Alternative Energy Development Plan (AEDP) 2015 and Supporting Schemes

Yaowateera Achawangkul, Ph.D.

Department of Alternative Energy Development and Efficiency
Ministry of Energy, Kingdom of Thailand

THE LOWER MEKONG INITIATIVE (LMI) RENEWABLE AND CLEAN ENERGY BUSINESS DIALOGUE 2015

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กระทรวงพลังงาน
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1. Thailand's Energy Situation

2. Key point on AEDP 2015-2036

3. Promotion guidelines

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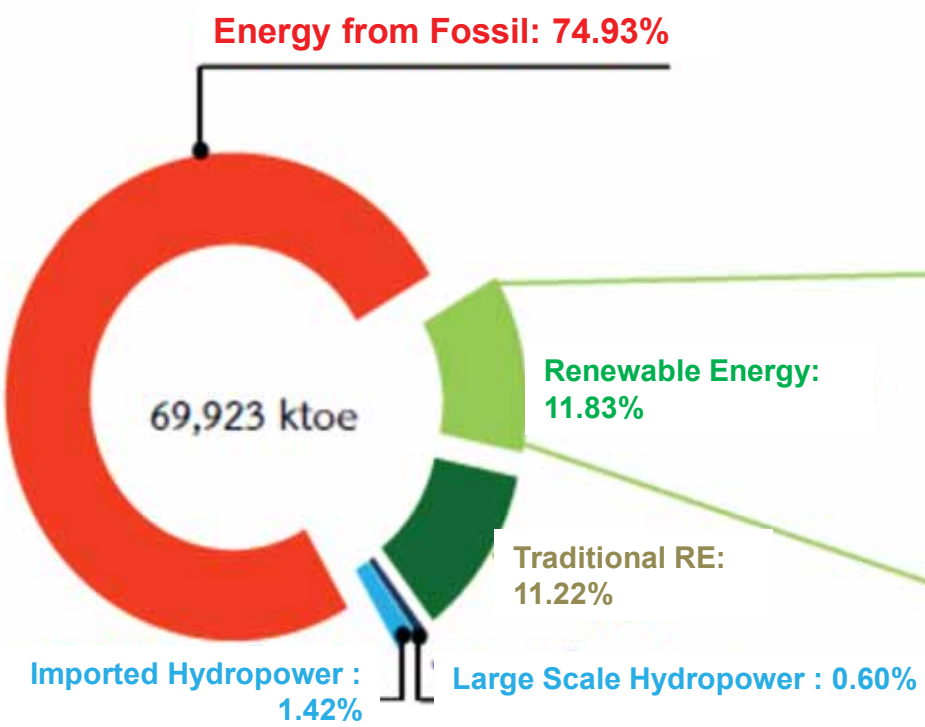
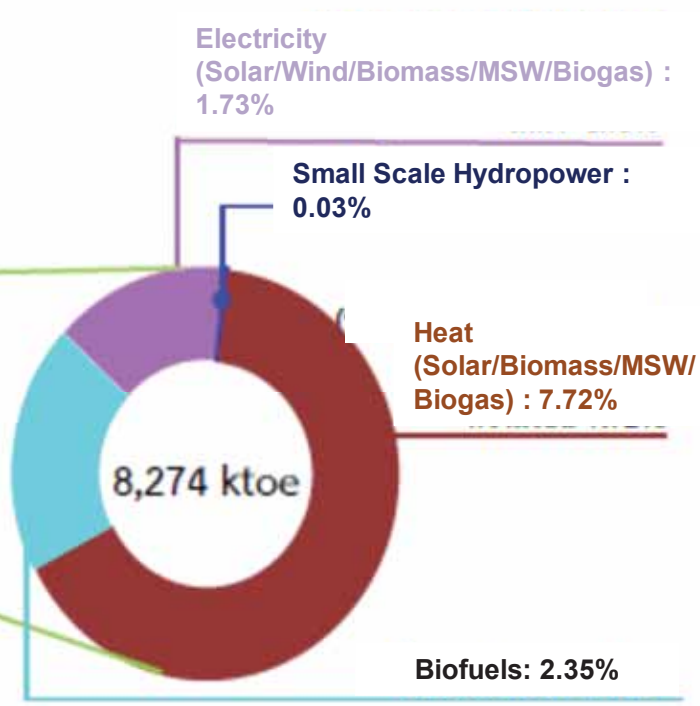
Thailand Final Energy Consumption 2014

Final Energy Consumption



Renewable Energy Consumption



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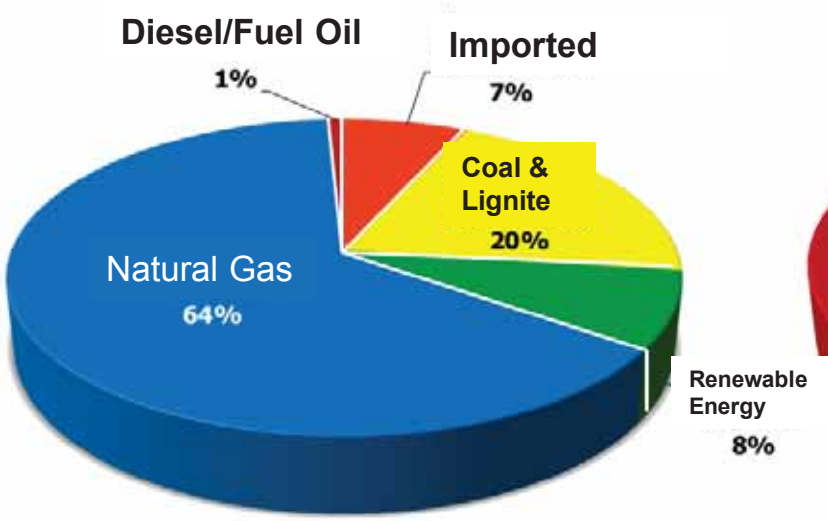
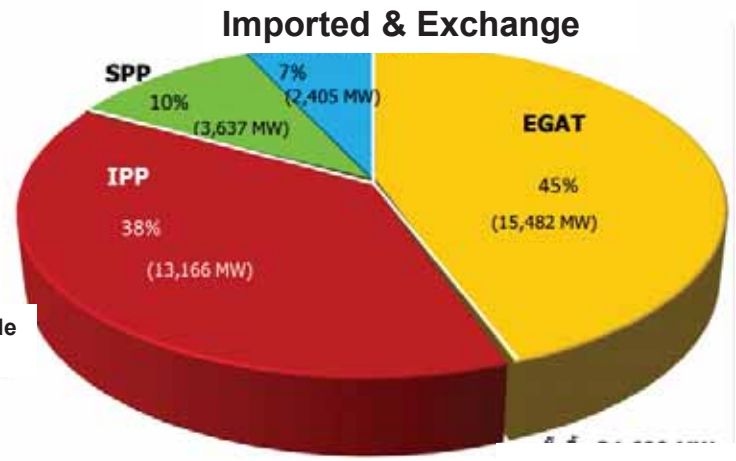
Power Generation by Fuel Type in 2014



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

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PDP 2015 : Estimation of Fuel Utilization

Fuel Type	PDP 2015 At Sep. 2014 (%)	PDP 2015 At 2026 (%)	PDP 2015 At 2036 (%)	PDP2010 Rev.3 At 2030 (%)
Import Hydropower	7	10-15	15 – 20	10
Clean coal (including Lignite)	20	20-25	20 – 25	19
Renewable Energy	8	10-20	15 – 20	8
Natural Gas	64	45-50	30 – 40	58
Nuclear	-	-	0 – 5	5
Diesel & Fuel Oil	1	-	-	-
Total	100	100	100	100

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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						
Rice straw						
Sugar cane and leaf						
Bagasse						
Corn cob						
Corn trunk						
Cassava rhizome						
Cassava trunk						
Oil palm frond						
Oil palm fiber						
Oil palm shell						
Oil palm empty fruit bunch						
Para wood root						
Coconut shell						
Coconut fiber						
Coconut bunch and frond						
Total						

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)

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RE potential for power generation

Energy Type	Total Potential	At present (Sep.2014)	Remaining Potential	Target in 2036	Energy in 2036
Power	MW	MW	MW	MW	GWh
1. MSW	697.01	65.72	631.29	501.00	3,072.13
2. Biomass	8,492.01	2,451.72	6,040.29	5,570.00	34,155.24
3. Biogas	657.58	312.95	344.63	600.00	3,679.20
4. Biogas (Energy crop)	4,287.05	-	4,287.05	680.00	4,646.30
5. Small Hyfropower	410.00	141.89	268.11	376.00	1,350.44
6. Wind	14,141.00	224.47	13,916.53	3,002.00	4,733.55
7. Solar	42,356.67	1,287.85	41,068.82	6,000.00	8,409.60
8. Large Hydropower	2,906.00	2,906.00	-	2,906.00	5,235.00
Total	73,947.32	7,390.60	66,556.72	19,635.00	65,281.46
Final Energy Consumption (ktoe)				326,119.00	131,000.00
RE share (%)				20.02%	4.25%

These data are under proceeding. Do not reference of publish

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RE potential for heat generation

Energy Type	Total Potential	At present (Sep.2014)	Remaining Potential	Target in 2036
Heat	ktoe	ktoe	ktoe	ktoe
1. MSW	200.00	98.03	101.97	200.00
2. Biomass	15,368.31	5,153.00	10,215.31	15,000.00
3. Biogas	1,000.00	496.13	503.87	1,000.00
4. Solar	1,255.91	4.89	1,251.02	1,200.00
5. Other Alternative Energy	361.00	-	361.00	100.00
Total	18,185.22	5,752.05	12,433.17	17,500.00
Final Energy Consumption (ktoe)				131,000.00
RE share (%)				13.36%

These data are under proceeding. Do not reference of publish

RE utilization for heat generation

Utilize RE instead of coal, oil and natural gas in an industrial sector, or heat applications

- Biogas : Generate biogas from waste water/ or industrial waste, and use as fuel in production line
- Biomass : Use for direct combustion or biomass pellet in the industrial's boiler
- MSW : Transform to RDF of pellet
- Solar: : Use solar collector to rise up water temperature, and use for boiler's feed water or other applications

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Biofuel – Target and Concepts

DEMAND

Goals: Substitute fossil fuel with domestic biofuel

Jan.-Sep. 2014	2036 BAU	2036 EE
22×10^6 l/d	33×10^6 l/d	?

ที่มา: สนพ.

Maximum blending in car and motorbike 85%

Jan.-Sep. 2014	2036 BAU	2036 EE
58×10^6 l/d	95×10^6 l/d	?

ที่มา: สนพ.

FAME Biodiesel can substitute diesel 7%

BHD Biodiesel can substitute diesel 20%

SUPPLY

Goals: Increase value for domestic agricultural products

Gasoline substitution - Ethanol

1. Sugar cane and sugar strategy (2014 – 2036)

Increase sugar cane crop area from 10 million rai to 16 million rai within 2036

2. Cassava and product strategy (2014 - 2036)

Increase product per rai from 3.5 ton/rai to 7 ton/rai in 2036

Ref: Office of Agricultural Economy

Diesel substitution – Biodiesel (FAME) and high level biodiesel BHD

Palm Oil strategy (2015-2036)

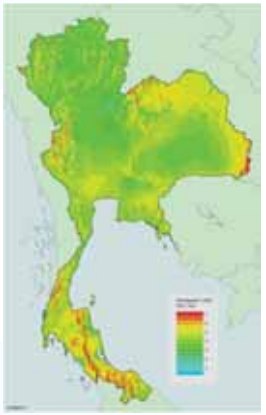
Increase oil palm crop area from 4.2 million rai to 7.5 million rai within 2036

Ref: Office of Agricultural Economy

Data and Information Support

Energy Potential

- Wind energy potential map and electronics database
- Solar energy potential map
- Biomass potential database



Prototype Demonstration

- Large scale wind turbine
- On-shore and valley small scale wind turbine
- Standard biogas system
- Standard solar drying system

Study and development on new energy

- Cost reduction for advanced biofuel production (2^{nd}/3^{rd} Gen.)

  Research and develop for raw materials and technologies for the 2^{nd} generation biofuel (biofuel from biomass)

  Follow up the 3^{rd} generation biofuel (biofuel from algae)

Policy Incentives

Contact and discuss with relate organizations

- **Ministry of Agriculture and Cooperatives**
  1. Raw material development
  2. Zoning of agricultural area
  3. Energy plant Contact farming

- **Ministry of Transport**
  1. High efficiency energy saving in transportation
  2. Clear and continuous biofuel promotion policy
  3. Automobile industrial promotion

- **Ministry of Industry**
  1. Biofuel plant

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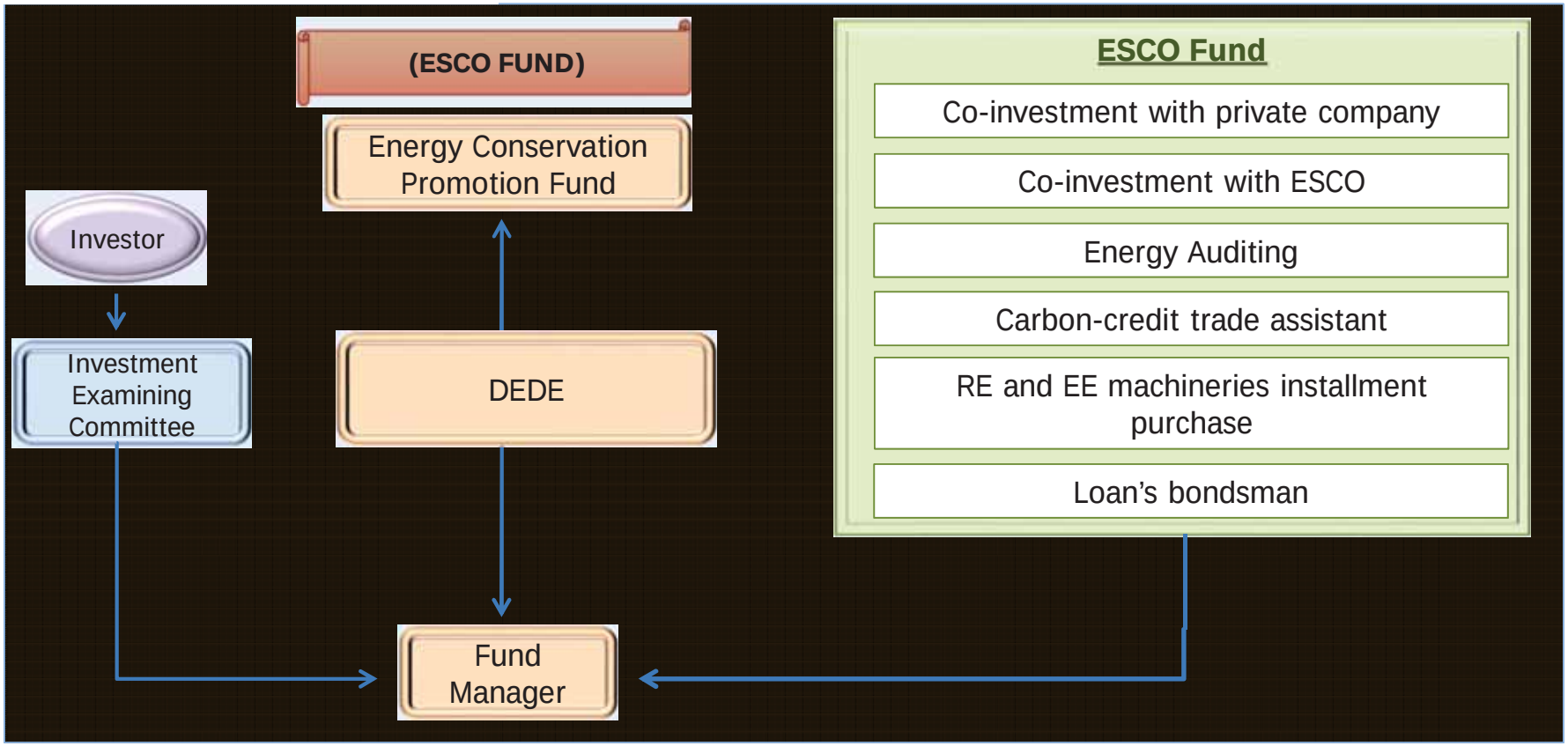
Energy Service Company (ESCO) Capital Fund



- Energy Conservation Promotion Fund has provided 1,000 million baht to establish "ESCO (Energy Service Company) Capital Fund"
- 2 Foundations (Energy for Environment Foundation and Energy Conservation Foundation) have been assigned to be fund managers

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Feed-in Tariff Scheme

Capacity (MW)	FiT (THB/kWh)			Period of Subsidy (Year)	FiT Premium (THB/kWh)	
	FiT_F	$FiT_{V,2017}$	$FiT^{(1)}$		Biofuel Project (8 years)	Project in Southern Territory Area (Throughout Project Period)
1) MSW (Hybrid Management)						
Existing Capacity ≤ 1 MW	3.13	3.21	6.34	20	0.70	0.50
Existing Capacity > 1-3 MW	2.61	3.21	5.82	20	0.70	0.50
Existing Capacity > 3 MW	2.39	2.69	5.08	20	0.70	0.50
2) MSW (Sanitary Landfill)	5.60	-	5.60	10	-	0.50
3) Biomass						
Existing Capacity ≤ 1 MW	3.13	2.21	5.34	20	0.50	0.50
Existing Capacity > 1-3 MW	2.61	2.21	4.82	20	0.40	0.50
Existing Capacity > 3 MW	2.39	1.85	4.24	20	0.30	0.50
4) Biogas (Waste Water/Sewage)	3.76	-	3.76	20	0.50	0.50
5) Biogas (Energy Crop)	2.79	2.55	5.34	20	0.50	0.50
6) Hydropower						
Existing Capacity ≤ 200 kW	4.90	-	4.90	20	-	0.50
7) Wind	6.06	-	6.06	20	-	0.50

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FiT Calculation Method

$$FiT_i = FiT_F + FiT_{V,i-1} \times (1+\text{Core inflation}_{i-1}) + \text{FiT Premium}$$

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