



ASEAN and Thailand

Renewable Energy & Energy Efficiency Target

33rd CAFEO 2015



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23 November 2015, Penang, Malaysia

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ASEAN RE & EE Target and policy



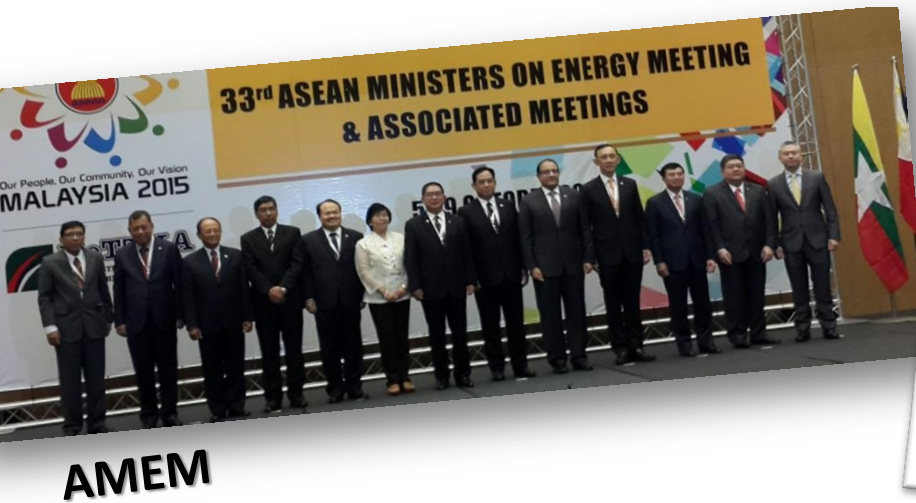
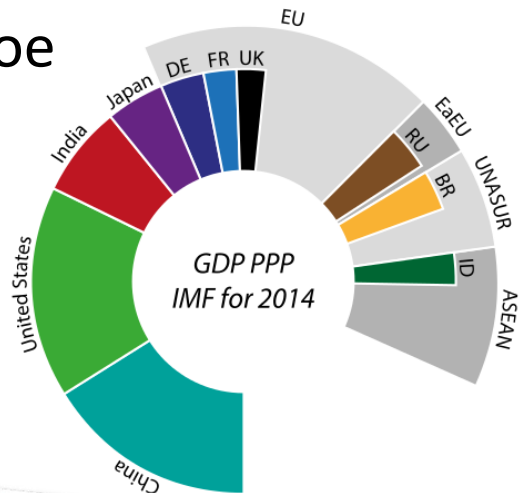


ASEAN

The Association of Southeast Asian Nations



- 10 nations
 - Population: 625 millions
 - GDP_{ppp}: 3.6 Trillion US\$
 - Primary energy production: 778 Mtoe
 - TFEC: 606 Mtoe
- All are 2013 data



ASEAN Energy Awards



33rd ASEAN Ministers on Energy Meeting

7th October 2015 Kuala Lumpur → 7 programmes

1. **ASEAN Power Grid (APG)** by initiating multilateral electricity trade in at least one sub-region in ASEAN by 2018;
2. **Trans-ASEAN Gas Pipeline (TAGP)** by enhancing connectivity within ASEAN for energy security and accessibility via pipelines and regasification terminals;
3. **Coal and clean coal technologies (CCT)** by enhancing the image of coal through the promotion of CCT in ASEAN;
4. Energy efficiency and conservation by **Reducing energy intensity by 20% in 2020** and 30% in 2025, based on 2005 levels;
5. Increasing **Renewable energy share in the ASEAN energy mix to 23% by 2025**;
6. Regional policy and planning by **better profiling the ASEAN energy sector internationally**;
7. **Civilian nuclear energy** by building capabilities on nuclear energy in technical regulatory and safety aspects.



ASEAN Clean Energy Target

Challenge for all ASEAN people

10 countries have EE targets
8 countries have RE targets
5 countries have feed-in-tariff

ASEAN Strategies on RE

- Increase the component of RE to 23% by 2025 in ASEAN energy mix
- Enhance awareness on the role of renewable energy among policy makers, private sectors and public
- Enhance R&D network on RE technology development and utilization within the region
- Increase the promotion of renewable energy financing scheme.
- Increase the commercial development and utilization of biofuels to 20% with a reference standard to facilitate deployment.



ASEAN Renewable Energy Target

Challenge for all ASEAN people

RE

15-20% in total installed capacity by 2020

30% of national demand by 2025

4.5% in 2020 and 6% in 2030

Increase 200% by 2030

10% of total power generation mix by 2035

RE 30% of final energy consumption by 2036

17% of power generation mix by 2030

25% of national energy mix by 2030



မြန်မာနိုင်ငံတော် MYANMAR



ไทย THAILAND



កម្ពុជា CAMBODIA



ລາວ LAOS



เวียดนาม VIETNAM



ฟิลิปปินส์ PHILIPPINES



มาเลเซีย MALAYSIA



บรูไนดารุสซาลาม BRUNEI DARUSSALAM



สิงคโปร์ SINGAPORE



อินโดนีเซีย INDONESIA

Country	RE target
ASEAN	23% share in energy mix by 2025
EU	20% share from final energy consumption by 2020



ASEAN Energy Efficiency Target

Energy intensity is key indicator



Reduce 5% of primary energy consumption in 2020, 8% by 2030



မြန်မာနိုင်ငံတော် MYANMAR

Reduce TFEC 10% all sectors



ສາທາລະນະລາດ ລາວ LAOS

Reduce 5-8% by 2015



ไทย THAILAND



ฟิลิปปินส์ PHILIPPINES

Reduce TFEC 10% all sectors

Reduce 30% of EI by 2036 (base year 2010)



កម្ពុជា CAMBODIA

Reduce 10% of TFEC all sectors



Việt Nam VIETNAM

Reduce FEC 10% from 2011-2030 (Ind, HH, Commerc)



มาเลเซีย MALAY



บรูไนดารุสซาลาม BRUNEI DARUSSA

Reduce 25% EI by 2030 from 2005 level

Reduce 20% EI by 2020 and 35% by 2030 from 2005 level



சிங்கப்பூர் SINGAPORE

Reduce 1% per year of TFEC from BAU



อินโดนีเซีย INDONESIA

Country	RE target
ASEAN	Reduce 20% EI by 2020 & 30% in 2025
EU	20% energy savings target by 2020 when compared to the projected use of energy in 2020

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Thailand EE Target





Thailand's Energy Policies

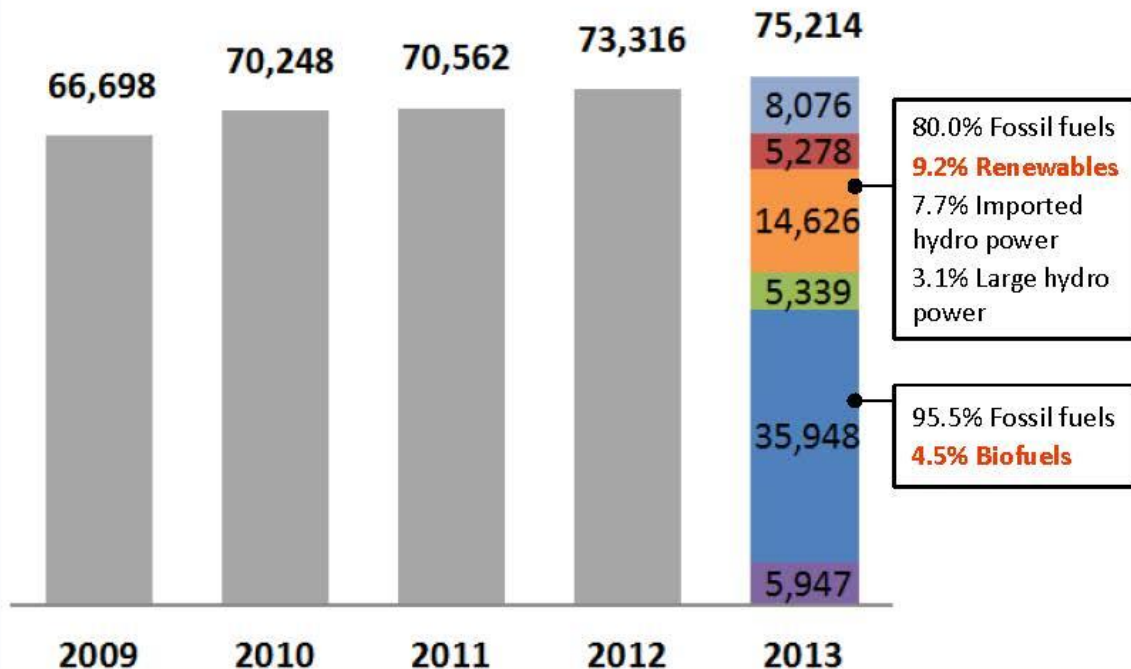
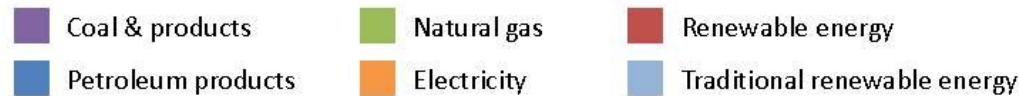


**General Prayuth Chan O-cha
Prime Minister**

- ✓ **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

Thailand Energy Consumption, 2009-2013

Energy consumption has been growing at 2.4% per year; renewable account for >10% of consumption

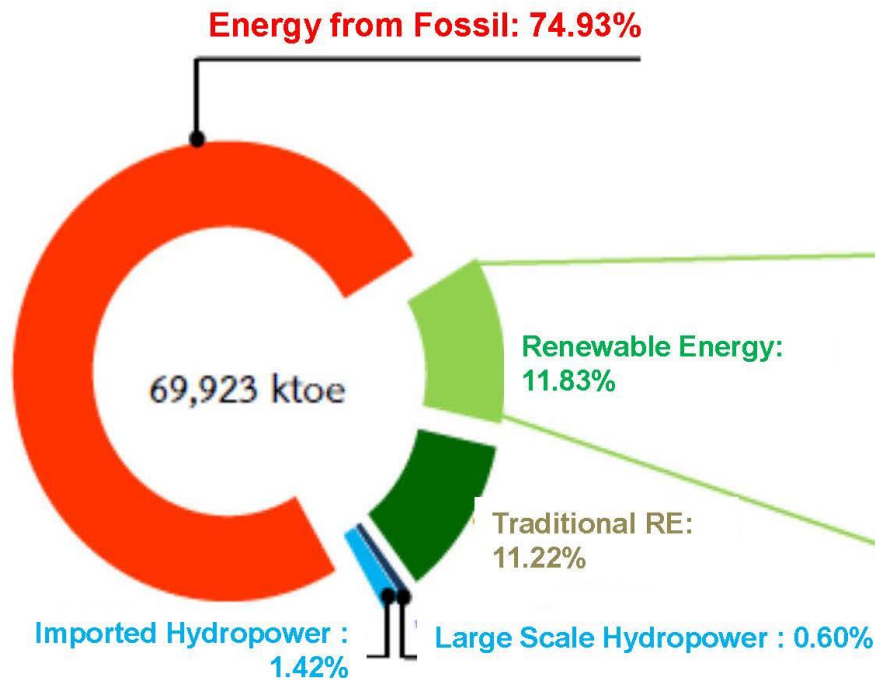


- In 2013, RE accounted for a total of 8,232 ktoe of consumption, or ~11%
 - 5,278 ktoe direct
 - 1,612 ktoe fuel
 - 1,342 ktoe converted electricity
- Utilizations of RE became approximately 12% in Nov. 2014

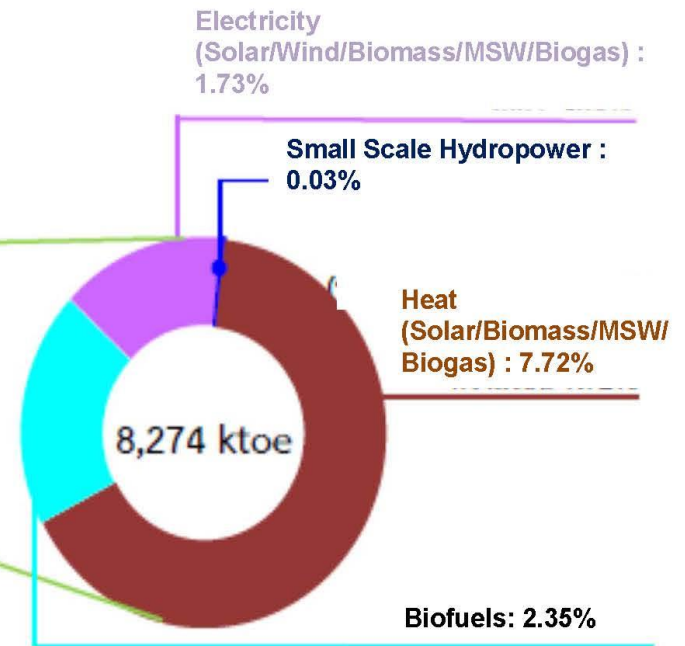


Thailand Final Energy Consumption 2014

Final Energy Consumption

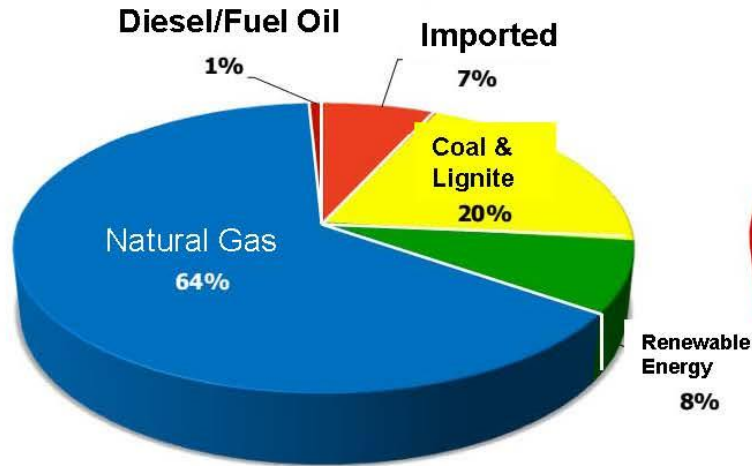


Renewable Energy Consumption

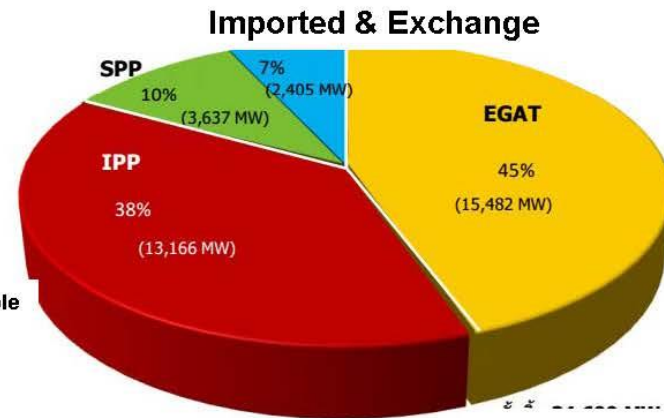




Power Generation by Fuel Type in 2014



Power Generation by Fuel
Type

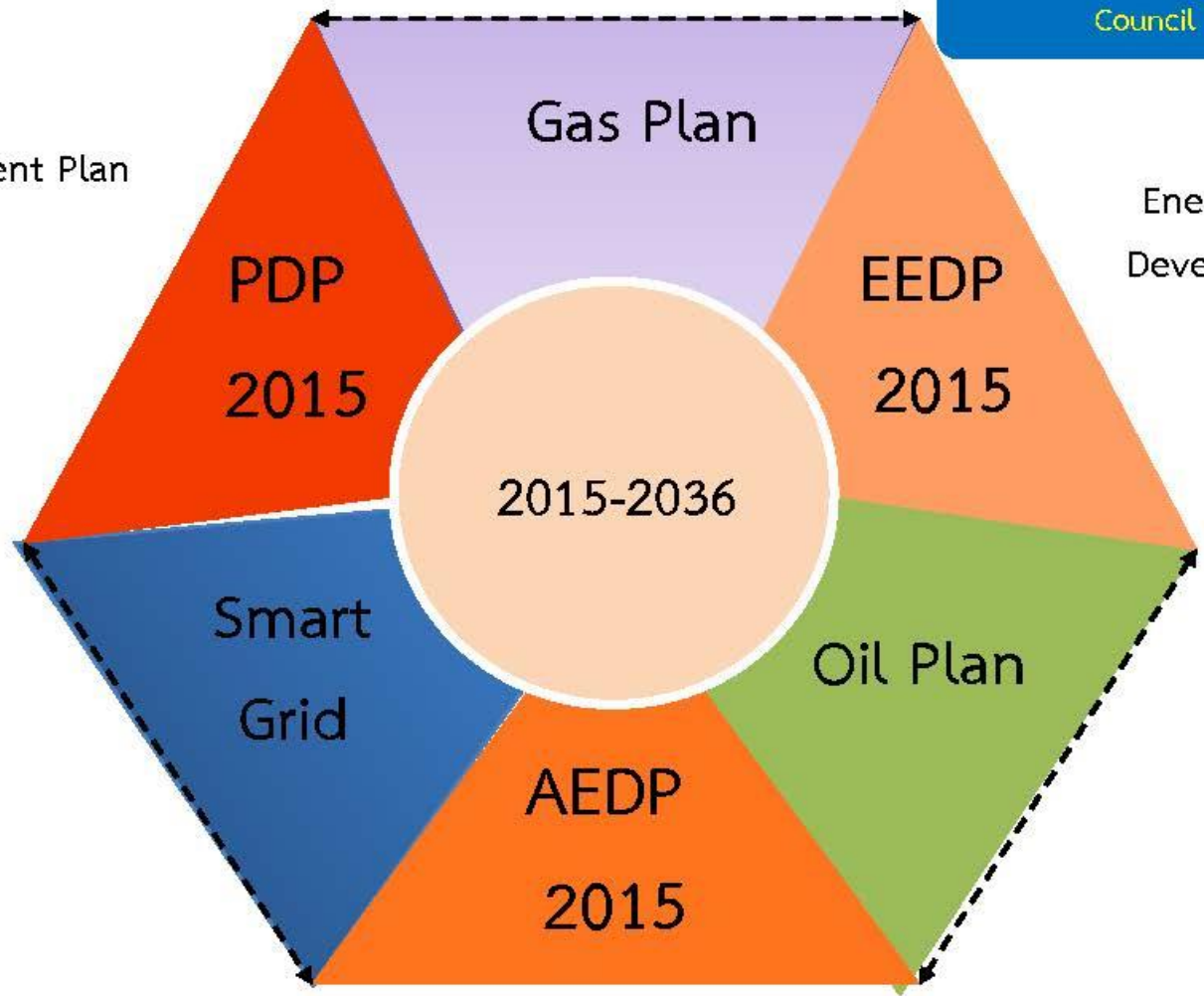


Power Generation by
Producer

Resolution of National Energy Policy Council (15/08/2014)

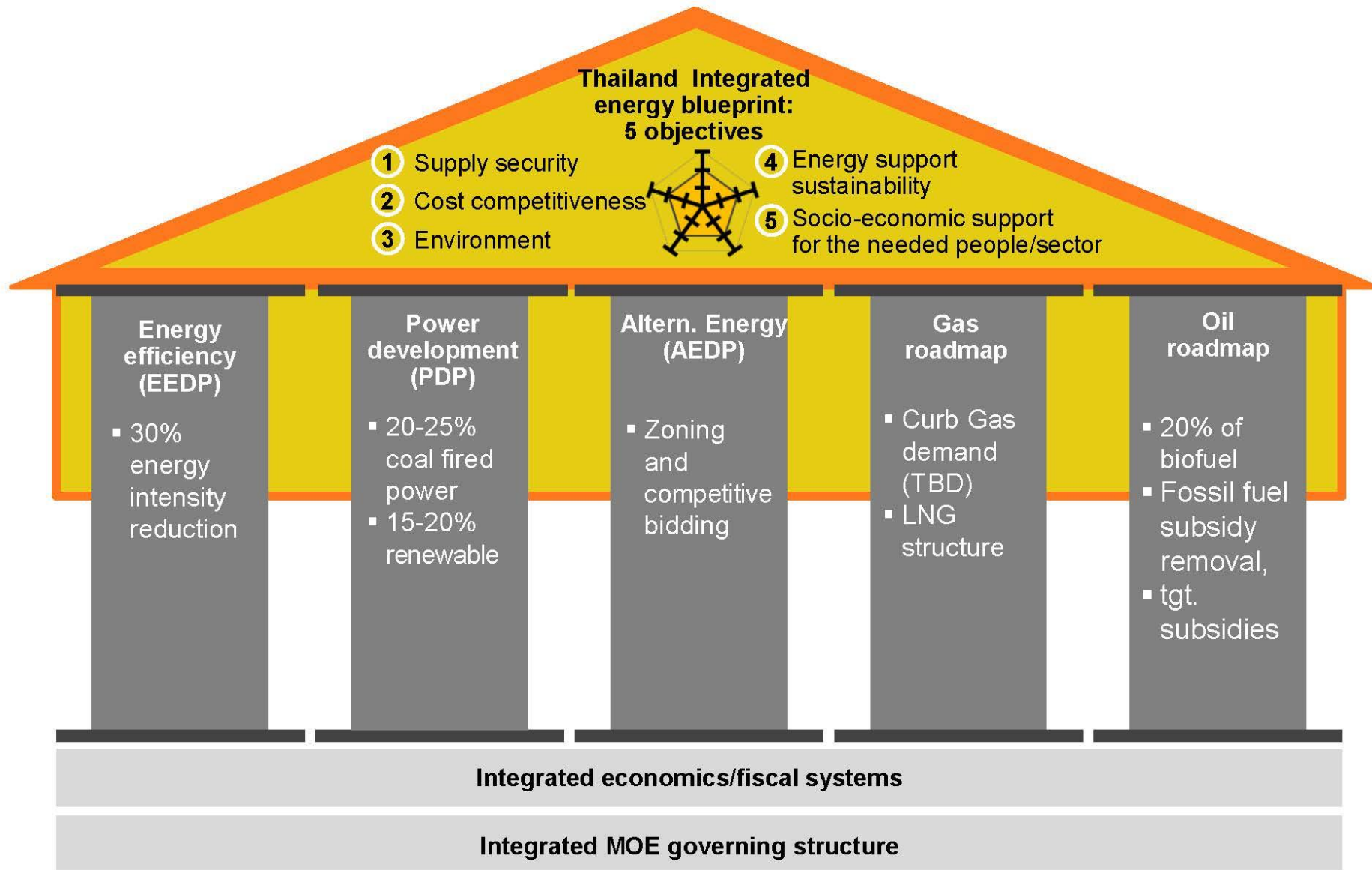
Power Development Plan

Energy Efficiency Development Plan

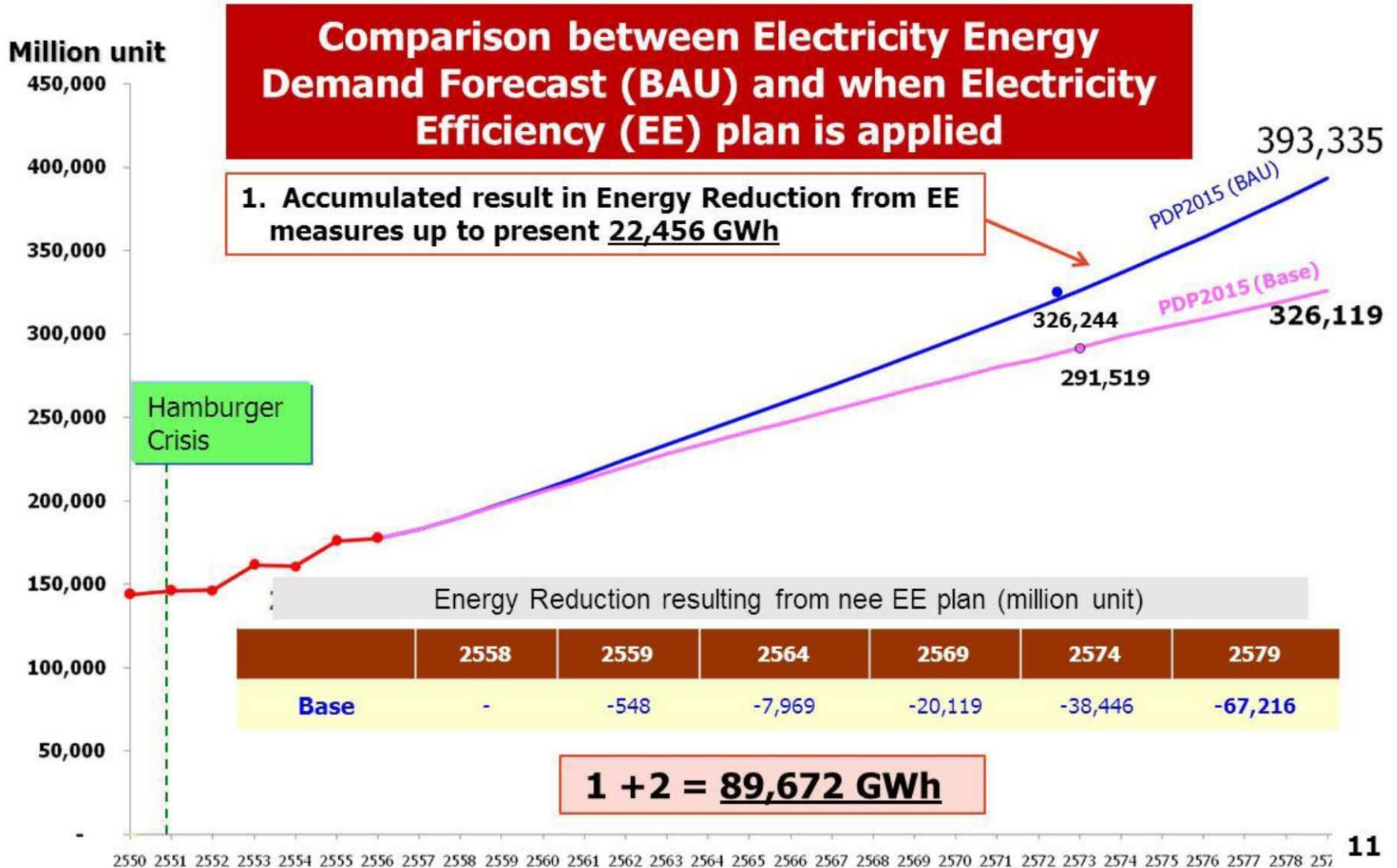


Alternative Energy Development Plan

Summary of Thailand Integrated Energy Blueprint



Demand Forecast for Electricity 2016-2036





Estimated fuel mix (percentage)

PDP 2015				PDP2010 Rev.3
Fuel type	September 2014	2026	2036	2030
Purchasing from neighbouring countries	7	10-15	15 – 20	10
Clean coal and 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

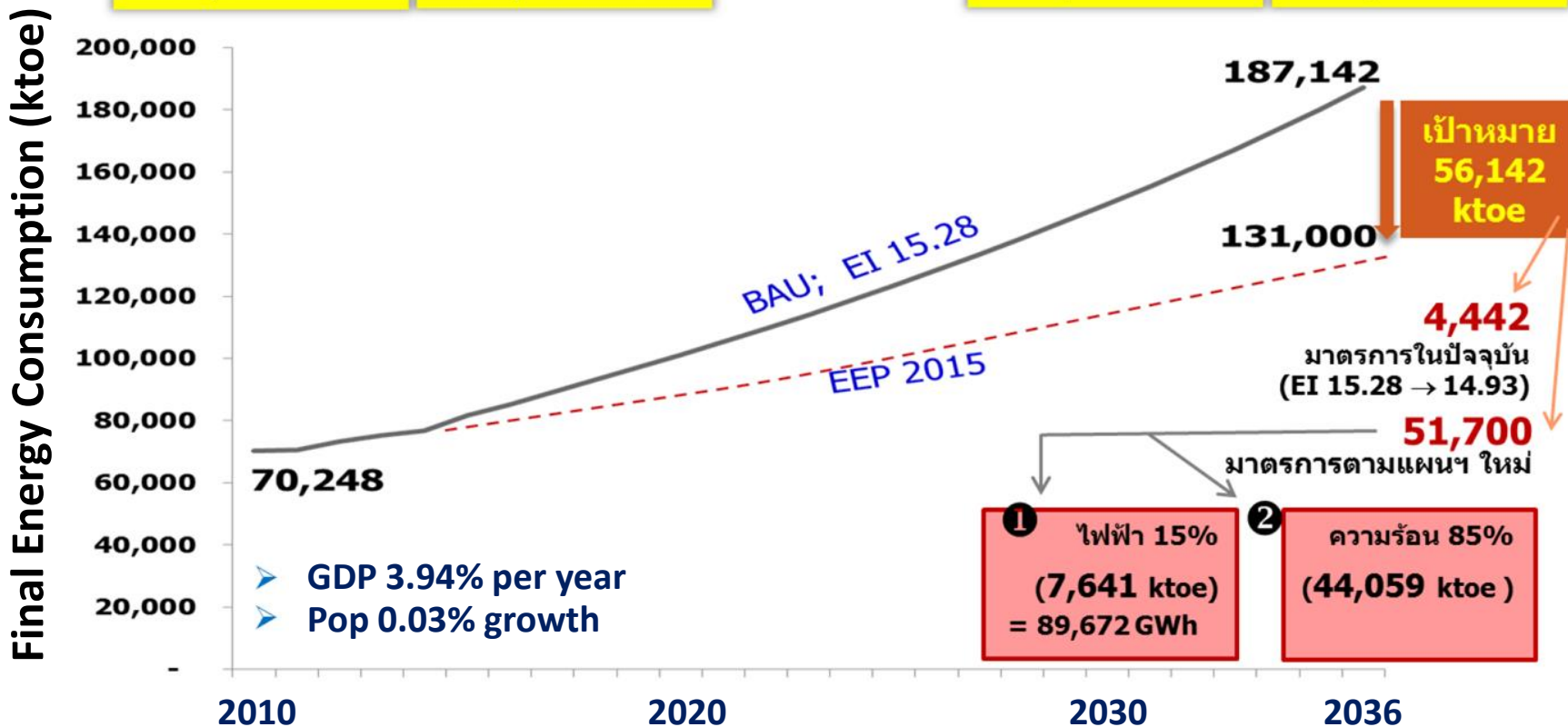


Thailand Energy Efficiency Plan 2015-2036

Energy intensity (EI) is key indicator

Reduce 30% of EI by 2036 (compare to 2010)

EI (2553) จริง 15.28 ktoe/billion baht	EI (2556) จริง 14.93 ktoe/billion baht	EI (2573) คาดการณ์ 11.0 ktoe/billion baht	EI (2579) คาดการณ์ 10.7 ktoe/billion baht
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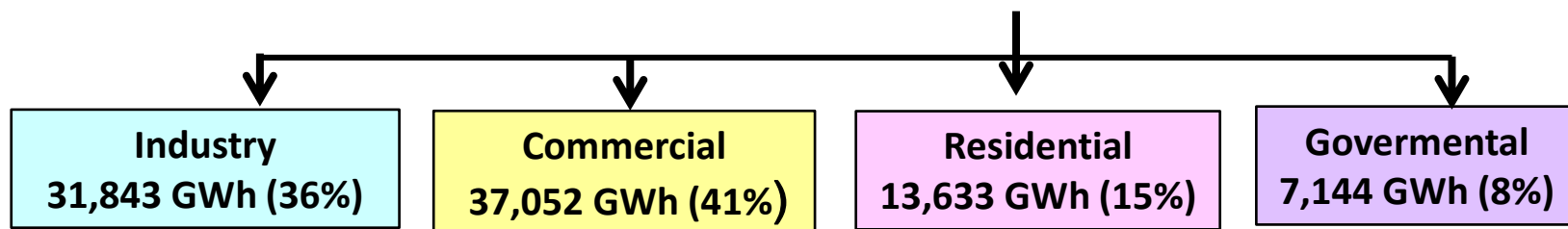
Source: Energy Policy and Planning Office (2015)



Thailand Energy Efficiency Plan 2015-2036

Measure	EEDP 2015 Saving Target			
	Electricity		Heat	Total
	GWh	ktoe	ktoe	ktoe
1. Compulsory Program				10,972
(1) Enforcement of energy management system designated factories and buildings	19,649	1,674	3,482	5,156
(2) Building Energy Code on the new buildings (BEC , LEED ,TREES)	13,685	1,166	-	1,166
(3) Energy labeling on equipment/appliances (HEPS & MEPS)	23,760	2,025	2,125	4,150
(4) Enforcing of Energy Efficiency Resource Standard (EERS)	5,872	500	-	500
2. Voluntary Measures				40,728
(5) Financial mechanisms and incentives				
- Standard offer Program , DSM Bidding	15,074	1,285	8,239	9,524
- Soft loan , ESCOs				
- Tax Incentive				
(6) Promoting of LED	11,632	991	-	991

Measure	EEDP 2015 Saving Target			
	Electricity		Heat	Total
	GWh	ktoe	ktoe	ktoe
2. Voluntary Program				
(7) Energy saving measures in transport sector - Oil subsidy removing - Restructuring automobile tax - Efficiency improvement in oil pipeline - Developing traffic and transport infrastructure - New Technology (EV)	-	-	30,213	30,213
(8) Supporting the energy efficiency technology research and development	-	-	-	-
3. Complementary Program				
(9) Supporting the human resource development on energy conservation	-	-	-	-
(10) Supporting the public awareness and behavioral change	-	-	-	-
Total	89,672	7,641	44,059	51,700



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Thailand RE Target





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"

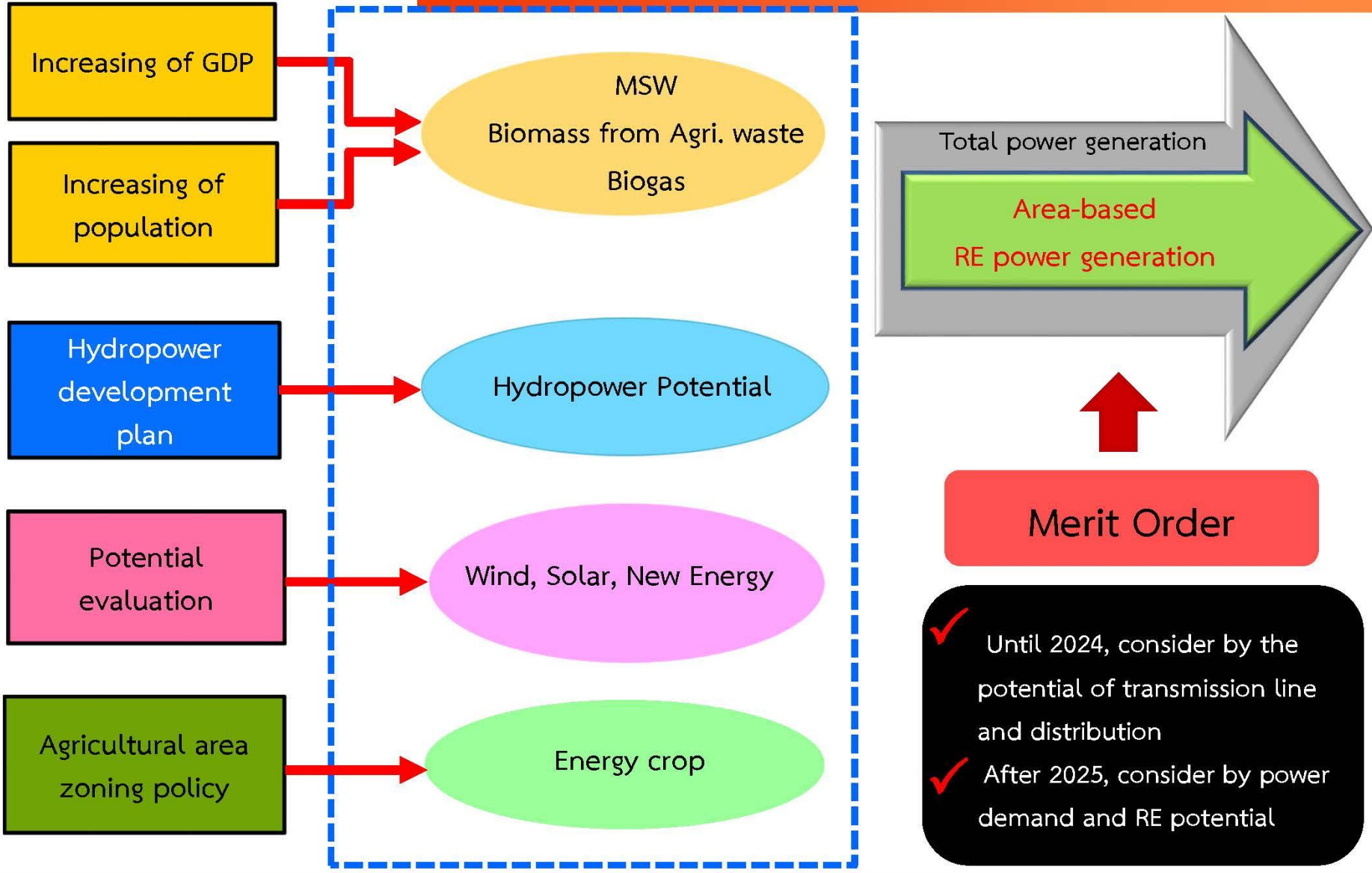
Heat

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

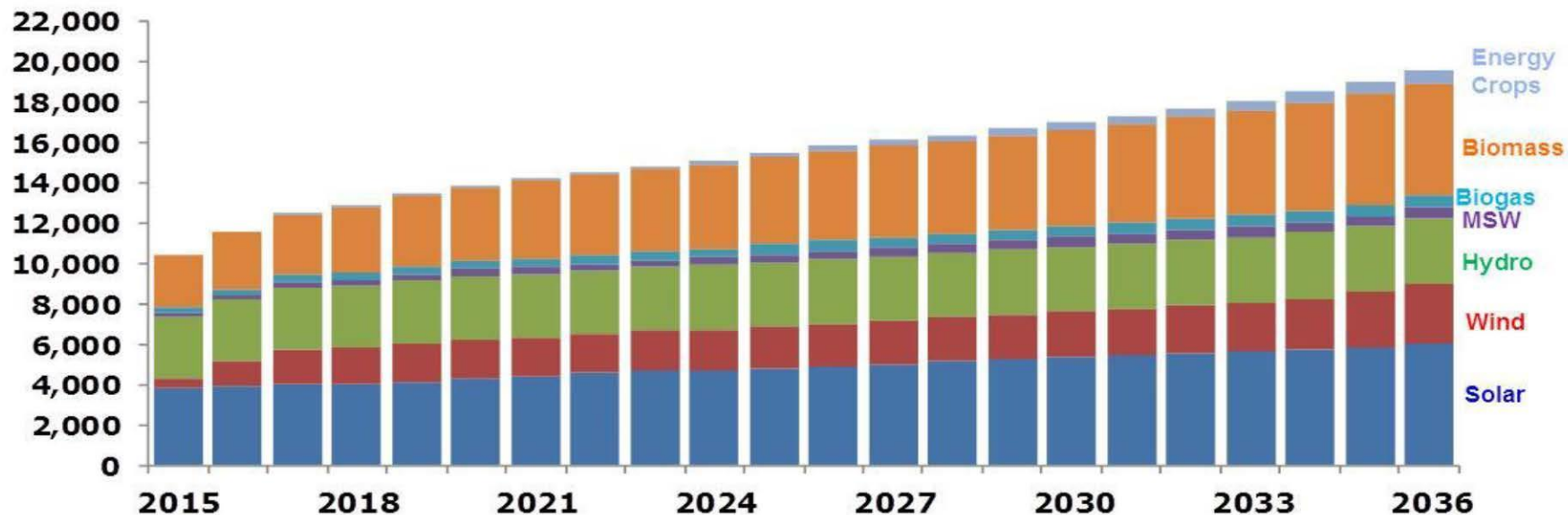
Concepts for prediction of power production potential



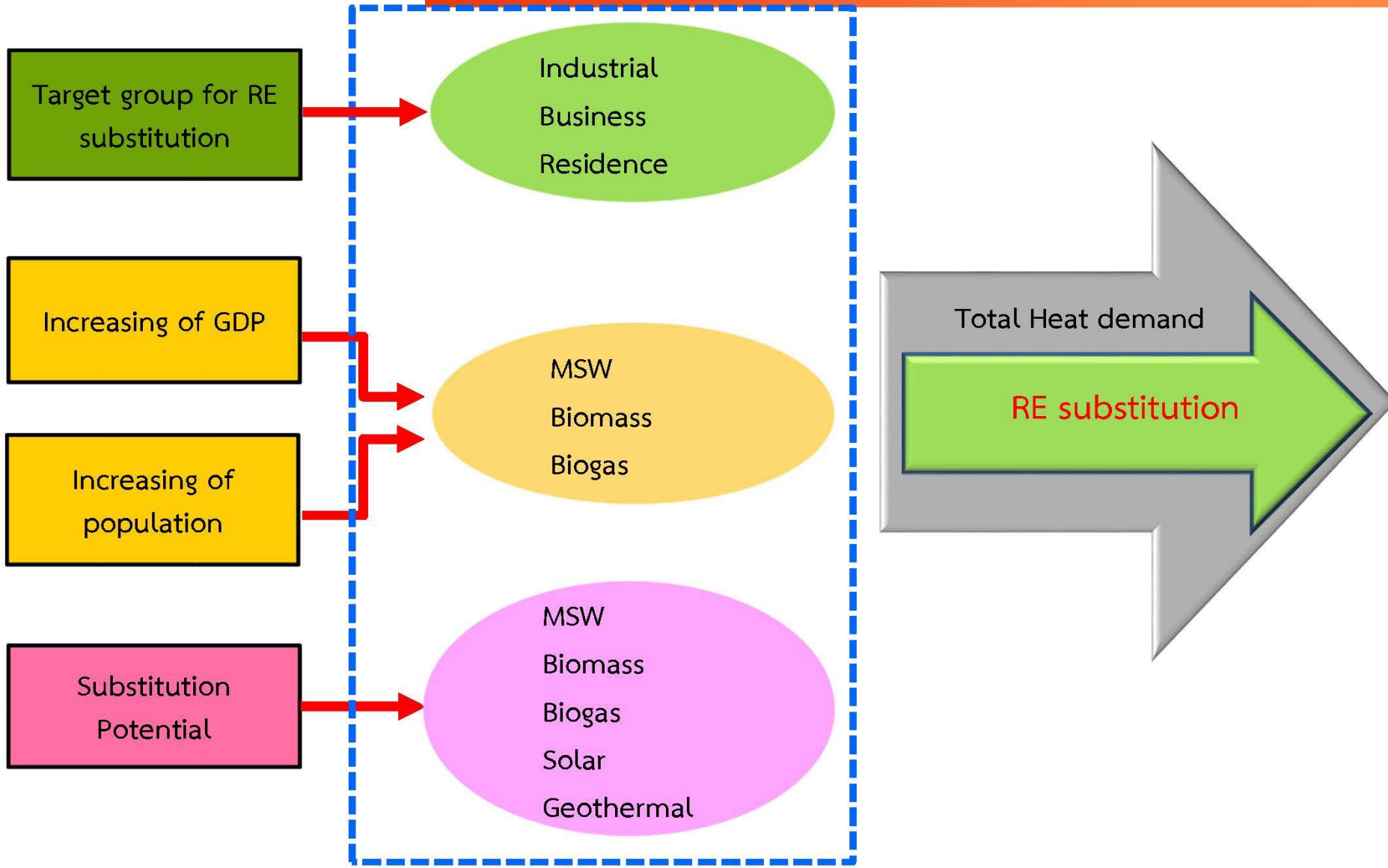
Alternative Energy Target

Type	Solar	Wind	Hydro	Mini Hydro (<12MW)	MSW	Biogas	Energy Crops	Biomass	Total
<u>Installed Capacity 2014</u>	1,298.5	224.5	2,906.4	142	65.7	311.5	-	2,541.8	<u>7,490.4</u>
<u>Installed Capacity 2036</u>	6,000	3,002	2,906.4	376	500	600	680	5,570	<u>19,634.4</u>

Megawatts



Concepts for prediction of heat production



Biofuel – Target and Concepts

DEMAND



Substitute fossil fuel with domestic biofuel



Jan.-Sep. 2014	2579 BAU	2579 EE
22x10 ⁶ V/d	33x10 ⁶ V/d	?

ที่มา: สบพ.

Maximum blending in car and motorbike **85%**



ม.ค. - ก.ย. 2557	2579 BAU	2579 EE
58 x 10 ⁶ V/d	95x10 ⁶ V/d	?

ที่มา: สบพ.

FAME Biodiesel can substitute diesel **7%**
 BHD Biodiesel can substitute diesel **20%**

SUPPLY



Increase value for domestic agricultural products

Gasoline substitution - Ethanol

- Sugar cane and sugar strategy (2014 – 2036)**
 Increase sugar cane crop area from 10 million rai to 16 million rai within 2036
 - 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

AEDP 2015-2036

RE = 30% Energy Consumption

Energy Sector	2014 (MW)	Target (MW)
1. Waste	65.72	500.00
2. MSW	-	50.00
3. Biomass	2,451.82	5,570.00
4. Biogas (Waste)	311.50	600.00
5. Small hydro power	142.01	376.00
6. Biogas (Energy Crops)	-	680.00
7. Wind Energy	224.47	3,002.00
8. Solar Energy	1,298.51	6,000.00
9. Hydro Power	2,906.40	2,906.40
Total	7,400.43	19,684.40

Electricity

5,588.24 ktoe
(4.27%)



Electricity Ratio
for RE / Electricity
Consumption
20%

Energy Sector	2014 (ktoe)	Target (ktoe)
1. Waste (MSW)	98.10	495.00
2. Biomass	5,184.00	22,100.00
3. Biogas	488.10	1,283.00
4. Solar Energy	5.12	1,200.00
5. Others heat	-	10.00
Total	5,775.00	25,088.00

Heat

25,088.00 ktoe
(19.15%)



Heat Ratio
for RE / Heat
Consumption
36.67%

Energy Sector	2014	Target	
Biofuels	Million liters/day	Million liters/day	ktoe
1. Biodiesel	2.89	14.00	4,404.82
2. Ethanol	3.21	11.30	2,103.50
3. Pyrolysis Oil	-	0.53	170.87
4. CBG (toe/day)	-	4,800.00	2,023.24
5. Others fuel	-	-	10.00
Total	6.10		8,712.43

Biofuels

8,712.43 ktoe
(6.65 %)



Fuels Ratio for RE
/ Fuels Consumption
25%



Challenges for clean energy

- Effective policy, regulatory and institutional framework
 - ✓ *Cooperation btw ASEAN and China*
 - ✓ *RE&EE standard harmonization is required*
- Development and support of new and innovative financing mechanisms for RE&EE applications with financial institutions
 - ✓ *FiT, Soft loan, ESCO and study on ETS*
- Expansion of Renewable Energy in energy mix and strengthening the local based production in RE systems
 - ✓ *Emphasize in RE-power, RE-heat and RE-biofuel*
 - ✓ *Biogas, small hydro, biomass, and biofuel*
- Responses to international climate change agreement
 - ✓ *Common but differentiated responsibility*
- Capacity building and outreach to all levels are very important.



Thank you very much
Terima kasih banyak banyak

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Helen Keller

Alone we can do so little;

together

we can do so much.

Photo by Wellington College

 Symphony of Love