

New and Renewable Energy in Thailand

Ms. Sutthasini Glawgitigul Scientist, Senior Professional level Department of Alternative Energy Development and Efficiency, Ministry of Energy

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1

Content





Geothermal energy in Thailand



General Information of Thailand



Capital and largest city: Bangkok

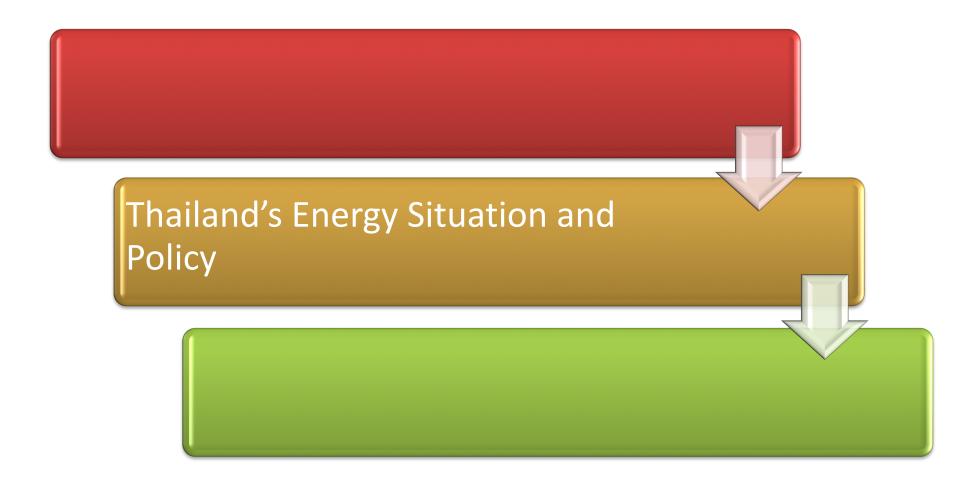
Time zone: UTC+7 (ICT) Official languages: Thai

Currency: Baht (THB)

Population: 2018 : 69.42 million

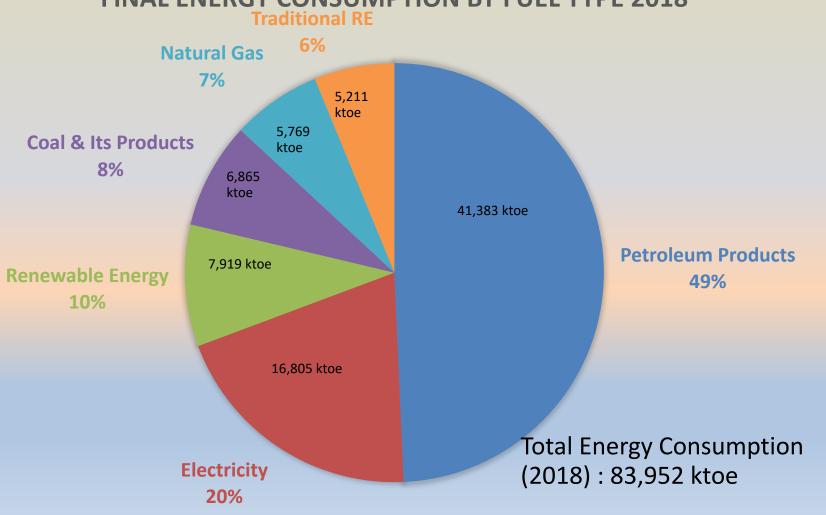
Land Area: 510,890 Km²

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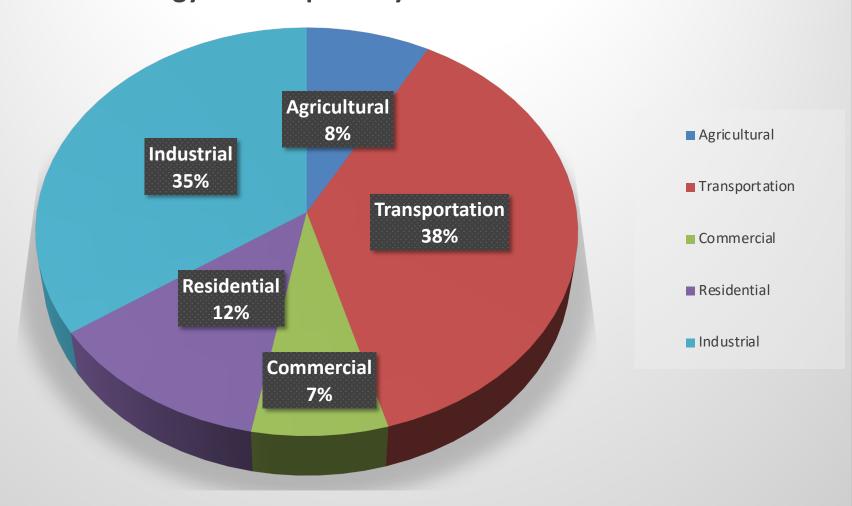
Final Energy Consumption by Fuel Type 2018

FINAL ENERGY CONSUMPTION BY FUEL TYPE 2018



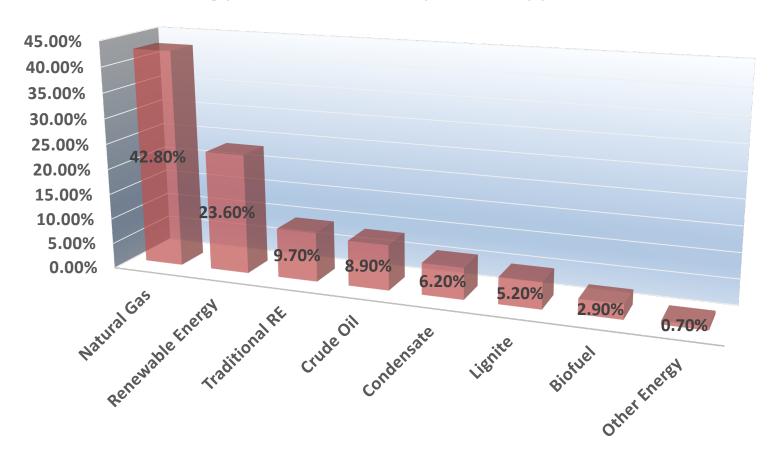
Final Energy Consumption by Economic Sector 2018

Final Energy Consumption by Economic Sectors 2018



Energy Production by Fuel Type 2018

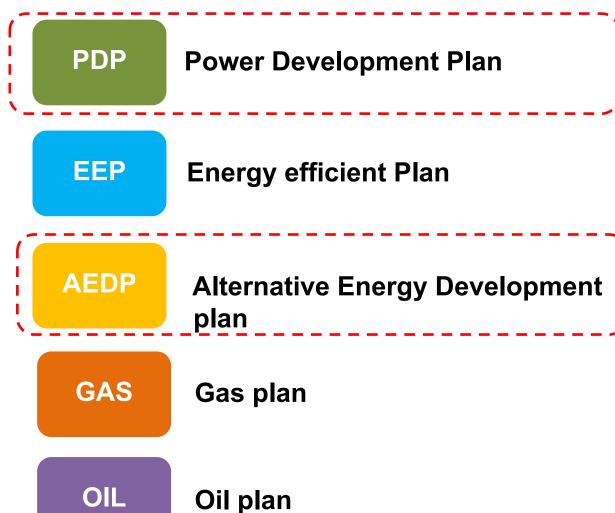
Energy Production by Fuel Type 2018



Total energy production in 2018: 72,609 ktoe

Thailand Integrated Energy Blueprint







Power Development Plan 2018

Reliability

- Consider the whole country electric system including generation, transmission and distributuion
- Give priority to renewable energy, import power and gas-fired generation especially LNG
- Increase system balance in regional level
- Maintain generation level of major power plants for stability to support increasing renewable energy
- Increase grid flexibility

Economic

- Electricity tariff form PDP 2018 will not be higher than current tariff
- Promote competitive cost generation
- Promote investment and stimulate regional economic by expanding investment in power plant to regional level

Social & Environment

- Maintain generation from renewable energy to comply with COP 21
- Promote waste to energy
- Promote residential solar

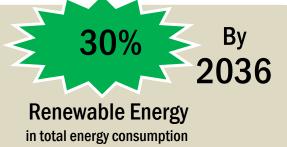
PDP 2018

Fuel	PDP 2015 (2036)	PDP 2018 (2037)
Natural gas	37	53
Coal/lignite	23	12
Import Energy	15	9
Renewable energy	20	20
Nuclear	5	-
Other fuel	0.1	6
EE		

RE type	Target (MW)
Solar	10,000
Biomass	3,376
Biogas	546
Floating solar + Hydro	2,725
Wind	1,485
Industrial waste	44
Total	18,176

AEDP 2015 - Targets

Overall Targets





19,684.4 MW







Wind

Hydro

Waste



Heat

25,088 ktoe







Solar

Biomass

Biogas



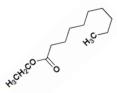
Fuel

11.3 MLPD Ethanol 14 MLPD B100

+0.53 MLPD Pyrolysis Oil +4,800 TPD of CBG



Ethanol



Biodiesel

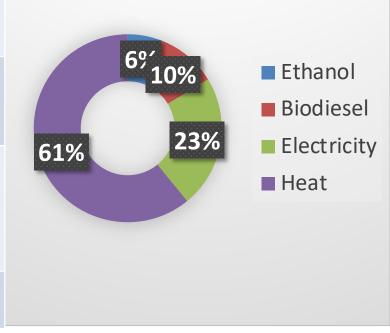


Compressed Biogas

Share of Alternative Energy Consumption in 2018

Alternative Energy Consumption		Quantity (ktoe)			Growth (%)	
		2015	2016	2017	2018	2018
1.	Electricity (Solar, Wind, Hydro, Biomass, MSW and Biogas)	1,556	2,122	2,473	2,960	19.7
1.	Heat (Solar, Biomass, MSW and Biogas)	6,579	7,182	7,322	7,919	8.2
1.	Biofuel Ethanol Biodiesel	879 1,063	684 1,063	733 1,203	781 1,336	6.5 11.1
	Total	10,077	11,051	11,731	12,996	10.8

Share of Alternative Energy Consumption in 2018



Draft AEDP 2018

Overall target

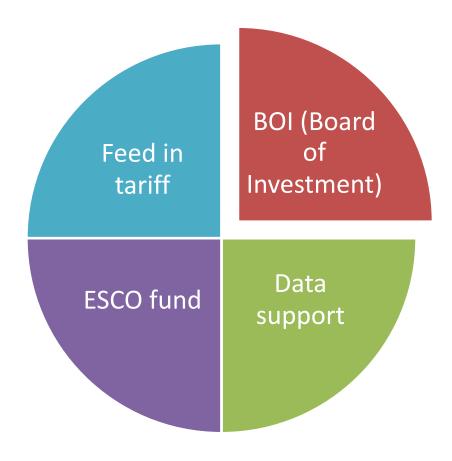
30 % by 2037

Renewable Energy in total energy consumption

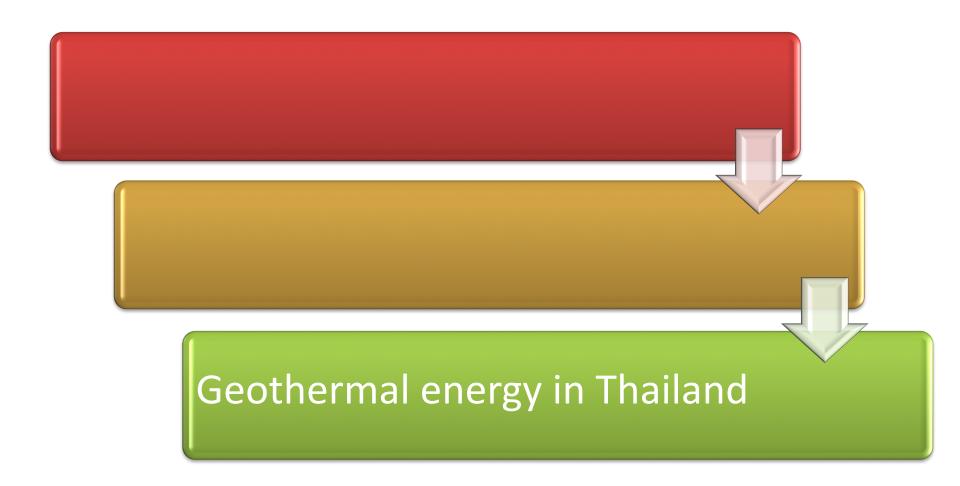


Sector	AEDP 2015	AEDP 2018	Differ
Electricity	4.27 %	5.86%	1.59%
Heat	19.15 %	21.12 %	1.97 %
Transportation	6.65 %	3.04 %	-3.61 %
Total	30.07 %	30.02 %	-0.05 %

Supporting Measures

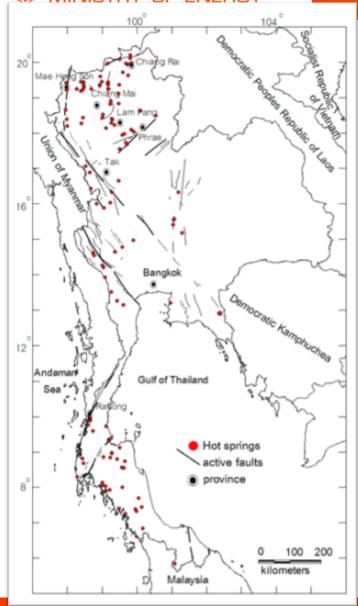


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Geothermal Energy in Thailand



There are 118 hot springs in Thailand.

They are founded in the northern, western and southern part of the country.

Manop, DMR



Geothermal Energy in Thailand

The surface temperature ranges of 40-100 °C

The hot springs in northern Thailand are suitable for small scale power plant.

Geothermal resources in Thailand are classified into low-medium enthalpy.

The hot springs in western and southern Thailand are low enthalpy which suitable for agricultural, tourist attraction and therapy bath.

History of Geothermal Energy in Thailand

1977

 Geothermal energy have been studied in Northern Thailand by Chiang Mai University (CMU), the Electricity Generating Authority of Thailand (EGAT) and the Department of Mineral Resources (DMR)

1982-1989

 The EGAT and the Japan International Cooperation Agency (JICA) established technical collaboration to define geothermal potential at the San Kamphaeng geothermal field, Chiang Mai province



History of Geothermal Energy in Thailand

1987

 A pilot project for utilization of geothermal energy to generate 300 kW electricity at the Fang geothermal field, Chiang Mai province. (under cooperative between EGAT and the Bureau de Recherches Geologigues et Mineres (BRGM) of France)

1994-1996

 EGAT investigated geothermal potential at the Muang Rae and Nuang Paeng in the Pai district, Mae-Hong-son province. The result showed that these areas are suitable for agricultural purposes.

Geothermal Resources and Potential

Hot Springs

There are 3 hot spring systems in Thailand

Hot spring system	Surface temperature (degree Celsius)	Location
Hot spring system	80 – 90	Northern
Warm spring system	40 -80	Most of the hot springs in Thailand
Geyser system	90 -100	The hot springs in Chiang Maiand Chiang Rai province

Geochemical Characteristics

Thermal water discharges from hot springs:

Clear

Colorless

pH ranges from 6.4 – 9.5

Derived from meteoric water and rain, infiltrated through underground

Receives heat transfer from hot rock then heated up and exposed to surface



Geothermal Utilization

Power Plant

Geothermal Power Plant

December 1989 : **Fang geothermal** is the first geothermal power plant in Thailand using binary cycle



A joint technical cooperation project between the BRGM, Geowatt of France and EGAT

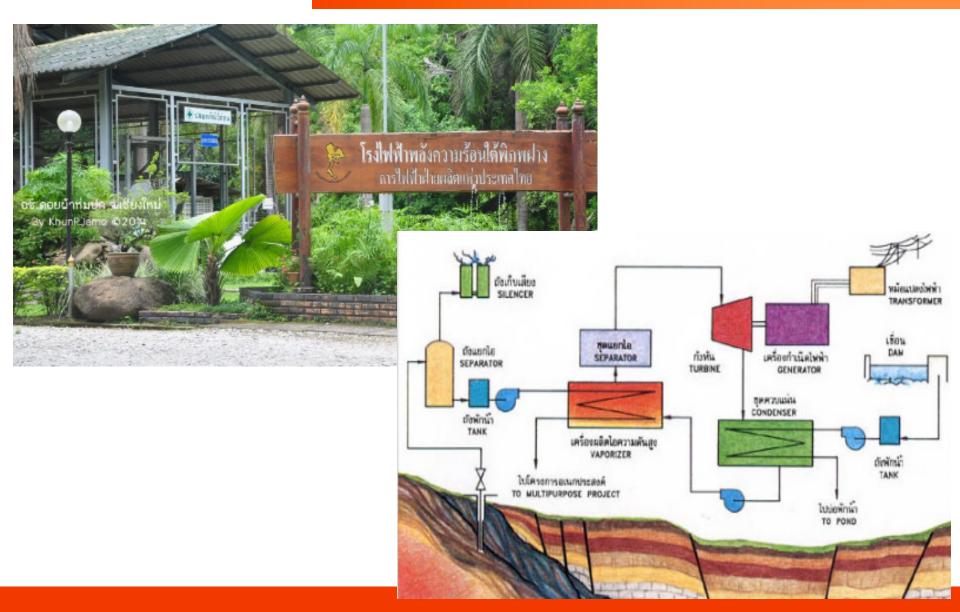
Inlet vaporizer temperature after passing through air released tank: 115- 120 °C

Hot water released from vaporizer outlet: 80 °C

Output: 300 kW (connected to grid + provided 1.2 million kWh annually)

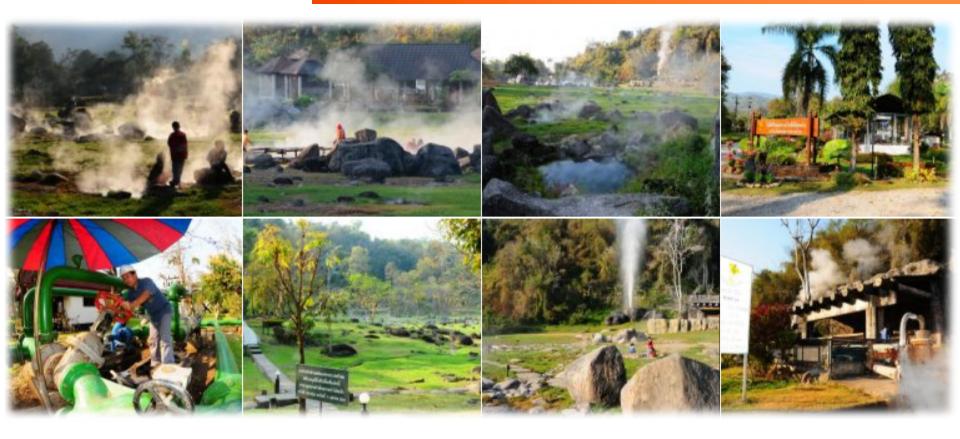


A 300 kW Binary Cycle Power Plant





Fang Geothermal



EGAT started construction of Fang Geothermal Power Plant. Apart from power generation, the geothermal power here is applied for drying agricultural crops such as onion, garlic, longan, and chilli. Moreover, the excessive hot water is used for physical therapy in the mineral bathing room.

EGAT

Geothermal Utilization

Direct Uses

Drying process: Sankamphaeng geothermal field: curing and drying banana, chili, garlic, maize etc.

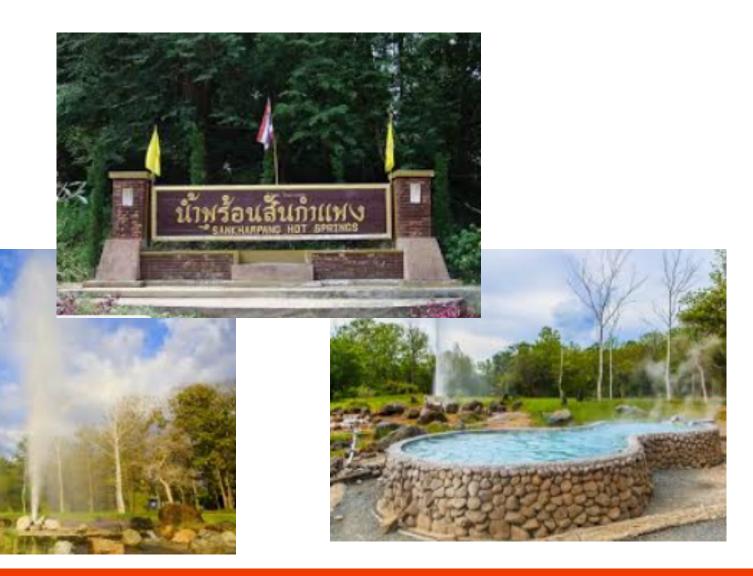
• Cooling storage Process: (1988) using absorption refrigeration system with 24,000 btu/hr and temperature at 4 °C for storing agricultural products: lemon, onion and lichee.

Public Water and Recreational Ground: suitable for therapeutic bathing

Manop, DMR



Hot spring at San Kampaeng



Thank you

