

Thailand's Past Success and Future outlook of its Solar Energy Policy

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Policy, Regulations and Plan in Thailand



Regulations for the Purchase of Power from SPP/VSP (Renew),

Target (Solar PV) - n/a



Renewable Energy Development Plan (REDP 2008-2022)

Target (Solar PV) - 500 MW



Alternative Energy Development Plan (AEDP 2012-2021)

Target (Solar PV) - 2,000 MW



AEDP 2012-2021 (Rev.2013)
Target (Solar PV) : 3,000 MW



AEDP 2012-2021 (Rev.2014)

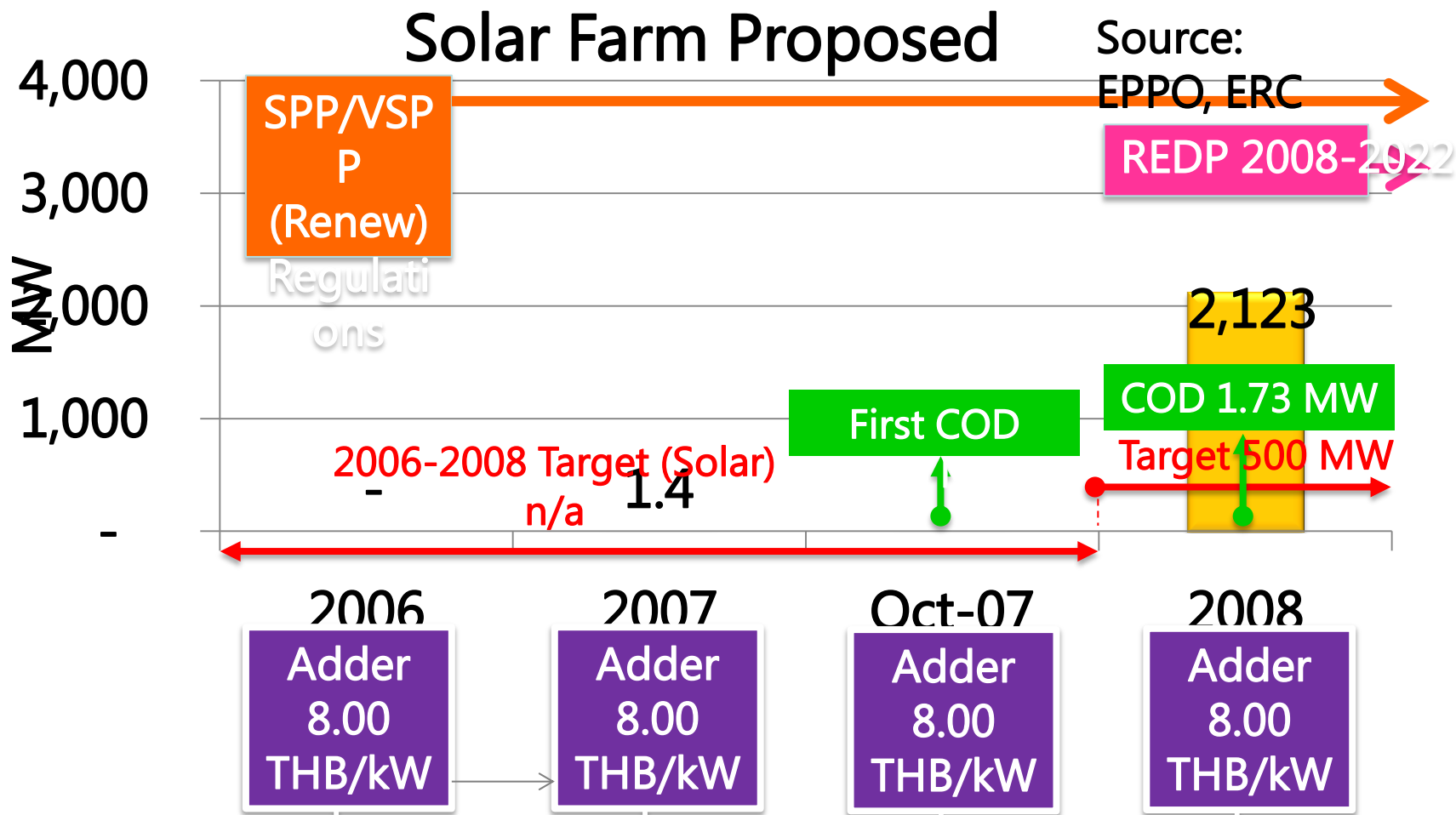
Target (Solar PV) : 3,800 MW



Source: ENSOP



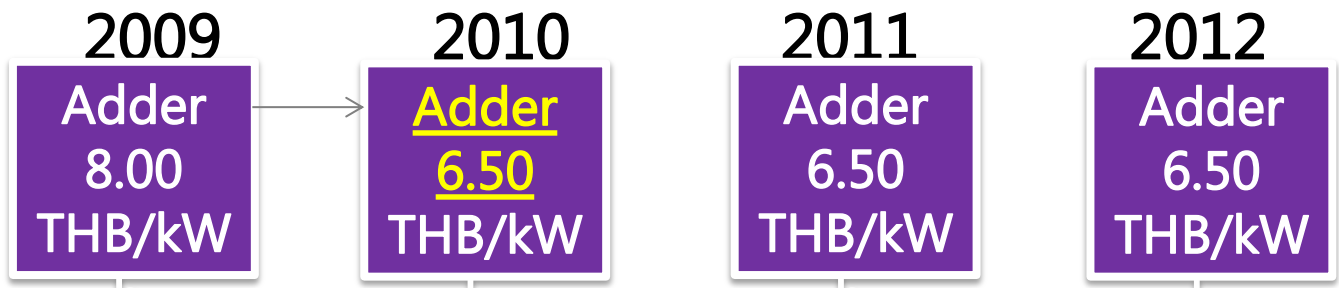
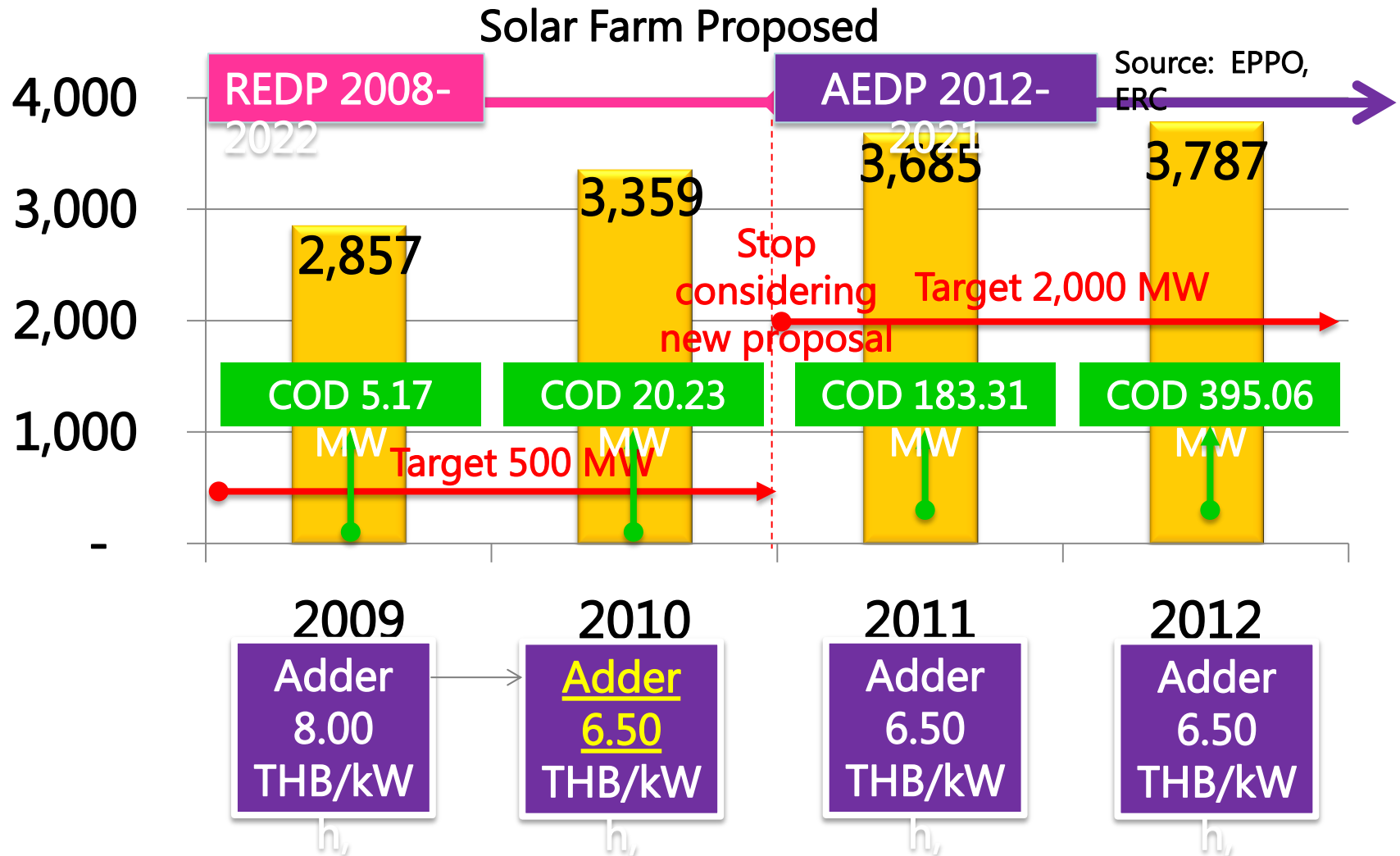
Solar Farm Proposed Year 2006 - 2008



Note: Aug 2009 REDP's Lower target 500MW / Source : The National Energy Policy Council.



Solar Farm Proposed Year 2009 - 2012



Note : June 2010, Stop considering new proposal. / Source : The National Energy Policy Council





บริษัท เ็นซ่า ประชาราษฎร์พัฒนาพลังงานทดแทน จำกัด ได้รับรางวัลชนะเลิศ การประกวดโครงการพลังงานทดแทนดีเด่น ประจำปี 2554 จากสมาพันธ์พลังงานทดแทนแห่งประเทศไทย และได้รับรางวัลชนะเลิศ การประกวดโครงการพลังงานทดแทนดีเด่น ประจำปี 2554 จากสมาพันธ์พลังงานทดแทนแห่งประเทศไทย

RENEWABLE ENERGY

NED sends first solar payload

1,100-rai plant takes just 18 months to start work

Intu C-Tan
The Nation

It's halting the launch of Thailand's largest solar farm in Lop Buri last year, Kaohorabkhan CEO Kaohorabkhan Lamsan said: "There is nothing more powerful than an idea whose time has come."

Last week, it arrived with a bang as the solar company, National Energy Development (NED), made its first transmission of electricity to the Electricity Generating Authority of Thailand (EGAT).

The billion-watt farm, formed by CLP, Epcor and Mitsubishi, aims to switch Thailand's dependence on fossil fuels to more sustainable sources. NED CEO Wisarut Kaohorabkhan calls it "the fastest execution and delivery of an energy project of this scale."

In all, from inception to delivery, NED took just 18 months to become operational. Despite the risks, the solar facility was not disrupted, being located not above sea level and protected by embankments.

Another mega solar plant by Bangkok-based NED is under way in another province. "We spent several months scouting for the best location before settling on the Lop Buri site."

The farm is built on a 1,100-rai estate. It is the largest of its kind in the world.



NED's first power with solar panels in Lop Buri.

Kaohorabkhan is one of four banks, including Bangkok Bank, Siam Commercial Bank and Manila-based Asian Development Bank, that provided a combined \$1.5-billion long-term loan to NED to build and run the farm, which will produce 70 megawatts of electricity when fully operational.

NED has signed long-term contracts to sell its megawatts to EGAT and to megawatts to the Provincial Electricity Authority at a fixed rate.

The bank loans are for 10-12 years. ADB was co-financed by the Thai government to target NED to expand its efforts as the bank has set aside a \$2.8-billion (200 billion baht) fund to invest in clean energy.

More on Page 4

EUROMONEY
ProjectFinance



Deals of the Year

A Successful Showcase of Thailand Renewable Energy Demonstration

Natural Energy Development Co., Ltd.



NED's Achievement

- ✓ The **World Largest** Thin Film Power Plant and Thailand First Utility scale solar energy project
- ✓ Over **1.3 million ton carbon** reduction over the project lifetime
- ✓ Full wrap up turnkey contract to mitigate the risk on project implementation
- ✓ Successful Project Financing through a strong support from ADB and Leading Thai Commercial Banks
- ✓ Contribution to local **employment**, etc.



NED Overview



Capacity :	73MWdc Lopburi Solar Project (LSP) 11MWdc Wang Phloeng Solar Project (WSP)
Offtaker :	EGAT through SPP scheme (on LSP) PEA through VSPP scheme (on WSP)
PPA :	5 years with automatic renewal Adder THB8/kWh for 10 years
Lenders :	Asian Development Bank Kasikorn Bank Siam Commercial Bank Bangkok Bank
Contractor :	SHARP/ITD/ITE
Technology :	Thin Film Silicon
Project Cost :	Approx THB8,000 million (USD250 million)
CDM :	LSP: Registered WSP: Registered
COD :	LSP: 29 March 2012 (full operation) WSP: 2 May 2013
Land :	Private title deed with over 1,500Rai (240 Hectare)
Tax :	Obtained full BOI tax privilege

Year 2013-2015

Alternative Energy Development Plan (AEDP 2012-2021) Rev.1

- Solar farm Target : 2,000 MW (Adder)
- Solar rooftop Target : 200 MW (FIT)*
- Solar Community Target : 800 MW (FIT)

Source:
ENSOP

Alternative Energy Development Plan (AEDP 2012-2021) Rev. * (Cancel Solar Community)

- Solar farm Target : 2,000 MW (Adder -> FIT)*
- Solar rooftop Target : 200 MW (FIT -> Reduce)*

- Solar Government office & Agriculture Co-op : 800 MW (FIT Solar farm)

Alternative Energy Development Plan (AEDP 2012-2021) Rev.

- Solar farm Target : 2,800 MW* (FIT)
- Solar rooftop Target : 200 MW (FIT)

Solar Government office & Agriculture Co-op : 800 MW (FIT Solar farm)

2013

Aug-2014

Oct-2014



Adder / FIT

Capacity	Adder / FIT (Old)		FIT (2014-2015)	
	THB/kWh	Year	THB/kWh	Year
Solar Farm				
$\leq 90 \text{ MW}_p$	Adder 8.0, 6.50	10	5.66	25
Solar rooftop (Residential)				
$\leq 10 \text{ kW}_p$	FIT 9.96	25	6.85	25
Solar rooftop (Commercial Building, Factory)				
$> 10 - 250 \text{ kW}_p$	FIT 6.55	25	6.40	25
$> 250 - 1,000 \text{ kW}_p$	FIT 6.16	25	6.01	25
Source : Bureau of Solar Energy Development, DEDE				
Government office & Agriculture Co-operation				
$\leq 5 \text{ MW}_p$	FIT 9.75,	25	5.66	25

Solar PV (Farm + Rooftop) Current Status (9th Jun 2015)

Type	Target (MW)	COD (MW)	Not COD (MW)
Solar farm	2,800	1,384	1,013
Solar rooftop			
- Residential	100	4.41	56.98
- Commercial	100	55.05	41.94
Government & Agriculture Co-op	800	n/a	n/a



Purchasing Rate

THB/kWh 25 years

COD

>>> COD in DEC 2015,

If can not COD = Contract will be terminated?????

And then what's

next????????????????????

Capacity

As shown in the contract

Ownership

Can not transfer to others.

Pervious major share holder must have not

lower than 51% at least 3 years after COD.

Source: ERC, The National Energy Policy



Future Outlook of Solar Rooftop 200 MW

Purchasing Rate

Residential FiT 6.85 THB/kWh 25 years
Commercial > 10 – 250 kW FiT 6.40 THB/kWh
> 250 – 1,000 kW FiT 6.01 THB/kWh

COD

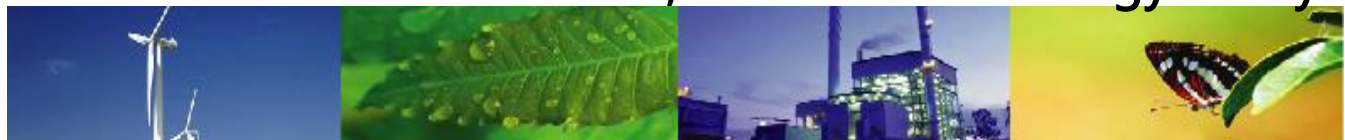
Apply in June 15
Must COD in DEC 2015

Capacity

Residential: still have time and room to apply
Commercial: still have time but almost no room to apply

Ownership

Residential and Commercial



Future Outlook PV for Gov & Agricultural Co-op 800 MW

**Purchasing
Rate**

FiT 5.66 THB/kWh 25 years

COD

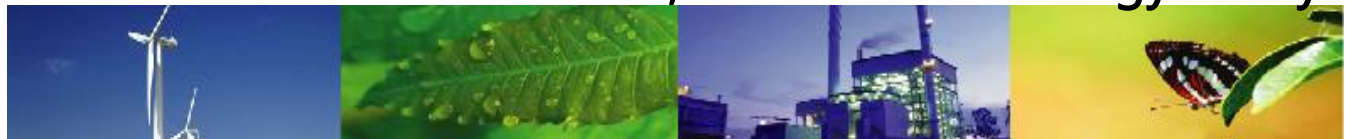
COD in JUN 2016, Still Waiting for
Purchasing Announcement

Capacity

≤ 5 MW for each project Site

Ownership

Government Office and Agricultural Co-
operation.



Barrier and Supporter

Barrier

- How to manage what we have done in the past
- Limitation of Transmission and Distribution System

Supporter

- Renewable Energy Act
- Smart Grid Plan



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Special Thank

Impact Electronics Siam Co., Ltd.



“Thank
you”

