers waited for regulations concerning selling energy to the grid and residential rooftop permits.
- Most recent data from July 2014 suggests that approx. 50 MW of rooftop solar PV applications have been approved. The Government intended growth of new installed PV capacity in 2014 will delay to 2015.

Sources: TPVA (2012), Bangkok Post (2013), PV-Magazine (2014)

MARKET NEWS (1/4)

Date	Topic	Source
22/08/2014	Thailand set for $1.4bn renewables boost Thailand's promising solar industry received a welcome boost this week with the news that a leading domestic clean energy developer is set to invest $1.4 billion into the country's renewable energy sector. Bangkok-based Energy Absolute Pcl has announced its intention to develop a number of renewable energy projects in Thailand over the course of the next three years, with large-scales solar PV projects totaling 180 MW foremost in those plans. Energy Absolute already owns Thailand's largest solar PV plant (a 90 MW solar plant in Nakhon Sawan province), and hopes to add 570 MW of clean energy generating capacity to the national grid by 2017.	PV-Magazine
30/07/2014	Kyocera, SPCG complete 257 MW of solar farms in Thailand Japan's Kyocera Corporation and Thai solar developer SPCG have begun operation of one of the largest PV power projects in Southeast Asia. The 257 MW project in Thailand consists of 35 solar farms that have been constructed since 2010. The completed project has been connected to the grid in northeastern Thailand.	PV-Magazine

MARKET NEWS (2/4)

Date	Topic	Source
17/07/2014	Thailand dusts off renewable energy plans as unrest subsides Recent political clashes pushed renewable energy to the back burner, but the new energy boss plans to reignite the sector. Thailand's months of political turmoil – which culminated in a military coup on 22nd May – may have punctured economic growth in each of the country's main industries, but signs are emerging that ruling military officials are keen to restart some of the previous government's policy targets, including those related to renewable energy. The country's previously soaring solar PV sector has been particularly hard hit, but newly appointed director general Viraphol Jirapraditkul has said this week that the Alternative Energy Development and Efficiency Department will reignite Thailand's renewable energy landscape, beginning with a revamp of the feed-in tariff (FIT) and reintroduction of tax breaks for installers of solar power. The ruling regime sees solar energy projects as key to attracting foreign investment scared off by recent events. Having launched a solar rooftop scheme in September last year, the target was to have installed 200 MW of rootop capacity by now. As it stands, just 100 MW is scheduled to come on stream, and the country is falling some way short of its aim to reach almost 14 GW of renewable energy by 2021. However, the most recent data suggests that little more than 50 MW of rooftop solar PV applications have been approved so far due to a lack of permitting. In total, there are more than 6,000 residential PV applications awaiting approval.	PV-Magazine
27/01/2014	Sharp signs EPC and supply agreement for 52MW Thai PV project Sharp has signed an engineering, procurement and construction (EPC) contract to construct a 52MW DC photovoltaic (PV) plant in Thailand for Thai company Serm Sang Palang Ngan (SSP). The plant will be built in the Lop Buri province, around 150km north of Bangkok. Construction is expected to begin this month, scheduled for completion by the end of 2014. Sharp will also supply 400,000 silicon (a-Si) thin-film modules to the installation as well as balance of system (BOS) components.	PV-Tech

MARKET NEWS (3/4)

Date	Topic	Source
17/01/2014	Political unrest hinders Thai rooftop solar The dissolution of the Thai government last month has halted residential rooftop solar installations. Installers are waiting for legislation needed to sell energy to the grid and the issuance of residential rooftop permits.	PV-Magazine
01/11/2013	Thailand: Easing of residential solar requirements The Thai government is reportedly preparing to make it easier for households to install solar plants on rooftops. An easier permitting regime could be put before government for approval on Tuesday. Bangkok-based English language newspaper The Nation has reported the Thai government is considering relaxing the rules relating to household solar systems. Under the current Thai regime, domestic installations require an industrial license, but The Nation reported yesterday the government's Industrial Works Department is considering removing the requirement for household systems generating up to 20 kW.	PV-Magazine
16/10/2013	Thailand to transfer quota to rooftop if farms not operational To reach its government quota for solar generated power, Thailand may look to rooftop installations, should solar farms fail to complete commercial operation by December 2013, according to local news reports. The Thai government aims for 2GW by 2013 to come from solar farms. Reportedly the minister for energy, Pongsak Ruktapongpisal, is now considering using rooftop solar to fulfil this quota, should any PV plants not be operational in time for the December cut off, according to The Nation.	PV-Tech

MARKET NEWS (4/4)

Date	Topic	Source
17/10/2013	Conergy: Further order from Thailand The provider of PV system solutions and services Conergy is building two solar parks for Siam Solar Energy 1 Co.Ltd (SSE1) with a capacity of 10.5 MW each. Since autumn 2012 Conergy has build and completed solar power plants with a capacity of over 70 MW for SEE1. The provider has a market share of 20 % in Thailand due to a contract volume of more than 100 MW.	Ecoreporter
30/05/2013	Grace Solar completes 11.7 MW solar power station in Thailand As the leader of PV mounting system in Southeast Asia, Grace Solar cooperated with world famous EPC company, providing ground mounting system for the Thailand 11.7MW solar PV project.	PV-Magazine
27/05/2013	More solar licenses to be revoked A combined 700 megawatts of approved solar farm operating licenses held by benign license holders will be revoked soon, says an Energy Ministry senior official. The official, who declined to be named, said solar energy licenses covering 3,000 MW have been approved by the ministry for those seeking the government's subsidy through the adder tariff programme since 2008 but only 400 MW are in operation.	Bangkok Post
27/05/2013	Thai-based solar developer completes 84 MW PV plant in Lopburi Thai solar project developer Natural Energy Development Co. has announced the completion of its 84 MW photovoltaic plant in Lopburi, Thailand. Investment in the Lopburi project amounts to more than 10 bn THB (335 m US-dollar) with an expected return of investment within 10 years at 1.3 bn THB annually. The Asian Development Bank granted a long-term loan of 2 bn THB for the first phase of the project.	PV-Magazine

CONTACT INFORMATION

Category	Name	Website
National Ministry of Energy	Department of Alternative Energy Development and Efficiency (DEDE) Ministry of Energy	www.dede.go.th/dede/
National Energy Regulator	Energy Regulatory Commission (ERC)	www.erc.or.th/ERCWeb2/EN/Default.aspx
State-owned Utility and Transmission Grid Operator	Electricity Generating Authority of Thailand (EGAT)	www.egat.co.th/en/
Utility and Distribution Grid Operator	Metropolitan Electricity Authority (MEA)	www.mea.or.th/home/index.php?l=en
Utility and Distribution Grid Operator	Provincial Electricity Authority (PEA)	www.pea.co.th/EN/SitePages/home.aspx
Photovoltaic Industry Association	Thai Photovoltaic Industries Association (TPVA)	www.tPVa2012.com/index.php

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Study

MARKET INFO TUNISIA – PHOTOVOLTAICS

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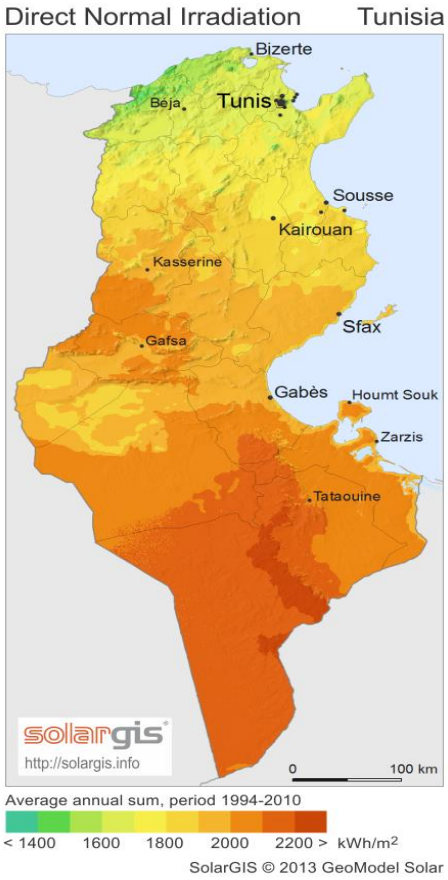
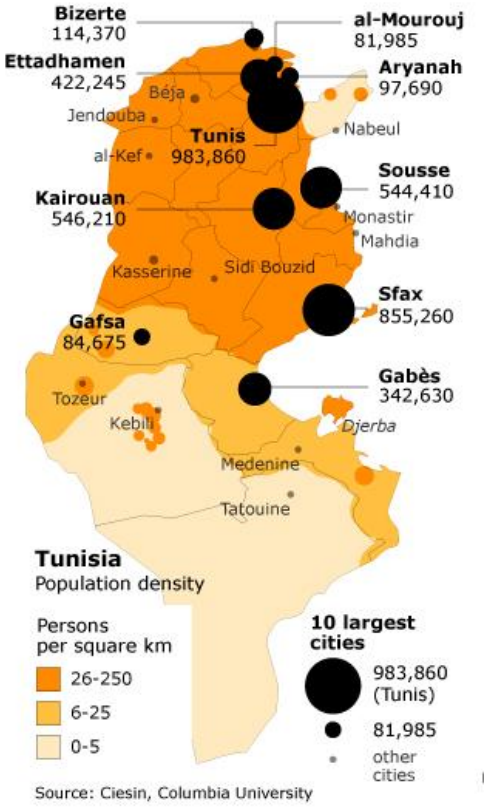
SOLAR IRRADIATION & POPULATION DENSITY

Annual average solar irradiation



Source: SolarGIS (2013)

Population density



Source: Ciesin (2013)

BASIC DATA

General basic data (2013)			
Surface	164,150 km²	GDP per capita (2014 est.)	7,530.2 TND (~ 3,455.81 €)*
Population (2014 est.)	11.1 m	Economic growth (est.)	2.7 %
National language	Arabic, French	National finances	Earnings: 12.16 bn $ Expenses: 15.8 bn $
Form of government	Republic	Inflation	6.1 %
Administrative division	24 governorates	Unemployment rate (est.)	16.7 %

Basic energy data (2013)	
Electricity generation	17.14 TWh
Electricity consumption	14.5 TWh
Net electricity imports (2012)	0.042 TWh
Electricity price (2014)	Industry: 0.075 – 0.35 TND / kWh (0.034 – 0.161 € / kWh*) Residential: 0.151 – 0.295 TND / kWh (0.07 – 0.135 € / kWh*)
Share in renewable energies (gross power generation)	7%
Increase of electricity consumption (2011 to 2031)	7.7% p. a.
Global solar irradiation	ca. 1,850 kWh / m² a (south: up to 2,600, north: up to 1,800)

*Exchange rate March 2014 (GTAI): 1 Euro = 2.179 TND (Tunisian Dinar)

Sources: GTAI (2014), STEG (2014b), ESMAP (2011), IEA (2012), GIZ (2014), CIA (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (yearly installed capacity)	2012: 0 MW	2013e: 20 MW	2014e: 30 MW	2015e: 40 MW
National PV goal 2030	1,510 MW			
Market drivers 2014	▪ Rapidly increasing power demand (projection until2031: 31 TWh) ▪ Tunisian Solar Plan (Plan solaire tunesien (PST)) see next slide ▪ Net metering, self-supply ▪ Guaranteed investment grants via the Fonds National de la Maîtrise de l'Energie (FNME), and respectively since the beginning of 2014 via the Fonds de Transition Energétique (FTE) ▪ Low customs duties (15 %) as well as value-added tax exemptions for PV installation equipment			
PV support 2014	**Net metering** (cf. slide 7) ▪ **PROSOL-Elec:** This program was introduced in 2010 to boost installations of residential PV (1 or 2 kWp) for customers of STEG (Société Tunisienne de l'Eléctricité et du Gaz). ▪ **Bâtiment Solaire**: This program was introduced in January 2013 to enable net metering for smaller rooftop installations in the residential and industrial sector connected to the low voltage grid of STEG. ▪ **Self-supply (in low voltage grid)**: PV systems (no capacity limit) for self-supply in the industrial, service as well as agricultural sector are being subsidised (20 % of tangible investment costs) via FNME/FTE. ▪ **Self-supply (in medium or high voltage grid):** PV plants are being subsidised as described above – but 30 % of the annual surplus electricity production is being taken off and compensated for by the STEG. The purchase tariff is determined by the energy minister via decree.			
Recent changes in PV regulation	▪ Due to law N° 74/2013 the electricity generation market has been open since 18th September 2014 for IPPs who can sell electricity either to the STEG (which still holds a monopoly on the transmission and distribution grid) or are able to export electricity subject to grid charges.			

*Exchange rate march 2014: 1 Euro = 2.179 TND

Sources: STEG (2014), ANME (2011), GIZ (2013), BSW-Solar (2014)

THE TUNISIAN SOLAR PLAN (PST)

RE subsidies policy	Details

The Tunisian Solar Plan	▪ The Tunisian Solar Plan („Plan solaire tunesien“) describes a long-term strategy that aims for a diversification of the Tunisian electricity market, which in 2013 was still dominated by fossil fuels (93 %).
	▪ By 2030, the following steps shall be put into effect:
	  ▪ Reduction of the share of gas in electricity generation down to 50 %
	  ▪ Development/construction of several coal-fired power plants
	  ▪ Massive development of renewable energies up to a share of 30 % of the national electricity generation (15 % wind power, 10 % photovoltaic, 5 % solar thermal power plants)
	  ▪ The plan needs a total investment of 6 bn. € for the renewables sector (thereof 2.3 bn. € for PV), which should be covered by public, private as well as international investors.

Source: GIZ (2013)

OVERVIEW OF PV SUPPORT SCHEMES (1/4)

Category	Details
Fonds de transition énergétique (fund for the energy transition)	▪ The fund for the energy transition (Fonds de transition énergétique (FTE)) was introduced in 2014 and replaces the "Fonds national de la maîtrise de l'énergie (FNME)". ▪ Its purpose is to encourage investors and private investors to invest in renewable energies and support industrial enterprises in Tunisia. ▪ The seed capital of 100 m TND (~ 43.8 m €*) for the fund is paid by the Tunisian government.

PROSOL ELEC (net metering)	▪ According to the national action plan for the development of renewable energies in Tunisia, the PROSOL ELEC programme intends to reach a total photovoltaic capacity of 190 MW in 2020.
	▪ The allocated budget totals approximately 40 m TND, covering a period of four years (2012 to 2016).
	▪ It is exclusively intended for residential consumers connected to the low-voltage grid, seeking to lower their electricity costs through the installation of PV systems in order to cover their electricity needs.
	▪ The PROSOL ELEC financial mechanism consists first of all of a subsidy granted by the FNME/FTE, representing 30 % of the investment costs, limited to 1,800 TND/kWp for a 1 kWp installation and to 1,450 TND/kWp for installations of 2 kWp capacity.
	▪ The Attijari Bank is the only Tunisian bank to have signed an agreement with the STEG for the development of a bank loan mechanism in form of a subsidised loan with an interest rate of 5.94 % over a period of seven years intended for 1 or 2 kWp PV installations.
	▪ The amount loaned is set according to the capacity of the installation:
	  ▪ 1 kWp installations: 3,500 TND
	  ▪ 2 kWp installations: 6,500 TND
	▪ Investors benefit from the value-added tax exemption for PV installation equipment.
	▪ PV installers have to be certified by Agence nationale pour la Maitrise de l'Energie (ANME), where the application for the subsidy can be filed after the installation has been completed.

* Exchange rate March 2014: 1 Euro = 2.179 TND (Tunisian Dinar)

Sources: GIZ (2013), ANME (2013), BSW-Solar (2014)

OVERVIEW OF PV SUPPORT SCHEMES (2/4)

Category	Details

Bâtiment Solaire (net metering)	▪ As in the PROSOL ELEC programme, under the "Bâtiment Solaire" programme 30 % of the investment costs of new PV rooftop installations are being subsidised through the FNME/FTE.
	▪ Since June 2012 the maximum amount that can be received per building is limited to 15,000 TND.
	▪ Since 1st January 2013, the subsidy is furthermore limited depending on the plant's capacity:
	  ▪ PV installations with 1 kWp: 1,800 TND
	  ▪ PV installations with ≥ 2kWp : 1,450 TND/kWp
	▪ Unlike the PROSOL ELEC programme, investors under the "Bâtiment Solaire" programme cannot obtain low interest loans of the Attijari Bank.
	▪ The installed capacity of the PV installation usually corresponds to the connected demand capacity set for a building with the STEG.
	▪ In addition, investors benefit from the value-added tax exemption for PV installation equipment.
	▪ PV installers have to be certified by ANME, where the application for the subsidy can be filed after the installation has been completed. As in the PROSOL ELEC programme, the PV installer receives the subsidy from the FNME/FTE directly via the ANME.

* Exchange rate March 2014: 1 Euro = 2.179 TND (Tunisian Dinar)

Sources: ANME (2013), BSW-Solar (2014)

OVERVIEW OF PV SUPPORT SCHEMES (3/4)

Category	Details

Self-supply in low, medium and high voltage grid of the STEG (net metering)	▪ Electricity customers of the STEG as industrial customers, commercial customers or agricultural businesses with a valid entry in the commercial register and connected to the low-voltage grid are being subsidised through the FNME/FTE totalling 20% of the investment costs for PV investments without a installation capacity limit.
	▪ The maximum amount of the subsidy is set according to the energy demand (global) of the customer:
	  ▪ ≤ 4 ktoe: 100,000 TND
	  ▪ 4 ≤ 7 ktoe: 200,000 TND
	  ▪ > 7 ktoe: 250,000 TND
	▪ The installed capacity of the PV installation usually corresponds to the connected demand capacity set for the customer with the STEG.
	▪ PV installers have to be certified by ANME, where the application for the subsidy can be filed after the installation has been completed. The PV installer receives the subsidy from the FNME/FTE directly via the ANME, if the customer's valid entry in the commercial register is also handed in.
	▪ Electricity customers of the STEG (industrial, service- and agricultural sector) with an entry in the commercial register and connected to a medium or high-voltage grid are also being subsidised through the FNME/FTE as shown above.
	▪ In this case, legislation allows the PV electricity producer to sell up to 30 % of its annually generated electricity (in surplus) exclusively to the STEG. For operation of the PV plant, it is mandatory to set up a subsidiary company. The purchase tariff of the STEG is determined by the energy minister via decree. At the moment, it is equal to the electricity tariff.

* Exchange rate March 2014: 1 Euro = 2.179 TND (Tunisian Dinar); ktoe = a thousand tons of oil equivelant

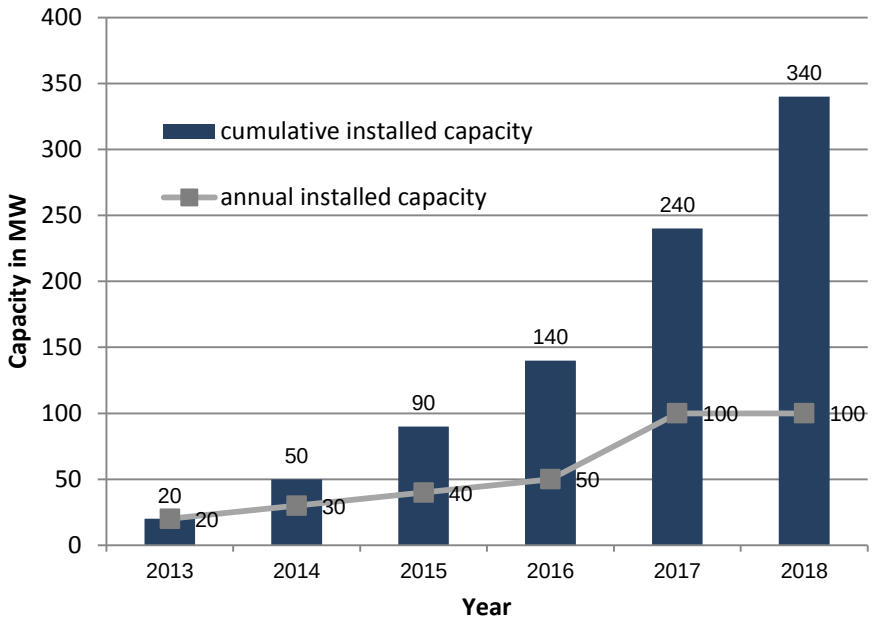
Source: BSW-Solar (2014)

OVERVIEW OF PV SUPPORT SCHEMES (4/4)

	PROSOL ELEC	Solar Building ("Bâtiment Solaire")	Self-supply	Self-supply
Voltage level	Low voltage	Low voltage	Low voltage	Mid and high voltage
Customer type	Private households (self supply)	Residential, service, industrial and other sectors	Industrial, service and agricultural sector with tax code	Industrial, service and agricultural sector with tax code
PV plant capacity	1 kWp or 2kWp	1 kWp or $\geq$ 2 kWp	No limitation	No limitation
Purchase of surplus electricity	No	No	No	Yes (max. 30 % of annual surplus PV generation)
FNME/FTE subsidy (in % of investment costs)	30 % of the investment costs (1 kWp: max. 1,800 TND, 2 kWp: max. 2,900 TND)	30 % of the investment costs (max. 15,000 TND)	20 % of the investment costs (max. varies depending on energy consumption)	20 % of the investment costs (max. varies depending on energy consumption)
Co-financing	Attijari Bank – low interest loans over seven years	Other banks	Other banks	Other banks

MARKET DEVELOPMENT AND BARRIERS

Development of the installed PV capacity



Source: GIZ (2013)

Main obstacles of the Tunisian PV market

Deficient liberalisation of the electricity market

- The STEG, national electricity- and gas supplier, is the only system operator and dominates the energy supply system. It controls 82 % of the market.
- There are two other power producers on the market, both independent, hence they have no free access to the grid: The Carthage Power Company“ (CPC) and CME Energy.
- Generally power generation is only possible via a contract with the STEG.

Political support for PV:

- Tunisia still generates 93 % of its power from fossil sources, connected to a big lobby.
- Competition with other energy sources. Wind energy plays a more important role than PV in Tunisia's solar plan.
- To guarantee the security of supply, Tunisia is increasingly relying on coal-fired power.
- There are some net metering programmes in place in connection with subsidies and low interest loans for customers of STEG, causing only s small market development.
- PV power generation by IPPs is only possible through contracts with STEG. There is no market for electricity trade.

Sources: GIZ (2013), ANME (2013)

MARKET NEWS

Date	Topic	Source
22/09/2014	Tunisia, renewable energy, new law opens market A new law on the production of electricity through renewable energy sources approved last week by the Tunisian Parliament is at the centre of a heated debate. For the first time, private investors will be able to enter a market which has so far been marked by a state monopoly thanks to a concession secured by the competent ministry. According to the government, the new provision will boost productive companies with positive repercussions on growth.	www.ansamed.info
17/09/2014	World Bank - Revolution didn't help Tunisian Economy (in German) The revolution in Tunisia in 2011 changed the political landscape dramatically but not the economy. To this result the World Bank comes in a study published today entitled " The unfinished revolution". According to this, the North African country is economically on the state of the era of the deposed ruler Zine el Abidine long-term Ben Ali , when corruption and excessive bureaucracy undermine fair competition.	www.orf.at
03/04/2014	Tunisia will progressively remove energy subsidies for industry Tunisia will progressively remove energy subsidies (gas and electricity) for industrial sector. The 10% reduction since January 2014 shall be enlarged from 3 to 6 years. The loss of subsidies could save up to 200 bn TND (126 bn $) in the states budget .	www.Enerdata.net
10/12/2013	The Energy Transition Fund will be launched early 2014 (in French) The Energy Transition Fund , recently submitted to the National Constituent Assembly (NCA), will be launched from the beginning of 2014. This is in any case what was said by Nidhal Ouerfelli , Secretary of State for Energy and Mines in the Ministry of Industry, in his speech on Tuesday to the work of the second edition of the days of entrepreneurship and innovation (10-11 December 2013 in Gammarth), adding that the fund aims to fund projects for the rationalization of energy consumption, promote renewable energy and mobilize grants for SMEs wishing to invest in renewable energy.	www.webmanagercenter.com

CONTACT INFORMATION

Category	Name	Website
Ministry of the Environment	Ministère de l'Environnement et du développement durable (MEDD)	www.environnement.nat.tn
Ministry of Energy and Industry	Ministère de l'Industrie, de l'Energie et des Mines	www.tunisieindustrie.gov.tn
Environmental Protection Agency	Agence nationale de protection de l'environnement (ANPE)	http://www.anpe.nat.tn/
The General Directorate of the Environment and Quality of Life	Direction générale de l'environnement et de la qualité de la vie (DGEQV)	www.semide.tn/DGEQV.htm
National Energy Agency	Agence nationale pour la Maitrise de l'Energie (ANME)	www.anme.nat.tn
State Energy and Gas Supplier/Network Operator	Société Tunisienne de l'Electricité et du Gaz (STEG)	www.steg.com.tn
Tunisian General Labour Union	Union Générale Tunesienne du Travail (UGTT)	http://www.ugtt.org.tn/eng/

Sources: dena (2013), Ambassade de France à Tunis (2013)

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Study

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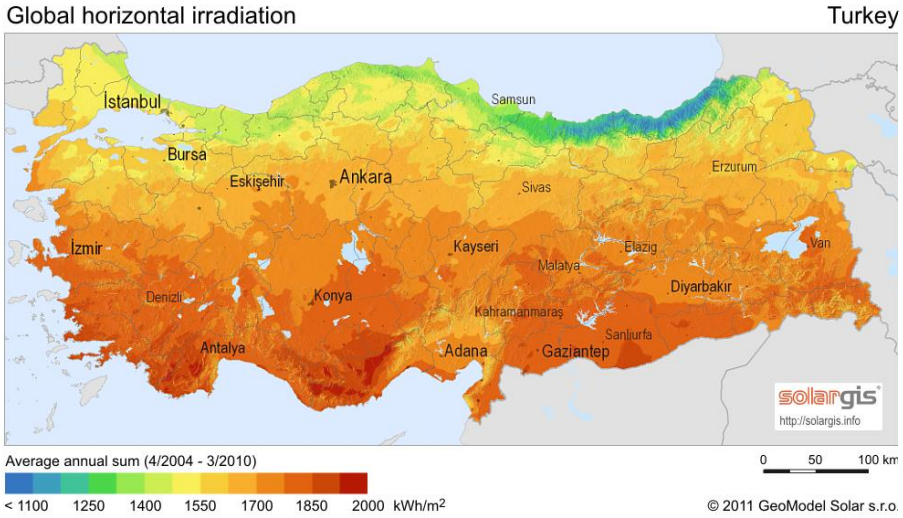
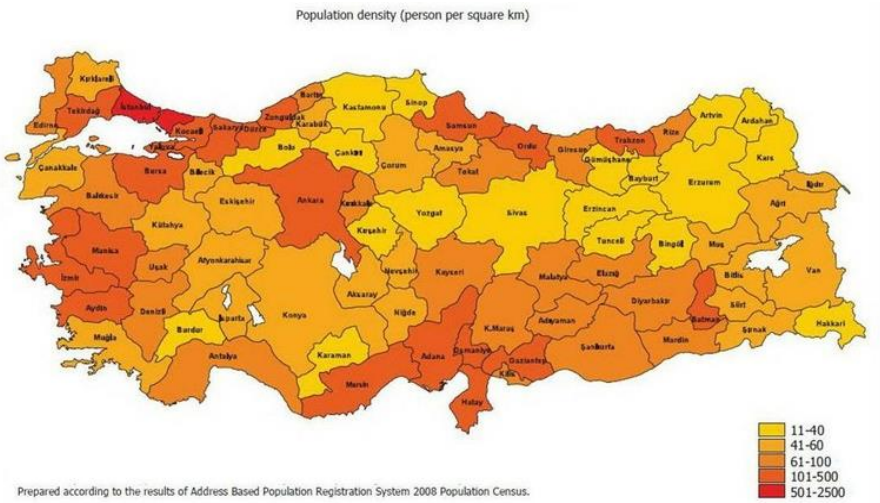
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGIS (2012)

Population density



Source: EEA (2012)

BASIC DATA

General basic data (2013)			
Area	783,562 km²	GDP	1,575.3 bn TL (~ 613.4 bn €**)
Population (2014 est.)	77.3 m	GDP per capita	20,540 TL (~7,998 €**)
Language	Turkish (official language), Kurdish	GDP growth	4.3 %
Government type	Republican parliamentary democracy	Inflation	7.5 %
Administrative division	81 provinces	Unemployment rate	9.7 %

Basic energy market data (2012)	
Final energy consumption	941 TWh
Electricity consumption (total/per capita)	230 TWh / 3,080 kWh
Total electricity import	4.5 TWh
Electricity generation	229.4 TWh
Electricity price (industrial 2012)	0.23 TL (~0.10 € / kWh*)
Electricity price (residential 2012)	0.3 TL (~0.13 € / kWh*)
Share of renewable energy (electricity consumption)	25 %
Increase of electricity consumption	6.3 % p.a.
Annual average solar irradiation	1,527 kWh/m² a

* Annual average exchange rate 2012 of the European Central Bank (ECB): 1 € = 2.34 TL ** Annual average exchange rate 2013 GTAI: 1 € = 2.568 TL

Sources: CIA (2014), dena (2013a), Eurostat (2013), IMF (2013), TEIAS (2011) GTAI (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Cumulative installed PV capacity	2011: 1 MW	2012: 5 MW	2013: 6 MW	2014e: 150 MW
National PV target by 2023	▪ 30 % of electricity generation from renewables ▪ minimum of 3 GW solar capacity: CSP or PV plants			
Main market drivers 2014	▪ Limit for licence-free PV systems is < 1 MWp (former < 500 kWp). ▪ Less complex approval procedure for PV systems < 1 MWp. ▪ Renewable energy law with amended feed-in-tariff (2011). ▪ High irradiation especially in southern Turkey. ▪ Increase of electricity consumption and electricity prices due to constant economic growth.			
PV support schemes 2014	▪ For systems commissioned between 18/05/2005 and 31/12/2015: 13.3 US-Dollar ct / kWh (10 € / kWh*) ▪ Duration: 10 years as from commissioning ▪ After 2015 tariffs will be revised. A degression of tariffs is planned.			

Recent changes in PV regulation	▪ Plants < 1 MWp benefit from a simplified approval procedure:
	  ▪ Simplified grid connection by the network operator (easy approval).
	  ▪ Small and medium-sized PV systems are excluded from the market cap.
	▪ Systems > 1 MWp are capped to 600 MWp by the end of 2013. As of 2014 the cap will be increased to 1 GW.
	▪ On-grid PV capacity has been capped at 600 MW by 31st December 2013. By the end of 2013 a PV capacity of 18 MW was installed.
	▪ Local content requirements: Bonus for locally produced components of up to 6.7 US-Dollar ct / kWh (5 € ct / kWh*).
	▪ Solar irradiation has to be measured for one year in order to get a permit.
	▪ Net Metering: according to the new regulation from 2nd October 2013 grid connected, not licensed PV-systems with a max. capacity of 1 MW are allowed to feed-in excess electricity at the regular FIT (previously 500 kWp).			

* Exchange rate in June 2013: 1 US-Dollar = 0,75 €

Sources: EPDK (2012), EPIA (2012), GENI (2012), REW (2012), Resmi Gazete (2013a, b)

MAIN PV SUPPORT SCHEME

Details	

Legal basis	▪ The renewable energy law (2005) defines the basic principles of electricity generation from renewables (including feed-in-tariff).
	▪ Legal amendments in 2008 and 2011:
	  ▪ Differentiation of tariffs (eg. maximum capacity of 50 MW per system)
	  ▪ Cap of 600 MWel for solar power plants (CSP / PV).

PV tariff	▪ The current support rate applies for systems, which are commissioned before 31st December 2015: 13.3 US-Dollar ct* / kWh (10 € ct / kWh**). The support is available for a period of 10 years. ▪ Operators (as legal entity in form of corporation or limited liability company (Ltd.)) must apply for approval by 31st October in order to receive the tariff of the following year.
Local content bonus	▪ PV mounting systems: 0.8 US-Dollar ct / kWh ▪ PV modules: 1.3 US-Dollar ct / kWh ▪ PV cells: 3.5 US-Dollar ct / kWh ▪ Inverter: 0.6 US-Dollar ct / kWh ▪ Tracking systems: 0.5 US-Dollar ct / kWh
Conditions	▪ Local content components must have "domestic production status certificate" (Turkish: *Yerli İmalat Durum Belgesi*). ▪ The system must be operational before the end of 2015. ▪ The local content support is valid up to 5 years after plant commissioning.

* In order to reduce the exchange rate risk for foreign companies, the FIT is tied to the US Dollar since 2011.
** Exchange rate in June 2013: 1 US-Dollar = 0.75 €

In the first bidding round for large-scale PV projects (> 1 MWp) the number of applications was almost 15 times more than the cap of 600 MWp. Between 10th and 14th June 2013 a total of 496 project applications with a capacity of 8,900 MW were submitted to the Energy Market Regulatory Authority (EMRA). The dates for the next round for license applications (2014) was officially announced by EMRA to start in April 2015 (1st, 2nd,3rd,6th, 7th of April 2015).

Sources: EPDK (2012), REW (2012), dena (2013b), Exportinitiative.de (2013), PV-Magazine (2013b)

FURTHER PV SUPPORT SCHEMES

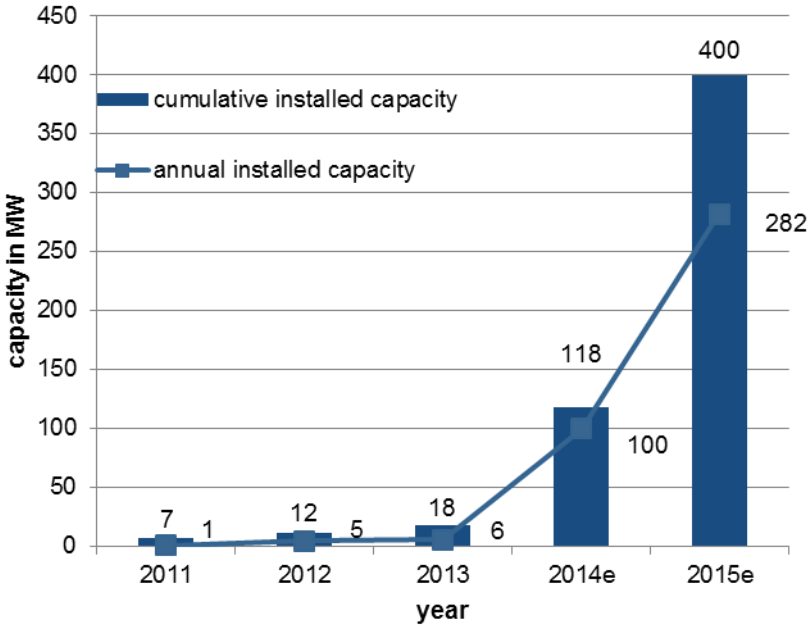
Legal basis	Description of support scheme
Renewable energy law (2005, Nr. 5346)	▪ Allocation of public land for renewable energy projects. ▪ 85 % relief on fees for rights of use or rent for the first ten years of operation. ▪ Exemption from the compulsory 1 % sales tax on business activities on state-owned properties.
Electricity Market Licensing Regulation (No. 24836)	▪ 99 % exemption of annual electricity license fees for the first year of operation. ▪ Prioritized network connection by TEIAS* and reduced network charges by 85 %. ▪ Systems up to 1 MWp, which are used for self-consumption, are exempt from administrative fees of EIE (electricity studies authority).
Tax incentives according to investment decision of the state **	▪ VAT exemption for business equipment
Law on research and development ***	▪ 100 % deduction of R&D expenditures from the corporate income tax. ▪ Exemption from income tax (80 % of the income of employees working on eligible R&D projects). ▪ Social insurance premium support for five years

* TEIAS: state transmission system operator
** State aid investment act (No. 2009/15199)
*** Law Regarding to the support of research and development activities (No. 5746)

Sources: REW (2012), TEIAS (2012)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity



Sources: EPIA (2012), EPIA (2013), EPIA (2014), Apricum (2014)

The main barriers in the Turkish PV market

Fossil and (in future probably also) nuclear energy sources dominate the energy market:

- Renewable energy competes with domestic fossil fuels, primarily coal and petroleum.
- The government plans to launch 20 new nuclear reactors by 2030 and also natural gas, hydro and wind power capacity expansion.

Structure of the electricity market:

- The current market is state dominated. The state-owned EÜAŞ holds 40 % of the generation capacity.
- The state transmission network operator TEİAŞ has a legal monopoly of 100 % on electricity transmission.

Local content requirements:

- The Turkish government supports the use of locally manufactured components with up to 45 % higher FIT (when using almost solely domestic production).

Other barriers:

- Bureaucracy remains the main barrier for a faster development of Turkey's PV market.
- Several factors pose continuing hindrances to PV development, including land availability for ground-mounted systems, adequate financing, grid infrastructure and professional experience in the sector.

Sources: EPIA (2012), dena (2013a)

MARKET NEWS (1/4)

Date	Topic	Source
07/10/2014	Wholesale grid parity for solar possible by 2020, report finds Global energy consultants Pöyry have this week published a report suggesting that the cost of solar and wind power may soon drop to the same level as fossil fuels within a decade, bringing to an end renewable subsidies in Europe. Wholesale grid parity for solar PV could be a reality in Turkey as soon as 2018 due to high wholesale prices in the country.	PV-Magazine
12/08/2014	Unlicensed PV sector could propel Turkey to 10 GW by 2023 Turkey could exceed official targets to install 2 GW of solar power capacity in 2023 by as much as 8 GW over the next decade, according to senior energy experts with knowledge of the country's solar sector "Right now there is a 2 GW project pipeline for unlicensed PV applications, of which at least 1 GW is very serious and backed by German, Chinese, Italian and Turkish investors," Polatkan said.	PV-Magazine
01/08/2014	Swiss developer signs 6.27 GW deal with Hareon The MD of a Swiss solar developer which has just signed a 6.27 GW framework agreement with Chinese manufacturer Hareon Solar says Turkey's thirst for energy is behind the decision by the two companies to develop 3.3 GW of projects in the country over the next three years.	PV-Magazine

MARKET NEWS (2/4)

Date	Topic	Source
13/05/2014	Turkey awards first large-scale solar project licenses The Ankara government has capped its incentive program at 600 MW for new PV plants. It has now awarded the first two licenses. The remaining projects are expected to follow this year. Turkey held the first round of its licensing program for large-scale solar projects last year, attracting nearly 15 times the 600 MW cap set by the Turkish Energy Regulatory Authority (EPDK). Applications for licenses applying to solar farms with capacities of between 1 MW and 50 MW reached a total capacity of 8.9 GW. The Ankara government has now awarded the first two licenses, one to an 8 MW solar park in the region of Elazig in Eastern Anatolia, and the other to a 5 MW project in the eastern region of Erzurum, according to Yalcın Adiyaman, deputy general manager of Halk Enerji.	PV-Magazine
10/04/2014	Turkish PV market expanding despite growing pains Local developers expect at least 500 MW a year of new installed PV capacity in Turkey starting in 2016 despite the difficulties facing the sector. Indeed, PV potential is estimated at around 500 GW and Sener Oktik, president of the Turkish Solar Energy Industry Association (GENSED), expects between 7 and 10 GW to be installed in the country by 2023. In Turkey's first licensing round last June, 9 GW of applications for large-scale projects of more than 1 MW were submitted, far exceeding the set 600 MW cap. However, no license has yet been approved for any of those projects over 1 MW. The total installed PV capacity in Turkey is currently at around 12 MW. It is the non-licensed projects under 1 MW that are the driving factor for the 100 to 200 MW new PV capacity expected to be installed this year — many of them commercial rooftop installations for self-consumption. The total application pipeline for non-licensed projects is over 357 MW, according to Yalcin Kiroglu of the Unlicensed Electricity Generation Association (LI-DER). Non-licensed solar projects also have to go through different stages of applications and permits on the local and national level.	PV-Magazine

MARKET NEWS (3/4)

Date	Topic	Source
15/10/2013	New support regulation for PV systems in Turkey The Turkish Government has decided that PV systems up to a capacity of 1 MW can receive a FIT. The support limit has been doubled. Previously, the FIT was only applicable for PV systems up to a capacity of 500 kW. Further, the government has lifted all kinds of limits for projects that are used for self-supply, which will most likely increase the demand for solar power.	PV-Magazine
26/09/2013	Thailand and Turkey are the emerging countries with the largest expected expansion of PV In its latest report about the development of PV markets in emerging countries, the company IHS is expecting Thailand and Turkey to develop into the biggest PV markets in the coming years. Both countries have the potential to reach a cumulative PV capacity of 3 GW by 2017.	Solar Industry
01/05/2013	First self-generated electricity sold by district municipality An unlicensed power generation project has started selling power to an electricity distribution company for the first time in Turkey. A 96 kW solar energy project, which is owned by the Gürsu municipality in the northwestern province of Bursa, sold power to the electricity distribution company in the region, marking a first for unlicensed power projects. Real or legal persons fulfilling certain minimum requirements can therefore generate their own electricity and sell the surplus power to the power distribution companies.	Hürriyet Daily News

MARKET NEWS (4/4)

Date	Topic	Source
11/04/2013	Turkey: 2013 a critical year for solar energy development 2013 is expected to be a pivotal year for the Turkish solar industry, as the country's Energy Market Regulatory Authority gears up to distribute PV production licenses for projects larger than 1 MW. Meanwhile, cumulative capacity is expected to surpass 4 GW by 2017. Overall, the Canada-based research company forecasts that Turkey will surpass 4 GW of installed photovoltaic capacity in 2017 – up from the around 6.5 to 7 MW currently installed.	PV-Magazine
09/04/2013	Federal Minister Rösler visits Turkey Federal Minister of Economics and Technology Dr Philipp Rösler will visit Turkey's capital city of Ankara from 10 to 12 April 2013. He will be accompanied by a business delegation that comprises leading energy industry companies and small and medium-sized enterprises. Rösler: "I see major opportunities for co-operation in the fields of energy efficiency and renewable energies, in which German firms are among the world's leaders. Therefore I look forward to opening the German-Turkish Energy Forum together with my colleague Mr. Yildiz to lay the foundations for greater co-operation in the energy sector."	Federal Ministry of Economic Affairs and Technology
07/04/2013	Frankensolar cooperates with Turkish solar company FR-Frankensolar GmbH from Nürnberg wants to open the Turkish market together with the Turkish PV company Kosi Solar. According to their statement the two companies intend to act as a wholesaler and drive the project business in Turkey through Kosi Solar.	Photon

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy and Natural Resources	Enerji ve Tabii Kaynaklar Bakanlığı (ETKB)	www.enerji.gov.tr
Energy Market Regulatory Authority	Enerji Piyasasi Düzenleme Kurumu (EPDK; English: EMRA)	www.epdk.org.tr
National Power Producer	Elektrik Üretim A.Ş. (EÜAŞ)	www.euas.gov.tr
National Transmission Network Operator	Türkiye Elektrik İletim A.Ş. (TEİAŞ)	www.teias.gov.tr
National Electricity Trading and Contracting Company	Türkiye Elektrik Ticaret ve Taahhüt A.Ş. (TETAŞ)	www.tetas.gov.tr
National Distribution Network Operator	Türkiye Elektrik Dağıtım A.Ş. (TEDAŞ)	www.tedas.gov.tr
General Directorate of Renewable Energy	Yenilenebilir Enerji Genel Müdürlüğü (YEGM)	www.eie.gov.tr
Association of Electricity Producers	Elektrik Üreticileri Derneği (EUD)	www.eud.org.tr
German-Turkish Chamber of Commerce and Industry	Alman-Türk Ticaret ve Sanayi Odası (AHK Türkiye)	www.dtr-ihk.de
Solar Energy Association	Güneş Enerjisi Sanayicileri ve Endüstrisi Derneği (GENSED)	www.gensed.org
Unlicensed Electricity Generation Association	Lisanssiz Elektrik Üretimi Derneği (LI-DER)	www.lisanssizelektrik.org/
Investment Support Agency	Investment Support and Promotion Agency	www.invest.gov.tr

Source: dena (2013b)

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Study

MARKET INFO UNITED KINGDOM – PHOTOVOLTAICS

dena-Market Information System

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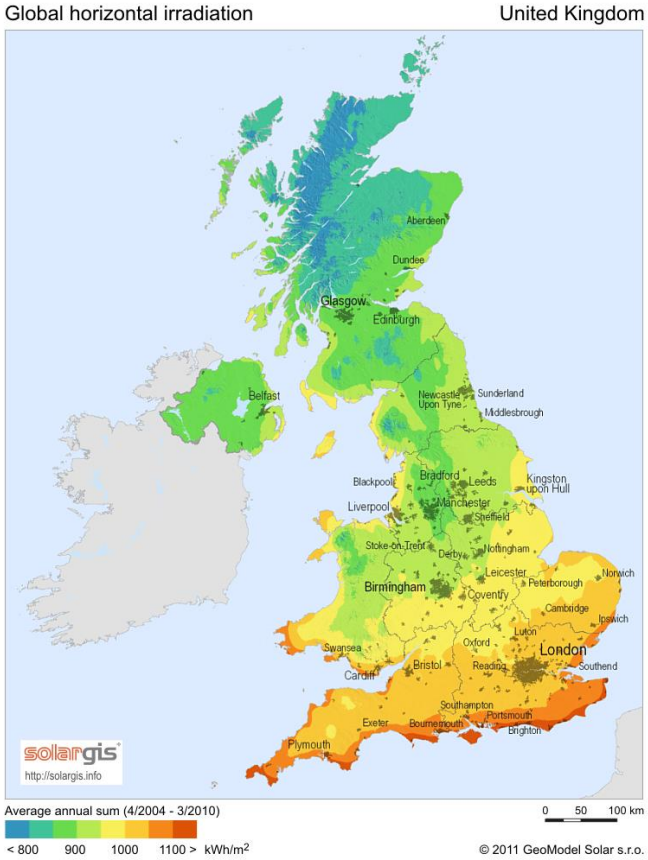
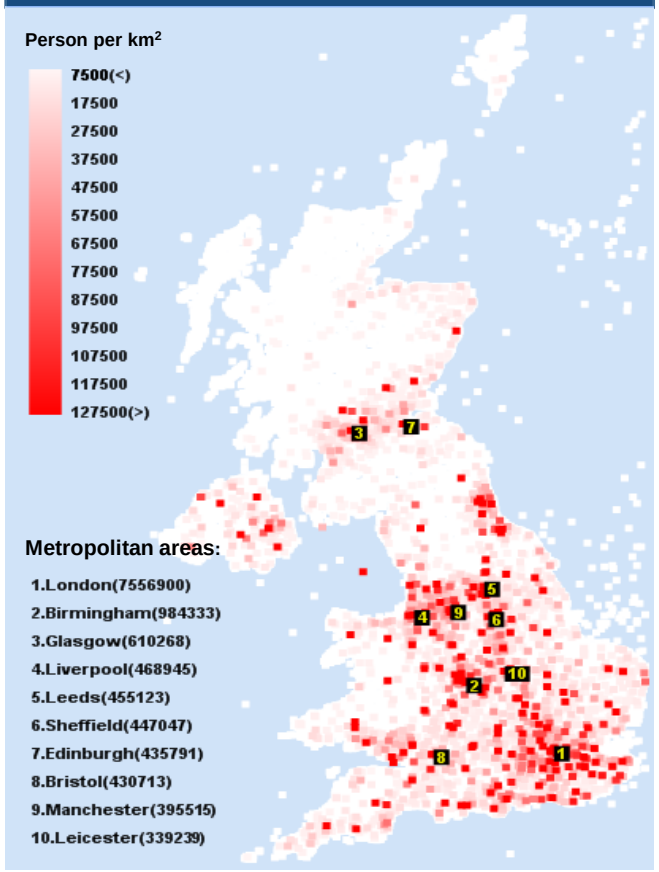
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: SolarGIS (2010)

Population density



Source: Populationlabs (2012)

BASIC DATA

General basic data (2013)			
Area	243,610 km²	GDP (2014 est.)	1,648.4 bn £ (~1,992.8 bn €)
Population (2013 est.)	64.1 m	GDP per capita	25,300 £ (~29,800 €)
Language	English	GDP growth	1.7 %
Government type	Constitutional monarchy with parliamentary system	Inflation	2.6 %
Administrative division	Four countries: England, Scotland Wales and Northern Ireland	Unemployment rate	7.5 %
Basic energy market data (2013)			
Electricity consumption (total/per capita)	323.3 TWh / ~ 5,051 kWh		
Electricity import (net)	14.427 TWh		
Electricity price (industrial 500 – 2,000 MWh/a)	0.118€ / kWh (excluding taxes)		
Electricity price (residential 2.500-5,000 kWh/a)	0.174€ / kWh (including VAT)		
Share of renewable (gross electricity generation in 2012)	11.9 %		
Increase of electricity consumption (2002 - 2012)	-0.46 %		
Annual global solar irradiation	900 – 1,200 kWh / m² a		

Currency exchange rates see European Central Bank (ECB)

Sources: CIA (2014), DECC (2014), dena (2013), ENTSO-E (2013), BDEW (2013), Eurostat (2014), IMF (2014), Gtai (2014)

PHOTOVOLTAIC MARKET INDICATORS

Indicators				
Market size (annual installed capacity)	2011: 813 MW	2012: 925 MW	2013e: 1,450 MW	2014e: 3,000 MW
National target (2020)	▪ PV capacity: 10 GW		▪ 15 % share of renewable energy of final energy demand	
Main market drivers 2014	▪ Large-scale systems > 5 MW : quota system (certificates), for small-scale systems: FIT (generation tariff) ▪ Ambitious goals of the government in the area of climate protection and expansion of renewable energies: there is an increased pressure to act because reaching the goal of covering 15 % of energy demand by renewables by 2020 might not be accomplished according to market observers. ▪ Based on rapidly falling prices for PV modules in the last three years especially large-scale systems have become more attractive in UK .			
PV Support in 2014	▪ The UK support policy up to now has been based on the Renewable Obligation-System (RO), which is a market based quota system (certificate trade for systems > 5 MW) as well as on a FIT for communities and end users of PV-systems with a capacity ≤ 5 MW (details on support scheme see next slide).			
Changes in PV regulation in 2013/ 2014	▪ Since April 2013 new rules concerning the ROCs have been in force. The promotion for PV systems that were accredited from 31/03/2013 is regulated in the Renewables Obligation (Amendment) Order 2013 and in regulations concerning each region (England/Wales, Scotland, Northern Ireland). ▪ Last changes to the FIT apply to installations since 1st July 2014. The current tariff rates since 1st October remain unchanged and will be valid until 30th December 2014. ▪ In 2014, the so called “Contract for Difference Model (CfD)” for PV systems > 5 MW was introduced. The Renewable Obligation Scheme with tradable certificates will be phased out in a transition period until 1st April 2015 for PV power plants. The CfD focusses on current electricity market prices. ▪ For details on the CfD model see slide 9.			

Sources: dena (2013), dena (2013a), EPIA (2013), Solar Power Portal (2013)

MAIN PV SUPPORT SCHEME – GENERATION TARIFF

PV-Support	Details
FIT Program in 2014	▪ The FIT system is a generation tariff, which means the payment is independent from feeding electricity into the grid . If a plant operator feeds into the grid, a bonus of 4.77 p / kWh (~5.79 € ct / kWh*) will be added. The FIT is being paid for 20 years. ▪ Eligible PV systems must be installed by a registered installation company with certified components. Maximum PV capacity per system is 5 MWp. ▪ Tariffs for PV systems depend on PV capacity (six categories), energy efficiency criteria and on the validity of multi-installations tariffs: Based on a scheme, the system will be rated as „high", „medium" and „low" efficient **. ▪ The tariffs below apply to installations from 1st July until 30th September 2014 and also apply unchanged to installations from 1st October until 30th December 2014. The tariffs will be adjusted every quarter.

tariff / capacity and efficiency	≤ 4 kW	4-10kW	10 - 50 kW	50 kW - 150 kW	150 kW - 250 kW	> 250 kW / ground mounted PV systems
low**	638 p / kWh (7.74 € c t/ kWh*)	6.38 p / kWh (7.74 € ct/ kWh*)	6.38 p / kWh (7.74 € ct/ kWh*)	6.38 p / kWh (7.74 € ct / kWh*)	6.38 p / kWh (7.74 € ct / kWh*)	6.38 p / kWh (7.74 € ct / kWh*)
medium**	12.94 p / kWh (15.7 € ct / kWh*)	11.73 p / kWh (14.23 € ct / kWh)	10.92 p / kWh (13.25 € ct / kWh*)	9.31 p / kWh (11.29 € ct / kWh*)	8.9 p / kWh (10.79 € ct / kWh*)	exchange rate 1 £ = 1.21340 €
high**	14.38 p / kWh (17.45 € ct / kWh*)	13.3 p / kWh (15.81 € ct / kWh*)	12.13 p / kWh (14.72 € ct / kWh*)	10.34 p / kWh (12.54 €ct / kWh*)	9.89 p / kWh (12.0 € ct / kWh*)	

** Detailed guidelines from the Office of Gas and Electricity Markets (Ofgem) are available in at „Feed-in Tariffs: Guidance for renewable installations".

Source: Ofgem (2014)

FURTHER PV SUPPORT SCHEMES (1/2)

Support	Details
The Renewable Obligation Order (2010): Quota system (RO Certificates)	**Renewable Obligation Scheme (ROCs)** ▪ Operators of PV plants earn a certain amount of certificates (Renewables Obligation Certificate - ROC or ROS in Scotland) per generated MWh depending on the capacity of the plant. ▪ The ROC allocation system, which has been in place since April 2013 determines a yearly reduction in the prices for certificates a plant operator receives per generated MWh until 2017. ▪ All utilities have to comply with a steady increasing renewable electricity quota, e. g. by purchasing renewable obligation certificates. ▪ Alternatively utilities can pay a fixed tariff of 43.30 £ (ca. 52.54 € *) per MWh directly to Ofgem (Gas and Electricity Markets Authority) for 2014-2015. The tariff will be adjusted based on the inflation rate. ▪ New PV plants > 5 MWp can be accredited no later than 31st March 2015 under the ROC system and get the 20-year funding period (to 2035). After that date the ROC system for new PV plants > 5 MWp will be closed.
Reduced / exemption of VAT	▪ PV systems on existing roofs (on residential or public buildings): 5 % VAT (instead of 20 % VAT), ▪ PV systems on new buildings: exempt from VAT ▪ PV systems are only eligible if they have been installed by registered installation companies.
Exemption of climate change levy (CCL)	▪ PV plant operators are exempt from the climate change levy. ▪ Utilities have to pay a climate change levy for fossil fired electricity generation, which is then added to the consumer's electricity bills.

* exchange rate : 1 £ = 1.21340 €

Detailed guidelines from the Office of Gas and Electricity Markets (Ofgem) of April 2013 are available at: „Renewable Obligation: Guidance for Generators"

Sources: dena (2013), dena (2013a), Ofgem (2013)

FURTHER PV SUPPORT SCHEMES (2/2)

Support	Details

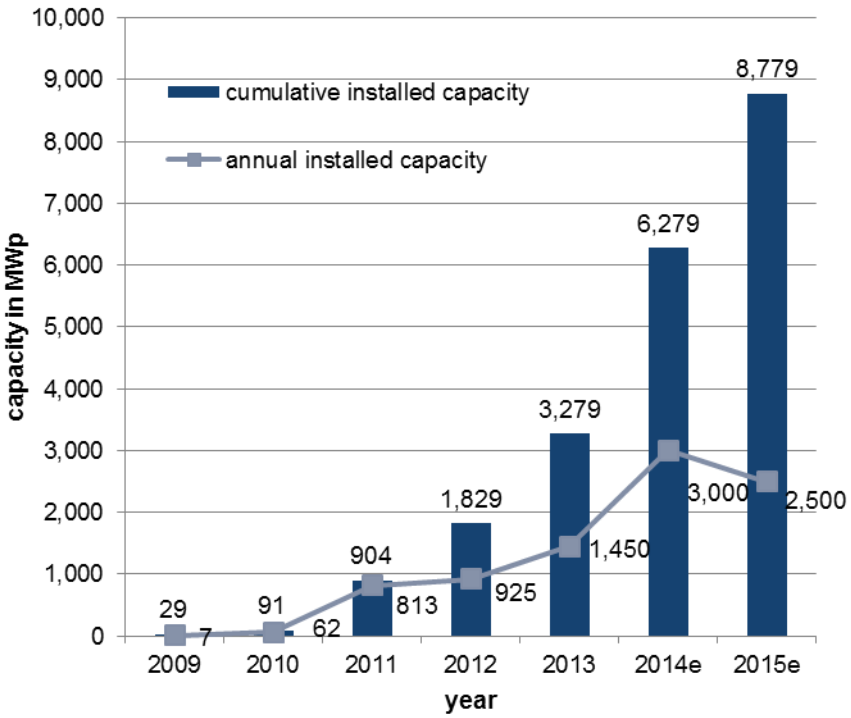
Planned (Contracts for Difference - CfD) based on Energy Act 2013	▪ February 2014: The CfD model is expected to come into force in 2014.
	▪ In Northern Ireland the new model cannot be applied before 2016 .
	▪ October 2014: Operators of accredited large PV systems (> 5 MW) can select between the new CfD model and the ROC system (- see slide 7 Renewables Obligation) until 31st March 2015.
	▪ From 31st March 2015 onwards operators of new PV plants > 5 MW only can use the CfD model.
	▪ According to the CfD model, an operator of a large PV system receives the difference between the purchasing price ("strike price") and the market price for electricity ("reference price ") through a private contract - concluded with a state-owned company.
	▪ If the market price of electricity is below the level of remuneration agreed in the contract, the electricity producer receives a premium on top of the market price. If the market price of electricity is above the current contract price, the PV electricity producer must refund the excess.
	
	▪ The following reference prices have been set for the PV systems:
	  ▪ in 2014/2015: £ 120 / MWh (about € 145.6 * / MWh)
	  ▪ in 2016/2017: £ 115 / MWh (about € 139.5 * / MWh)
	  ▪ in 2017/2018: £ 110 / MWh (about € 133.5 * / MWh)
	  ▪ in 2018/2019: £ 100 / MWh (about € 121.3 * / MWh)

* exchange rate : 1 £ = 1.21340 €

Source: dena (2014)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity



Sources: EPIA (2013), Solar Power Portal (2014)

The main barriers in the UK PV market

Dominance of conventional resources

The UK energy supply is mostly (~ 95 %) based on local primary energy sources like oil, natural gas and coal (status 2011).

- The government focusses on:
  - Carbon Capture and Storage (CCS) to improve the carbon balance sheet for existing coal power plants.
  - The development of nuclear power plants as a climate-friendly technology
  - Exploration of shale-gas and oil deposits.

Support mechanisms are changed frequently:

- In 2014 the FIT system will be amended every 3 months. In April 2014 the FIT was reduced for all system categories (see slide 6)

Sources: EPIA (2013), dena (2013)

MARKET NEWS (1/3)

Date	Topic	Source
09/10/2014	Lightsource teaming up with local installers to expand rooftop business in UK Lightsource Renewable Energy - with an operating portfolio of more than 600 MWp, the U.K.'s largest producer of solar energy - is looking to expand its rooftop solar business. The company has so far invested some £1.1billion into the U.K. solar industry, the lion's share in large-scale ground-mounted projects, but that is now changing. Due in part to the shift in government support for solar, Lightsource says it is seeking to "deploy significantly more investment into rooftop installations" and is looking to build long-term relationships with rooftop installers who the company says will gain from its industry expertise, supply chain and funding.	PV-Magazine
02/10/2014	UK Foresight Solar Fund to raise up to £100 million The fund plans to acquire two PV plants with a combined capacity of 74 MW and expects to continue acquisitions of plants below and above 5 MW following the introduction of next year's CfD scheme.	PV-Magazine
02/10/2014	£300 million budget to launch UK auctions for renewables Renewable electricity projects will compete for £300 million in support this autumn – an increase of £95 million from the indicative budget published in July, Energy and Climate Change Secretary Ed Davey announced today. The funding for Contracts for Difference, which provide long-term certainty for investors, are a cornerstone of the Government's reforms to the electricity markets, designed to drive investment in a new generation of clean, secure electricity supplies. The Government is also changing the way it supports rooftop-mounted solar power, in line with the Solar Strategy. This includes changes to the Feed-in Tariff Scheme (FITs), with a new degression band for solar installations over 50 kW, which will help to protect existing levels of financial support for this type of rooftop-mounted solar, as well as consulting on changes that would enable businesses and other organisations to take their panels and FiTs with them when they move premises.	GOV.UK (Press Release: Department of Energy & Climate Change)

MARKET NEWS (2/3)

Date	Topic	Source
17/09/2014	Suntech, Greenfield team up with youmex in UK Continuing the ambitious worldwide expansion of its project business, Shunfeng Photovoltaic International has unveiled a new partnership with two German players, EPC provider Greenfield Solar International and clean energy financing and investment group youmex, to finance and sell their solar farm projects pipeline in the United Kingdom.	PV-Magazine
12/08/2014	UK hits 5 GW solar PV capacity Solar analysts NPD Solarbuzz have today published data that shows the U.K. has now installed 5 GW of cumulative solar PV, making it the sixth country in the world to surpass this landmark figure. The analysts' finding reveal that 90 % of the U.K.'s capacity has been installed in the past three years (with 1 GW coming online in the first six months of this year), and nearly half of all deployed PV in the country is located in England's southern regions – the South West and South East of England combined account for 46 % of all PV capacity. The dry, sunny east of England boasts 15 % of installed capacity, whereas cramped London and cloudy Northern Ireland can only muster 1 % each.	PV-Magazine
01/08/2014	Planning barrier to UK solar could be removed The government has proposed raising the bar for commercial rooftop systems needing planning permission, from 50 kW to 1 MW. The STA says more needs to be done for the 50 kW-to-5 MW rooftop market in the UK. UK trade body the Solar Trade Association (STA) has welcomed a government proposal to remove the requirement for commercial businesses to secure planning permission for PV rooftops of 50 kW to 1 MW in scale. But with only 65 MW of large commercial rooftop systems – defined as 50 kW to 5 MW – installed in the UK in the 12 months to June, the STA says a lot more must be done to boost that segment of the PV market.	PV-Magazine

MARKET NEWS (3/3)

Date	Topic	Source
16/05/2014	UK Moves to Cut Support for Large Scale Solar PV DECC, the UK's Department of Energy and Climate Change, has unveiled proposals for further reform of the country's renewable energy support program. The measures include plans for the closure of the Renewables Obligation scheme to new solar PV capacity above 5 MW from 1st April 2015. Outlining the plans at the launch of a series of consultations, the government argues that the proposals are designed to maintain the growing momentum behind renewable electricity investment in the UK and a smooth transition to the new Contracts for Difference (CfD) support scheme, while continuing to deliver value for consumers. In one of the key measures of the new proposals, the government points out that large-scale solar is deploying much faster than expected. Industry projections indicate that by 2017 there could be more than the 2.4 to 4 GW set out in the electricity market reform (EMR) delivery plan deployed. This is behind the consultation on proposals to close the RO to new solar PV capacity above 5 MW from 1st April 2015, though the proposals do include grace period arrangements to protect developers, which have already made significant financial commitments to projects. The proposals also envisage keeping the RO open for projects under 5 MW, which are not eligible for the new Contracts for Difference (CfDs). Projects above 5 MW will be able to apply for CfDs — part of the Electricity Market Reform Programme that is slowly progressing.	Renewable Energy World
13/05/2014	UK proposes incentive cuts to large-scale solar Consultation published on Tuesday by the government suggests removing the renewables obligation certificate (ROC) for plants over 5 MW by April 1, 2015.	PV-Magazine
14/01/2014	UK solar PV demand reached 1.45 GW in 2013: large-scale grows by 600% Large-scale solar PV installations in the UK grew by an incredible 600 % during 2013, driving the UK to a record 1.45 GW of new solar PV capacity added. Ground-mounted installations accounted for over 90 % of new large-scale solar PV added in the UK in 2013. The UK was ranked in sixth place globally for large-scale solar PV, and is one of just six countries that had, or approached, a GW-level large-scale solar market during 2013.	Solarpowerportal UK

CONTACT INFORMATION

Category	Name	Website
Ministry of Energy	Department of Energy and Climate Change (DECC)	www.decc.gov.uk
Ministry of Economics	Department for Business, Innovation and Skills (BIS)	www.bis.gov.uk
Ministry of Environment	Department for Environment, Food and Rural Affairs (Defra)	www.defra.gov.uk
Energy Market Regulator	Office of Gas and Electricity Markets (Ofgem)	www.ofgem.gov.uk
Solar Energy Association	Solar Trade Association British Photovoltaic Association (BPVA)	www.solar-trade.org.uk www.bpva.org.uk
Renewable Energy Association	Renewable Energy Association (REA)	www.r-e-a.net
National Partner for Project Financing and Development	UK Trade and Investment (UKTI)	www.ukti.gov.uk

Source: dena (2013)

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Study

MARKET INFO USA/CALIFORNIA – PHOTOVOLTAICS

dena-Market Information System

www.export-erneuerbare.de or http://exportinitiative.dena.de

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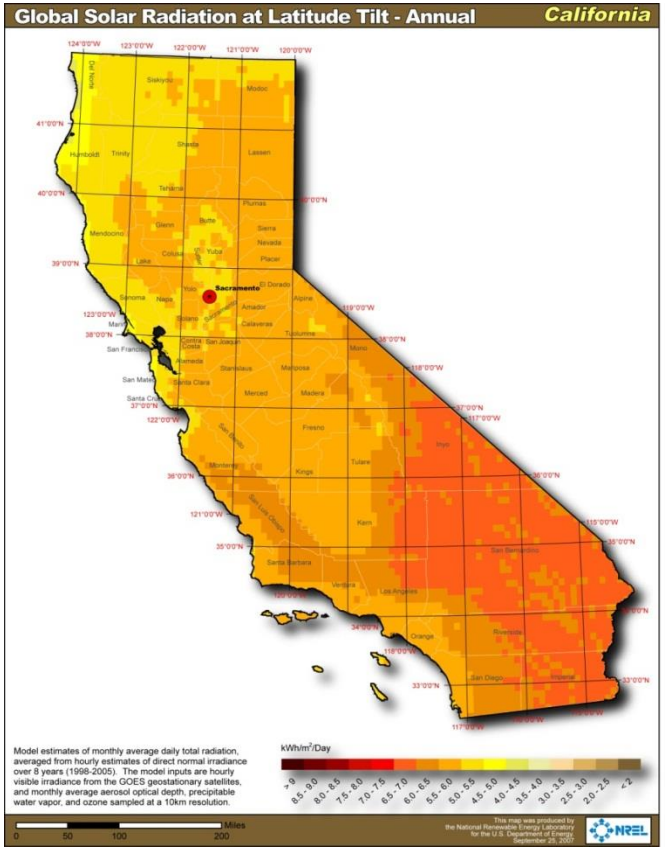
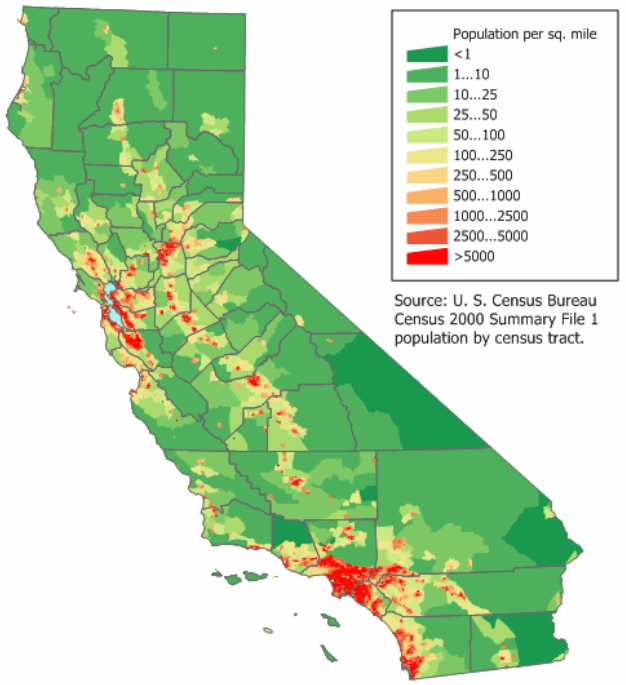
SOLAR IRRADIATION & POPULATION DENSITY

Annual global solar irradiation



Source: NREL (2012)

Population density



Source: thelargest.net (2012)

BASIC DATA

General basic data (2012)			
Area	411,046 km²	GDP (est.)	2,050.7 bn US$(~1,602.1 bn €*)
Population (2013 est.)	38,041,430	GDP (per capita est.)	53,907 US$ (~42,114.84 €*)
Language	English, Spanish	GDP Growth (est.)	2.7 %
Government type	Federal republic	Inflation	1.7 %
Administrative division	One state (of 50)	Unemployment rate	8.2 %

Basic energy market data (2011)	
Electricity consumption (total/per capita)	250.384 TWh/ 6,640kWh
Total electricity import	84.539 TWh
Average electricity price (industrial 04/2014)	10.72 ¢/ kWh (8.08 €ct/ kWh**)
Average electricity price (commercial 04/2014)	13.11 ¢/ kWh (9.87 €ct/ kWh**)
Average electricity price (residential 04/2014)	10.17 ¢/ kWh (7.66 €ct/ kWh**)
Proportion of renewable energy (electricity consumption)	14.2 %
Increase of electricity consumption (since 2000)	1.3 %
Annual average global solar irradiation	1,900 kWh/ m² a

* Annual average exchange rate 2012 of the European Central Bank (ECB): 1 € = 1.28 US$; ** Annual average exchange rate 2013 (ECB): 1Euro = 1.3281 US$

Sources : DOC (2013), DOF California (2013), EIA (2013), EC California (2011), EC California (2012), ECB (2013), State of California (2013)

PHOTOVOLTAIC MARKET INDICATORS

Indicators						
Market size (annual installed capacity)	2010: 259 MW	2011: 537 MW	2012: 1,033 MW	2013: 2,746 MW	2014e: 3 GW	2015e: 4 GW
PV target	3,000 MW by 2016 for PV systems with a capacity < 1 MW (Go Solar California) 300 - 475 MW by 2014 for PV systems with a capacity from 3 ≤ 20 MW (Renewable Auction Mechanism -RAM)					
Main market drivers 2014	▪ California Renewable Portfolio Standard (RPS) ▪ California Solar Initiative (CSI): The program was closed to customers in the service territory of Pacific Gas and Electric (PG & E) - applications will no longer be accepted here. ▪ California Net metering ▪ Federal Investment Tax Credit (ITC), Modified Accelerated Cost-Recovery System (MACRS)					
Employees in PV industry	47,100 (2013)					
Changes in PV regulation	▪ April 2011: further development and extension of RPS (Senate Bill X1-2): 33 % share of renewable energy by 2020 in electricity sold in California (formerly: 20 % by 2010). ▪ November 2011: start of RAM-Program. RAM is a reverse auction mechanism with contracts between plant operators and utilities for 10-20 years. ▪ 1st February 2013: extension of ITC from 01.02.2013 to 31.12.2016. ▪ May 2013: All support programs of the California Solar Initiative are available until the administrators /utilities of each program have spent the whole budget. ▪ July 2013: The Californian FIT program has been replaced by the Renewable Market Adjusting Tariff (Re-MAT) system in July 2013. Project proposals can be submitted since 1st October 2013 for a first period to adjust the tariff (see slide 11). ▪ October 2013: The California Net-Metering rules were amended by AB 327 (see slide 12). ▪ The California Public Utilities Commission adopted Resolution E-4655 on 15th May 2014 to modify the SCE's, PG&E's, and SDG&E's RAM solicitation protocols and pro forma PPAs before the fifth RAM auction.					

Sources : dena (2012 / 2013), IHS iSuppli (2012), SEIA (2013), SEIA (2014)

OVERVIEW OF PV SUPPORT SCHEMES

PV support	
Rebate programs / soft loans	Support programs of the California Solar Initiative (CSI) ▪Investment subsidies for PV systems on existing and new buildings Local support programs of municipal utilities (MUNIs) ▪Utility rebate programs (rebate depends on investment) ▪Utility loan programs (soft loans to finance investment) Local support of counties and cities ▪Local rebate (Grant) programs ▪Local green building incentive programs (exemption of fees/or a simplified approval process for PV systems in connection with construction or retrofit projects of buildings)
Tax incentives	▪ The Californian Law is offering the exemption of property taxes for operators of qualifying solar systems. (California Revenue and Taxation Code, § 73). ▪ The installation of a roof-top system will not lead to an increased property tax, as the value of the system is not added to the property value. ▪ Investment Tax Credit (ITC)
Other	▪ RPS, California Net Energy Metering, pace-financing, Re-MAT, California FIT, Renewable Auction Mechanism ▪ The whole US PV market is expected to benefit from recent action of the Federal Energy Regulatory Commission (FERC): With the beginning of February 2014 the "Order No. 792 Small Generator Interconnection Agreements and Procedures (Final Rule)" came into force and as a result it is easier for small power generation projects to get a network connection. Among other things, the upper limit for participation in the simplified connection process was increased up to 5 MW for inverter-based grid connected systems. ▪ Details on the Order No. 792 Small Generator Interconnection Agreements and Procedures (Final Rule): www.ferc.gov/whats-new/comm-meet/2013/112113/E-1.pdf

Sources : dena (2014), GTAI (2014)

CALIFORNIA RENEWABLE PORTFOLIO STANDARD (RPS)

Category	Details
Description	By 2020, Californian utilities are obliged to have a 30 % share of renewable energy in the electricity sold (possible with power purchase or self generated amounts of electricity). This applies to all electricity retailers in the state including publicly owned utilities (POUs), investor-owned utilities (IOUs), electricity service providers, and community choice aggregators.
Enacted / development	Established in 2002 under the Senate Bill 1078, California's Renewables Portfolio Standard was accelerated in 2006 under Senate Bill 107 by requiring that 20 % of electricity retail sales be served by renewable energy resources by 2010. This new RPS pre-empts the California Air Resources Boards' 33 % Renewable Electricity Standard and applies to all electricity retailers in California including publicly owned utilities (POUs), investor-owned utilities(IOUs), electricity service providers, and community choice aggregators. All entities must adopt the RPS goals of 20 % of retail sales from renewables by the end of 2013, 25 % by the end of 2016, and the 33 % requirement being met by the end of 2020.
Changes	Since 18th August 2011: The Renewable Auction Mechanism (RAM) requires from three investor-owned utilities in California (PG&E, SCE, SDG&E) the auction of new renewable generation capacity of 1,000 MW (~ 300 to 475 MW of solar capacity). Total capacity was expanded to 1,299 MW by D.12-02-035 and D.12-02-002 through RAM by holding four auctions over two years. RAM, is a simplified market-based procurement mechanism for renewable distributed generation (DG) projects greater than 3 MW and up to 20 MW. The fourth RAM auction closed on 28th June 2013. The California Public Utilities Commission adopted Resolution E-4655 on 15th May 2014 to modify the SCE's, PG&E's, and SDG&E's RAM solicitation protocols and pro forma PPAs before the fifth RAM auction.
Weblinks	www.energy.ca.gov/portfolio/index.html www.cpuc.ca.gov/PUC/energy/Renewables/index.htm www.cpuc.ca.gov/PUC/energy/Renewables/hot/Renewable+Auction+Mechanism.htm

Sources: dena (2014), CPUC (2014)

INVESTMENT TAX CREDIT (ITC)

Category	Details
Description	Corporate Tax Credit: The credit is equal to 30% of expenditures, with no maximum credit. Eligible solar energy property includes equipment that uses solar energy to generate electricity.
Supported PV market segment	Commercial, industrial, agricultural customers and utilities
Enacted	01/01/2006
Changes in 2013/2014	In February 2013, the ITC was extended for PV installations in operation until 31st December 2016. A number of changes to this credit are scheduled to take effect for systems taken into service after 31st December 2016. The credit for equipment that uses solar energy to generate electricity will decrease from 30 % to 10 %. June 2014: The future of the ITC after 2016 is still uncertain. In U.S. politics, various efforts have been made to unify the broad promotion of renewable energies. For example, President Obama attempted to let the Investment Tax Credit for solar energy phase out completely in 2016 as stated in his budget plan that was proposed in March 2014 for the upcoming fiscal year ("Budget of the United States Government, Fiscal Year 2015“). Instead, PV plant operators would be able to make us of the "Production Tax Credit" (PTC). As a result, the promotion would be a production-dependent tax credit over a period of ten years, which would then also be designed to be recoverable in the future. The Solar Association SEIA rejected this proposal. The industry association tries to achieve an extension of the ITC after 2016.

Sources: dena (2014), DSIRE (2014), GTAI (2014)

GO SOLAR CALIFORNIA (CSI AND NSHP)

Category	Details
Description	California Solar Initiative (CSI) Program: (Incentives for rooftop PV systems on existing buildings) ▪PV systems ≤ 50 kW: Expected Performance Buydown (EPBB): Incentive (per installed capacity) depending on expected performance. ▪PV systems ≥ 50 kW: Performance Based Incentive (PBI): Incentive (per generated kWh) for a duration of five years ▪New Solar Home Partnership (NSHP) Program: Incentives for rooftop PV systems in newly constructed buildings
PV market segment	Residential and commercial market
Enacted	01/07/2009
Incentives	See following slides
Weblinks	http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA134F&re=1&ee=1 http://www.gosolarcalifornia.ca.gov/ Current status: http://www.csi-trigger.com

Source: dena (2014)

CSI-INCENTIVES FOR ROOFTOP SYSTEMS (CERB)

Expected Performance Buydown (EPBB) Incentive (per installed Watt) (PV system capacity ≤ 50 kWp)					Performance Based Incentive (PBI) (Incentive per generated kWh within five years) (PV system capacity ≥ 50 kWp)		
Step	supported PV capacity (in MWp) in step	Residential market (in $/Watt)	Non-residential market		Residential market (in $/kWh)	Non-residential market	
			Commercial (in $/Watt)	Government/ non-profit (in $/Watt)		Commercial (in $/kWh)	Government/ non-profit (in $/kWh)
1	50	n/a	n/a	n/a	n/a	n/a	n/a
2	70	2.50	2.50	3.25	0.39	0.39	0.50
3	100	2.20	2.20	2.95	0.34	0.34	0.46
4	130	1.90	1.90	2.65	0.26	0.26	0.37
5	160	1.55	1.55	2.30	0.22	0.22	0.32
6	190	1.10	1.10	1.85	0.15	0.15	0.26
7	215	0.65	0.65	1.40	0.09	0.09	0.19
8	250	0.35	0.35	1.10	0.044*	0.044*	0.139*
9	285	0.25	0.25	0.90	0.032*	0.032*	0.114*
10	350	0.20	0.20	0.70	0.025	0.025	0.088

*tariffs were revised and are in force since February 12, 2011. For current status and step see http://www.csi-trigger.com .

Source: dena (2014)

RENEWABLE MARKET ADJUSTING TARIFF

Category	Details	
Renewable Market Adjusting Tariff (Re-MAT) For Small-Scale Renewable Generation	▪ Project proposals are being received by the three IOUs San Diego & Electric, Pacific Gas and Electric, and Southern California Edison within the framework of the Renewable Market Adjusting Tariff (Re-MAT) program since 1st October 2013.	
	Application	▪ Within the Re-MAT program electricity providers are offering contracts for off-taking electricity generated by PV projects with a capacity up to 3 MWp. ▪ The PV projects have to be within the service area of one of the three electricity providers and be using their transmission grids.
	Status/ timeframes	▪ An application fee of 2 US Dollar/kW (~ 1.50 €/kW) is charged for every project. ▪ The client can chose between a contract duration of 10, 15, or 20 years. ▪ Re-MAT is divided into two-month-periods. ▪ First period started 1st of November 2013. ▪ Seventh period started on 1st November 2014.
	Tariff	▪ The FIT has been determined at an introduction rate of 89.23 US Dollar/MWh (~ 66.86 €) and will be adjusted every two months according to demand. ▪ The introduction rate also applied in the sixth period (in September/October 2014).
	Adjustment	▪ In case that in a two-month-period less than 20 % of the available capacity will be used, the tariff will be increased for the next period. ▪ When in one period 100 % of the available capacity is used, then the tariff will decrease for the next period.

Sources: dena (2013), SDGE (2014)

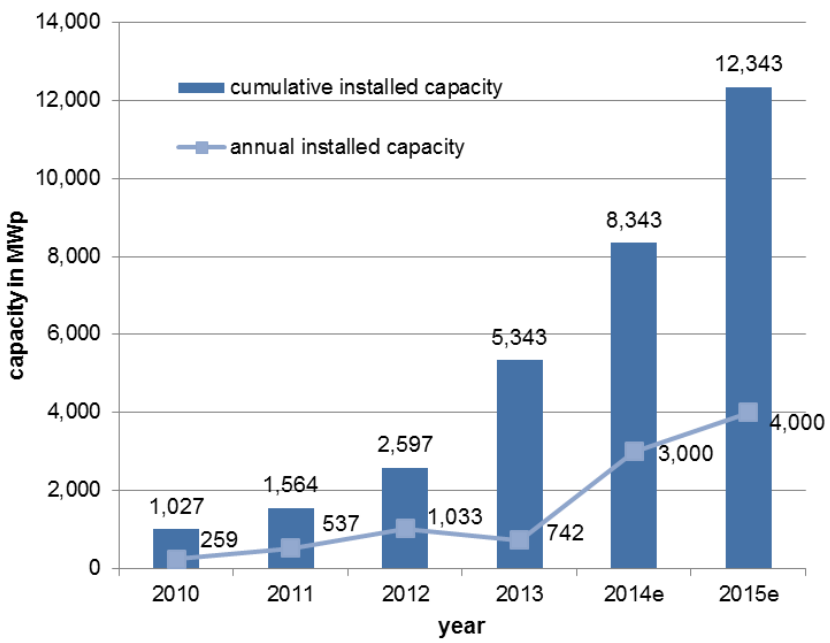
CALIFORNIA NET ENERGY METERING (NEM)

Category	Details
Description	PV system operators (≤ 1 MWp) as customers of Californian utilities have the right to apply for California net metering (without customers of LADWP). Commercial or residential PV system operators receive an electricity bill with figures about own use and excess generated PV electricity, which is fed into the distribution grid in the service area of their relevant utility.
PV support	Utilities (IOUs and MUNIs) are obliged to connect PV systems to the grid and to accept excessive generated PV electricity as well. Net metering for PV system operators proceeds with the principle of avoided electricity costs. A meter will monitor excessive PV electricity. Excessive electricity will be accounted for in the electricity bill of the PV system operator.
Market segment	Commercial and residential PV market
Support since 1996	California Public Utilities Code § 2827 (01/1996) ; CA Public Utilities Code § 2830 (09/2008) ; AB 327 (10/2013)
Market cap until first of July 2017	The AB 327 of November 2013 stipulates that utilities with more than 100,000 domestic service connections must offer net metering until the relevant market cap or the 1st July 2017 is reached, whichever occurs first. For additional clarity the legislation offers a specific market cap for each of the three major utilities in California (see below). Starting with 1st July 2017 or when the cap has been reached, the utilities must offer standard contracts or tariffs for new producers of electricity from the respective customer base. Capacity limits for net metering of the three major utilities in California: San Diego Gas and Electric: 607 MW Southern California Edison: 2,240 MW Pacific Gas and Electric: 2,409 MW
Weblink	http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA02R

Sources: dena (2014), CPUC (2012)

MARKET DEVELOPMENT AND BARRIERS

Development of installed PV capacity



Sources: NPD SolarBuzz (2013), SEIA (2013), SEIA (2014)

projection 2015: dena

The main barriers in the Californian PV market

Site permit:

- Approval process of renewable energy projects can be complex, long and uncertain based on a site permit, which is mandatory.
- Type of approval process depends on: Technology, capacity and site.

Approval process:

- Fees for approval processes vary enormously in California.

Several support schemes:

- Eligible PV system operator cannot apply for ReMAT and CSI-programmes. PV support exist in parallel and are excluding each other. Net metering is exempt from this rule and can be combined with other support schemes.

Sources: dena (2011), EPIA (2012), SEIA (2014)

MARKET NEWS (1/4)

Date	Topic	Source
07/10/2014	Panasonic, Coronal complete nine solar projects for Southern California Edison Coronal's total joint project development with Panasonic is now more than 100 MW. The nine installations mark the first commercial projects to be finished under Panasonic and Coronal's exclusive partnership.	PV-Magazine
26/09/2014	Sunrun announces expansion plans The leading US residential solar company will open or expand 10 new offices across four states before the end of the year. The company, which currently has offices in California, Colorado, Nevada, New York, New Jersey, Hawaii and Arizona, will increase its presence in Arizona, California, Nevada and Hawaii to meet rising demand for its services.	PV-Magazine
22/09/2014	Vivint Solar targets IPO of $371 million The financing target sees the residential solar installer step up its efforts to gain a greater share of the US leasing market.	PV-Magazine
18/09/2014	U.S. installed solar PV costs continue to fall The latest report by Berkeley Lab shows that installed PV costs in the United States fell 12-15% during 2013, despite a stabilization in PV module costs. However, America still has the highest installed costs among major markets for systems under 100 kW.	PV-Magazine

MARKET NEWS (2/4)

Date	Topic	Source
10/09/2014	Solar, wind gaining as drought continues to hamper California's hydroelectric power Ongoing drought conditions in California have caused its hydroelectric power production to plummet to 10 % of the state's total generation, according to data released by the U.S. Energy Information Administration. The shortage of hydropower has caused California to rely more heavily on natural gas-fired capacity, with natural gas production 16 % higher from January to June this year compared to the average from the past decade. Other renewables are also filling the gap left by hydro, with wind and solar generation growing.	HydroWorld
21/08/2014	Bill to streamline solar permitting passes the California legislature Legislation to standardize and improve the “byzantine” permitting and inspection procedures in various cities and counties in California has passed both houses of the state's legislature. CALSEIA says that this will both reduce installation time and help bring down the cost of solar.	PV-Magazine
20/08/2014	US lowers anti-dumping tariffs on Taiwanese solar cells, modules The U.S. Department of Commerce has issued a “correction” to preliminary anti-dumping tariff levels on PV cells and modules produced in Taiwan by Motech Industries, citing an error in its calculations.	PV-Magazine
07/08/2014	PACE returns: 17 counties launch clean energy funding programs in California Enabled by legislation at the state level, counties across California have launched property assessed clean energy (PACE) programs. This represents a revival for PACE, a promising mechanism for property owners to finance solar systems and energy efficiency improvements, and the program administrator expects CaliforniaFirst to support US$250 million in solar PV systems in 2015.	PV-Magazine

MARKET NEWS (3/4)

Date	Topic	Source
04/08/2014	US anti-dumping case threatens future of 3 GW of solar projects As much as 3 GW of solar PV projects in the U.S. could be under threat following the confirmation last month that fresh anti-dumping tariffs will be levied on solar modules from China and Taiwan. A new report from solar analysts NPD Solarbuzz suggests that many project pipelines may be forced to find alternative suppliers or potentially pay higher prices for the Chinese modules they had originally lined up, with approximately 3 GW of capacity at risk from the new ruling.	PV-Magazine
24/06/2014	California moves to fast-track rooftop solar applications Law makers in California have moved to expedite and standardize the state's solar permitting process in an effort to make it even easier for homeowners to install rooftop PV arrays. If passed, the legislation could simplify the permitting process for solar installations on homes – a process that, currently, can take months.	PV-Magazine
24/03/2014	First Solar acquires 250 MW PV Project in Nevada from K Road Power First Solar, Inc. (Tempe, Arizona, USA) on September 26th, 2013 announced that it has acquired the 250 megawatt (MW)AC solar photovoltaic (PV) project Moapa from K Road Power Holdings LLC (San Diego, California, USA). The PV project is located in the Moapa River Indian Reservation in Clark County, Nevada. The project will be designed and built by First Solar using its Cadmium-Telluride (CdTe) thin film solar modules, and has in place a 25-year Power Purchase Agreement (PPA) with Los Angeles Department of Water and Power (LADWP).	SolarServer

MARKET NEWS (4/4)

Date	Topic	Source
16/01/2014	California greenlights 485 MW PV project While considerably smaller than originally planned, the $1.13 billion project will spur California's transition to renewable energy and help advance its climate change goals, say regulators. The California Energy Commission on Wednesday approved NextEra Energy's plan to use photovoltaic technology rather than the previously approved solar parabolic trough system for its planned 484 MW Blythe Solar Power Project.	PV-Magazine
31/10/2013	USA: storage expanison goal favourable for grid integration of renewables (in German) The California Public Utilities Commission (CPUC) has set a goal for a power storage capacity of 1.325 GW for the three biggest private power suppliers until 2020.	Exportinitiative
21/10/2013	Vivint secures US$540 m for residential solar August Vivint has secured 200 m US Dollars for installations in the residential market. It is planned to install rooftop systems on private homes. The electricity can then be bought by the home owners at a cheaper rate than from the electricity supplier.	PV-Tech
16/10/2013	First Solar to build California solar plant for NextEra First Solar, the biggest US producer of PV systems, is constructing a PV plant with a capacity of 250 MW in California for NextEra. The construction will start by the end of 2014 and be completed by the end of 2016. The generated electricity will be sold to the power company Southern California Edison.	Bloomberg

CONTACT INFORMATION

Category	Name	Website
Renewable Energy Database of the North Carolina Solar Center	Database of State Incentives for Renewables & Efficiency	www.dsireusa.org
Federal US Energy Market Regulator	Federal Energy Regulatory Commission (FERC)	www.ferc.gov
State Energy Policy and Planning Agency	California Energy Commission (CEC)	www.energy.ca.gov
Renewable Energy Association	Center for Sustainable Energy California (CCSE)	www.energycenter.org
Solar Energy Association	California Solar Energy Industries Association (CALSEIA)	www.calseia.org
Authority for Consumer Protection	California Public Utilities Commission (CPUC / PUC)	www.cpuc.ca.gov
Transmission Grid Operator	California Independent System Operator (CA ISO)	www.caiso.com
Certification Body	Underwriter Laboratories (UL)	www.ul.com

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