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for Economic Affairs
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Thailand

Bioenergy Policy Update 01/2017

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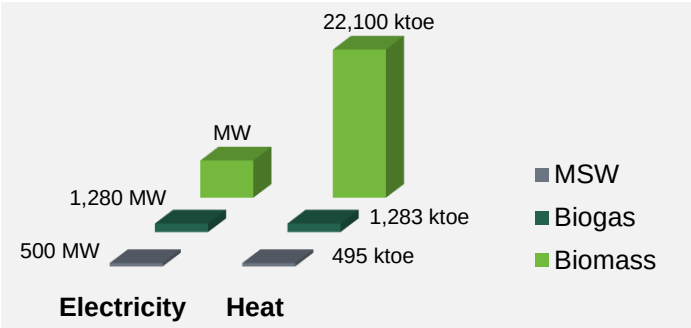
1. Overall Targets for Bioenergy in Thailand

The latest Alternative Energy Development Plan 2015-2036 (EN / TH) was approved by the National Energy Policy Council (NEPC) in September 2015 (original document). The plan determines an overall renewable energy (RE) target of 30% share in final energy consumption by 2036, including electricity, heat and fuel consumption from renewable energy sources. For electricity, the target is to have 20.11% of final energy consumption from RE, which is supposed to equal a total installed RE capacity of 19,684.4 MW (including hydro power). For heat, the target is to have 36.67% share of RE in the final heat consumption, amounting to 25,088 ktoe.

In order to achieve the targets, AEDP 2015 provides individual targets for each type of fuel. The target for biogas aims to achieve an installed power generation capacity of 600 MW from 'wastewater and manure' by 2036, plus an additional 680 MW of capacity from 'energy crops'. In terms of heat generation from biogas, the target is 1,283 ktoe. Notably, AEDP 2015 also plans for 4,800 tons of CBG per day, equivalent to 2,023 ktoe to be used as substitution in the transport sector.

In the biomass sector, the target in 2036 is to achieve 5,570 MW and 22,100 ktoe for power and heat generation respectively. Targets to utilize municipal solid waste (MSW) are set to be 500 MW for power generation and an additional 495 ktoe for heat generation by 2036.

Figure 1: AEDP targets for electricity and heat generation from biogas, biomass and MSW by 2036



Facilitator

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

2. Bioenergy Support Framework: Power Generation

Bioenergy projects for power generation have been supported by feed-in tariffs since the inception of the adder scheme in 2007. The adder scheme has proven successful in driving the bioenergy for power generation. However in late 2014, the previous "adder scheme" was replaced by the current FIT Bidding Scheme.
For more information on the overview of the FIT Scheme for other RE technologies, please see chapter 4 in GIZ's Renewable Energy Policy Update.

RE-FIT Bidding Scheme (2016)

Background: The RE-FIT Bidding scheme for bioenergy projects was anticipated to be open for applications since mid-2015 when ERC released an initial draft of the RE FiT bidding scheme for public hearing (Link). But due to delays with regards to availability of the grid, the RE-FIT Bidding scheme was split into 2 phases. Phase 1 for projects that are located in the 3 southern provinces and Phase 2 for projects in the other regions.

Application & Selection Process: ERC will announce the application timeframe for each phase, the projects can only be submitted with this timeframe (normally 1-3 months after the announcement of the scheme). ERC will then screen and announce those projects that are technically eligible. The projects with the lowest proposed FiT (F) will be sorted and selected by order, grid availability (feeder) and the specified target/quota for each type of fuel will also determine whether the project will be accepted or not.

Phase 1

ERC announced the detailed regulations for phase 1 on 15th January 2016 (Source). Projects in this phase must be located in the area of Pattani, Yala or Narathiwat province or in one of the 4 special districts in Songkla province (Incl. Chana, Thepa, Saba Yoi, Na thawi districts). Projects located in these provinces also receive a premium of 0.5 THB/kWh throughout the duration of the PPA.

Table 1: Targets for RE-FIT Bidding Phase 1

Fuel Type	Target/Quota
Biogas (Waste/Wastewater)	10 MW
Biomass	36 MW
Total	**46 MW**

Current Status: For the biogas quota, there were 4 biogas projects that applied, 4.9 MW in total (Source). Out of the 4, only 1 project was selected with a capacity of 2 MW that proposed a 10.25% discount from FIT (F) (Source).

For the biomass quota, 89 biomass projects applied with 547 MW in total. ERC approved 28 projects out of the 89 to be technically eligible. In the end, 4 projects were selected which fulfilled the 36 MW quota. The lowest bidder proposed an 81.17% discount, meaning that the project will receive 0.45 THB/kWh for the FIT (F) portion.

All of the selected projects have a SCOD deadline on December 31, 2018.

Phase 2

Phase 2 will be opened for projects that are in the other regions of Thailand. According to ERC's draft regulation, released for public hearing in July 2015 (Source), the overall target for phase 2 is 280 MW. For which the major share will be for biomass technologies with a target of 189 MW. Biogas from energy crops and waste/wastewater was targeted for 70 MW and 21 MW respectively. The foreseen region specific targets are outlined in table 3, however these numbers may change as the process has been delayed. There's a possibility that ERC might re-consider the availability of feeder after EGAT finish its plan to upgrade the grid in the North-East which could allow more integration of RE in more areas.
The application periods and timeframe for phase 2 have not been announced. However, GIZ expects that the application process will open within the first half of 2017.

Figure 2. Sugar cane plantation, Lopburi, Thailand

3. Thailand's Bioenergy Hard Facts

Table 2: Bioenergy FiT Rates in THB/kWh

	FiT(F)	FiT (V2017)	Total calculated FiT	Period of support	FiT Premium For Bio-Energy (8 years)	FiT Premium Southern Provinces[1] (project lifetime)
(1 € = 37 Baht)	THB/kWh	THB/kWh	THB/kWh	Years	THB/kWh	THB/kWh
1) Biomass						
Capacity ≤ 1MW	3.13	2.21	5.34	20	0.50	0.50
Capacity > 1 to 3MW	2.61	2.21	4.82	20	0.40	0.50
Capacity > 3MW	2.39	1.85	4.24	20	0.30	0.50
2) Biogas (from wastewater / waste products)						
	3.76	-	3.76	20	0.50	0.50
3) Biogas (from energy crops)						
	2.79	2.55	5.34	20	0.50	0.50

[1] Yala, Pattani, Narathiwat and 4 districts in Songkla province (i.e. Chana, Thepa, Saba Yoi and Na Thawi)
Source: ERC (Link)

Table 3: Foreseen targets (by 2017 in MW), as of ERC's draft regulation (July 2015)

		Biomass	Biogas (wastewater/waste product)	Biogas (Energy crops)	Total (MW)	%
Phase 1	3 Southern Provinces	36.00	10.00	-	46.00	-
Phase 2						
PEA	North	48.24	-	-	48.24	17%
	North-East	-	-	-	0	0%
	South	36.23	-	-	36.23	13%
	East	49.00	4.84	-	53.84	19%
	West	40.81	10.28	34.89	85.98	31%
	Central	14.81	6.03	27.75	48.59	17%
MEA		-	-	7.54	7.54	3%
Total		**189.10**	**21.15**	**70.18**	**280.42**	**100%**
%		67%	8%	25%	100%	

Source: ERC announcement July 2015

Figure 3. Biogas plant at a pig farm, Lopburi, Thailand

4. Biogas

Current Status

Over the past years, the cumulative installed capacity of biogas power plants in Thailand has increased consistently. As of October 2016, there are a total of 412 MW of biogas power plants installed in Thailand (Figure 4), including on-grid and off-grid power plants. Within this, there are at least 293 MW on-grid power plants (i.e. selling power under a PPA), the remaining power plant capacities are either off-grid or used for self-consumption.

The majority of biogas plants are installed in the livestock farming sector (e.g. pig farms) and the industrial sector (e.g. palm oil industry). So with regards to regional distribution, most plants are located in the central region (west of Bangkok), where many livestock farms are located and in the South, the centre of palm oil production, see map of biogas power plants in Thailand (Figure 5).

Market Development

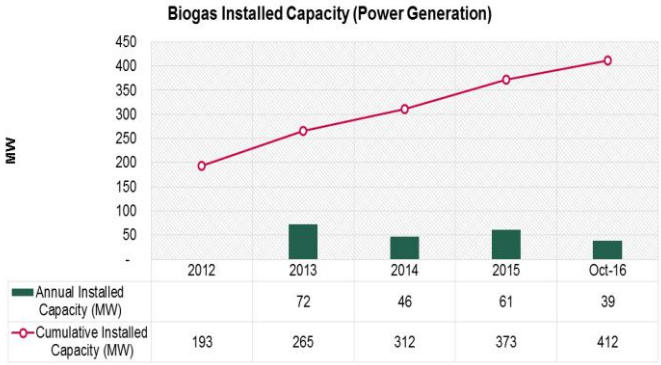
Biogas market development resulted from continuous support measures for industrial scale biogas plants since the 1990s. The "adder scheme" (feed-in premium) was established in 2007 to incentivize biogas power plants at a rate of 0.3 THB/kWh. Tax incentives and investment grants have also long been established, focusing on bio waste from pig farms and agricultural production e.g. in the starch, palm oil and sugar industries.

In 2014, DEDE estimated the remaining biogas potential for Thailand to be ~18,700 Mio m^3/a, equivalent to 2.2 GW or 9,350 ktoe for electricity and heat production respectively (Source). However, the largest share of this potential is attributed to biogas from energy crops 15,772 Mio m^3/a, with only about 2,927 Mio m^3/a of undeveloped potential from useable agricultural waste and livestock farming remaining.

Since the potential for biogas from agricultural residues and waste (mainly sugar, starch, palm oil, pig and chicken manure) is highly utilized already, recent political support programs focus on the support of alternative raw materials such as energy crops or household and community waste, municipal waste-to-energy, as well as the utilization of compressed biogas (CBG) in the transport sector. The government looks to support community-based business models in order to trigger local value creation and foster additional income for rural communities.

In the past, the Ministry of Energy has also funded pilot plantations for Napier grass cultivation in order to assess their biogas potential as energy crops. Although a support programme for 12 biogas pilot projects with Napier grass as feedstock has been suspended in late 2014 and the targets for biogas from energy crops have been reduced from 3,000 MW to 680 MW, GIZ still expects that the Government will continue its focus on biogas technology in the future due to its potential for value creation in the poorer agricultural regions.

Figure 4: Total Biogas Installed Capacity (Power Generation)



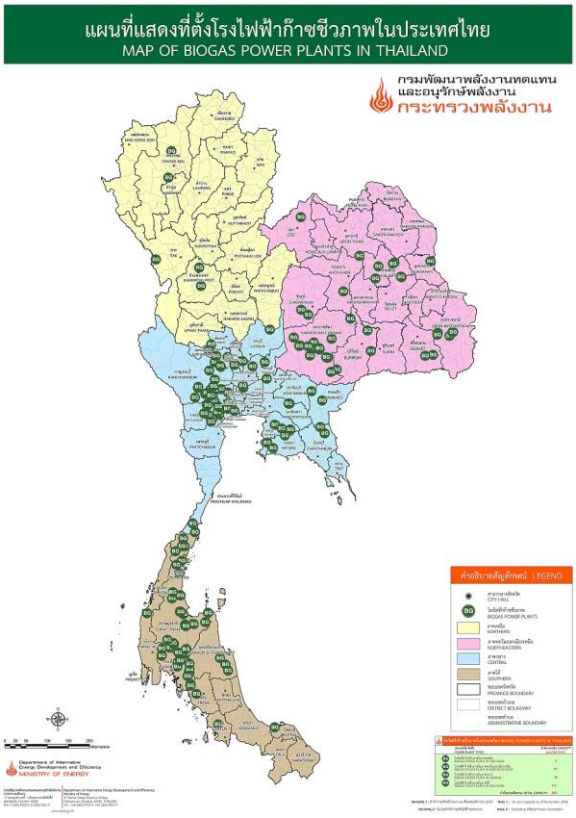
Remarks: Including off-grid power plants
Source: DEDE, Percentage of Alternative Energy Consumption, October 2016 (Link)

Table 4: On-Grid Biogas Power Plants

Region	Number of plants	Installed capacity [MW]	PPA capacity [MW]
North (Yellow)	5	6.53	4.88
North-East (Pink)	41	94.38	84.92
Central (Blue)	59	91.18	79.00
South (Brown)	51	152.22	124.20
Total	**156**	**344.31**	**292.99**

Remarks: Excluding off-grid power plants
Source: DEDE, Map of biogas power plant (Link), As of November 2016

Figure 5. Map of On-Grid Biogas Power Plants



Remarks: Excluding off-grid power plants
Source: DEDE, Map of biogas power plant (Link), As of November 2016

In addition, the target of 4,800 tons of CBG per day shows the ambition regarding the use of bio methane. Currently, there are only a few biogas upgrading pilot plants installed in Thailand, but DEDE has been announcing several support schemes to increase the share.

5. Biomass

Current Status

The total cumulative installed capacity for biomass power plants stands at 2,812 MW as of October 2016 (Figure 6), including both off-grid and on-grid installations. 1,606 MW[1] of these are on-grid, but only 930 MW are selling power under a PPA.

Most of the power plants are located in the north-western and central provinces as they are agricultural dominated and due to the existing grid connection opportunities (Figure 7).

Market Development

Biomass has been a traditional energy source in rural Thailand for decades. The utilization of biomass' potential in power generation has continuously. In 2014, DEDE estimated that the remaining biomass residue potential is 62 Mio tons, equivalent to 3,943 MW (Source). Corresponding to AEDP 2015, Thailand aims to explore this potential to an extent of 5.6 GW of biomass installed capacity by 2036.

The biomass potential for heat generation is estimated to be 15,368 ktoe of which 5,153 ktoe were developed by September 2014. By 2036 Thailand aims to utilities most of its heat generation potential with a target of 15,000 ktoe.

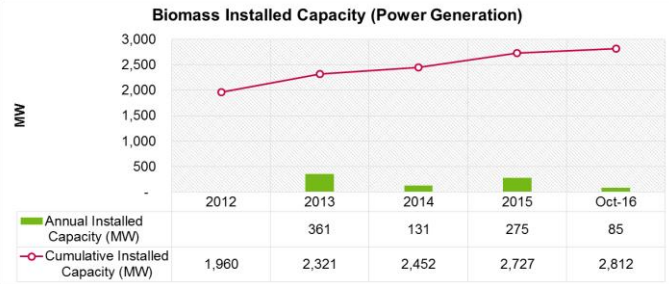
The major biomass resources in Thailand comes from:

- Woody biomass residues (from forest plantations, wood and furniture industries)
- Agricultural residues (rice husk, bagasse, corn cobs, etc.)
- Biomass for ethanol production (cassava, sugar cane, etc.)
- Biomass for biodiesel production (palm oil, jatropha oil, etc.)
- Industrial wastewater from agro-industry
- Livestock manure
- Municipal solid wastes and sewage.

Break down information of the resources can be found in DEDE biomass potential database here.

Similar to biogas, future market development for biomass power plants will be majorly driven by the 'RE FiT bidding scheme', which is a FiT with a competitive bidding selection process, see chapter 2.

Figure 6. Total Biomass Installed Capacity (Power Generation)



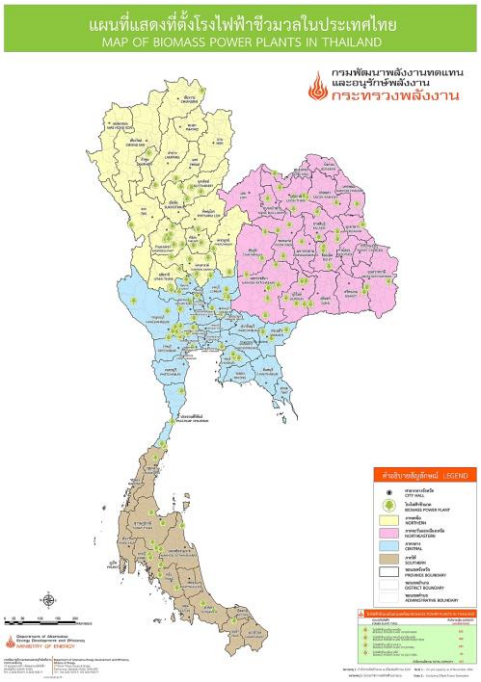
Remarks: Including off-grid power plants
Source: DEDE, Percentage of Alternative Energy Consumption, October 2016 (Link)

Table 5: On-Grid Biomass Power Plants

Region	Number of plants	Installed capacity [MW]	PPA capacity [MW]
North (Yellow)	33	433.96	223.95
North-East (Pink)	56	586.05	385.16
Central (Blue)	47	492.93	242.55
South (Brown)	13	93.33	78.70
Total	**149**	**1606.26**	**930.36**

Remarks: Excluding off-grid power plants
Source: DEDE, Map of biomass power plant (Link), As of November 2016

Figure 7. Map of On-Grid Biomass Power Plants



Source: DEDE, Map of biomass power plant (Link), As of November 2016

[1] GIZ assumes that the install capacity and PPA capacity shown in Table 5 only shows the installed capacity for Very Small Power Producer (VSPP) projects (<10 MW) and does not include Small Power Producer (SPP) projects (10-90 MW).

6. Industry Players

The Thai Biogas Trade Association (TBTA) have recently been set up in February 2016 to support and promote the biogas industry in Thailand. On October 19, 2016, GIZ together with TBTA organized 'Biogas Association Roundtable Talk: Biogas safety and Market Development in Thailand', which brought together the different members and stakeholders of the association. The German Biogas Association: Fachverband Biogas (FvB) was invited to share and exchange knowledge and experience from Germany, especially on biogas safety guidelines. Summary of the event and presentations can be downloaded online.

Other related associations and organizations that are active in bioenergy projects includes:

- Renewable Energy Industry Club, the Federation of Thai Industries (FTI) (more info).
- Thai Tapioca Starch Association (more info)
- Thai Sugar and Bio-energy producers association (more info)
- Thai Palm Oil Crushing Mill Association (more info)

7. Upcoming events:

- **14.-15.03.2017 Biogas Indonesia,** Jakarta. More information.
- **15.-17.03.2017 VIV Asia Biogas Conference and Pavilion**, Bangkok. More information.
- **18.-19.05.2017 Biogas Asia Pacific**, Kuala Lumpur. More information.
- **09.-10.10.2017 Biogas Philippines**, Manila. More information.

Contact

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Tanai Potisat
tanai.potisat@giz.de

Previous Versions

2015
Biogas Policy Factsheet Update 12/2015
GTCC Biogas Market Analysis 2015 (In German Only)
2014
Policy Briefing Thailand: Biogas
Policy Paper: Thailand: Support Programme for Biogas Pilot Projects Suspended

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