

# Draft of the Fifteen Year-Alternative Energy Plan

The Director General of DEDE, Dr.Panich Pongpirodom, had presented the Draft of the 15 year-Alternative Energy Plan as for the public hearings at the three brainstorm seminars, i.e.

- (1) at Nakorn Rachasima Rajabhat University, dated October 27<sup>th</sup> 2008
- (2) at Lotus PangSuankaew, dated November 3<sup>rd</sup> 2008
- (3) at Phuket Merin, dated November 8<sup>th</sup> 2008

The presentation by DG Panich was on an overview of the draft of the fifteen year - alternative energy plan that covered objectives, goal, potentials, development strategies and promotion measures. Other presentations were of the four groups of alternative energy resources presented by each executive director in charge.

1. natural energy group (solar, wind and hydro)
2. Bio-energy group (biomass, biogas, MSW)
3. Bio-fuels group (ethanol, bio-diesel)
4. NGV group (natural gas for vehicles)

## The overall of Draft of the Fifteen Year - Alternative Energy Plan

### Objectives:

1. To make Thailand using an alternative energy as the national main energy to replace the oil import.
2. To strengthen the security of energy provision to the country.
3. To promote using energy for an integrated green community.
4. To support the industry of the alternative energy technology production.
5. To research, develop and promote the high efficiency technology for alternative energy.

### Target

" Increasing the proportion of using alternative energy to 20 percent of the national final energy consumption by 2022 "

### The Plan Implementation

The Plan will be implemented in three phases, i.e.

- **Short Term (2008-2011)**

\* Focusing on promoting the proven technology of alternative energy with high potentials sources such as: biofuels, the power and the heat generation by biomass and biogas. The financial support measures will be fully implemented.

- **Medium Term (2012-2016)**

\* Promoting the alternative energy technology industry and supporting the development on new prototype of alternative energy technology for a higher economical cost-effectiveness. This includes promoting the new technology of biofuel production and development on Green City prototype that leads to build up the strength of the local alternative energy production.

- **Long Term (2017-2022)**

\* Promoting the new technology of alternative energy which is economical cost-effective for ex: hydrogen energy, this covers the result extension of Green City and local energy. Supporting Thailand to become the hub of biofuel import and importing the alternative energy technology in the ASEAN region

# Alternative Energy Potentials

## Potentials of Power Generation by Alternative Energy Resources

### Solar Energy

Potential	> 50,000	MW
Existing	32	MW

- Non-electrification Rural Area
- Solar Home / On Grid
- Royal Initiative Projects
- Installing area at 0.1 %

### Hydro Energy

Potential	700	MW
Existing	50	MW

- Hydropower plants at capacity of micro, mini and irrigation dam (power generation at outlet/tailrace)

### Wind Energy

Potential	600	MW
Existing	0.958	MW

- Wind farm in the southern part of Thailand

### Biomass

Potential	4,400	MW
Existing	1,597	MW

- The industry of: sugar, palm, paper and rubber; rice mill; sawmill.

### Biogas

Potential	190	MW
Existing	29.2	MW

- Industry sub-sector of: starch, palm, food processing and livestock/animal farm.

### Municipal Solid Waste (MSW)

Potential	320	MW
Existing	5	MW

- Municipal Solid Waste
- Bangkok metropolitan
- Municipality/Sub-District (Tambon) Administration "a so-called Or-Bor-Tor".

## Potentials of Heat Generation by Alternative Energy Resources

### Solar Energy

Potential	154	ktoe
Existing	2.3	ktoe

- Producing the hot water (hospital hotel)
- Using for drying (the agro-products)

### Biomass

Potential	7,400	ktoe
Existing	2,344	ktoe

- Industry sub-sector of sugar, palm, paper and wood processing
- Community (high efficiency stove)

### Biogas

Potential	600	ktoe
Existing	79	ktoe

- Waste water from industry of: starch, food and beverage, pal, rubber, paper and biofuels.

### Municipal Solid Waste (MSW)

Potential	78	ktoe
Existing	1	ktoe

- community garbage (organic waste)

## Potentials of Biofuel Production

### Ethanol

Potential *	3.3	ml/day
Existing	1	ml/day

- Ethanol produced from molasses, sugarcane juice, starch. cellulose

### Biodiesel

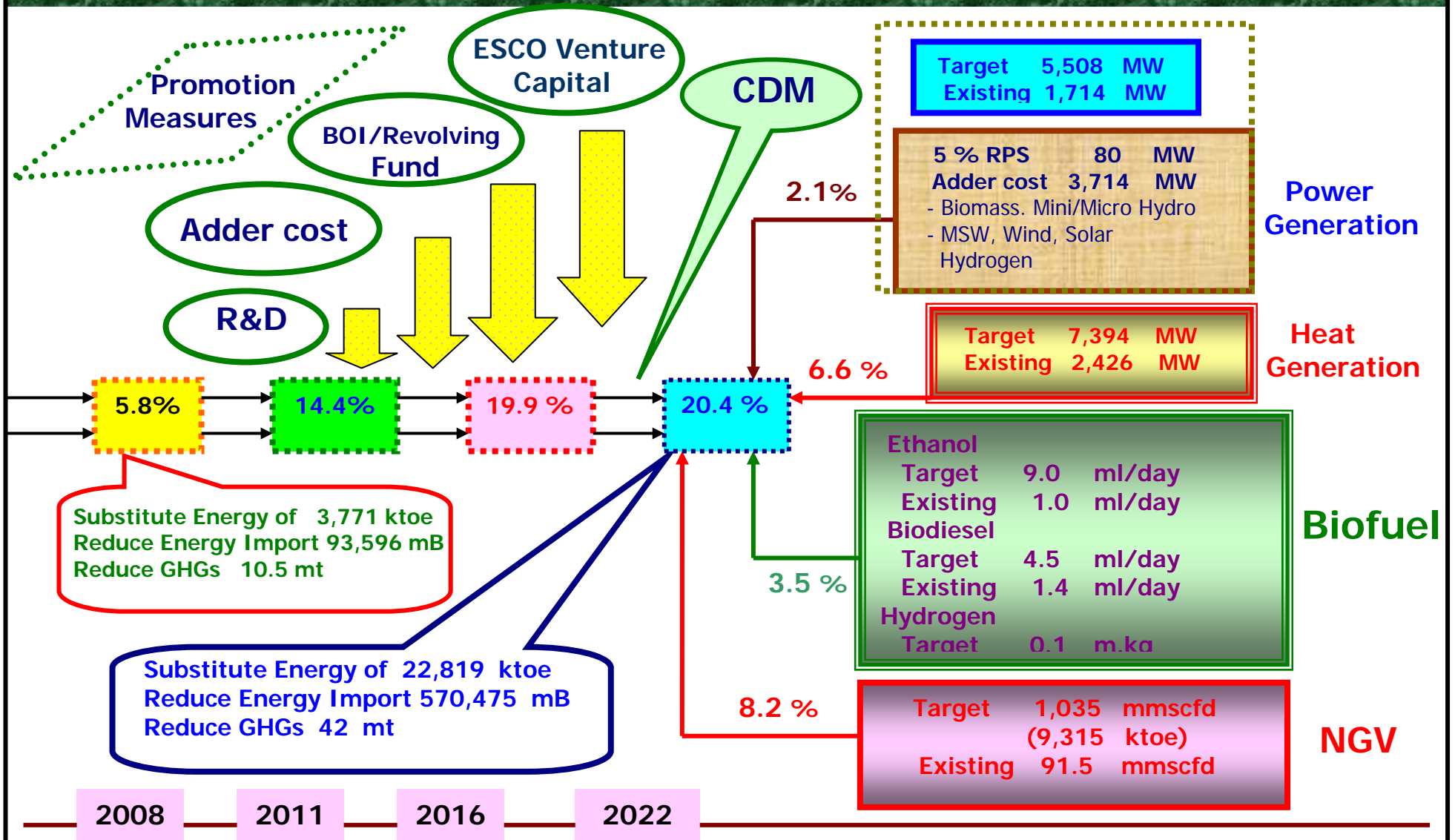
Potential	3.3	ml/day
Existing	1.39	ml/day

- Biodiesel produced from oil palm. Jatropha, used vegetable oil and DME

- *Calculated from the excess feedstock (Output - Domestic Consumption - Import)*

**Remark:** Such the info/data stated as its Draft, using as an official reference is not recommended.

# Development Strategy on Alternative Energy for 2008 -2022



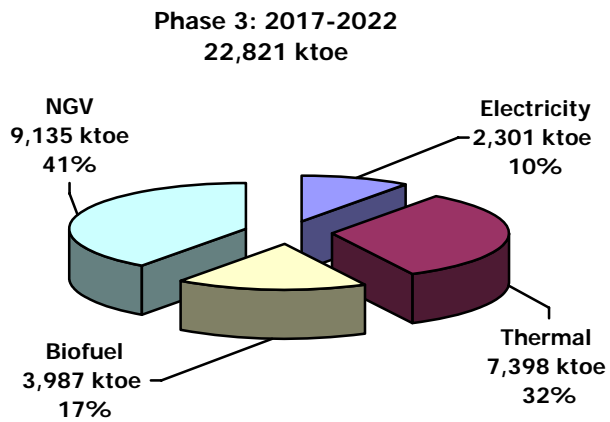
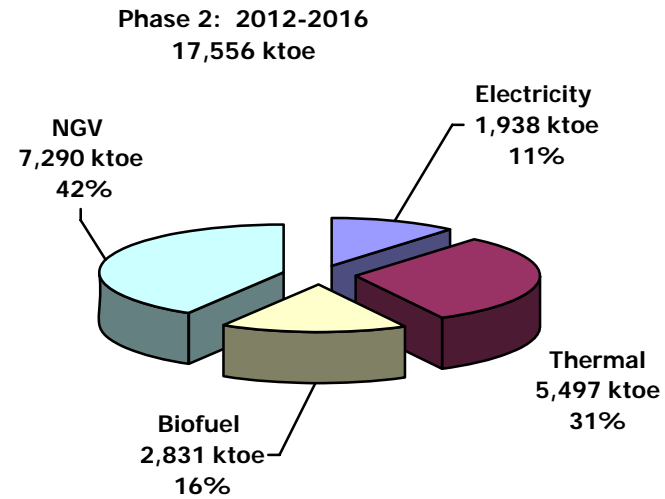
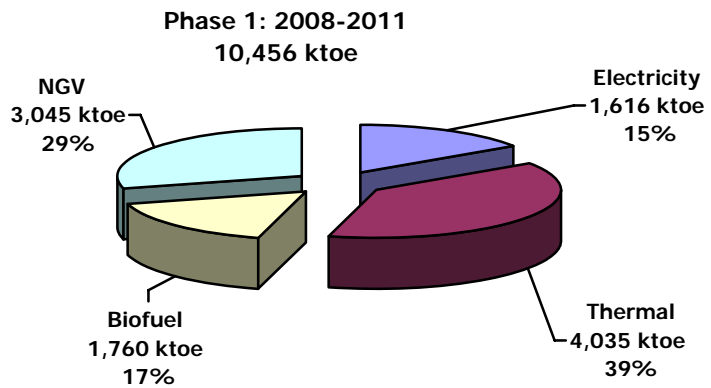
Remark: Stated in September 2008

# Alternative Energy Promotion Measures

	Phase 1: 2008 - 2011	Phase 2: 2012- 2016	Phase 3: 2017- 2022
<b>Electricity</b>	<ul style="list-style-type: none"> <li>* sustain the measures of RPS, BOI and Revolving Fund</li> <li>* demonstrate the integrated local power generation</li> <li>* promote the co-generation system</li> <li>* adjust the Adder properly to technology</li> <li>* extend the purchasing time of SPP/VSP generated from renewable energy by giving the Adder</li> </ul>	<ul style="list-style-type: none"> <li>* RPS, BOI and Revolving Fund measures</li> <li>* promote the integrated local power plants</li> <li>* promote the prototype of Green City</li> <li>* promote the new technologies for ex: BIGCC</li> </ul>	<ul style="list-style-type: none"> <li>* RPS, BOI and Revolving Fund measures</li> <li>* reduce the production cost of alternative energy</li> <li>* extend the result of Green City</li> <li>* support the alternative energy technology industry</li> </ul>
<b>Thermal</b>	<ul style="list-style-type: none"> <li>* measures of BOI,ESCO Fund and a financial support for installation cost</li> <li>* establish the standard requirements on high efficiency of energy producing equipment/appliances</li> <li>* R&amp;D on co-producing the biogas from effluents and biomass (Biomass to Biogas)</li> <li>* revise the regulations to facilitate an investment on producing the energy from MSW</li> <li>* extend the loan ranging for the low interest revolving fund</li> </ul>	<ul style="list-style-type: none"> <li>* measures of BOI, Revolving Fund and ESCO Fund</li> <li>* promote the planting of fast-growing plants</li> <li>* promote the co-production of biogas from effluents and biomass (Biomass to Biogas)</li> <li>* promote such the Green City, Building Code (Solar) and energy produced from RDF</li> <li>* promote the industry of domestic production for equipment /appliances</li> </ul>	<ul style="list-style-type: none"> <li>* measures of BOI, Revolving Fund and ESCO Fund</li> <li>* support the planting of fast-growing plants</li> <li>* promote Biomass to Biogas</li> <li>* extend the result of Green City</li> <li>* promote the Building Code (Solar)</li> <li>* promote the RDF energy production</li> <li>* promote the industry of technology production and equipment producing alternative energy in the country</li> </ul>
<b>Biofuel</b>	<ul style="list-style-type: none"> <li>* research on the 2<sup>nd</sup> Generation Technology for ex: biodiesel/ ethanol produced from seaweed, jatropha cellulose, BHD, BTL</li> <li>* extend the planting area of oil palm to increase the agro-products of energy crops</li> <li>* do the hydrogen research</li> <li>* speed up the extension of the E20/E85 petrol stations</li> <li>* accelerate the development of auto industry for E85</li> <li>* promote to build up the value added of by-products from biofuel industry</li> <li>* measures of BOI, Revolving Fund</li> </ul>	<ul style="list-style-type: none"> <li>* promote the 2<sup>nd</sup> Generation Technology for biofuel production, for ex: BTL, Hydrogenation (BHD)</li> <li>* develop the other energy crops to be economical cost-effective</li> <li>* demonstrate the hydrogen production and consumption</li> <li>* make a confidence in using biofuel at more than 5 percent proportion</li> <li>* promote the Green City</li> <li>* develop the biofuel hub / exporting centre</li> </ul>	<ul style="list-style-type: none"> <li>* promote the 2<sup>nd</sup> Generation Technology for biofuel production, for ex: BTL, Hydrogenation (BHD)</li> <li>* increase the product yielding per rai of energy crop ( plants grown for energy purposes)</li> <li>* promote and extend the results of hydrogen utilisations</li> <li>* promote the producing of ethanol from cellulose</li> <li>* promote the downstream industry</li> <li>* impose the tax measures</li> </ul>
<b>NGV</b>	<ul style="list-style-type: none"> <li>* speed up an extension of more NGV gas+C13 stations</li> <li>* support the installation</li> <li>* build up the confidence in using NGV</li> <li>* promote using NGV in buses and trucks</li> </ul>	<ul style="list-style-type: none"> <li>* extend for more NGV gas stations</li> <li>* increase the NG supply</li> <li>* develop the transport system of the NGV main station and its sub-stations</li> <li>* improve the gas quality</li> <li>* build the more gas separation plants</li> </ul>	<ul style="list-style-type: none"> <li>* extend for more NGV gas stations to cover overall the country</li> <li>* increase the NG supply</li> <li>* develop the transport system of the NGV main station and its sub-stations</li> <li>* improve the gas quality</li> <li>* build the more gas separation plants</li> </ul>

## Alternative Energy Target of 20.4% in 2022

Energy Type	Potential	Existing	Year 2008-2011		Year 2012-2016		Year 2017-2022	
<b>Electricity</b>	MW	MW	MW	ktoe	MW	ktoe	MW	ktoe
Solar Energy	50,000	32	55	6	95	11	500	56
Wind Energy	1,600	1	150	17	400	45	700	78
Hydropower	700	50	165	43	281	73	324	85
Biomass	4,400	1,597	2,800	1,463	3,235	1,682	3,700	1,933
Biogas	190	29	60	27	90	40	120	54
MSW	320	5	100	60	130	87	160	96
Hydrogen			0	0	0	0	3.5	1
<b>Total</b>		1,714	3,330	1,616	4,231	1,938	5,508	2,303
<b>Thermal (Heat) Energy</b>	ktoe	ktoe		ktoe		ktoe		ktoe
Solar Energy	154	2.3		5		17		34
Biomass	7,400	2,344		3,544		4,915		6,725
Biogas	600	79		470		540		600
MSW	78	1		16		25		35
<b>Total</b>		2,426.3		4,035		5,497		7,394
<b>Biofuels</b>	ml/day	ml/day	ml/day	ktoe	ml/day	ktoe	ml/day	ktoe
Ethanol	3.30	1.00	3.00	816	6.20	1,686	9.00	2,447
Biodiesel	3.30	1.39	3.00	944	3.64	1,145	4.50	1,416
Hydrogen			0.00	0	0.00	0	0.1 m.kg	124
<b>Total</b>		2.39	6.00	1,760	9.84	2,831	13.50	3,987
<b>Total Energy Demand (ktoe)</b>		<b>65,420.00</b>		<b>72,539</b>		<b>88,389</b>		<b>112,046</b>
Total Renewable Energy Demand		3,411.80		7,411		10,266		13,684
Proportion of Renewable Energy Use		5.2		10.2%		11.6%		12.2%
NGV (mmscfd)		91.5	345	3,045	826	7,290	1,035	9,135
Total Alternative Energy Demand (ktoe)				10,456		17,556		22,819
Proportion of Alternative Energy Use				14.4%		19.9%		<b>20.4%</b>



**Target Proportion of  
Alternative Energy**