Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Current status and Development plan for Grid Small Hydro Power in Thailand

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Content

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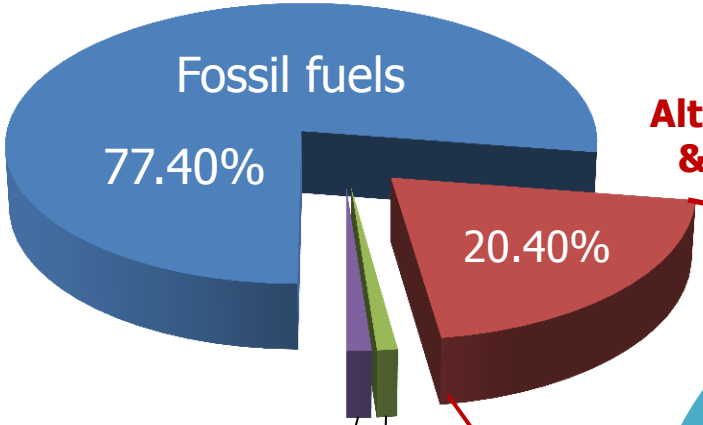
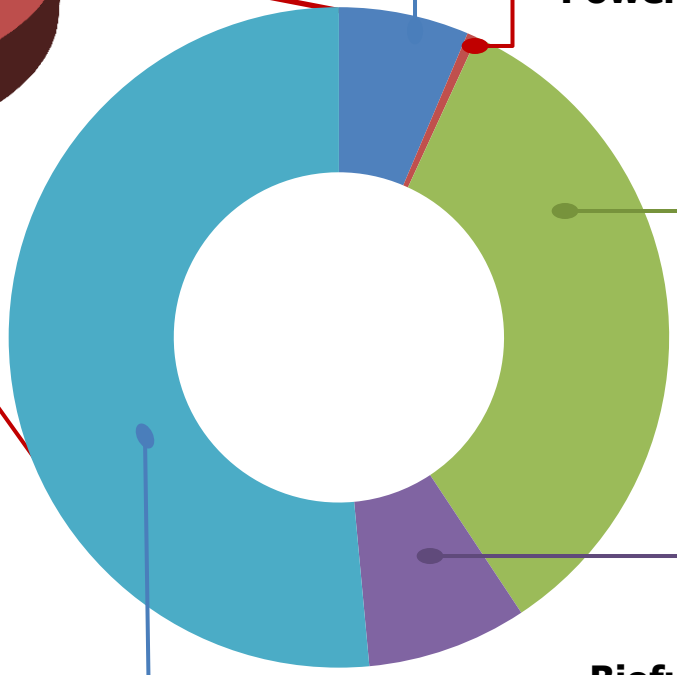
Thailand's Energy situation in 2012

Final Energy Consumption



Alternative Energy & Traditional RE



Power Generation 1.3 %
(Solar/Wind/Biomass /MSW/Biogas)

Small Hydro Power 0.1%

Heat 6.9%
(Solar/Biomass /MSW/Biogas)

Biofuels 1.6%

Traditional RE 10.5%

Alternative & Renewable Energy 9.9 %

PDP2010 Rev#3 (2010-2030)

Unit : MW

	PDP2010 Rev3
Comprising total capacity (Dec.2011)	32,395
Total added capacity	55,130
Deduction of the retired capacity	-16,839
Grand total capacity	70,686

Classification of added capacity during 2012-2030 of 55,130 MW

Renewable energy power plants 14,580

- power purchase from domestic (9,481)
- power purchase from neighboring countries (5,099)

Large Hydro Power

Cogeneration 6,476

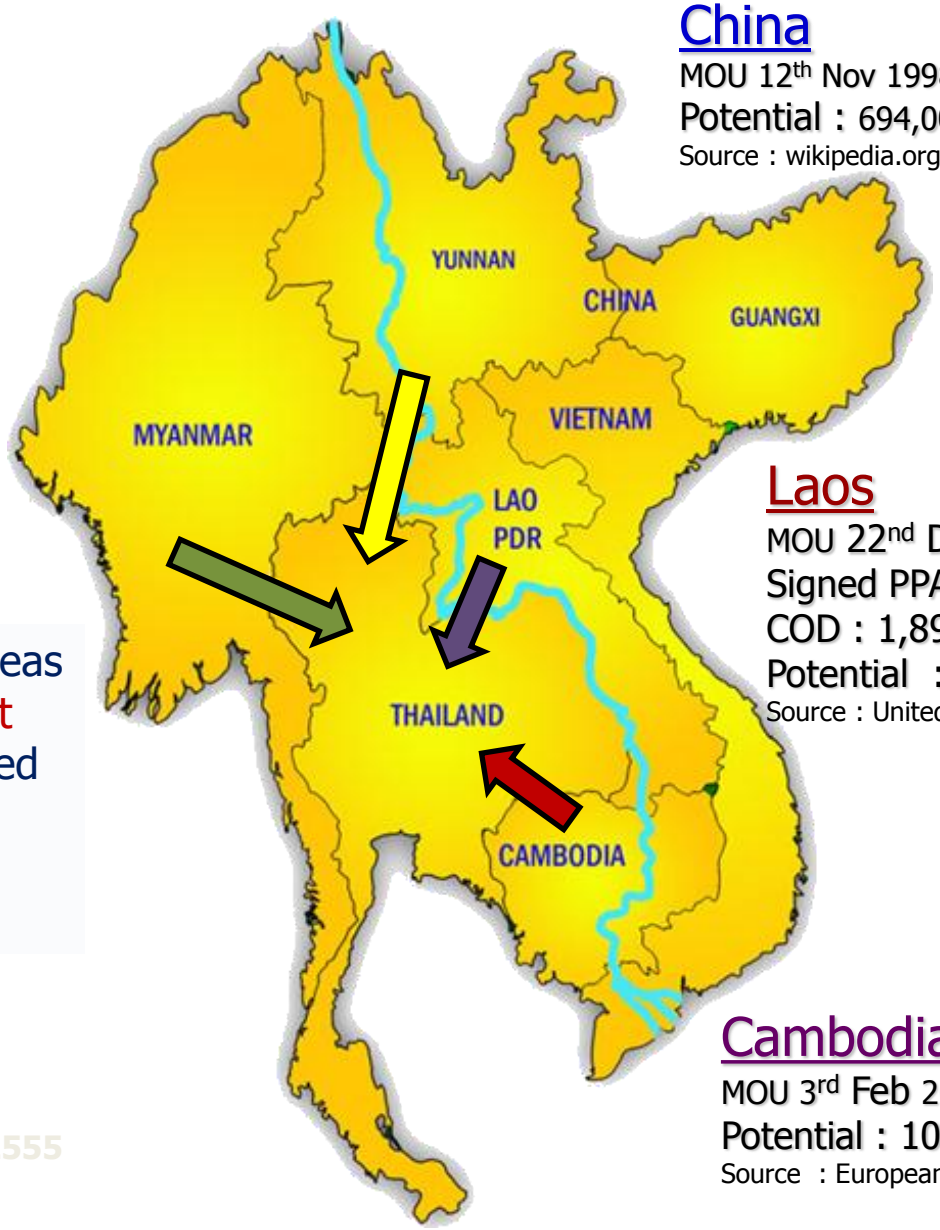
Combined cycle power plants 25,451

Thermal power plants 8,623

- coal-fired power plant (4,400)
- Nuclear power plant (2,000)
- Gas turbine power plant (750)
- Power purchase from neighboring countries (1,473)

Imported Electricity from neighboring countries

Myanmar
MOU 4th July 1997 : 1,500 MW
Potential : 39,720 MW
Source : Ministry of Power, India



China
MOU 12th Nov 1998 : 3,000 MW
Potential : 694,000 MW
Source : wikipedia.org

Laos
MOU 22nd Dec 2007 : 7,000 MW
Signed PPA : 2,913 MW
COD : 1,891 MW
Potential : 26,000 MW
Source : United Nations

- High of potential areas
=> North & Northeast
- Available to Imported electricity from neighboring countries

Cambodia
MOU 3rd Feb 2000 : no specific quantity
Potential : 10,000 MW
Source : European Commission

* ข้อมูล ณ วันที่ 31 มกราคม 2555

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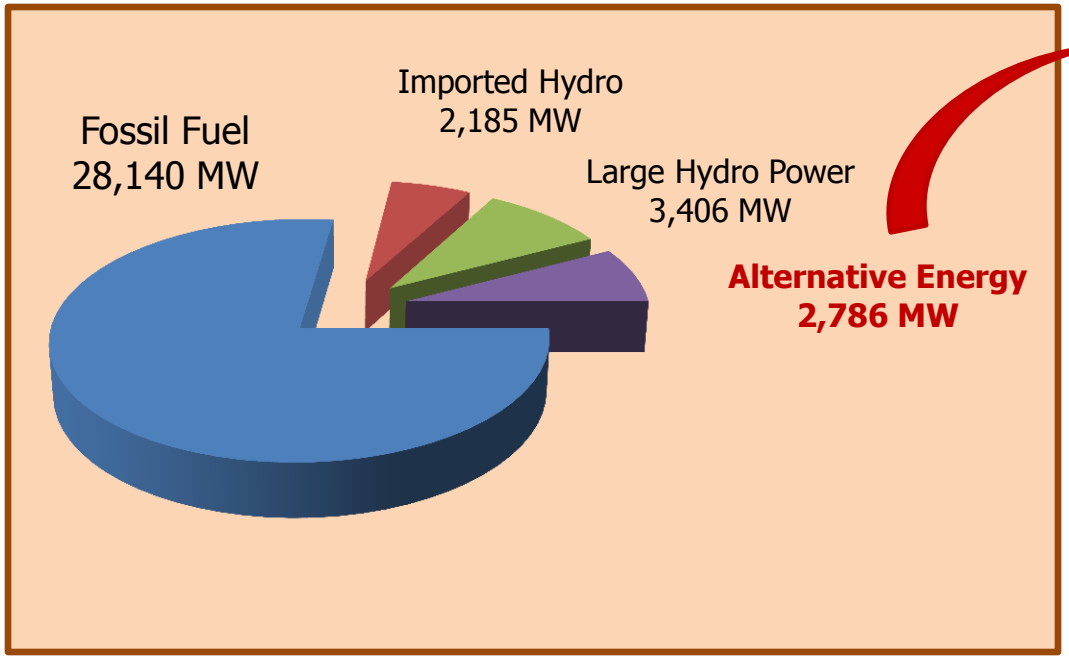
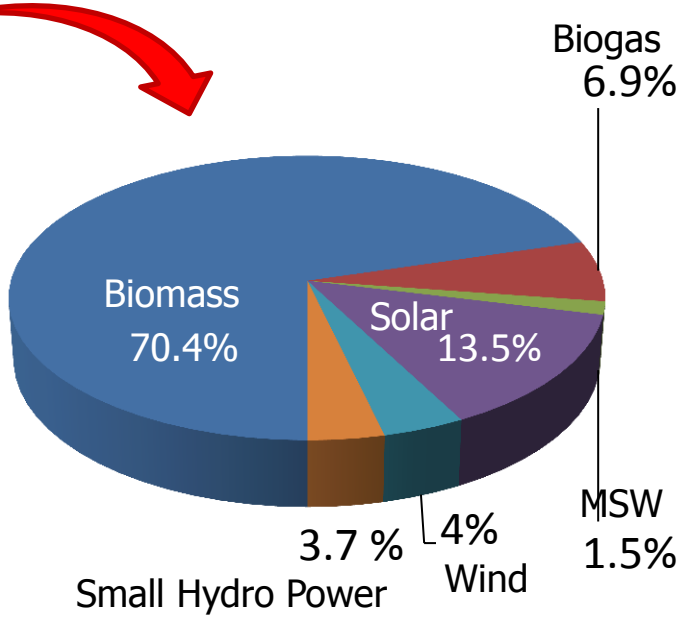
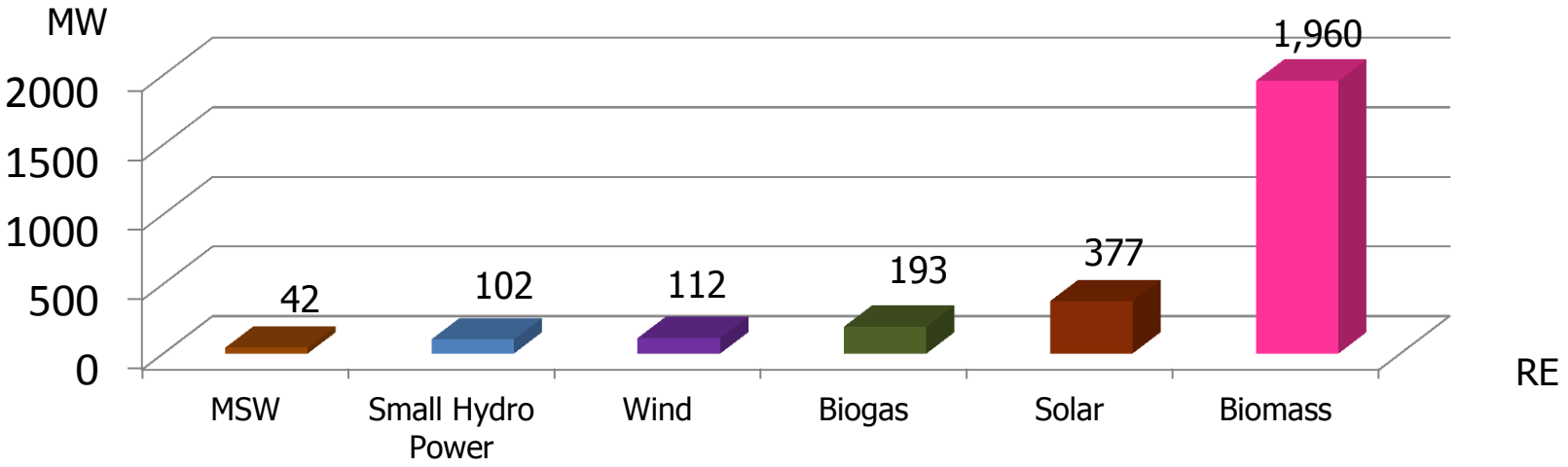
Installed Capacity of RE power generation







"Adder" : Feed-in Premiums

- Technology based premiums
- More incentives for smaller projects

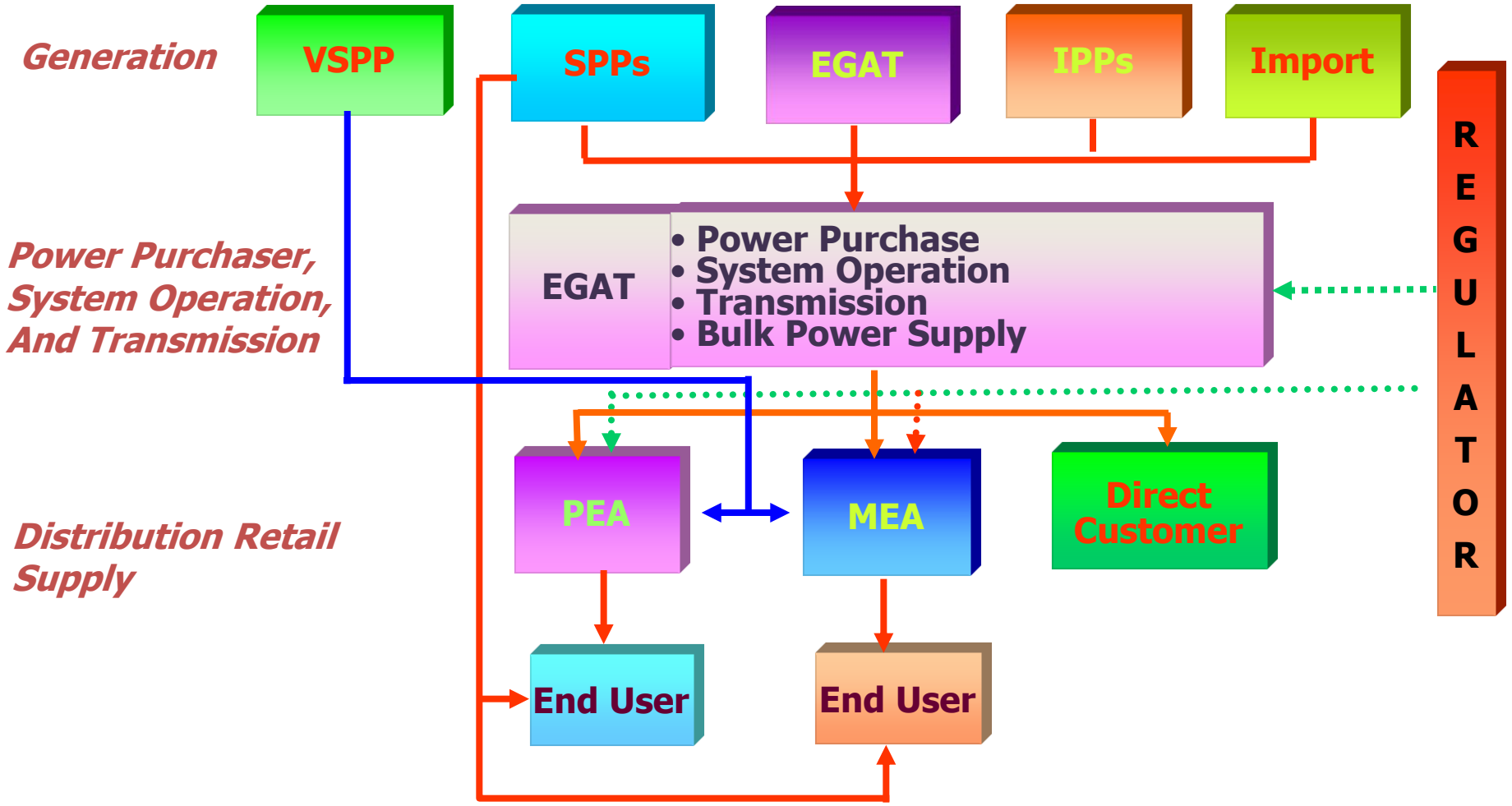
Fuel	Adder (Baht/kWh) VSPP	Adder (Baht/kWh) SPP	Adder-VSPP (USD Cents /kWh)**	Special adder * (Baht/kWh)	Supporting period (Year)
❑ Biomass					
- Installed capacity <= 1 MW	**0.50**	**Bidding**	**1.66**	**1.00**	**7**
- Installed capacity > 1 MW	**0.30**		**1.00**	**1.00**	**7**
❑ Biogas (all categories of production sources)					
- Installed capacity <= 1 MW	**0.50**	**Bidding**	**1.67**	**1.00**	**7**
- Installed capacity > 1 MW	**0.30**		**1.00**	**1.00**	**7**
❑ Waste (community waste, not hazardous industrial waste, and inorganic waste)					
- AD &b LFG	**2.50**	**2.50**	**8.33**	**1.00**	**7**
- Thermal Process	**3.50**	**3.50**	**11.67**	**1.00**	**7**
❑ Wind power					
- Installed capacity <= 50 kW	**4.50**		**15.00**	**1.50**	**10**
- Installed capacity > 50 kW	**3.50**	**3.50**	**11.67**	**1.50**	**10**
❑ Mini and micro hydropower					
- capacity 50-200 kW	**0.80**	**-No-**	**2.67**	**1.00**	**7**
- capacity < 50 kW	**1.50**		**5.00**	**1.00**	**7**
❑ **Solar power**	**8.00/6.50**	**8.00/6.50**	**26.67**	**1.50**	**10**

Now EPPO is studying to adjust the Adder to be

"Feed-in-Tariff system"

Grid System

Thailand Electricity Supply Industry Structure



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Alternative Energy Development Plan (AEDP)

Committed to the development of low-carbon society

Government Funding On R & D Activities

10 years Alternative Eergy-Development Plan (AEDP-Master Plan 2012-2021)

Private-Led Investment

Target 25 % of RE in Total Energy Consumption By 2021

New energy			solar	wind	Hydro power plant			Bio-energy			Biofuels		
Ocean & Tidal	Geothermal				Small	Micro	Pumped-Storage	biomass	Bio-gas	MSW	Ethanol	Bio-diesel	2nd –Gen. Biofuels
2 MW	1 MW		2,000 MW	1,200 MW	324 MW		1,284 MW	3,630 MW	600 MW	160 MW	9 ML/day	5.97 ML/day	25 ML/day
3 MW			**3,200 MW**		**1,608 MW**			**4,390 MW**			**Renewable fuel 44%**		

Current RE Share of 9.9% (March 2013)

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RE Power Plant Map

กรมพัฒนาพลังงานทดแทน และอนุรักษ์พลังงาน
กระทรวงพลังงาน

North
Total 1,458 MW

- Large Hydro = 1,279 MW
- Biomass = 110 MW
- Mini hydro = 40 MW
- Solar = 24 MW
- Geothermal = 0.3 MW
- Biogas = 5 MW

Northeast
Total 1,377 MW

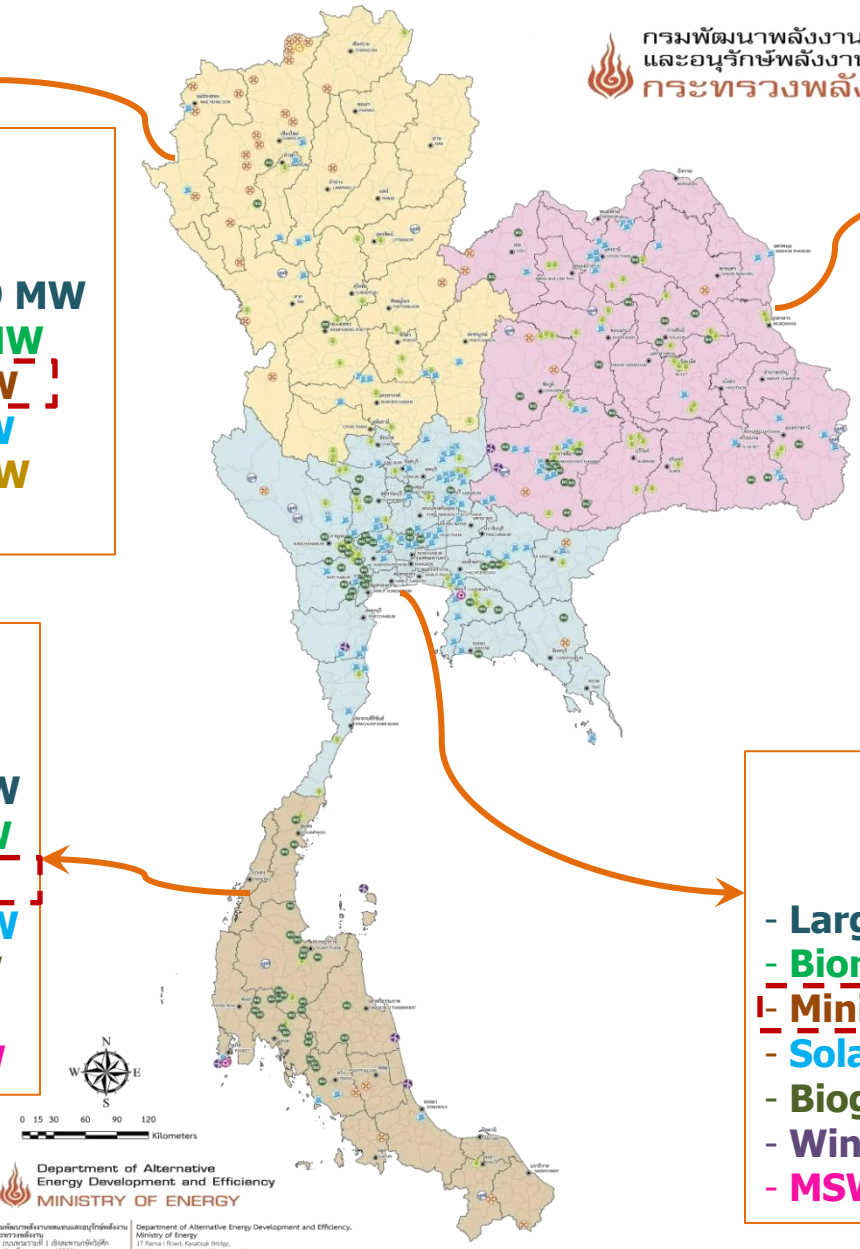
- Large Hydro = 737 MW
- Biomass = 352 MW
- Mini hydro = 24 MW
- Solar = 120 MW
- Biogas = 51 MW
- Wind = 93 MW

South
Total 430 MW

- Large Hydro = 312 MW
- Biomass = 48 MW
- Mini hydro = 4 MW
- Solar = 0.1 MW
- Biogas = 47 MW
- Wind = 2 MW
- MSW = 17 MW

Central
Total 1,606 MW

- Large Hydro = 1,078 MW
- Biomass = 241 MW
- Mini hydro = 13 MW
- Solar = 230 MW
- Biogas = 43 MW
- Wind = 0.1 MW
- MSW = 1 MW



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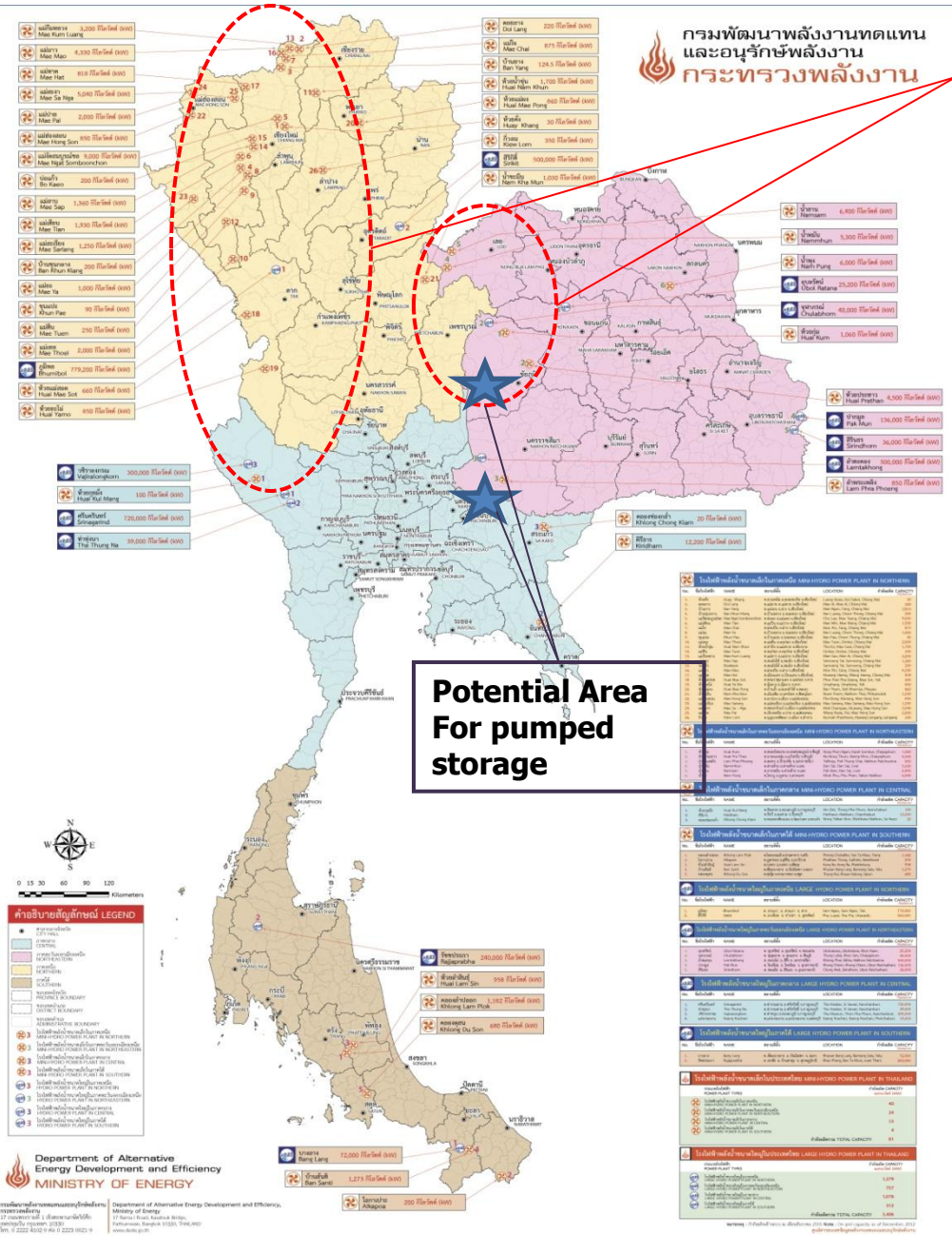
DEDE Strategy for Hydro Power



- ✓ **Focus on " Micro+Pico Hydro+Pumped Storage"**
- ✓ **Targeted 1,608 MW with measurements**

1. Electricity from Small Hydro Power at village level , for non-electrified households
   => Off grid / isolated system
2. DEDE supports Small Hydro Project in community
   => Owned by Local Administrative organization / People
   => Managed by Community
3. Solve the barrier
   => Site located in conserved area / restricted area
4. Research & Study Micro Hydro Turbine of Run-of-River
5. Develop hydro turbine of low-head type

- ✓ **Community Participation**

DEDE Hydro Power

10 yrs AEDP Target **1,608 MW**

Present Generating Capacity

101.75 MW **Small-Micro-Pico**

500 MW **Pumped storage**

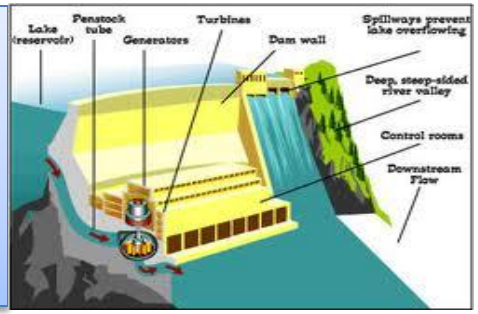
Generate hydro power at Village level

Very small power plant
Non-electrified household (Off-Grid)

Support construction at community level

Small hydro power plant
Local Admin Organization/people collaboration ⟶ project owner

DEDE & EGAT develop small hydro power system of downstream irrigation dam



First Small Hydropower project

- Mae Hong Son Project since 1964
- Mae Hong Son Canal
- 850 kW
- Generate 4.51 GWh
- 0.4 km of 22 kV line
- Sell power to PEA-Grid

Current Capacity of Small Hydro Power

Organization	Large Dam	Pumped Storage	Small Hydro	Micro-Pico Hydro
EGAT	21 projects 3,400 MW	2 projects 500 MW	2 projects (irregation dam) 36 MW	-
DEDE	-	-	22 projects 43.3 MW	48 projects 1.8 MW
PEA	-	-	8 projects 19.8 MW	2 projects 0.5 MW

* EGAT = Electricity Generating Authority of Thailand

DEDE = Department of Alternative Energy Development and Efficiency

PEA = Provincial Electricity Authority

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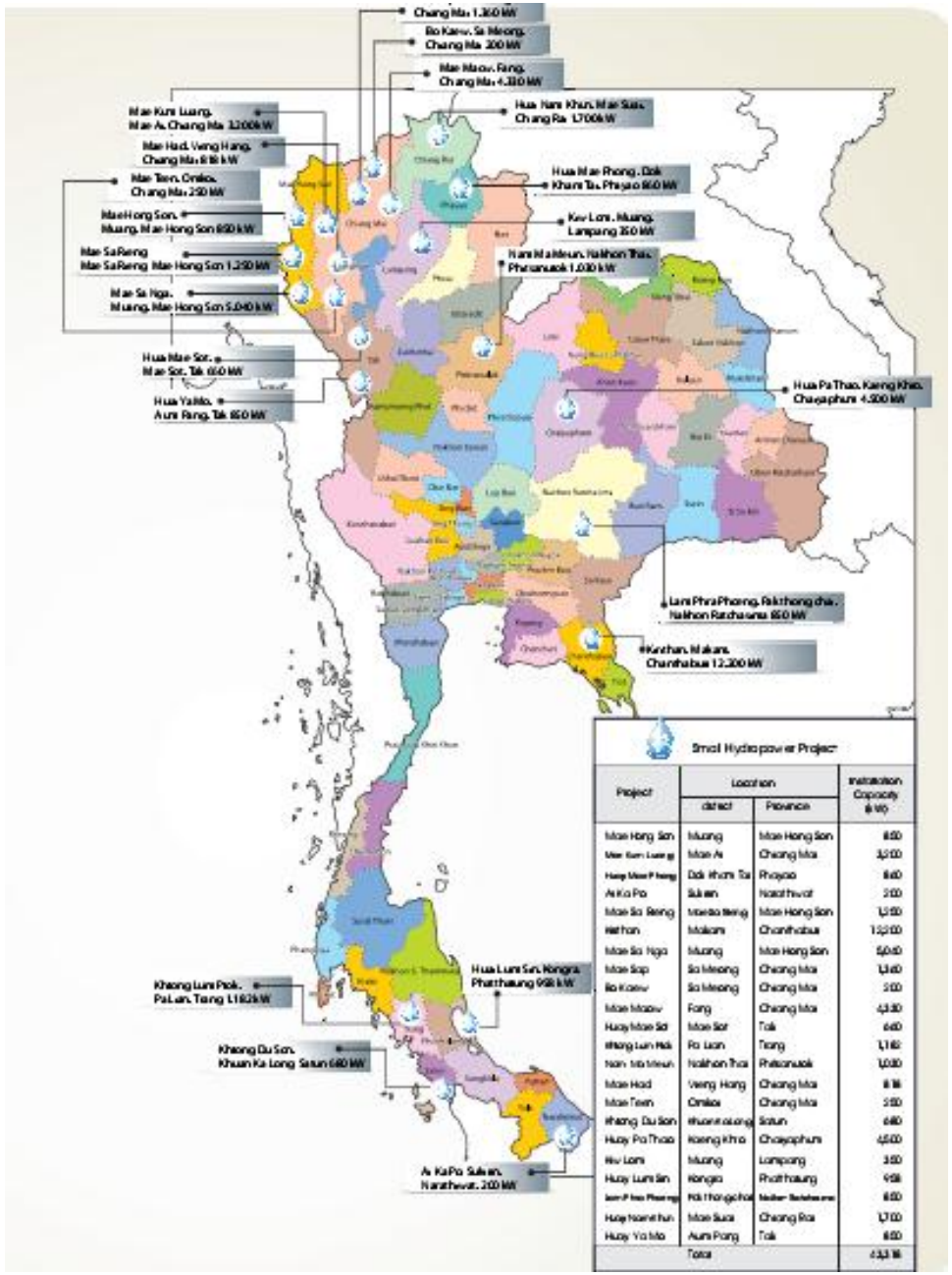
Small Hydro Power Projects



22 Small Hydro Power Projects

- The Projects started since 1971
- Aims to secure power system
- Electricity sold to EGAT and PEA
- Performance = 140.867 GWh / 31.208 ktoe

DEDE Small hydro power project under construction ;

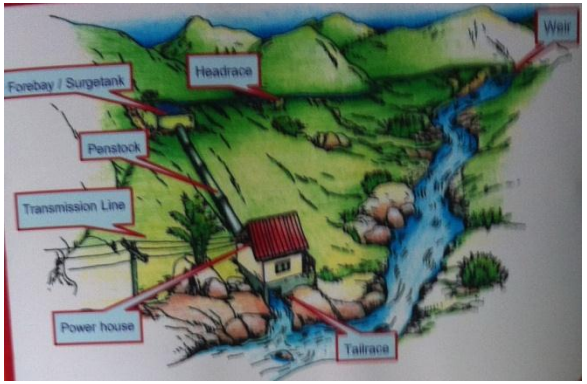
1. Klong Tung Pel Hydro Power Project , a royal initiated project
2. Upper Nan River Hydro Power Project , Nan Province
3. Mae Ka Nai Hydro Power Project , Mae Hong Son Province
4. Huay Mae U su , Tak Province
5. Extended small hydro power installed

Micro-Pico Hydropower Project

48 Hydropower Projects at village level

- Capacity of 1.8 MW
- Very small with installed capacity below 200 kW
- Located far from grid

Showcase "Mae Kam Pong"



Mae Kam Pong Electric Project

- National Policy in 1980 , aims to extend the use of electricity in rural area
- 1,300 m. than MSL with 23.5 sq.km.
- located far from grid system distribution
- In 1982 , DEDE started micro hydro project

site 1 = 20 kw
site 2 = 20 kw

" Small water resource = The cheapest energy resource "

✓ **Community Participation =>** Share holders cooperative

- Community
  - Provide Labour
  - Construction Material => Locally available ex. sand, gravel, wood etc.
- DEDE
  - Budget
  - Design /Technical Assistance
    - ⇒ Generating equipment
    - ⇒ advise, monitor civil work
    - ⇒ organize cooperatives

After Construction → Transfer Ownership to Community → O & M

Showcase "Mae Kam Pong"

Mae Kam Pong Electric Project

- In 1994-2003 => increase capacity in the area to site 3 with 40 kw
- Managed by local cooperatives => one time charge payment
- In 1995 , Electricity from PEA grid system came into "Mae Kam Pong" Area.

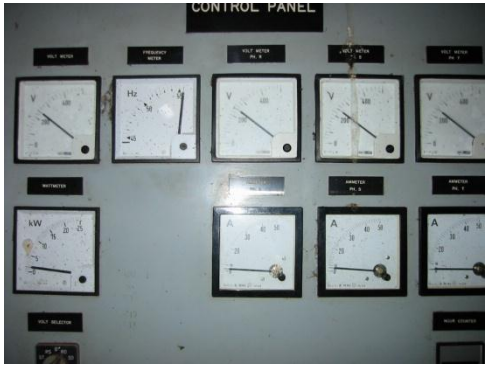
2 grid systems in area

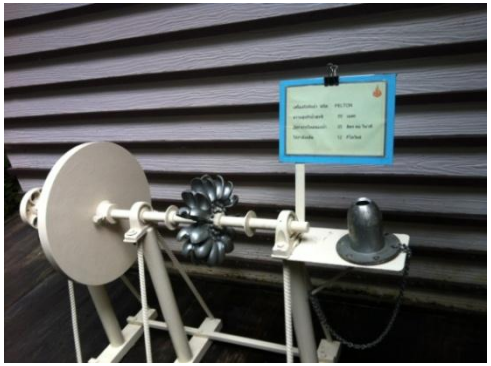
1. Local micro hydro power
2. Grid connected power utility

Micro Hydro Power still operate
=> without interruption

- ✓ Strong unity of people in community
- ✓ Managing system
- ✓ Local rules & regulations
- ✓ Maintenance / Advise from DEDE

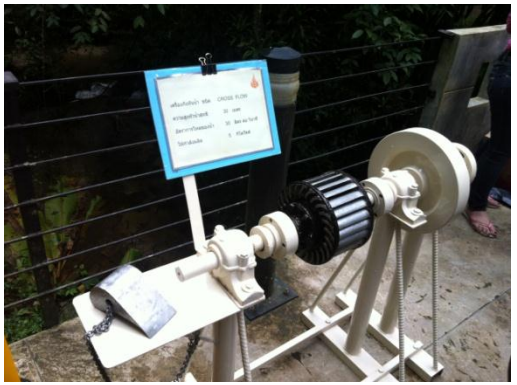
Showcase "Mae Kam Pong"





Benefit :

- ✓ Bring "Cheap Energy" to local people
- ✓ electricity available for remote area people
- ✓ Benefit of cooperatives => used to develop public service in community
- ✓ Transfer technology to local people
- ✓ Saving from imported machinery / equipment
- ✓ Participation among people / between people & government



Lesson Learned

- ✓ Micro-Pico Hydro = Cheapest RE Resource
- ✓ Technology => Simple & Proven
- ✓ Needs Strong Community to
  - operate
  - maintenance
- ✓ Technical assistance and transfer to local people is still necessary for continuity of the projects.

Thank you for Your attention