Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Renewable Energy R&D Trends in Thailand

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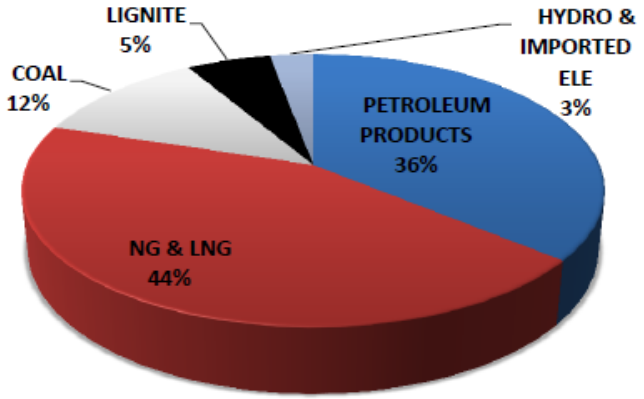
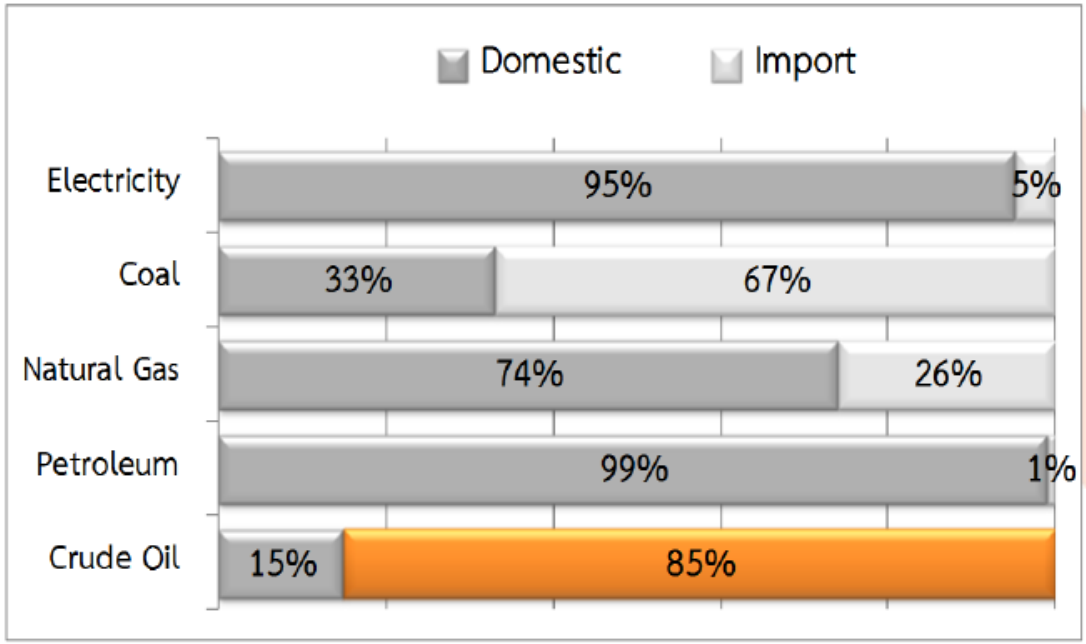
Content

Thailand's Energy Situation 2011



Energy Consumption in 2011



Import value (billion Baht)
12
40
136
10
927

82%

Source : Department of Energy Business, Ministry of Energy

(as of September 2011)

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Thailand's Renewable Energy Development

Committed to the development of low-carbon society

Government Funding On R & D Activities

Alternative Energy Development Plan (AEDP : 2012-2021)

Encouraging Private-Led Investment

Target 25 % of RE in Total Energy Consumption By 2021

Solar	Wind	Small + Mini Hydro	Bio Energy			Biofuels	Others
2,000 MW	1,200 MW	1608 MW	Biomass	Biogas	MSW	• Ethanol 9 Million l/d • Biodiesel 5.97 Million l/d • New fuel replace diesel 25 Million l/d	• Tidal wave 2 MW • Geothermal 1 MW
100 ktoe (Heat)			3,630 MW	600 MW	160 MW		
			8,200 ktoe (Heat)	1,000 ktoe (Heat)	35 ktoe (Heat)		





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R&D Needs for RE Development

25% of RE in Total Energy consumption

Current Tech. 19-20%

R&D : 5-6%

- -To Develop 2nd - 3rd generation biofuels
- -To increase local content &development existing technologies
- -To create new technologies & innovation

R&D Activity

Encouraging Private-Led investment

R&D Cooperation

กระทรวงพลังงาน
MINISTRY OF ENERGY

Cross-Ministerial Coordination

MOU on 13 Jan 2011 : To integrate RE research plan

- **To Establish a committee including a representative of related organizations for approving & monitoring the projects under the plan**
- **To draft an action plan on Science Technology and Innovation (STI) for RE Development (2012-2016) : comprise with 3 sectors**
  - **biofuel in transportation sector (Biodiesel,Ethanol & New fuel for replace diesel)**
  - **Electricity and Heat (Solar,Wind,Biomass,Biogas,MSW)**
  - **New energy (Hydrogen,Geothermal,Ocean&storage)**

R&D Cooperation

The Ministry of Science and Technology(MOST) through the National Science Technology and Innovation Policy Office (STI)

Analyzed & prioritized the technologies requirement

"Technology Needs Assessments (TNA) and Technology Action Plans Report for Climate change Mitigation/Adaptation in Thailand"


THAILAND

TECHNOLOGY NEEDS ASSESSMENTS REPORT FOR CLIMATE CHANGE

MITIGATION

Coordinated by

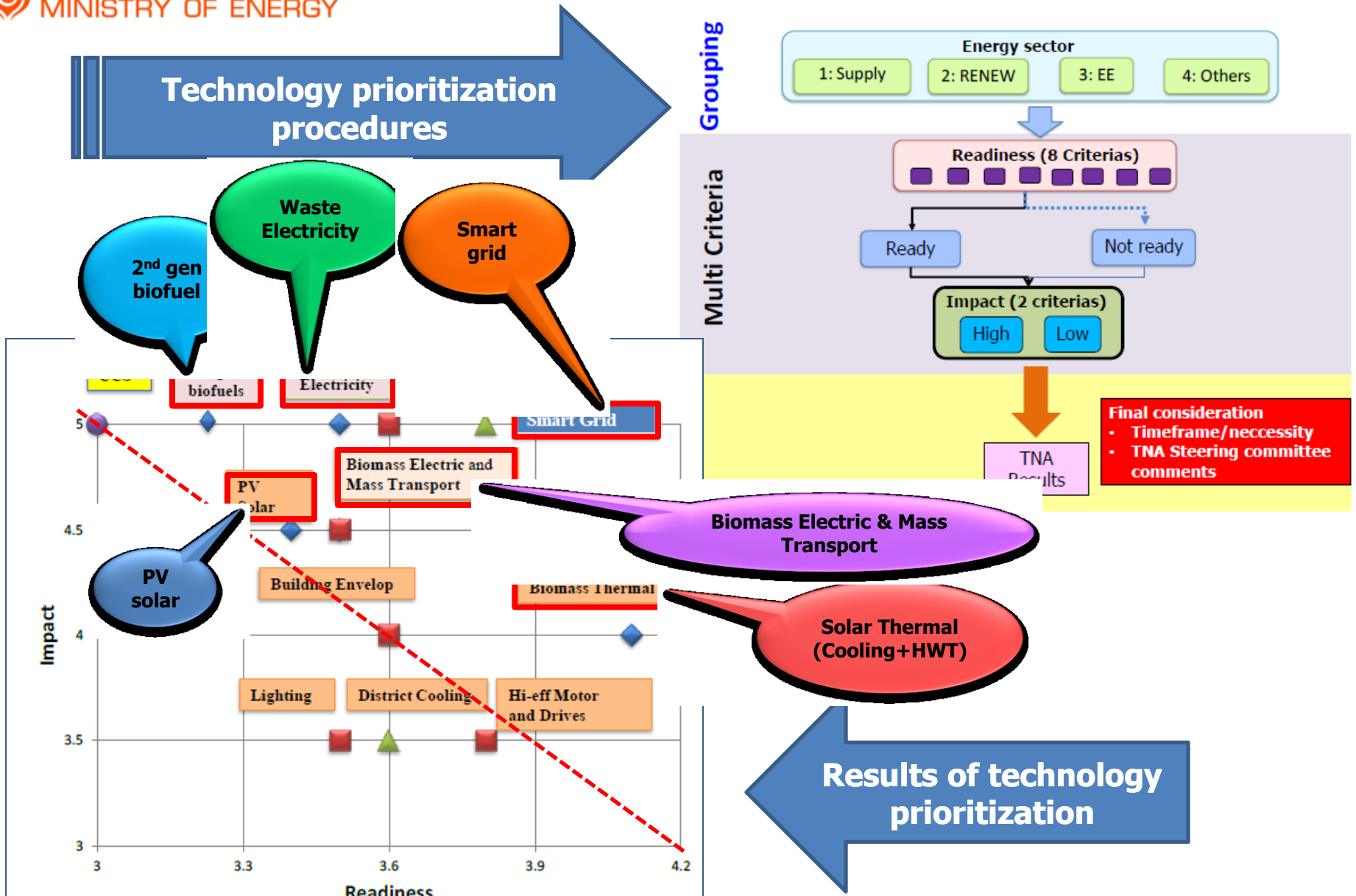
National Science Technology and Innovation Policy Office

Supported by

July 2012

Process & Results of Tech.prioritization

Technology prioritization procedures



Results of technology prioritization

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Action Plan on Science Technology and Innovation for RE Development (2012-2016)

Type	No. of project	budget ($M)					
		2012	2013	2014	2015	2016	Total
1. Biofuel							
1.1 Ethanol	37	8.6	22.4	14.9	13.9	7.1	66.9
1.2 Biodiesl	17	2.6	3.9	2.9	1.8	0.7	11.9
1.3 New fuel replace diessel	45	7.7	22.3	22.5	5.5	3.7	61.7
2. Electricity/Heat							
2.1 Solar	30	0.8	4.6	3.2	3.1	1.9	13.6
2.2 Wind	12	2.0	1.5	0.8	0.5	0.3	5.1
2.3 Biomass	23	6.1	4.5	3.2	1.6	0.6	16.0
2.4 Biogas	19	0.6	1.7	1.9	3.5	0.6	8.3
2.5 MSW	7	0.3	0.1	1.5	0.6	0	2.5
3. New energy	6	0.2	0.8	0.1	0	0	1.1

- 196 projects
- 36 organizations from 5 ministers(MOAC,MOEN,MOIN,MOST, MOE)
  research institutes, state enterprise and academic
- Total budget 187.1 Million$ in 5 years (2012-2016)

Remark: Data as of March 2012
In November 2012,the action plan has been monitoring and updating for 2nd revised

MOAC: Ministry of Agriculture and Cooperatives
MOEN:Ministry of Energy
MOST:Ministry of Science&Technology
MOE:Ministry of Education
MOIN:Ministry of Industry

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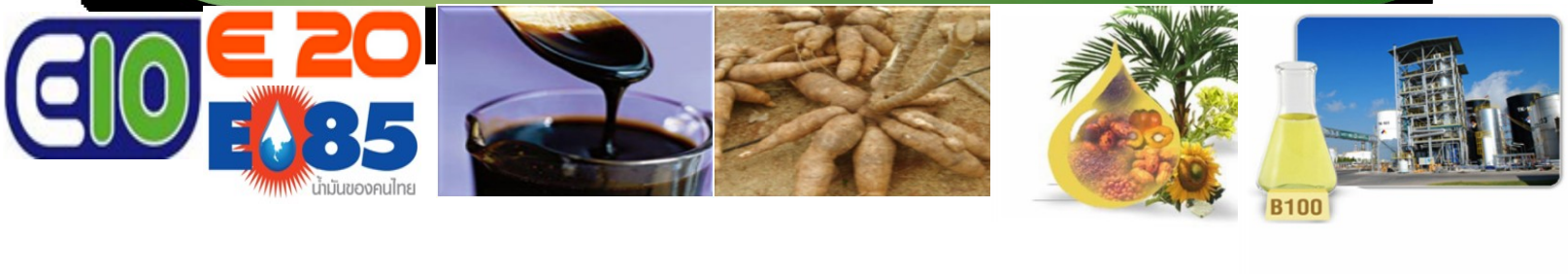
BIOFUEL



Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

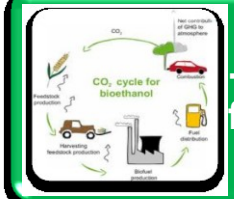
Key Research Objectives

Ethanol → Cost-Reduction

-To increase sugarcane & cassava yield

-non food (sweet sorgum&cellulosic ethanol)

To increase cultivation efficiencies & logistic



-To increase utilization of CO2 from fermentation

Biodiesel → on-food focus

Non-food feedstock(Jatropha)

To increase cultivation efficiency & logistic

-To develop production tech.& catalyst

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Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

7 New directions of fuel for diesel substitution

New Fuels Development Plan

Development Plan	Indicator	Phase 1	Phase 2
1. Research		2014	
1.1 ED95	- The research result on the future new fuels has been envisaged enough for the policy decision and is ready for the pilot project and commercial development respectively.	ED95 Diesohol	
1.2 Diesohol		2015	
1.3 FAEE		FAEE BHD	
1.4 BHD			2016
1.5 River and Sea Algae		Algae,Jatropha, BTL	
1.6 Jatropha			
1.7 BTL			
2 Pilot Project and Fleet Test	- The emergence of the Pilot Project at the Fleet Test Level	2014-2016 -Pilot ED95 or Diesohol or FAEE	
	- The decision to select the most suitable new fuels	2015-2017 -Pilot Algae and Seaweed, Jathropa+BHD	
		2015-2017 -Pilot the BioJet Project(BHD)	
3. The Commercial Development	- The emergence of commercial-based factories with the generating capacity of 2 ml/day in 2018		
	- The increasing capacity to 25 ml/day in 2021		

Capacity for commercial purpose

18	19	20	21
2	6	15	25

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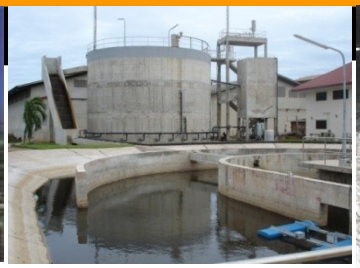
Electricity&Heat




Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

Solar ⇨ System Integration focus

- To develop hybrid system in remote area (PV+biomass)
- Building-integrated PV

- To study and develop low cost of solar hot water & cooling system in small scale

- To study PV module recycle process

- To develop installation codes & safety performance standards

Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

Wind → Low-wind speed focus

To develop microscale maps(200 x 200 m.)

- R&D low speed wind turbine (<=250kW)
- R&D energy storage such as Lead acid battery deep cycle

-To develop installation codes , performance & safety standards

-To study the grid-stability of wind farm& develop Real-time forecasting system

Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

Biomass → Small-scale(<1MW) focus

- R&D fast growing crops such as napier & miscanthus grass,
- To develop biomass collection machines: to chip&collect

- To develop the standards of biomass pellets & briquettes

- R&D Multi-feedstock gasifier (1 MW of pilot project has been developing)

Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

Biogas ⇨ Application to Transportation

- R&D biogas from co-digestion process (Waste-water+biomass)

- To develop gas desulphurization system
- To develop performance & safety standards for equipments, installation & production

- To develop CBG for transportation sector

Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

Municipal Solid Waste(MSW) → Local Community focus

- To develop waste separation technologies

- To develop small size of power production technologies (<=50 tons of waste/day)

- To develop RDF production technologies

Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

Long term

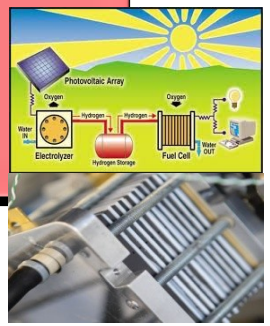
Medium term

New Energy Types

Hydrogen & Energy storage

torage

- R&D high efficiency battery (LI-Ion) & battery recycling
- R&D cost reduction of fuelcell



Geothermal & wave

potential & develop the prototype of power plant

Smart Grid

- To develop smart grid components such as "Low-cost Smart Meter" & "Micro Grid Control System"
- To study international standard for smart grid devices

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Science Technology and Innovation for RE Development Implementation Plan(2012-2016)

Outcomes

R&D spend per GDP ➡ 1%

≈ 120,000 MB

2011≈0.2%

Impacts

Economic & Social aspects

- Currency saving on energy import 18,500 M$/year with in 2021
- Increase farmers' incomes 593 M$/year in 2021 by incresing crops yield
- Stabilization of agricultural prices effect on farmers well being

Environmental aspect

- Reduce CO2 emission

Technology aspects

- Consistency of RE research&development and RE development policy
- Increase the competitiveness of technologies and innovations




Thank you

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