Alternative Energy Development Plan (AEDP) 2015 - 2036

Yaowateera Achawangkul, Ph.D.

Department of Alternative Energy Development and Efficiency (DEDE)
Ministry of Energy, THAILAND

The EGNRET 45th Meeting
Xiamen University, Xiamen, China

กระทรวงพลังงาน
MINISTRY OF ENERGY

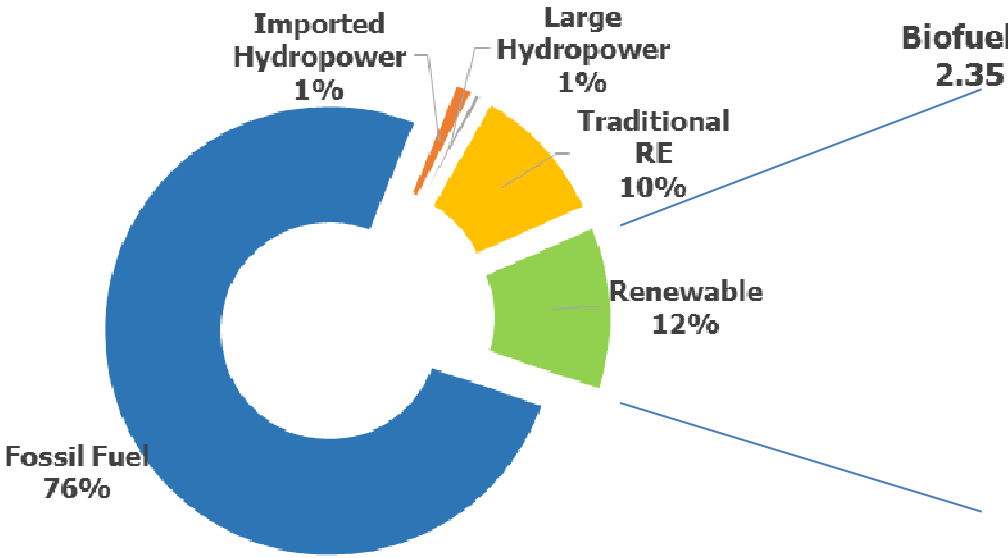
Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Thailand's Energy Situation

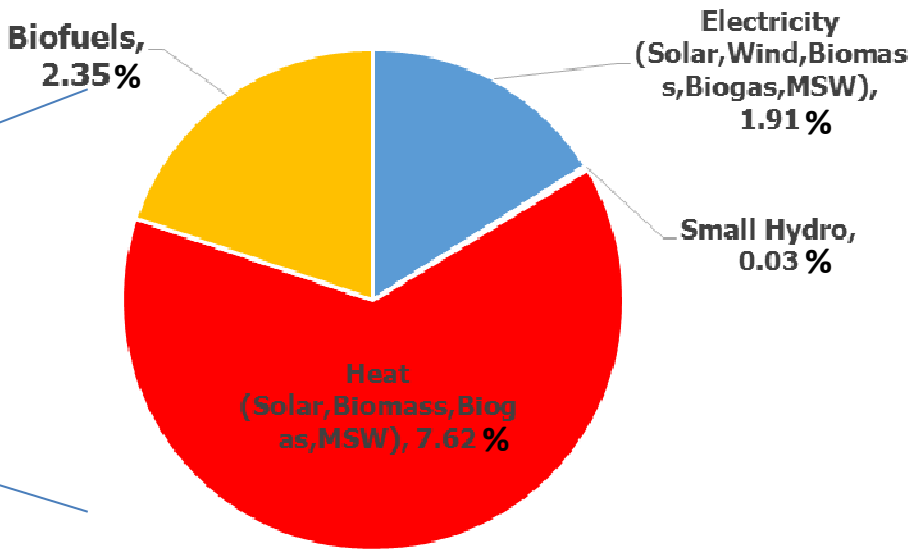
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Thailand Final Energy Consumption 2014

Final Energy Consumption

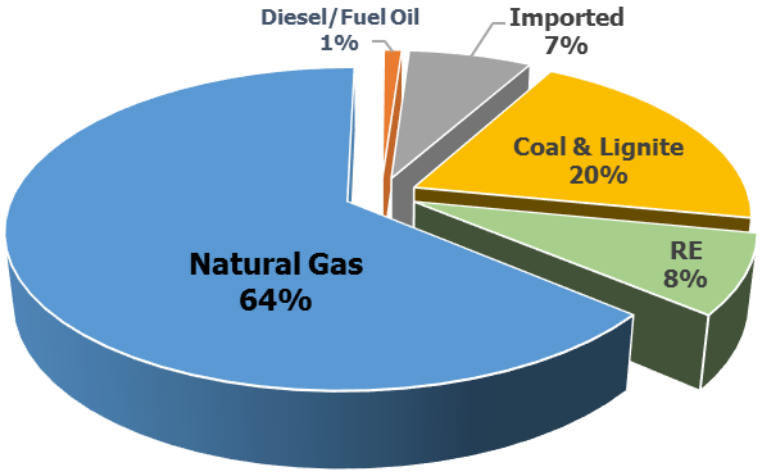


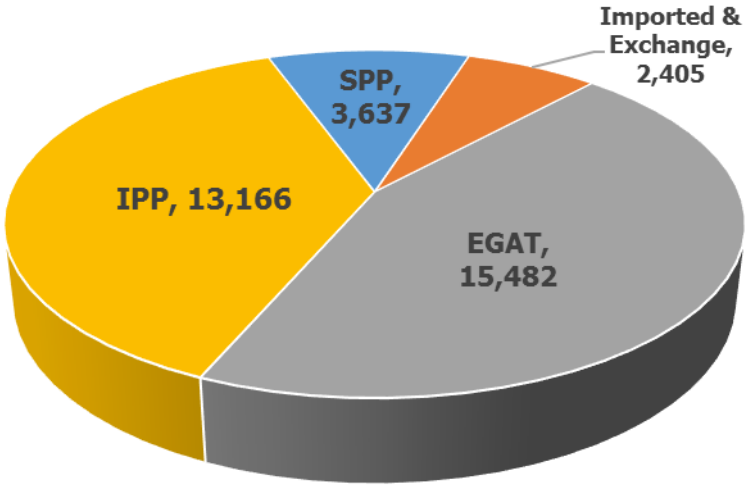
Renewable Energy Consumption



Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Power Generation by Fuel Type in 2014





Unit : ktoe

Power Generation by Fuel Type

Power Generation by Producer

Energy Policy

Thailand's Energy Policies

General Prayuth Chan O-cha
Prime Minister

✓ Secure Thailand Energy supply
- Exploration and production of natural gas and crude oil both in the sea and on land
- More new power plant by government agencies and private organizations
- Increase the use of renewable energy
- International energy development cooperation

✓ Fair Energy Pricing
- Energy price restructure
- Appropriate tax between different types of oil

✓ Energy conservation
- More efficient use of energy
- Awareness of consumer

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Alternative Energy Development Plan (AEDP) 2015-2036

Initial concepts for AEDP 2015-2036

1) **Promotion on power generation from MSW, biomass and biogas, to benefit both farmer and community.**

- MSW 500 MW
- Biomass
  - 2,500 MW from biomass potential at present
  - 1,500 MW from increased agricultural area, due to zoning policy (Ministry of Agriculture)

2) **Set up target of the provincial RE development** by zoning of electricity demand and RE potential

3) **Power generation from solar and wind if the investment cost will be able to compete with power generation using LNG**

4) **Incentives** by using the competitive bidding, and promote the utilization by energy consumption reduction (Net Metering or Self-Consumption)

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Initial concepts for AEDP 2015

Study for the potential of domestic RE source (Power/Heat/Biofuel) and forecast the quantity of RE in future

Analyze and appoint the share of RE for power, heat and biofuel at present and future

Total energy used prediction from EPPO's model

Opportunity for fossil replacing using RE

Power

Provide RE for power generation by the potential of transmission line of PEA's substation by the consideration of:

1) RE potential of each area
2) Priority of RE by merit order, using "Levelized Cost of Electricity (LCOE) model"

Heat

Provide RE for heat generation by the potential of fossil fuel replacement/target group

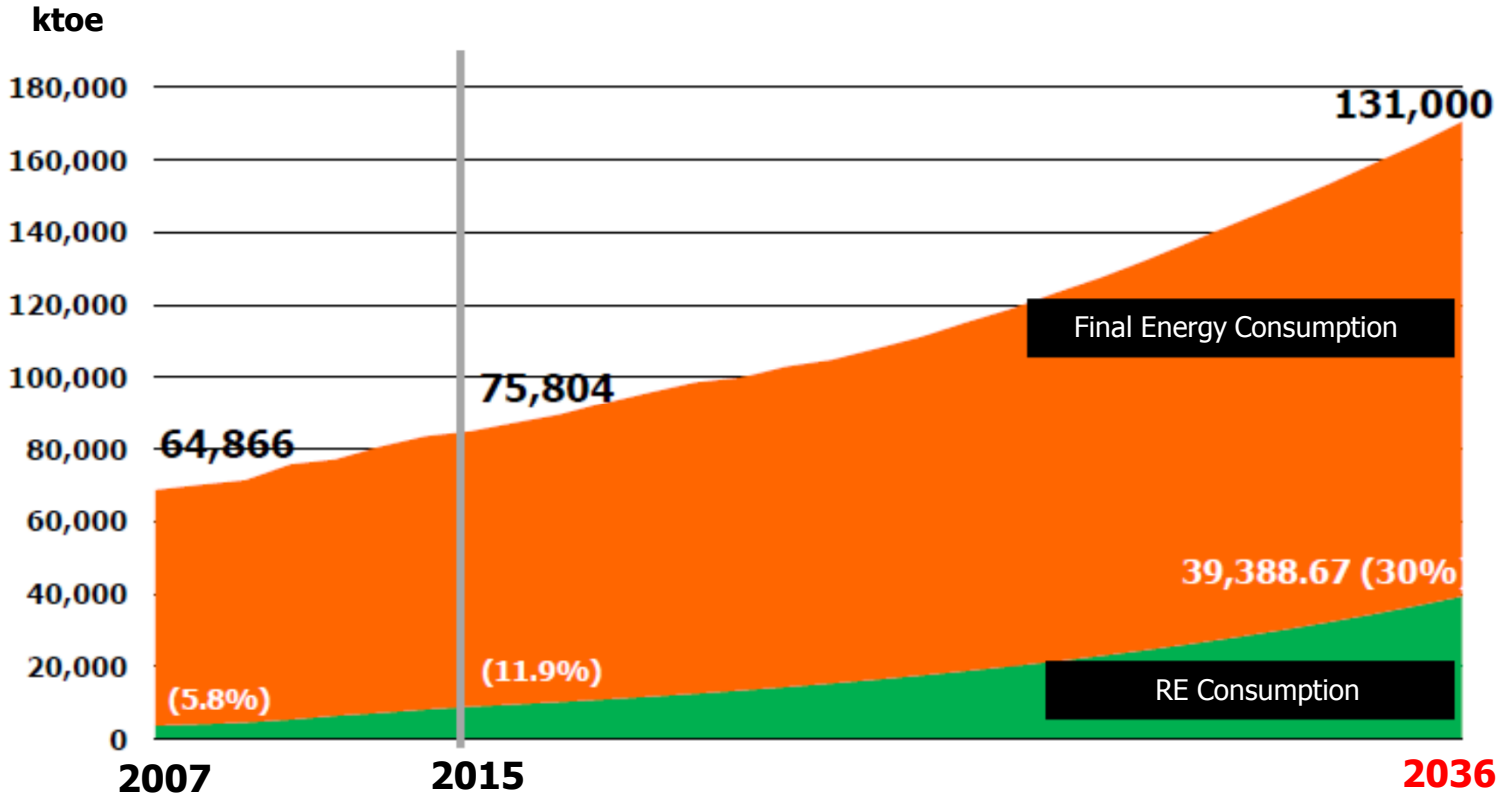
Biofuel

Increase amount of biofuel production instead of fuel oil in transportation sector, by considerate the equilibrium of production and utilization

Alternative Energy Development Plan (AEDP) 2015-2036

Goal: *Target 30%* renewables in Total Energy Consumption by 2036

Target	ktoe
RE Consumption (ktoe)	39,388.67
Final Energy Consumption (ktoe)	131,000
RE share (%)	30%



Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Alternative Energy Development Plan (AEDP) 2015-2036

Foundation: Commitment to the development of a low-carbon society

Facilitator: *Private-led investment*

Strategy: Alternative Energy Development Plan 2015-2036

Facilitator: *Government funded RD&D*

Goal: ***Target 30%*** renewables in Total Energy Consumption by 2036

Bio-Energy

Biomass	Biogas	MSW + Industrial Waste
5,570 MW	600 MW	550 MW
22,100 ktoe	1,283 ktoe	495 ktoe

6,720 MW Power | 23,878 Ktoe Heat

Bio-Fuel

Ethanol	Biodiesel	Pyrolysis Oil
11.3 ML/Day	14 ML/Day	0.53 ML/Day

CBG	Alt. Fuels*
4,800 t/Day	10 ktoe

Solar

6,000 MW

1,200 Ktoe

Wind

3,002 MW

9,002 MW Power | 1,200 Ktoe Heat

Hydro

Large Hydro 2,906.40 MW	Small Hydro 376 MW

3,282.40 MW

New-Energy

Geothermal, Used Tire Oil, etc.

10 ktoe

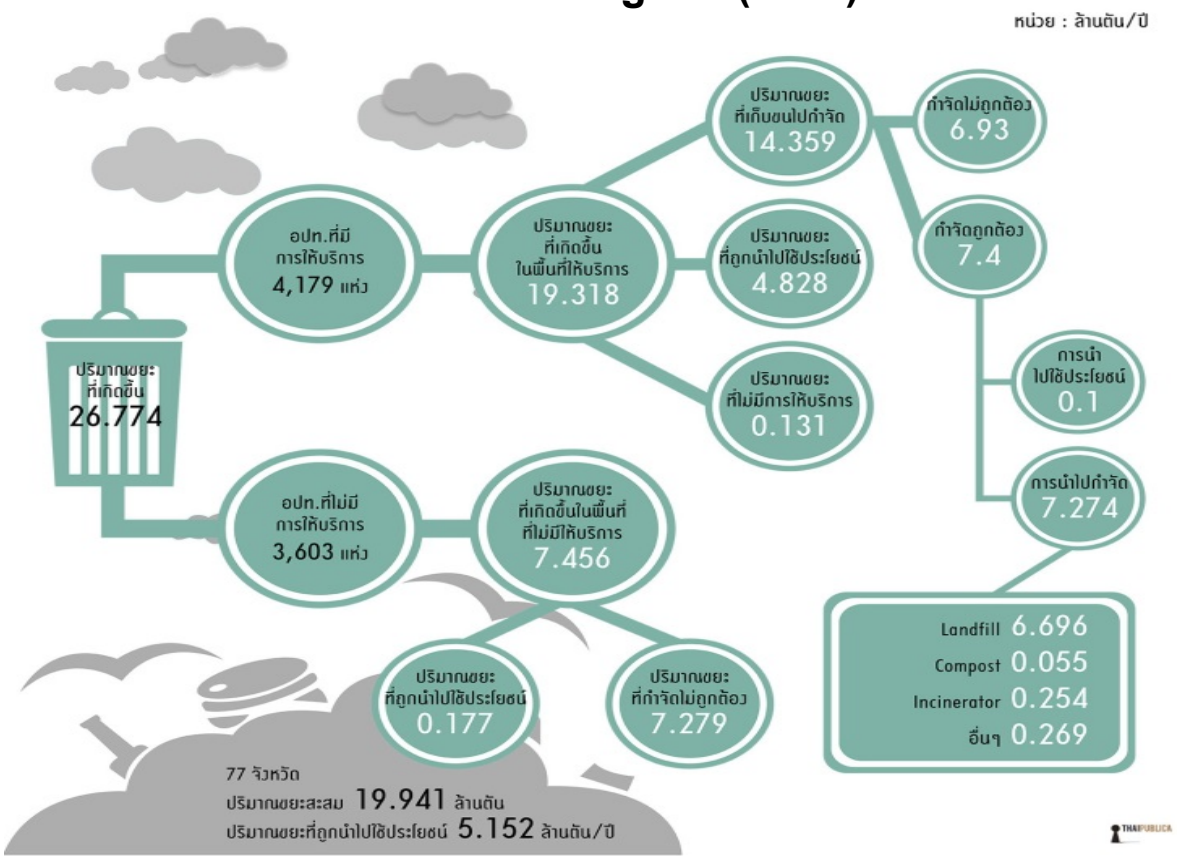
* Alternative fuels = Bio-oil, Hydrogen

Renewable Energy Potential in Thailand

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Municipal Solid Waste (MSW) Potential

MSW Flow Diagram (2013)



Potential 631 MW

Amount of MSW (million ton/y)	Total MSW (ton/day)	Usable MSW(ton/day)	Utilized MSW (ton/day)	Unutilized (ton/day)	Energy Potential MW
26.774	73,353.42	47,876.00	3,686.00	44,190.00	631.29

Ref. Pollution Control Dept.

Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Biogas Potential

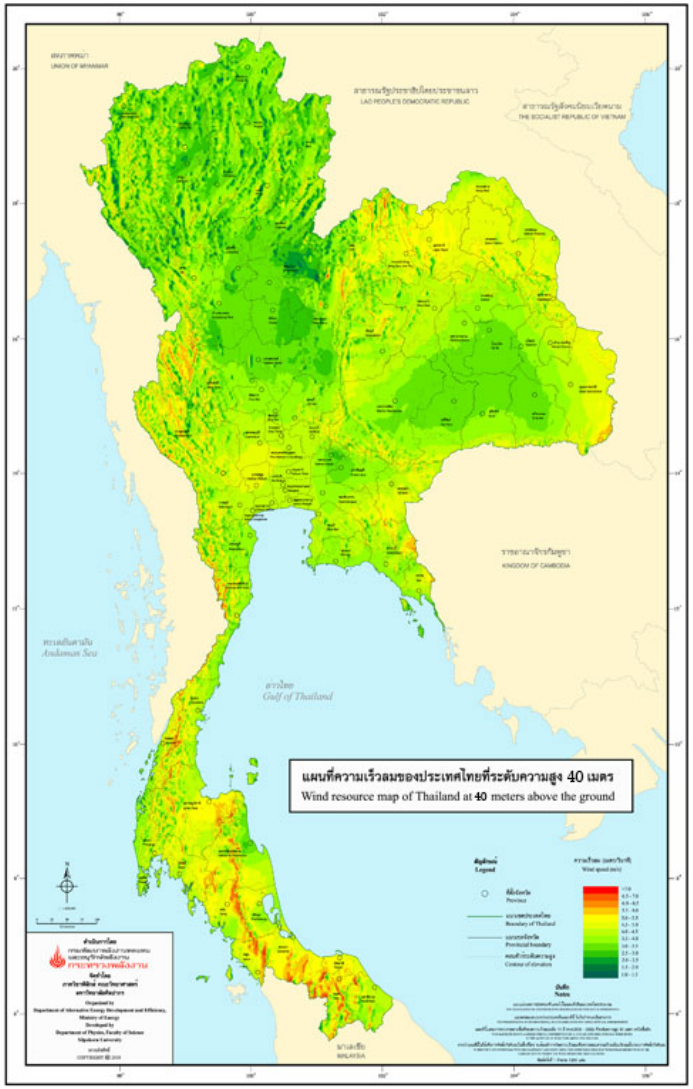
Potential	All Types	Energy crop	Industries + Agri. Plan	Livestock Farm	Agricultural Waste	Sewage
Remaining Potential (Million cubic meter per year)	36,421	33,010	1,311 + 648	880	425	147
Availability for Energy Production(40-60%)	18,442	16,505	787 + 259	528	255	88
Power Potential (MW) (3.69 million m3 per 1 MW)	4,657	4,168	264	133	64	22

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Biomass Potential

Biomass potential data	Remain Biomass (at year 2014)			Remain Biomass incl. Agri. Plan		
Type of biomass	Ton/y	ktoe	Existing (MW)	Ton/y	ktoe	Existing (MW)
Rice husk	432	0.14	0.05	432	0.14	0.05
Rice straw	4,124,630	1,204	461	4,124,630	1,204	461
Sugar cane and leaf	2,928,140	1,073	411	5,265,619	1,929	738
Bagasse	-	-	-	21,280,000	3,712	1,421
Corn cob	80,889	18	7	80,889	18	7
Corn trunk	3,369,690	784	300	3,369,690	784	300
Cassava rhizome	2,838,125	369	141	3,372.560	439	168
Cassava trunk	1,052,636	388	149	2,084,755	769	294
Oil palm frond	14,606,671	2,265	867	33,586,191	5,208	1,993
Oil palm fiber	-	-	-	2,944,803	795	304
Oil palm shell	-	-	-	619,959	248	95
Oil palm empty fruit bunch	606,541	104	40	1,402,455	240	92
Para wood root	1,411,834	287	110	1,411,834	287	110
Coconut shell	79,678	31	12	79,678	31	12
Coconut fiber	71,875	27	10	71,875	27	10
Coconut bunch and frond	249,026	91	35	249,026	91	35
Total	31,420,166	6,642	2,542	79,944,394	15,783	6,040

Wind Potential



Wind potential 14,141 MW

The area in which has average wind speed over than 6 m/s, has potential for power generation by 14,141 MW

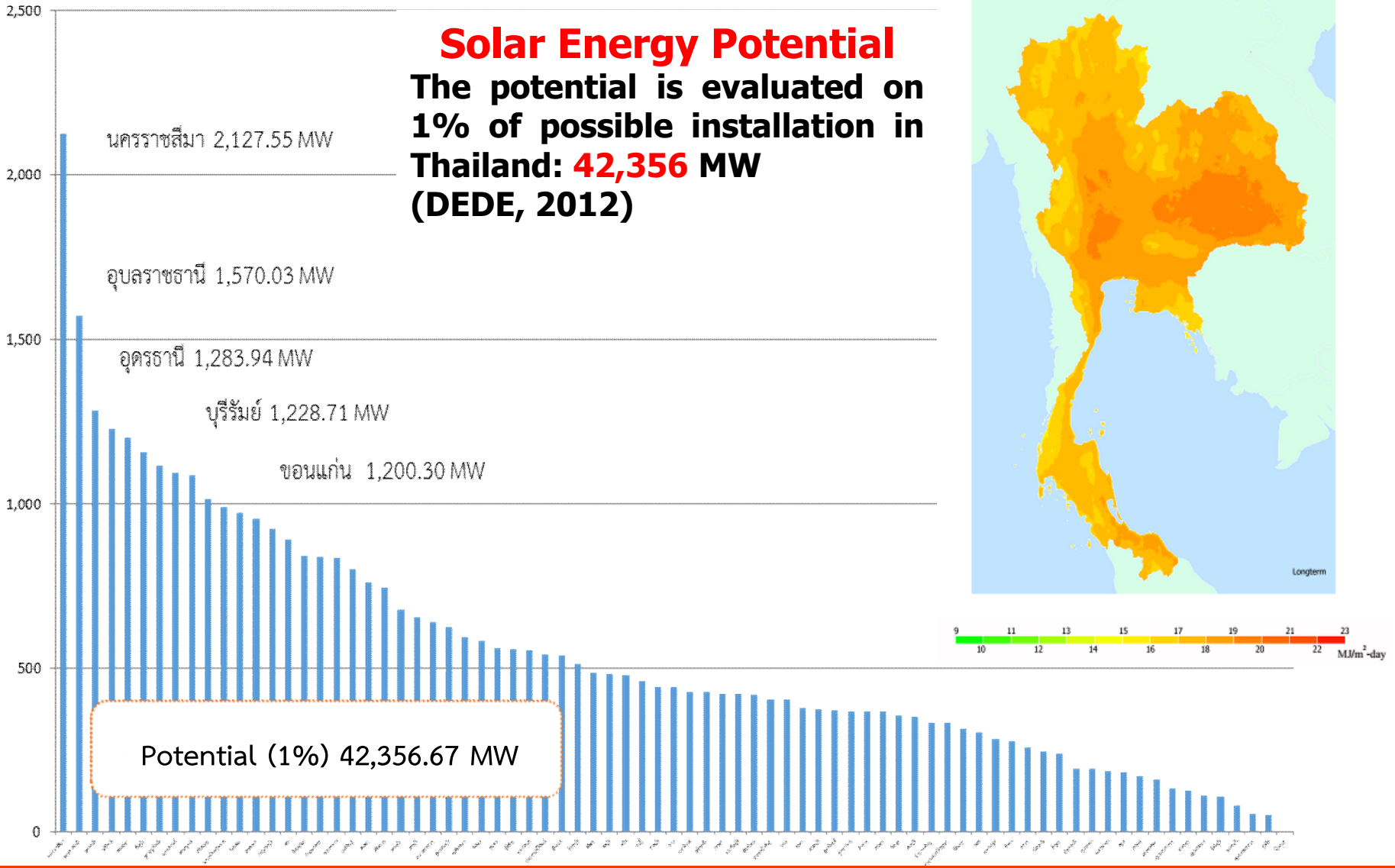
(Ref. DEDE report year 2010)

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Solar Potential

Solar Energy Potential

The potential is evaluated on 1% of possible installation in Thailand: 42,356 MW (DEDE, 2012)



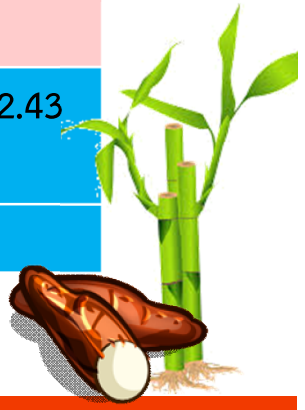
Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Biofuel – Target

Target : Increase the share of biofuel utilization from 7% at present to be 20-25% of total domestic fuel demand in year 2036

	Status at 2014		Target in 2036	
Biofuel	Million litre/day	ktoe	Million litre/day	ktoe
1. Ethanol	3.21	872.88	11.3	2,103.50
2. Biodiesel	2.89	909.28	14.0	4,404.82
3. Pyrolysis-Oil			0.53	170.87
4. Compressed biogas (CBG) (ton/d)			4,800	2,023.24
5. Other Alternative Fuel*				10
Total		1,782.16		8,712.43
% of RE share	6.65%		25.04%	

* Other alternative fuel are hydrogen, etc.



Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Main Activities

Electricity

- Area-based RE power generation target must be related to RE potential (RE Grid Capacity)
- Develop and support for power generation from unutilized fuel (e.g. agricultural waste, industrial waste, fast growing crop)
- Support competitive bidding for power purchasing system

Heat

- Promote and support RDF transformation for municipal waste management
- Promote and support biomass-derived fuel (e.g. biomass pellet, bio-coal)
- Support biogas generation from waste water or solid waste
- Promote heat utilization in building by building code establishing

Biofuel

- Promote utilization of B10, B20 in both transportation and industrial sector
- Promote gasohol utilization
- Promote CBG utilization for vehicle and industry
- Promote biofuel production efficiency improvement

Thank you for Your attention