



**จุฬาลงกรณ์มหาวิทยาลัย**  
**Chulalongkorn University**  
Pillar of the Kingdom

# Thailand's Integrated Energy Blueprint (2015-2036)



# Thailand's Energy Situation

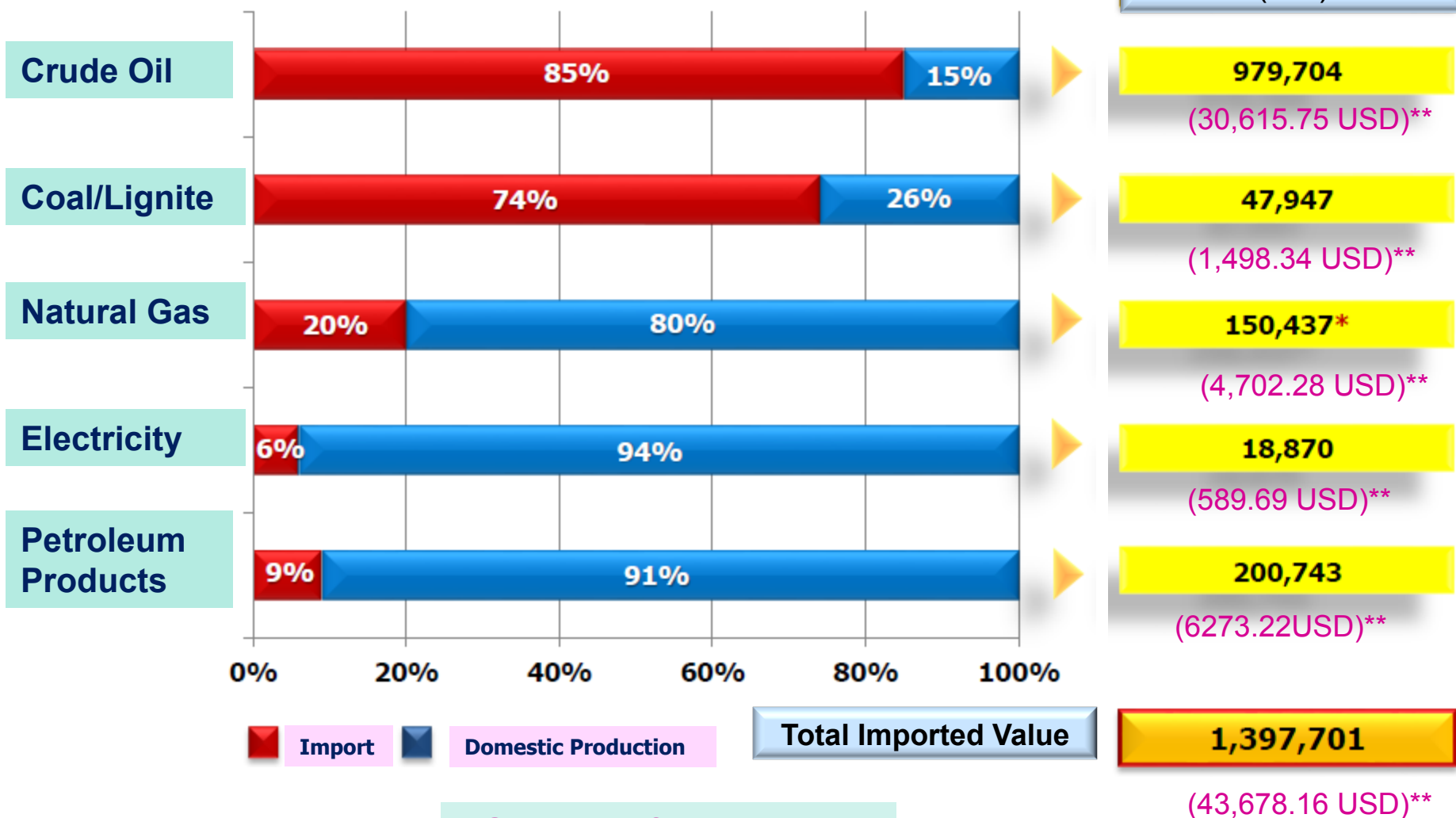
- Demand Increasing → Need Energy Conservation (Efficiency Improvement) and Supply Security
- Import Dependency → Need Alternative Energy and Fuel Diversification
- Environmental Concerns and RE Preferable
- High Cost → Not Affordable  
→ Not Competitive



**Need Integrated Energy Plan**  
(AEDP, EEDP, PDP, Oil Plan, and Gas Plan)

# Thailand's Energy Import and Domestic Production

## Import Dependency



\*\* @ 32 THB/USD

\* Inc. imported liquid natural gas

# Long Term Integrated Energy Plan 2015-2036

Alternative Energy Development Plan (AEDP2015)

Energy Efficiency Development Plan (EEDP2015)

Power Development Plan (PDP2015)

Gas Plan 2015

Oil Plan 2015

2015 16 17 18 19 20 21 22 23 24 25 26 27 28 28 30 31 32 33 34 35 36

NESDB Plan #12  
(2017-2021)

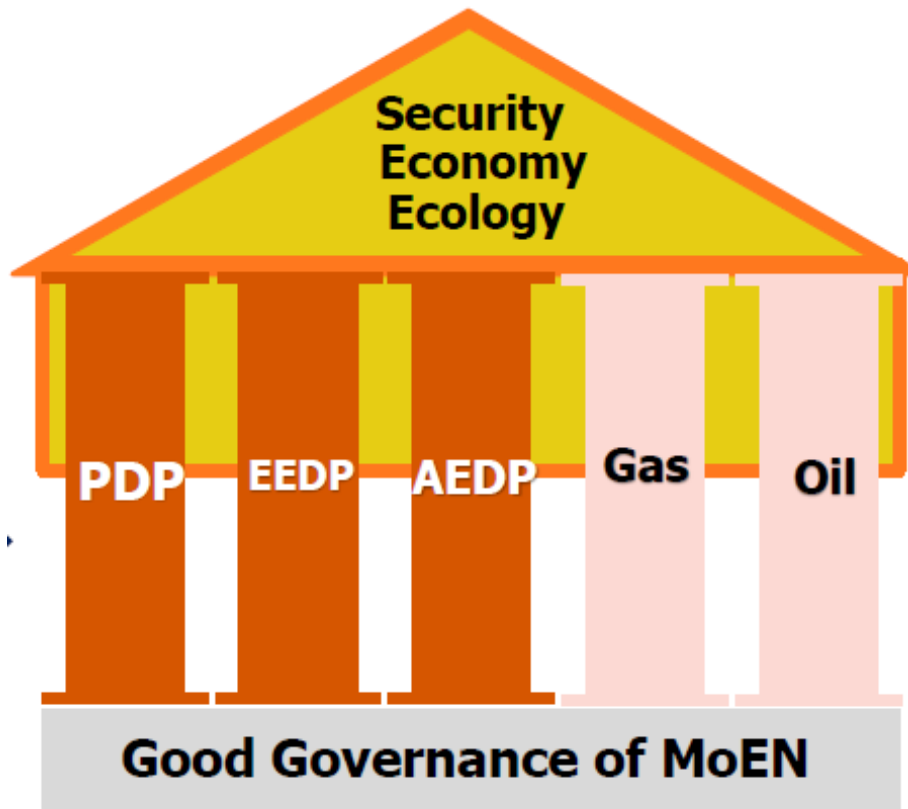
NESDB Plan #13  
(2021-2026)

NESDB Plan #14  
(2026-2031)

NESDB Plan #15  
(2031-2036)

NESDB = National Economic and Social Development Plan

# Thailand Integrated Energy Blueprint



**Security** – to create stability for national energy demand and **support the NESDP** (National Economic and Social Development Plan) by **fuel diversification** to reduce dependency on single fuel.

**Economy** – to create reasonable energy cost for both people and business, which will not be barrier for long-term national development, including ENCON promotion.

**Ecology** – to reduce impacts on **environment** and **community**

**PDP:** Power Development Plan  
**EEDP:** Energy Efficiency Development Plan  
**AEDP:** Alternative Energy Development Plan

# 5 Master Plan as the Pillars of Energy Sustainability

## Thailand Integrated energy blueprint: 5 objectives

- 1 Supply security
  - 2 Cost competitiveness
  - 3 Environment
  - 4 Energy support sustainability
  - 5 Socio-economic support for the needed people/sector
- 

### Energy efficiency (EEDP)

- 30% energy intensity reduction

### Power development (PDP)

- 20-25% coal fired power
- 15-20% renewable

### Altern. Energy (AEDP)

- Zoning and competitive bidding

### Gas roadmap

- Curb Gas demand (TBD)
- LNG structure

### Oil roadmap

- 20% of biofuel
- Fossil fuel subsidy removal,
- tgt. subsidies

Integrated economics/fiscal systems

Integrated MOE governing structure

# Thailand's Energy Conservation Approach

## AEDP

(Alternative Energy Development Plan)

2015-2036



**30% Alternative Energy Share by 2036**

(compared with Total Energy Consumption)



**20% Electricity from RE by 2036**

## EEDP

(Energy Efficiency Development Plan)

2015-2036



**30% EI Reduction by 2036**

(compared with the 2010 base year)

Note: **EI** = Energy Intensity  
= Energy Consumption / GDP

# Principle for AE/RE Target Formulation

**Final Energy Demand**  
EEDP2015 = 131,000 ktoe



**Electricity Demand**  
PDP2015 = 27,789 ktoe



**Heat Demand**  
68,413 ktoe



**Demand in Transport**  
Oil Plan = 34,798 ktoe

**AE/Total**  
11.9% (@2014)

**AE/Total**  
30% (@2036)

**Electricity from RE**

9%



20%

**Heat from RE**

17%



30-35%

**Biofuels**

7%



20-25%

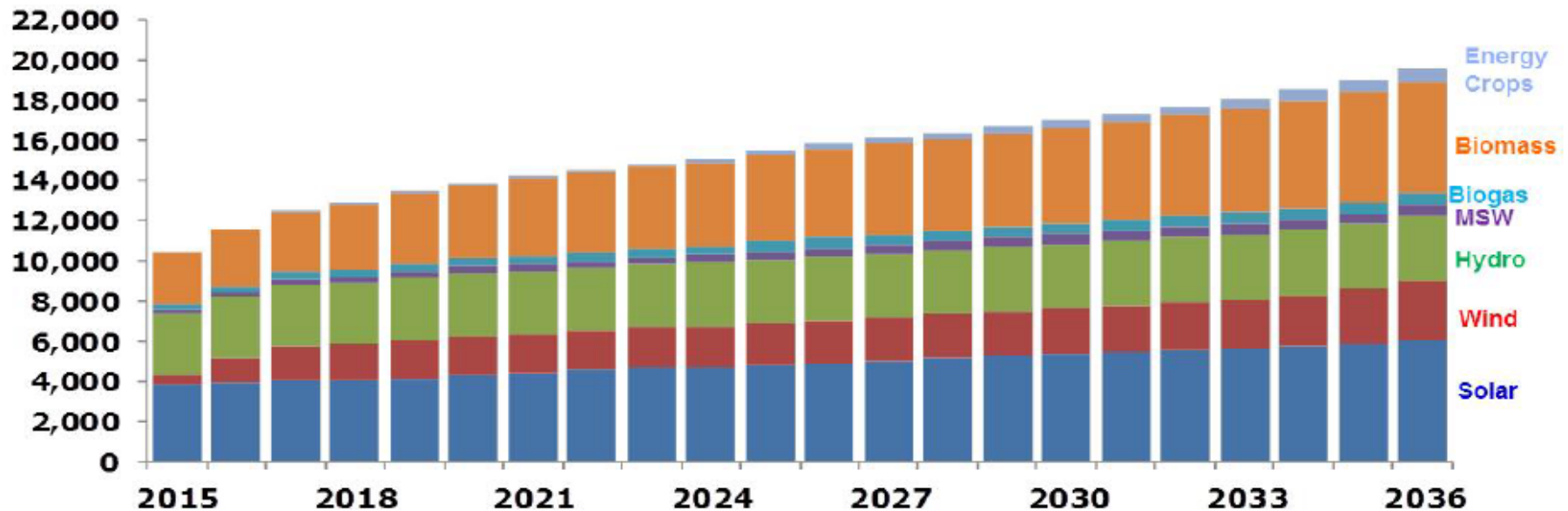




## Alternative Energy Target

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>	<b>6,000</b>	<b>3,002</b>	<b>2,906.4</b>	<b>376</b>	<b>500</b>	<b>600</b>	<b>680</b>	<b>5,570</b>	<b><u>19,634.4</u></b>

Megawatts



# EEDP 2015 Saving Target

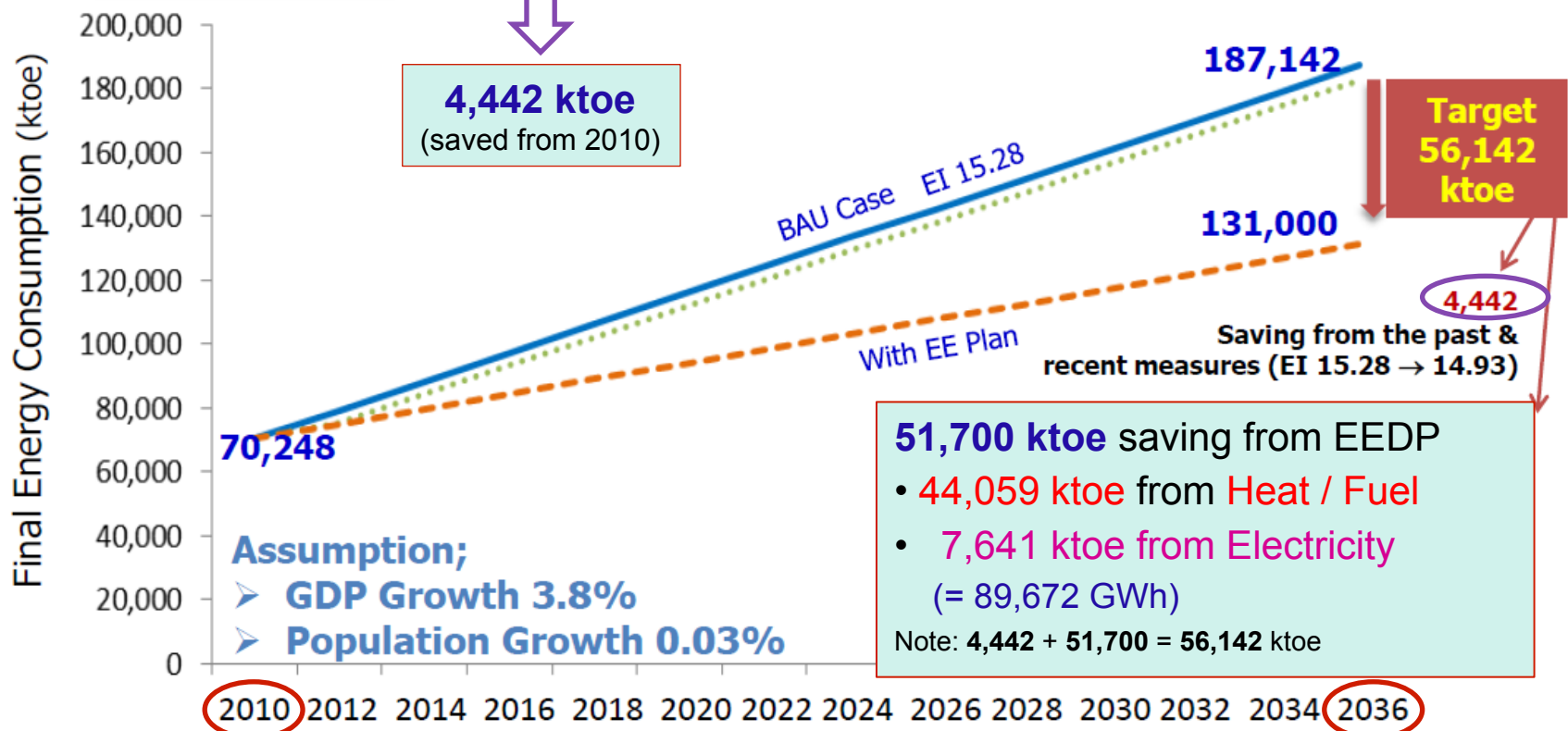
**A Target to reduce Energy Intensity by 30% in 2036,  
compared with that in 2010**

EI (2010) actual  
**15.28**  
ktoe/billion baht

EI (2013) actual  
**14.93**  
ktoe/billion baht

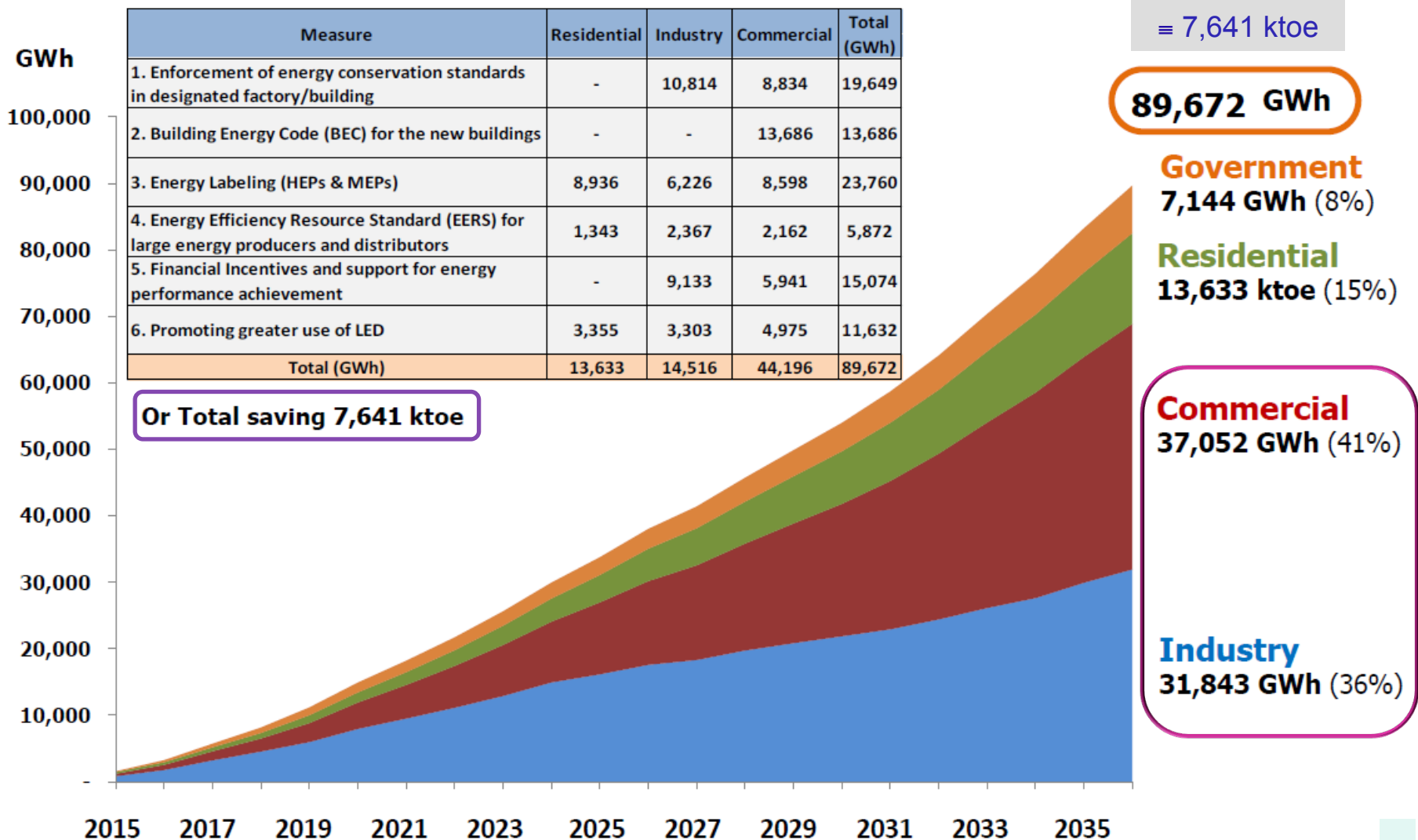
EI (2030) forecast  
**11.0**  
ktoe/billion baht

EI (2036) forecast  
**10.7**  
ktoe/billion baht



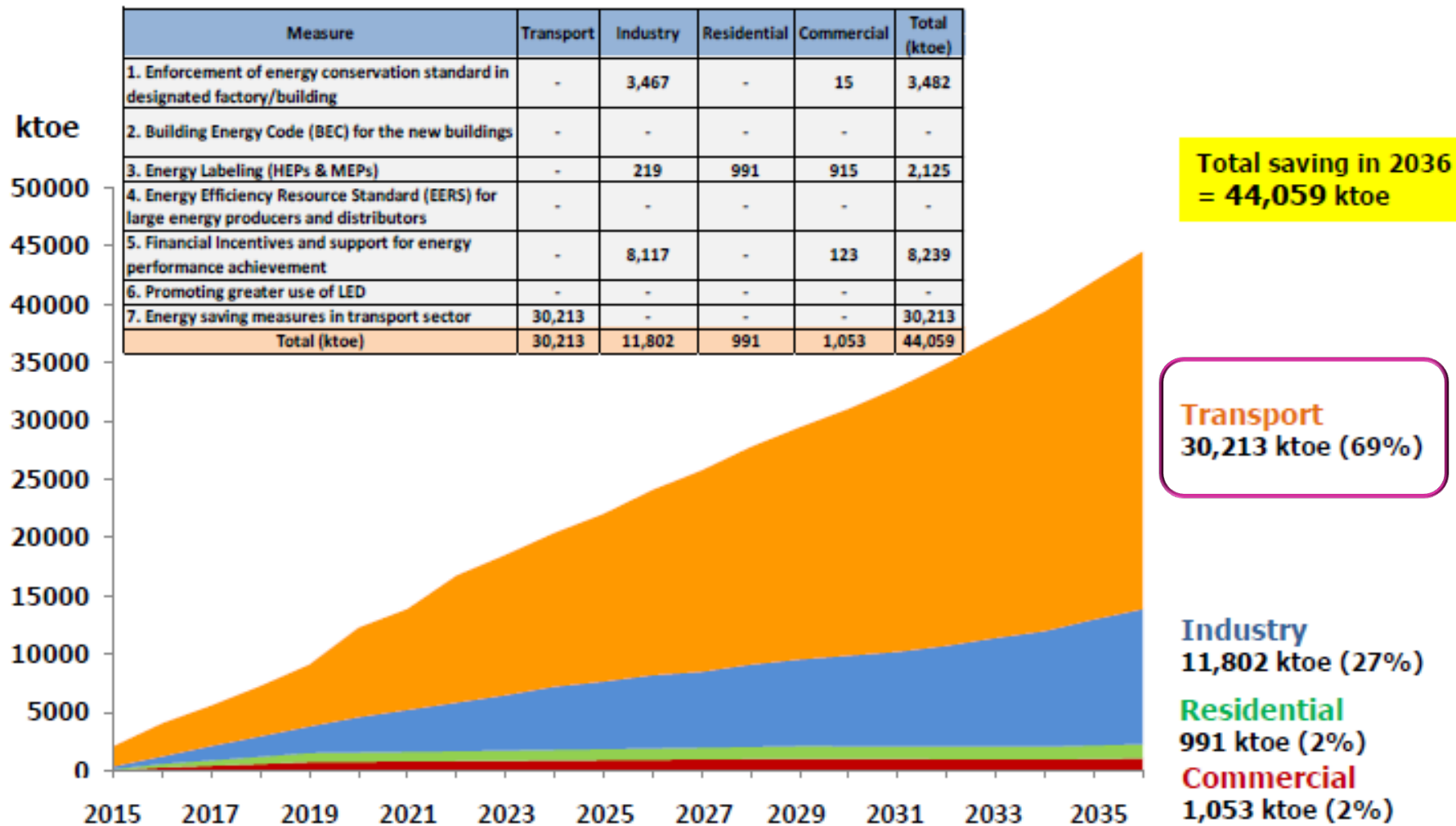
# EEDP 2015 Target by Economic sectors

## Electricity saving



# EEDP 2015 Target by Economic sectors

## Heat/Fuel saving



# Power Development Plan ⇒ PDP 2015

## Key Principles:

- Electricity System Security
- Cost Competitiveness
- Low Environmental Impacts



## • Fuel Diversification

- Reduce NG dependency (⇒ to increase supply security)
- Increase electricity from clean coal (⇒ to increase supply security and reduce cost)
- Increase electricity from RE (⇒ to lower environmental impacts)
- Increase import of hydro electricity (⇒ to increase RE proportion)
- Plan to install Nuclear at the Plan End (⇒ to increase supply security)





## • Reserve Margin (not less than 15%)

## • Revise Plan for IPPs & SPPs

## • Infrastructure Investment

- National Grid Development
- Smart Grid System Development

# Power Development Plan 2015-2036

PDP 2015				PDP2010 Rev.3
Fuel Type	@ Sep 2015 %	@ 2026 %	@ 2036 %	@ 2030 %
Imported Hydro Electricity	7	10-15	15 – 20 	10
Clean Coal (inc Lignite)	20	20-25	20 – 25 	19
RE	8	10-20	15 – 20 	8
NG	64	45-50	30 – 40 	58
Nuclear	-	-	0 – 5	5
Diesel/Fuel Oil	1	-	-	-
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

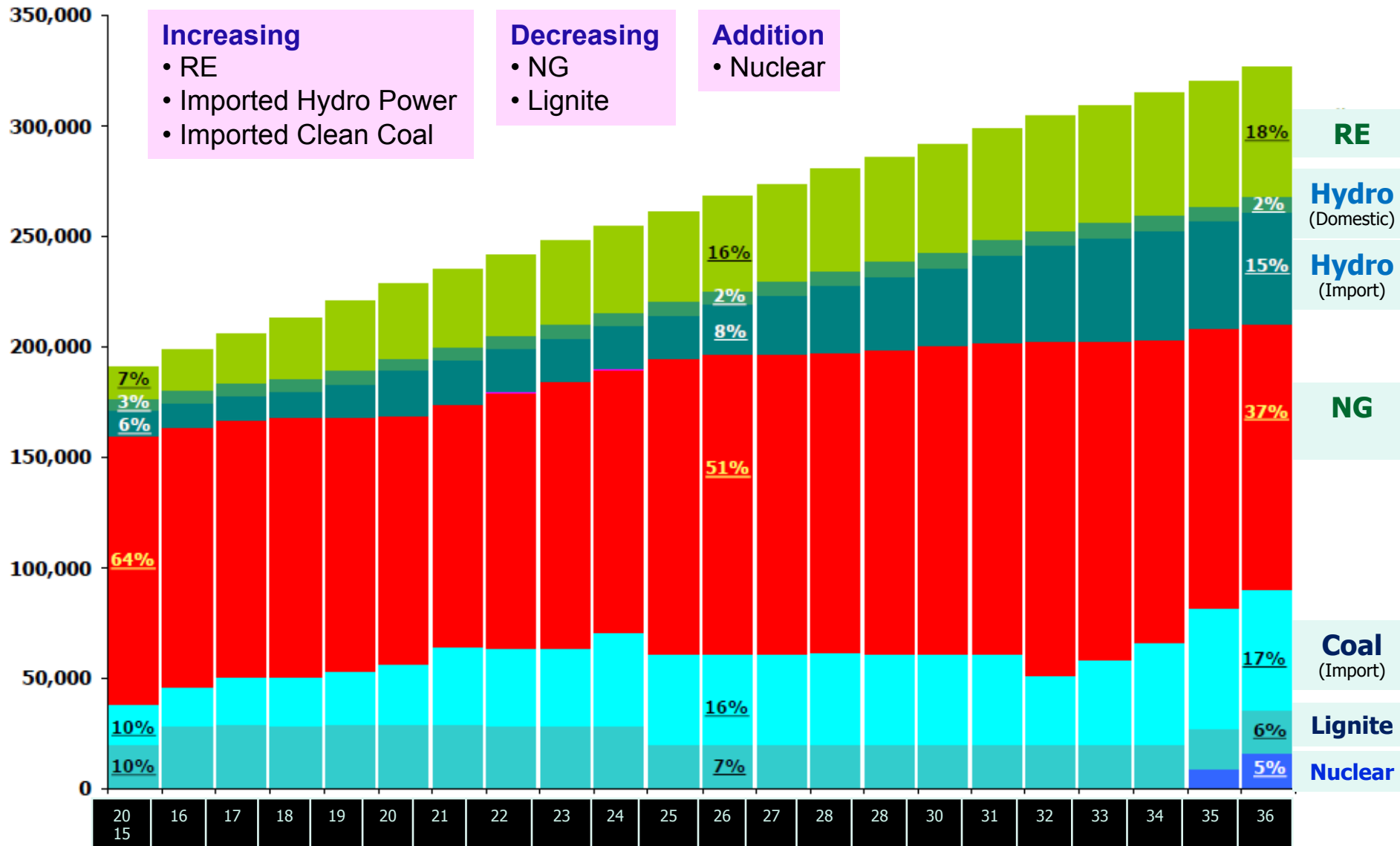
# Compared with Other ASEAN

Percent

ประเภท	PDP2010 rev.3 (2030)	PDP2015 (2036)	Malaysia (2015)	Indonesia (2015)	Philippines (2015)
ซื้อไฟต่างประเทศ (Hydro/import)	10	15-20	8	6	10
ถ่านหิน+ลิกไนต์ (Coal & lignite)	19	20-25	42	59	47
พลังงานหมุนเวียน (RE)	8	15-20	1	8	12
ก๊าซธรรมชาติ (Gas)	58	30-40	48	18	25
นิวเคลียร์ (Nuclear)	5	0-5	-	-	-
Diesel/Fuel Oil	-	-	1	9	5
<b>Total</b>	100	100	100	100	100

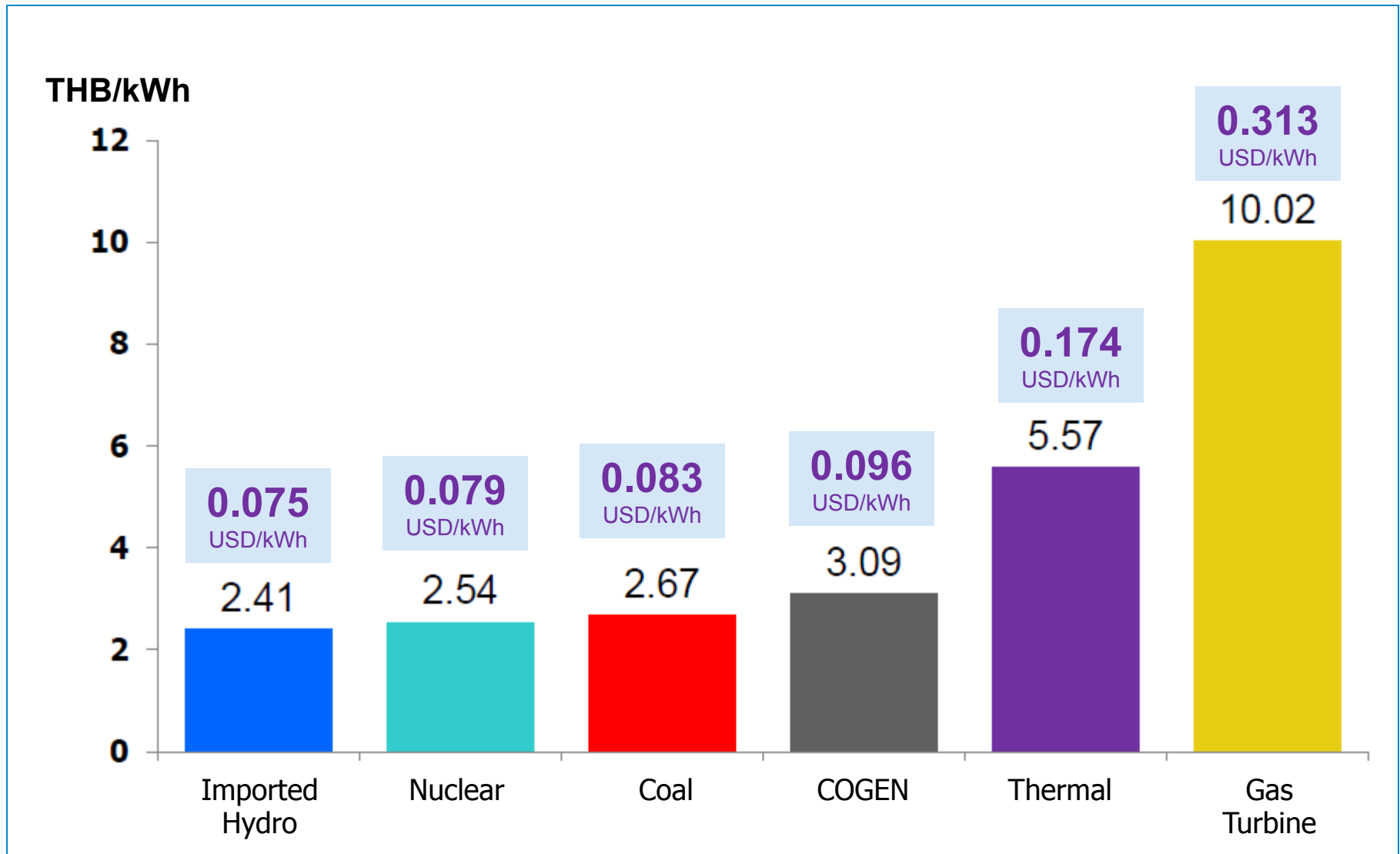
# Power Generation by Fuel Type (PDP2015 Basis)

Million Units

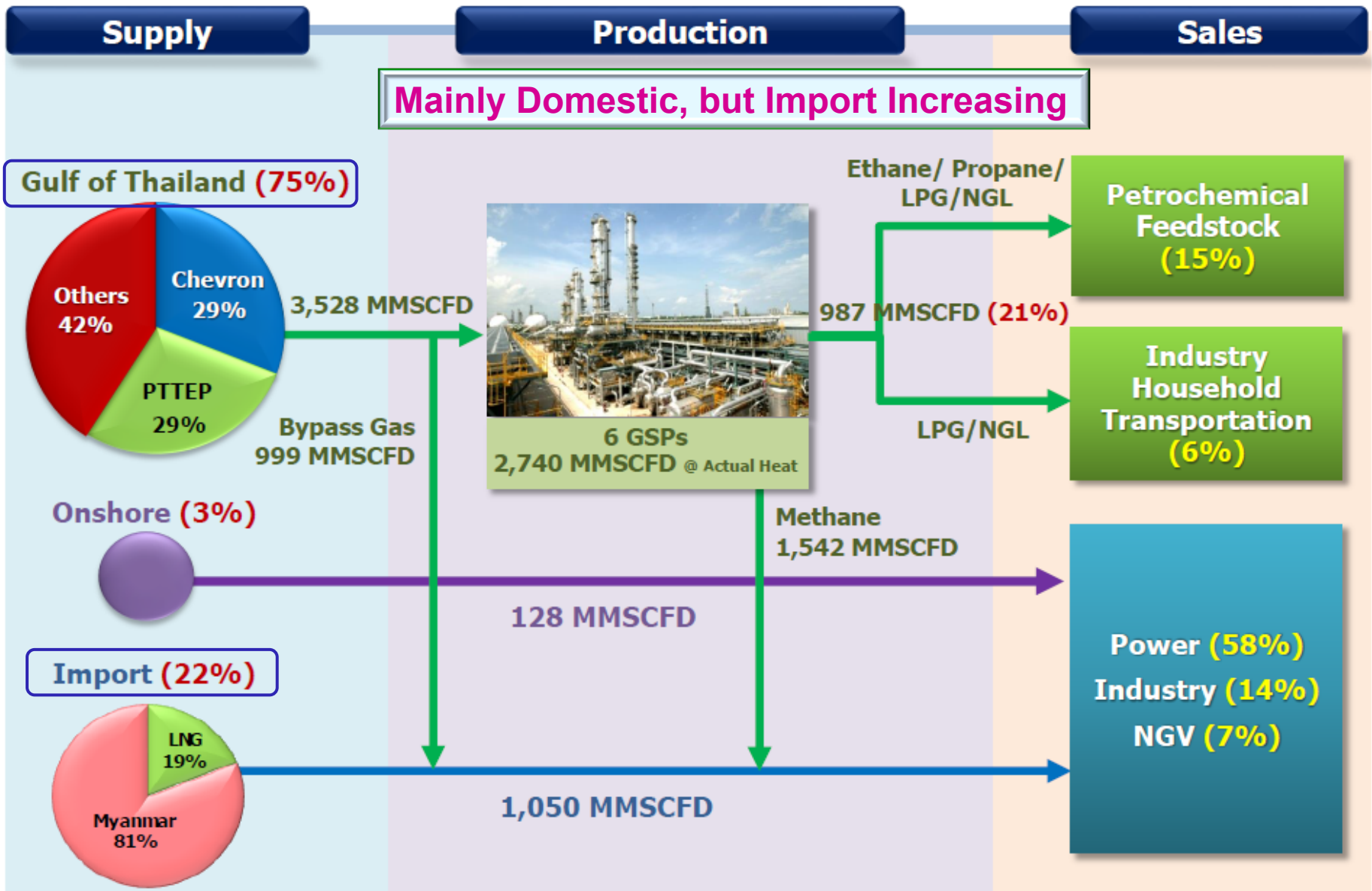




# Average Cost of Power Generation by Fuel Type

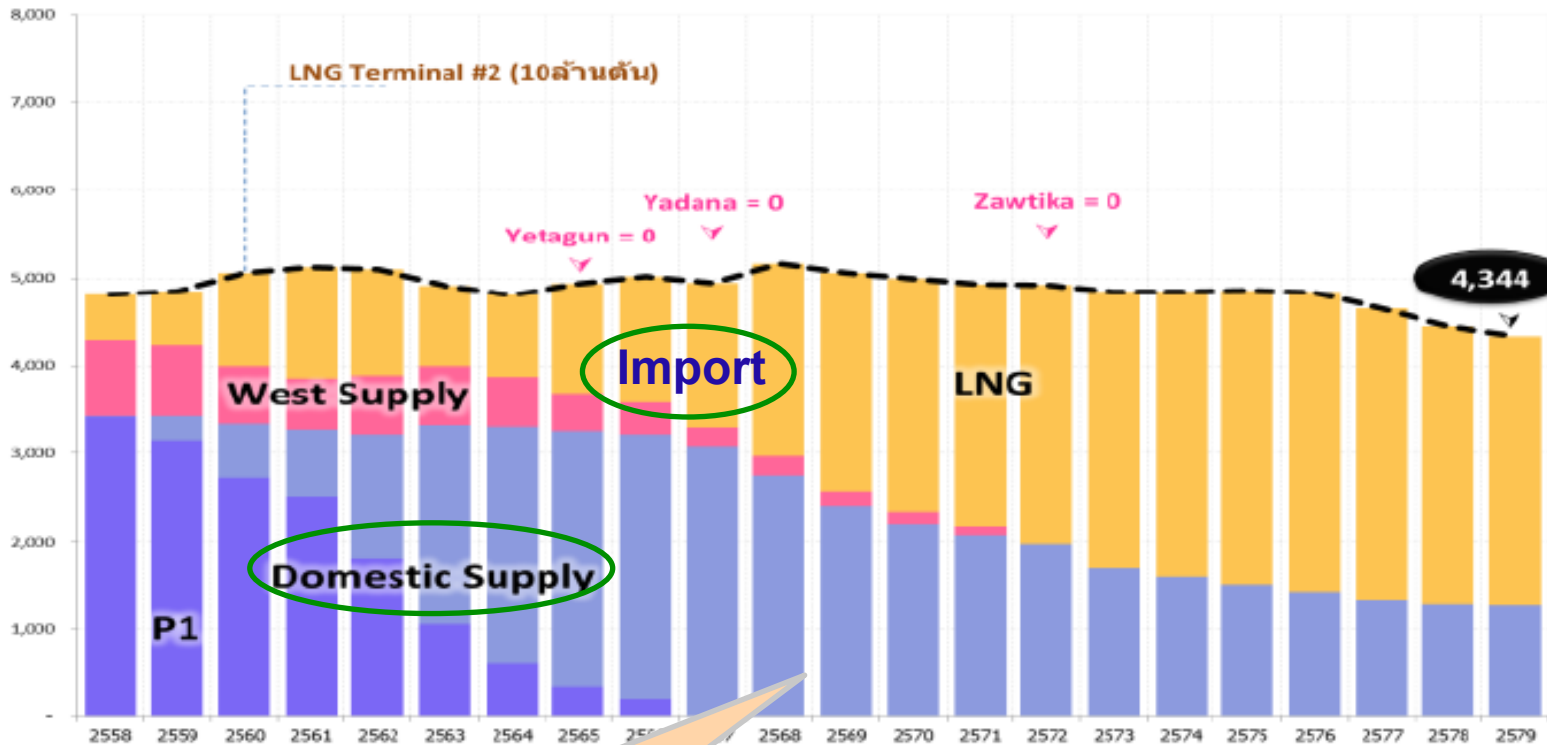


Source: EGAT (@ 32 THB/USD)



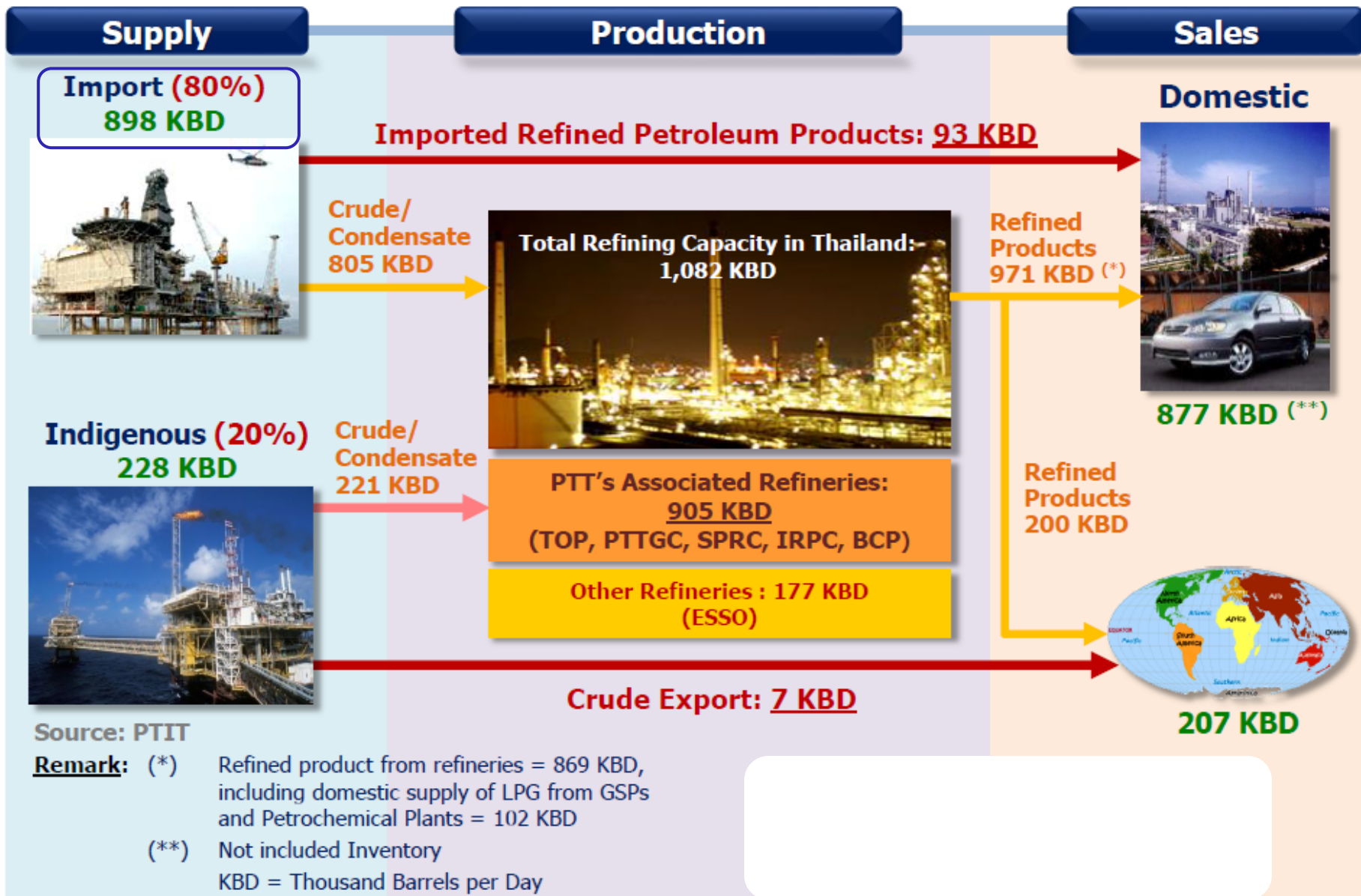
# Gas Plan 2015

Mft<sup>3</sup> / day  
@ 1000 btu/ft<sup>3</sup>



- **Extend domestic production** >7 years
- Available for Petrochem until the plan end

- **Reduce LNG Demand Growth** 9.9% per year
- Reduce LNG Dependency
- Reduce LNG Import >20 Mtons/year



# Oil Management Plan

## Oil Plan

**EEDP  
2015**

**AEDP  
2015**

### Objectives:

1. Enhance Energy Security
2. Improve Economic Efficiency
3. Conserve Ecology



Energy Saving  
in Transport  
(EEDP2015)

1



Appropriate Mtg  
of Fuel Types

2



Oil Price Structure  
Revolution

3



Promote Biofuels  
(AEDP2015)

4



Infrastructure  
Investment Support

5





Thank you

**Dr. Dawan Wiwattanadate**

Energy Research Institute  
Chulalongkorn University  
Bangkok 10330, Thailand

[dawan.w@chula.ac.th](mailto:dawan.w@chula.ac.th)

[dawancu@gmail.com](mailto:dawancu@gmail.com)