

Thailand

Solar PV Policy Update 09/2016

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1. Overall targets and status of PV in Thailand

The latest targets for solar PV in Thailand are outlined in the Alternative Energy Development Plan 2015-2036 ([AEDP 2015](#)), which was approved by the National Energy Policy Council (NEPC) on 17th September 2015 ([original document](#)). The overall renewable energy (RE) target to be achieved is a 30% share in final energy consumption by 2036, including RE shares in electricity, heat and fuel consumption. For electricity, 15-20% of energy consumption shall be sourced from RE, which is supposed to equal a total installed RE capacity of 19,684.4 MW (including hydro power capacity). For solar energy, the target is to reach an installed capacity of 6,000 MW by 2036. A timeline for Thailand's solar target and policy is illustrated in figure 2.

According to the Energy Regulatory Commission's (ERC) latest update the total installed capacity in Thailand today reaches 2,753 MW. Out of the total there are 2,623 MW of free-field installations (solar farms), while solar rooftops account for 130 MW (see Table 1). 2015 has been a record year for solar in Thailand, the annual market of newly installed projects grew by more than 50 percent to 722 MW up from 470 MW in 2014 (see Figure 1).

The market is expected to continue developing dynamically in 2016, 723 MW of have been added up until quarter 3 of 2016. More capacities are expected from Phase 1 of the Governmental agency and agricultural co-operatives programme (Agro-Solar, see chapter 5). In the rooftop sector, the long awaited 'Rooftop PV Self-Consumption Pilot Scheme' has been announced, marking the start of the transition away from FiT and towards a self-consumption driven market (See chapter 3).

Facilitator

2. Thailand's Solar Photovoltaic Hard Facts

Table 1. Current Status of Solar Programmes in Thailand

Status of solar programmes in MW		COD achieved	PPAs signed and accepted, but no COD yet	Total (COD + PPA)	COD Deadline	AEDP Target
1) Free-field installations (solar farms) ^[1]	Adder & FIT Scheme (2006-2015)	2,623	1	2,624	Finished	2,800
	Government and Agricultural Cooperatives Phase 1	-	244 ^[3]	244	December 31, 2016	300
	New! Government and Agricultural Cooperatives Phase 2 (Not announced)	-	-	-	-	500
2) Solar Rooftop	Phase 1 (2013) & Phase 2 (2015) ^[2]	130	-	130	Finished	200
	New! Self-consumption pilot scheme (2016)	-	-	-	January 31, 2017	100
Total		2,753	245	2,998		3,900

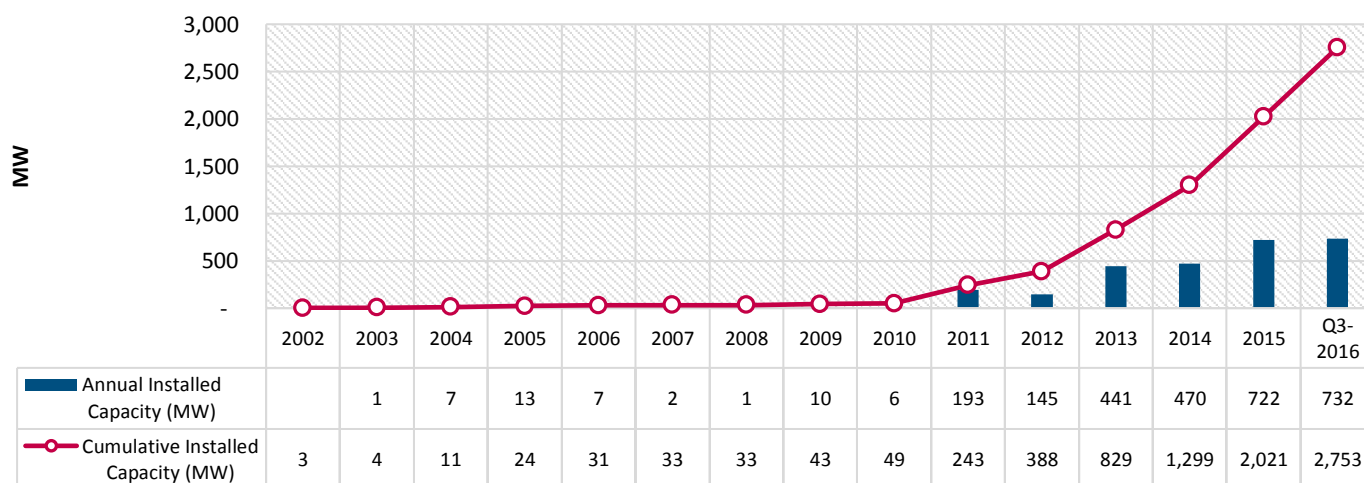
Source: ERC

[1] EGAT data as of 30 June 2016, PEA/MEA data as of 31 July 2016

[2] MEA/PEA Data as of 30 June 2016

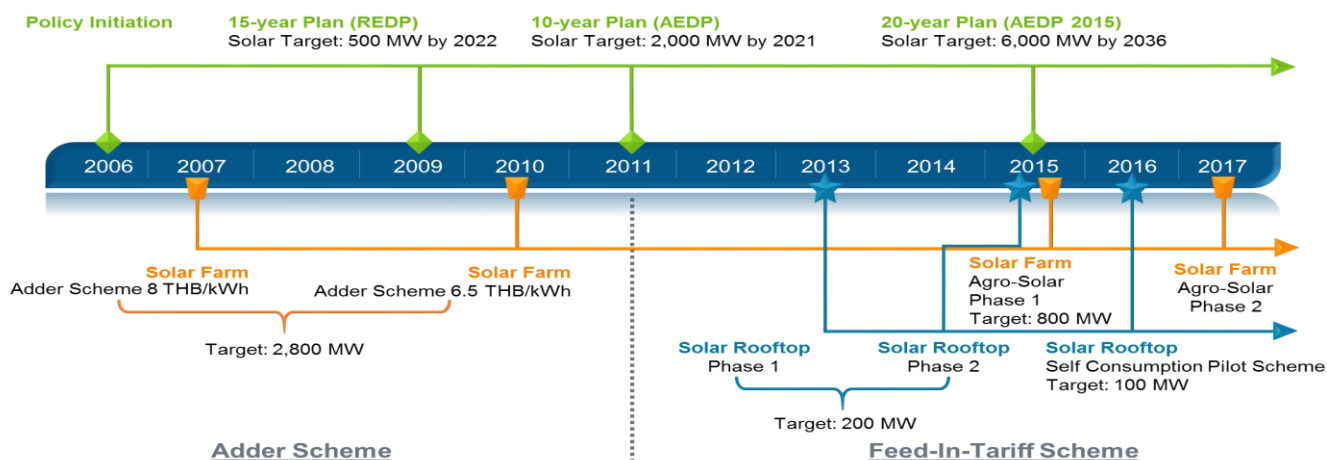
[3] ERC SPP/VSP Database as of 9 September 2016 ([Link](#))

Figure 1. Thailand's Solar PV Installed Capacity



Source: 2002-2014 data from DEDE ([Link](#)), 2015&2016 data from ERC

Figure 2. Thailand's Solar PV Policy Timeline



3. Rooftop PV Self-Consumption Pilot Scheme

Background: In January 2015, the National Reform Council (NRC) spoke in favour of a program that aims at simplifying the installation of rooftop solar and allows all citizens to install such systems and connect it to the power network. The "Solar Quick Win" policy framework includes the proposal to implement a net-metering system in Thailand and setting a long-term target of 10,000 MW for rooftop solar ([Original proposal](#) and [unofficial GIZ translation](#)). A working group including all related agencies (ERC, EPPO, DEDE, MEA, PEA) were involved in crafting the content of the scheme. The working group proposed a draft scheme to NEPC and was approved in March 2016.

Current status: ERC officially announced the scheme on August 11, 2016 ([Original document](#)). The application period is now open and runs from 22 August 2016 to 7 October 2016. Systems must be installed by January 31, 2017.

Details of the Scheme

Overview: 100 MW quota for residential and commercial rooftops to install solar PV systems for self-consumption (note: [not net-metering](#)). This means that electricity generated from the rooftop PV system must be consumed on-site (self-consumption) and any excess electricity fed into the grid will not be compensated for.

The scheme is positioned as a pilot scheme, meaning that governmental agencies want to use this scheme to first monitor and evaluate the data. The results from the evaluation and analysis by the consultant will be presented as technical and policy suggestion towards the government in order to plan for future support scheme for rooftop PV.

Table 2. Timeline for Rooftop PV Self-Consumption Pilot Scheme

Actions	Dates
MEA and PEA open for applications	22 August - 7 October 2016
COD deadline	31 January 2017
Monitoring and Evaluation	January-May 2017

Eligible applicants:

- The applicant shall be the roof owner or a third person holding a lease contract with the owner or be otherwise permitted by the owner to act on his behalf. The applicant can be an existing or new electricity user with MEA/PEA.
- Those who have previously installed PV systems for self-consumption can apply into the scheme (See note on the following page for self-consumption installation outside of the pilot scheme)

Application Process:

1. Applicants must submit all required documents in digital format to MEA and PEA via their online portal. ([MEA application portal](#) / [PEA application portal](#))
2. Applicants are then assigned a number by submission order
3. PEA/MEA will check all documents and technical requirements (PEA/MEA will check if transformer cap and feeder cap has been exceeded) and continuously announce eligible applicants by submission order via e-mail.
4. Eligible applicants shall then pay the connection costs to PEA/MEA, if applicable (See connection costs section below for details)
5. After completion of installation, the applicant shall enter into a connection agreement with PEA/MEA (see connection agreement section below for details). Then PEA/MEA will test for first synchronization.

Quota:

The pilot scheme is allocated for 100 MW, PEA and MEA each allow for 50 MW (10 MW for residential-scale; 40 MW for commercial scale).

Table 3. Quota for rooftop PV self-consumption pilot scheme

Area	Residential rooftop*	Commercial rooftop**	Total
MEA	10	40	50
PEA	10	40	50
Total	20	80	100

* Residential electricity user (Type 1), system size <10 kWp

** Commercial electricity user (Type 2 – 6), system size <1000 kWp

Capacity Limitations:

The scheme imposes certain capacity limitations on 3-4 different levels. On the system sizing level, single phase users are limited to installing a maximum of 5 kW. Additionally for MEA, system sizes are limited according to the ampere capacity of the applicant's meter.

The transformer cap and feeder cap is a limitation on the grid level, which MEA/PEA will review the applications by submission order until the transformer cap and feeder cap have been reached.

Table 4. MEA Capacity Limitations

	Low Voltage	High Voltage	
	230/400 V	12 kV	24 kV
Meter Cap	Limit according to ampere of meter	None	
Single Phase Power Cap	1 Phase not exceeding 5 kW	None	
Transformer Cap	Not exceeding 15% of transformer capacity (kVA)	Not exceeding 20% of transformer capacity (kVA)	
Feeder Cap	None	≤ 4 MW per feeder	≤ 8 MW per feeder

Table 5. PEA Capacity Limitations

	Low Voltage	High Voltage*	
	380/220 V	22 kV	33 kV
Single Phase Power Cap	1 Phase not exceeding 5 kW	None	
Transformer Cap	Not exceeding 15% of transformer capacity (kVA)	Not exceeding 75% of transformer capacity (kVA)	
Feeder Cap	None	≤ 8 MW per feeder	≤ 10 MW per feeder

* Limitations for for 115 kV connection; Single Conductor ≤ 120 MW per circuit, Double Conductor ≤ 230 MW per circuit

Connection costs:

There are two types of connection costs that may be applicable:

1) Cost for grid improvement

Most residential scale installation won't incur any cost for grid improvement. For larger systems grid improvement costs may apply if transformer limitations are exceeded.

2) Fee for meter and meter monitoring

This fee is waived for all installations connected on the low voltage level (<12 kV). For high voltage connection (>12 kV) there are fees for meter and meter monitoring approx. 100,000 THB (referring to information from PEA).

Connection Agreement:

Once the applicant has complete installation, the applicant shall notify PEA/MEA to enter into a connection agreement. The

4. Solar Rooftop FiT

The government shows a strong position to transition away from giving premium price FiTs with the recent announcement of the 'Rooftop PV Self-Consumption Pilot Scheme'. The government also revoked all awarded solar rooftop PPAs that have not been constructed by June 2016. The history of feed-in-tariffs scheme for rooftop PV systems is described below:

Solar Rooftop Phase 1

The first solar PV rooftop FiT policy for the country was announced in 2013 with a target of 100 MW for commercial rooftops (10-1,000 kW) and 100 MW of residential (0-10 kW) rooftop systems ([original document](#) and [unofficial GIZ translation](#)). While the quota for commercial rooftop PV was reached quickly and the programme was closed for further applications, only ~21 MW of PPAs were signed in the residential sector. The systems were originally meant to be commercially operated by the end of 2013, but many of the systems were not built on time and were delayed until 2014 and 2015 due to licensing reasons.

Solar Rooftop Phase 2

As the residential sector received only ~21 MW of application from the 100 MW quota. In August 2014 the NEPC announced to re-open

agreement refers to safety standard, operational codes and inspection requirements that the applicant shall follow. The agreement duration is 5 years for PV systems < 250 kW and 3 years for those >250 kW. At the end of the agreement, applicants shall submit an inspection report to automatically renew the connection agreement.

Monitoring and evaluation:

The Energy Research Institute, Chulalongkorn University have been assigned to conduct the monitoring and evaluation of the pilot scheme starting from January – May 2017. The research scope will cover both technical evaluation, socio-economics evaluation. 1,000 units of data loggers will be installed on-site collect real generation and load data. Applicants will also receive a questionnaire together with the application form to collect data from applicants. The expected output of the monitoring and evaluation is to formulate a suggestion, on both the technical and policy side, to plan for future support schemes.

Note:

Self-consumption systems are allowed to be installed independent of the pilot scheme. But the systems shall follow the requirements stated in the grid connection code, which is mostly similar to the pilot scheme. But the main difference is that reverse flow of electricity is not allowed for systems outside of the pilot scheme, therefore a reverse power relay has to be installed. These systems also have to pay for meter fees to MEA/PEA.

the residential programme calling it 'Solar rooftop phase 2' ([original document](#) and its [amendment](#)). The scheme allocated 78.63 MW to fulfil the 100 MW target in the residential sector, with no quota for the commercial sector and ERC officially announce the applications in February 2015.

There were a total of 11,645 project that applied, combining for 93.21 MW, which exceeded the intended target. The original COD deadline was by the end of 2015, however there was an extension until 30 June 2016. At present, all awarded PPAs that have not been installed have been revoked.

Find an overview of past FiTs for solar PV rooftop in table 6 below:

Table 6. FiT for Commercial and Residential Rooftop Installations

Capacity	Phase 1 FiT (THB/kWh)	Phase 2 FiT (THB/kWh)
Residential Rooftop (0-10 kW)	6.96 THB/kWh (18.73 €Cent/kWh)	6.85 (18.44 €Cent/kWh)
Commercial Rooftop (10-250 kW)	6.55 THB/kWh (17.63 €Cent/kWh)	6.40 (17.23 €Cent/kWh)
Commercial Rooftop (250-1000 kW)	6.16 THB/kWh (16.58 €Cent/kWh)	6.01 (16.19 €Cent/kWh)

Source: NEPC ([Original document](#))

Exchange rate = 1 Euro : 37.14 THB

5. Governmental Agency and Agricultural Cooperatives programme (Agro-Solar)

Background: In August 2014 the Government announced the “Governmental Agency and Agricultural Cooperatives Programme” (Agro-Solar) with an overall target of 800 MW. This programme aims at realizing solar farms with capacity up to 5 MW in the form of public-private partnerships (PPP) with the governmental sector or agricultural cooperatives as public partners. However, the details were not revealed until March 2015, when the Energy Regulatory Commission (ERC) published the details and regulations ([original document](#)) after NEPC’s approval. Following the approval, ERC announced the detailed application process on 17th September 2015 ([original document](#)).

There were some controversies with regards to criteria in selecting eligible projects in December 2015. So ERC decided to postpone the selection process, the problem was only resolved after NEPC’s resolution in March 2016, to re-announce eligible projects and extend the scheduled commercial operation date (SCOD) date to 31st December 2016 ([News article](#)). On April 1, 2016 ERC re-announced the process and defined new dates ([original document](#)), as shown in table 7.

Current Status: In phase 1, there were 67 projects, totalling 281.32 MW which were selected and awarded PPAs. Some of these projects are now in construction and are to be commercially operated by 31st December 2016. But due to delays, there has been reports that the 50% of the projects cannot be constructed due to the conflict between the private-public partnership.

Table 7. New dates for Agro-solar programme

Actions	Initial dates	New dates
Submission of applications to ERC	1-10 Nov. 15	Same dates
Announcement of eligible projects	11 Dec. 15	18 Apr. 16
Drawing process and results	15 Dec. 15	21 Apr. 16
Official announce of selected projects	24 Dec. 15	26 Apr. 16
Phase 1 SCOD	30 Sep. 16	31 Dec. 16
Phase 2 Submission of applications	-	Late 2016 – Early 2017
Phase 2 SCOD	1 Jan. – 30 Jun. 18	Same dates

Source: ERC, 2016

Detailed regulation for Agro-Solar

The regulation from 13th March 2015 ([original document](#)) announced the purchase of power from solar free-field installations located on land owned by governmental agency or agricultural cooperatives with an installed capacity of 5 MW or less. Power will

be purchased via a Feed-in Tariff (FiT) at a fixed rate of 5.66 THB/kWh for 25 years. This rate is applicable for power sale which does not exceed a capacity factor of 16%¹.

Eligible applicants: Applicants must be either a government agencies or agricultural cooperatives, which will function as project owner and PPA holder. The project owner can have project supporters through public-private partnerships (PPP). Project supporters must be companies registered in Thailand and each company is allowed to support more than one project but no more than 50 MW in total.

Group 1 – Governmental agencies:

- Governmental agencies
- Universities regulated by the government
- Governmental organizations (excl. public organization and state enterprises)
- Local administration

Group 2 – Agricultural cooperatives:

- Agricultural cooperatives
- Land settlement cooperatives
- Fishing cooperatives

Targets: The two groups will split the quota of 800 MW for 400 MW each. Each agency or cooperative will be allowed to host only one project per each depending department per one area.

Power purchase agreement (PPA): The PPA duration is 25 years starting from the SCOD specified in the PPA, the COD or the actual operation date, depending on which comes first. The PPA must be signed within 120 days from the date of notice from ERC. In case a PPA has already been signed but the project cannot dispatch power to the system, the SCOD can be postponed by sending a letter to the related distribution authority 30 days prior to the SCOD. The distribution authority will then consider to extend the SCOD.

It is not permitted to transfer the rights and obligations in the application or in the PPA itself to others, unless the applicant receives the consent of the electricity distribution authority according to its guidelines, and the transfer is approved by ERC.

However, if PPAs or rights and obligations are traded, it is not allowed to:

- Change the number of shareholders in a way that causes the original shareholders of the project to constitute less than one half of the project consortium.
- Change the distribution of shares among the new shareholders in a way that causes the original shareholders to hold less than 51% of shares during the first 3 years after COD.

¹ The capacity factor is meant to limit the amount of kWhs fed to the grid at the specified purchase price of the feed-in tariff. It expresses the percentage of the total energy produced annually compared with a multiple of installed capacity and number of hours in a year. With a capacity factor of 16% a maximum of 1,401,600 kWh per MW installed (in a year with 365 days) or 1,405,440 kWh per

MW installed in a year with 366 days) will be remunerated with the FiT. All exceeding kWhs will be remunerated with a 12 months average of the wholesale electricity rate that EGAT sells to PEA (THB/unit) (at the voltage level of 11-33 kV) plus fuel tariff surcharge average wholesale (THB/unit).

Following ERC's announcement on 17th September 2015, the application process have been separated into 2 phases:

Agro-Solar Phase 1

The target for phase 1 was initially planned for a total of 600 MW for regions with transmission line currently available (North, East, West and Central). However, ERC's re-announcement after NEPC's resolution ([original document](#)) revised phase 1 target down to 300 MW. Which meant that Phase 1 only contained projects under agricultural cooperatives, leaving 167 eligible projects, 798.62 MW. Out of those projects, there were 67 projects with a total MW of 281.32 which were selected from the drawing process, shown in Table 2. The COD for all projects in phase 1 must not exceed 30th December 2016 according to the latest NEPC resolution ([News Article](#)). This is the second time the COD has been extended; previously from 30th September 2016 and 30th June 2016 ([original document](#)).

Agro-Solar Phase 2

In order to fulfil the programme's overall target of 800 MW, phase 2 will have a target of 519 MW (500 MW plus 19 MW leftover from phase 1). The SCOD is determined to be between 1st January 2018 and 30th June 2018. The application period for phase 2 will be announced either late 2016 or early 2017.

Table 8. Selected projects in phase 1

Region	Projects	MW
1. Metropolitan Electricity Authority (MEA)	6	21.65
2. Provincial Electricity Authority (PEA)		
North	1	5
North-East	-	-
South	-	-
East	17	70.47
West	18	76
Central	25	108.20
PEA Total	61	259.67
Phase 1 Total	67	281.32

Source: ERC ([Link](#))

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Previous Versions

May 2016
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