

# S1-4 Role of Energy Efficiency in Long Term Energy Planning

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25-27 May 2016, Hotel CHINZANSO, Tokyo, Japan



Energy Policy  
and Planning Office  
**MINISTRY OF ENERGY**



**Dr. Twarath Sutabutr**

**Director-General  
Energy Policy and Planning Office  
Ministry of Energy**

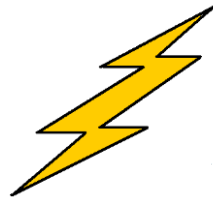


- Long term energy planning
  - Is vital but must be adaptable for change & constraint
- Priority in long energy planning of Thailand
  - Energy efficiency (same output, less input)

Forecast of electricity, oil & gas demand



**EED2015**

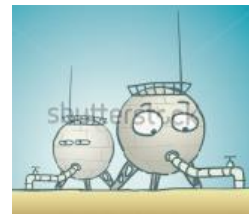


**PDP2015**



OIL PLATFORM

**OilPlan 2015**



**GasPlan 2015**

Estimating renewable fraction



**AEDP2015**

- TIEB: Thailand Integrated Energy Blueprint



# Thailand Integrated Energy Blueprint (2015 - 2035)



**ENDS**

**Security**  
**Prosperity** **Sustainability**

**KPI**

## Security

- Reserve of electricity and natural gas maintain at secure and sufficient level
- Long term electricity reserve margin ~ 15%
- 2P Reserve ~ 11-12 years

## Efficient/Prosperity

- Moderate energy price comparing to neighboring countries
- EI reduces by → - 30%

## Sustainability

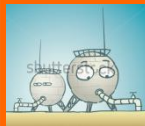
- Reduce green house gas in electricity production
- Promote energy efficiency
- Increase proportion of RE up to 30%

**WAYS**

**PDP**



**Gas Plan**



**Oil Plan**



**AEDP**



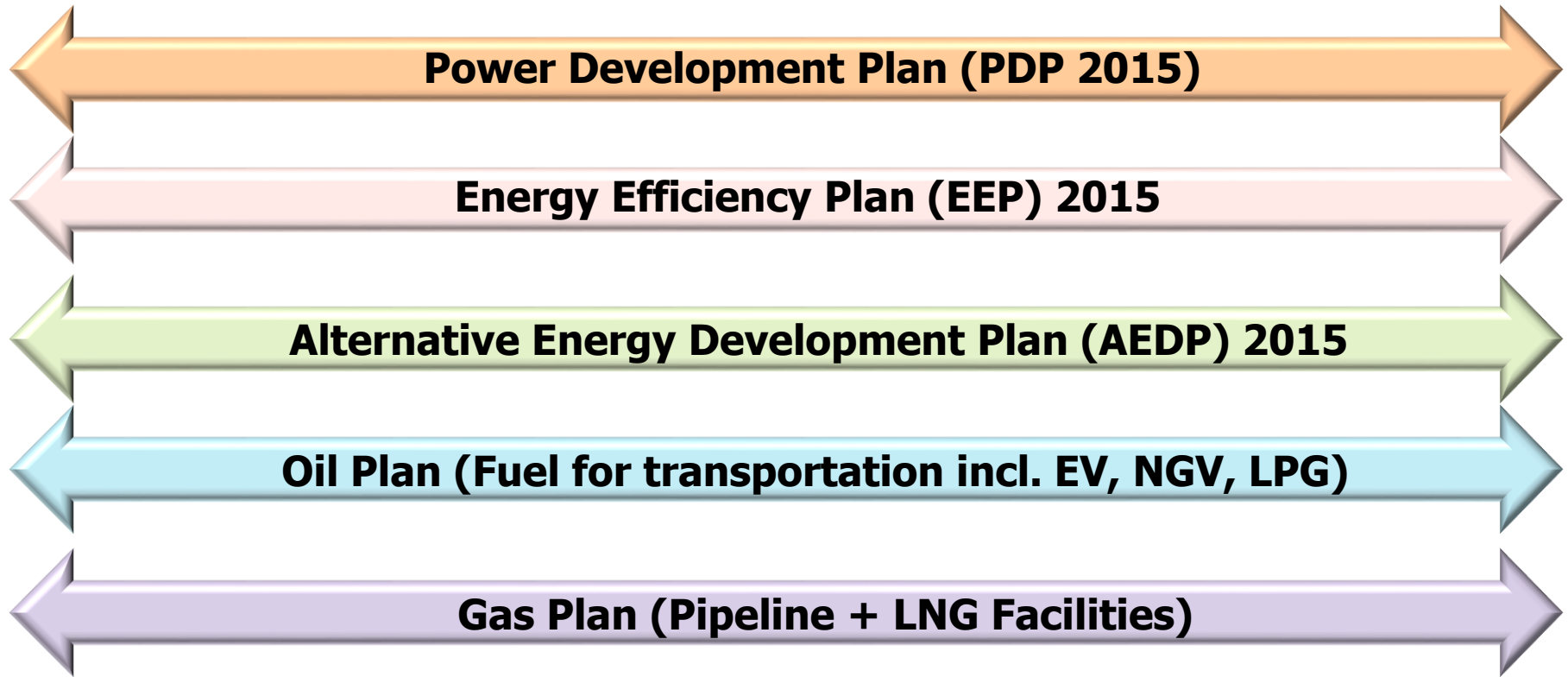
**EEP**



**MEANS**

**Oversee & steer by Energy Policy Administration Committee**

**Incorporate with Suggestions from National Reform Steering Committee and MOE internal restructuring**



## National Economic and Social Development Plan



**NESDB#12**  
2017-2021

**NESDB#13**  
2022-2026

**NESDB#14**  
2027-2031

**NESDB#15**  
2032-2036

# Energy Efficiency Target

- 2010: Ref from Agreement by APEC Leaders in 2007

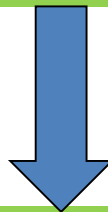
Target to reduce Energy Intensity by 25% in 2030,  
compared to 2005



- 2011

**20-Year Energy Efficiency Development Plan  
(EEDP: 2011-2030)**

Target to reduce Energy Intensity by 25% in 2030,  
compared to **2010**



- 2015

**Energy Efficiency Plan  
(EEP: 2015-2036)**

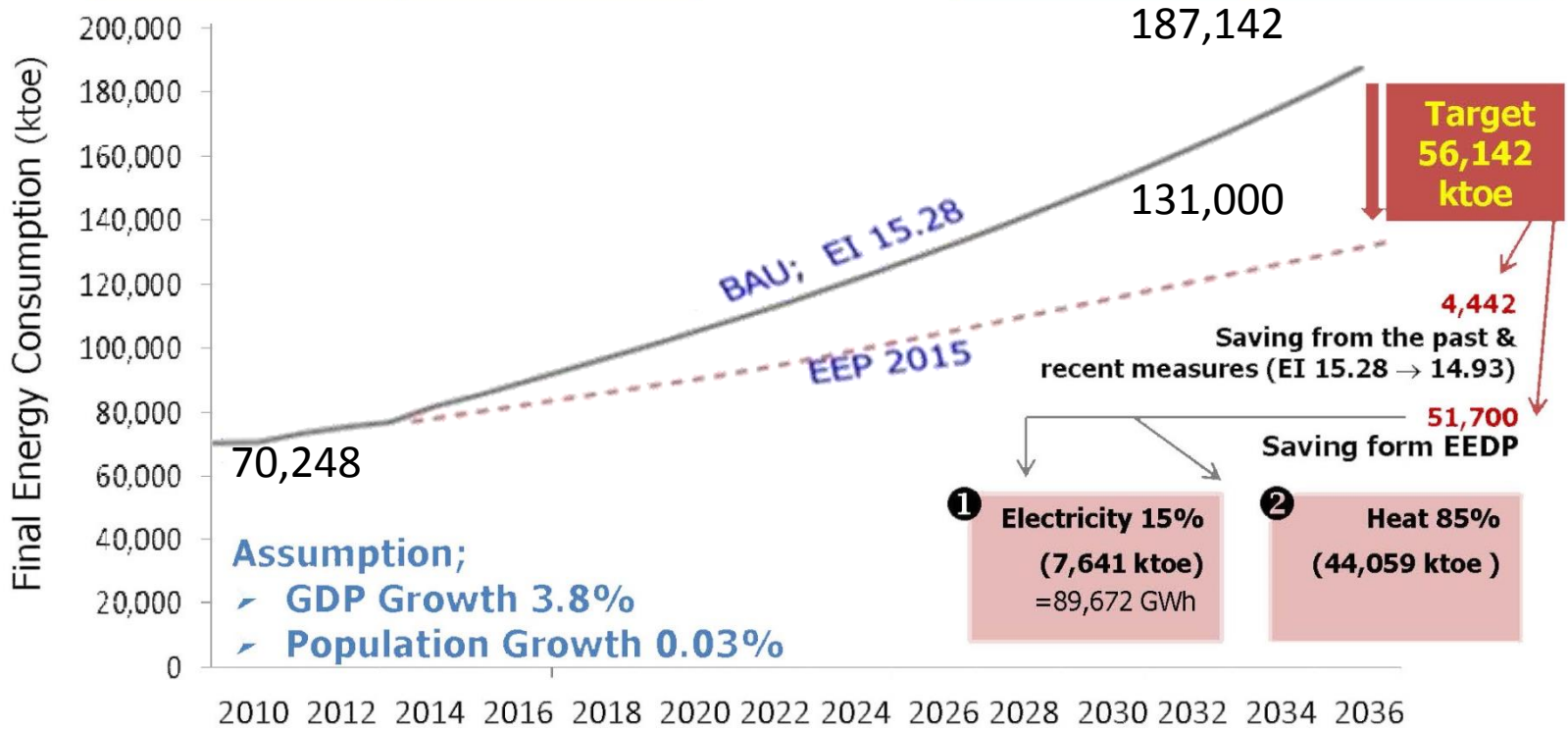
Target to reduce Energy Intensity by 30% in **2036**,  
compared to **2010**



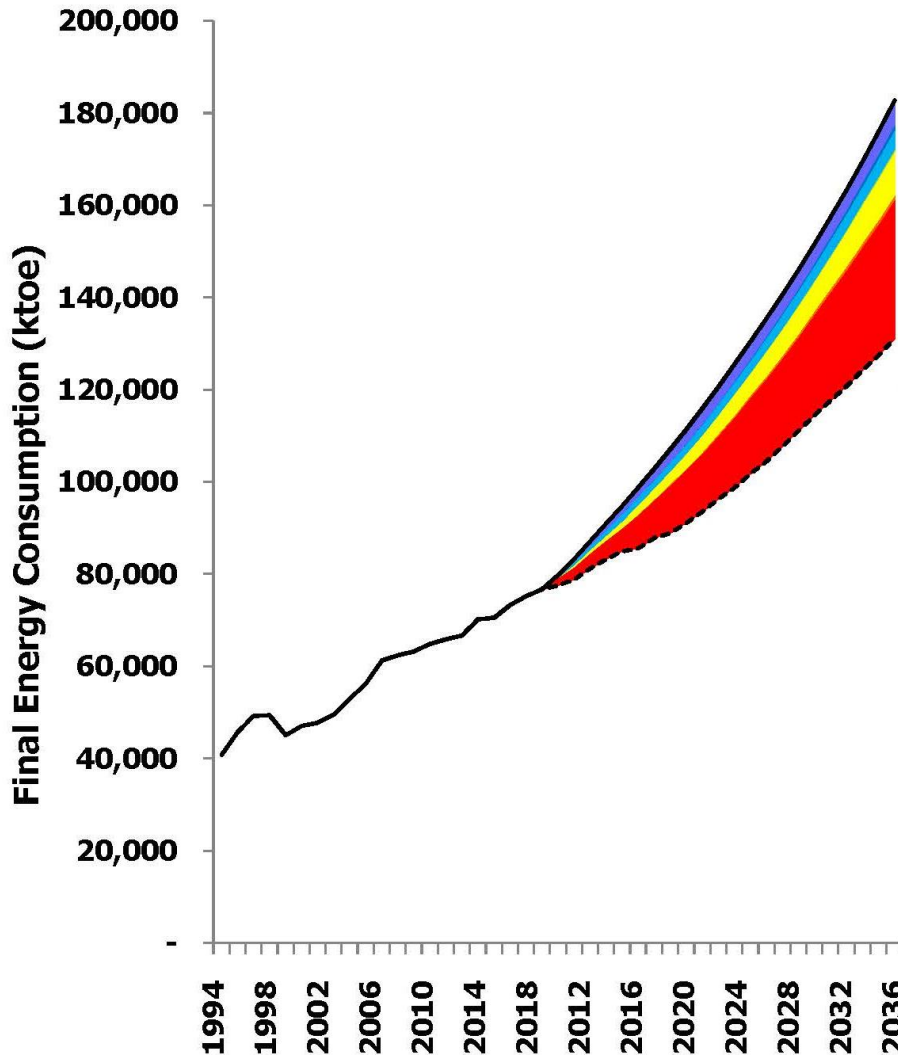
# EEP 2015 Saving Target

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

<b>EI (2010) actual</b> <b>15.28</b> ktoe/billion baht	<b>EI (2013) actual</b> <b>14.93</b> ktoe/billion baht	<b>EI (2030) forecast</b> <b>11.0</b> ktoe/billion baht	<b>EI (2036) forecast</b> <b>10.7</b> ktoe/billion baht
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# Summary of EEP 2015 Target by Measures

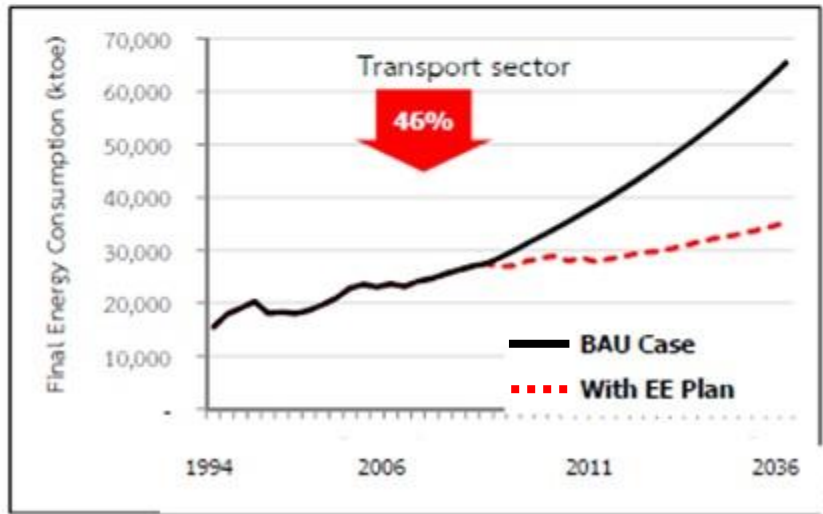
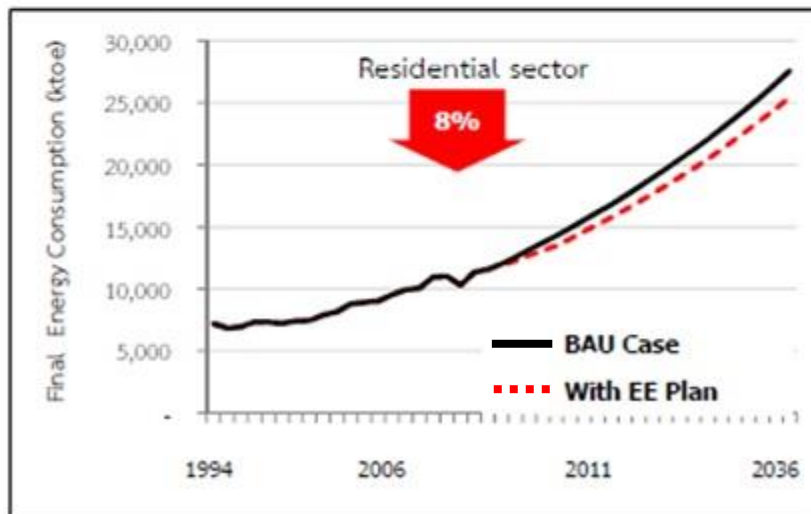
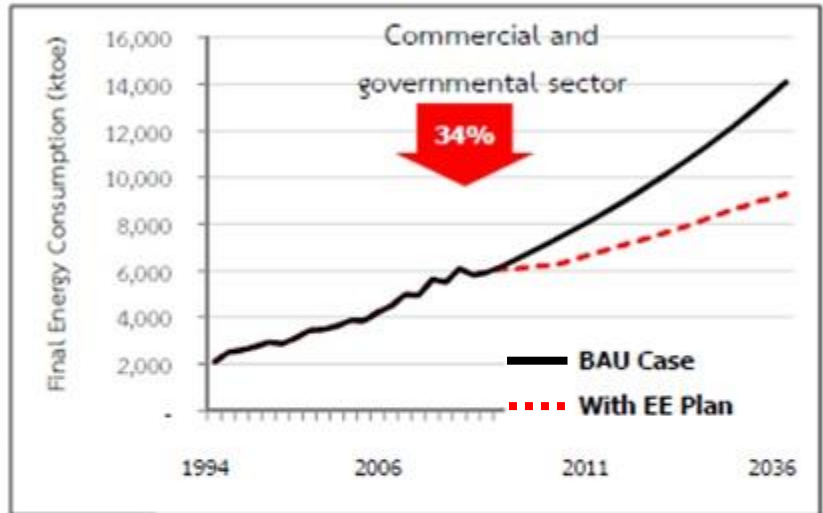
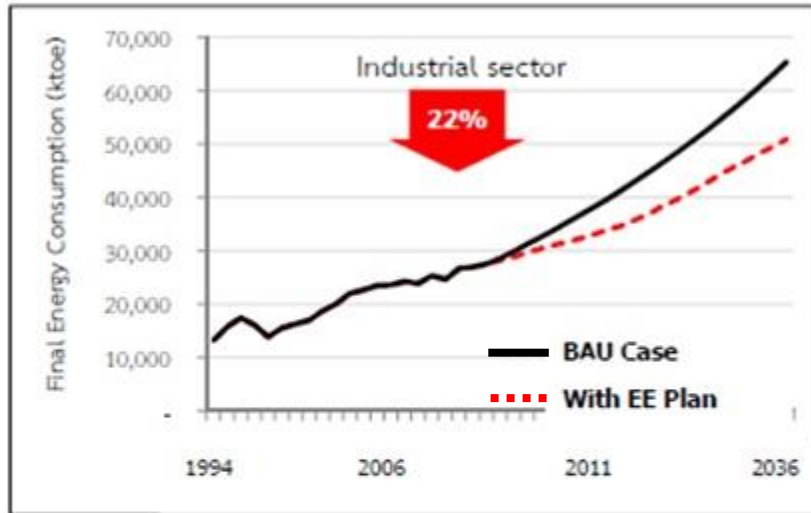


Expected Energy Saving by Economic sector		Total	
		(ktoe)	(%)
EE1	Enforcement of energy conservation standard in designated factory/building	5,156	10%
EE2	Building Energy Code (BEC) for the new buildings	1,166	2%
EE3	Energy Labeling (HEPs & MEPs)	4,149	8%
EE4	Energy Efficiency Resource Standard (EERS) for large energy producers and distributors	9,524	18%
EE5	Financial Incentives and support for energy performance achievement	991	2%
EE6	Promoting greater use of LED	500	1%
EE7	Energy saving measures in transport sector	30,213	58%
Total (ktoe)		51,700	100%

**Economic Sector**

1. Industry
2. Commercial
3. Residential
4. Transportation

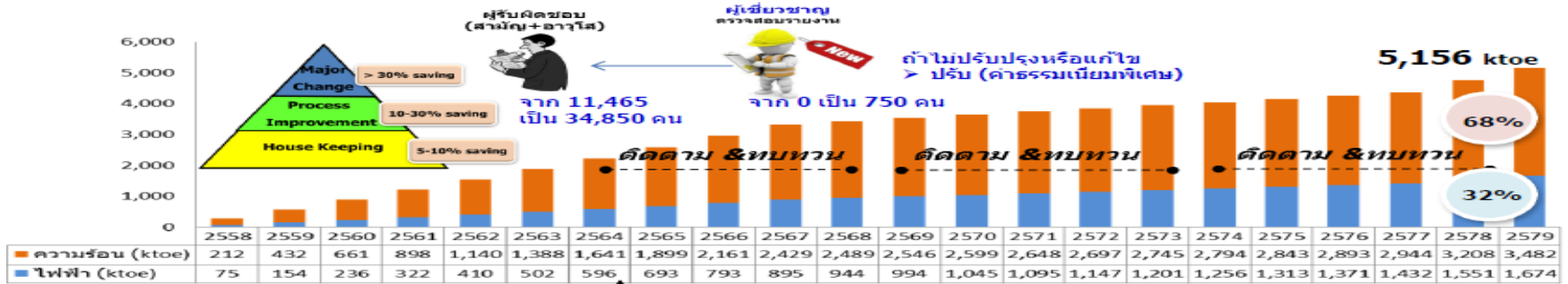
# Target in Economic Sectors in 2036



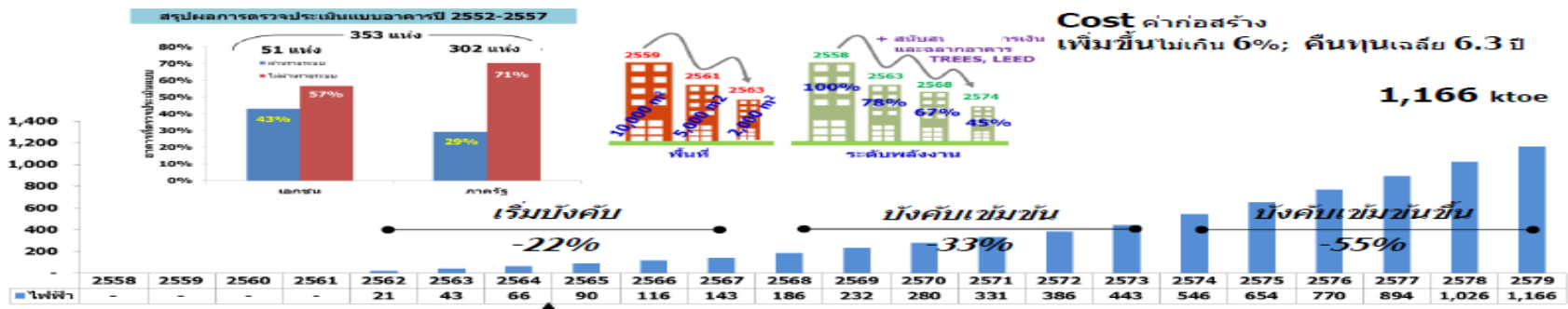


# 10 Measures for Energy Efficiency (1/4)

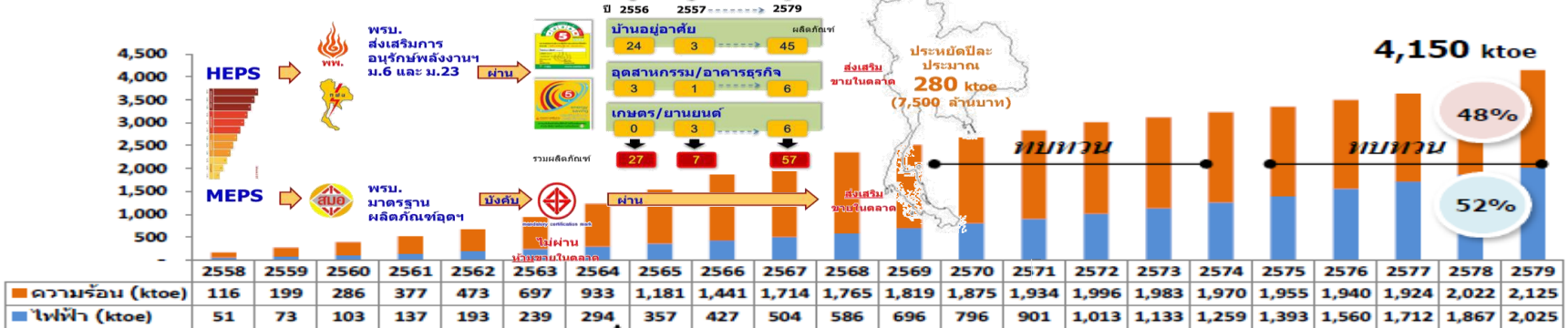
## 1. Measure for controlled factory and controlled building management



## 2. Measure for building standard

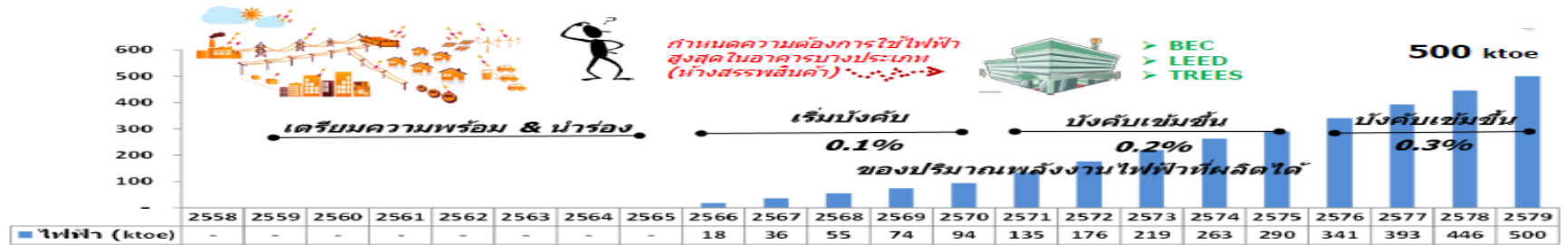


## 3. Measure on standard assessment and equipment labeling



# 10 Measures for Energy Efficiency (2/4)

## 4. Measure on compulsory energy efficiency standards for the production and distribution of energy (EERS).



## 5. Measure on financial support

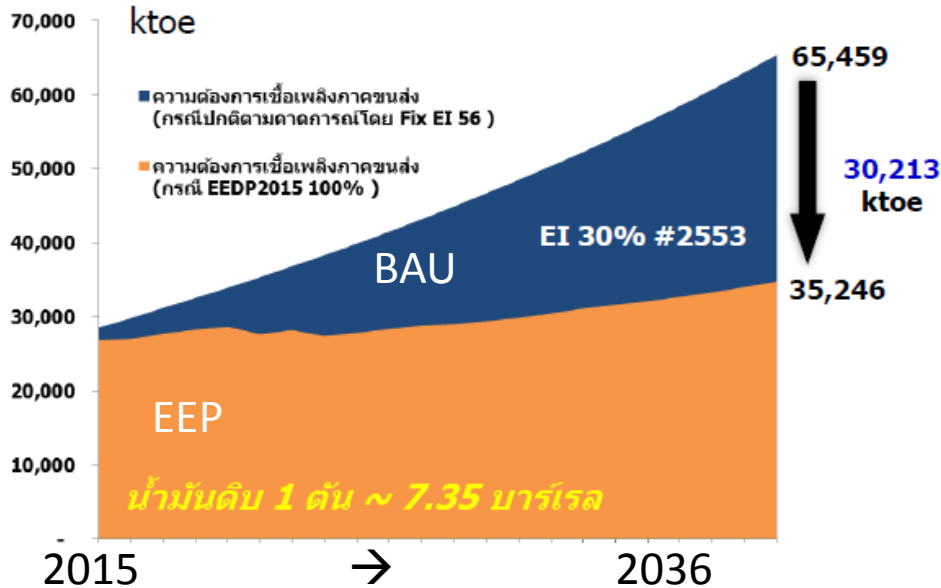


## 6. Measure on the use of Light Emitting Diode (LED)

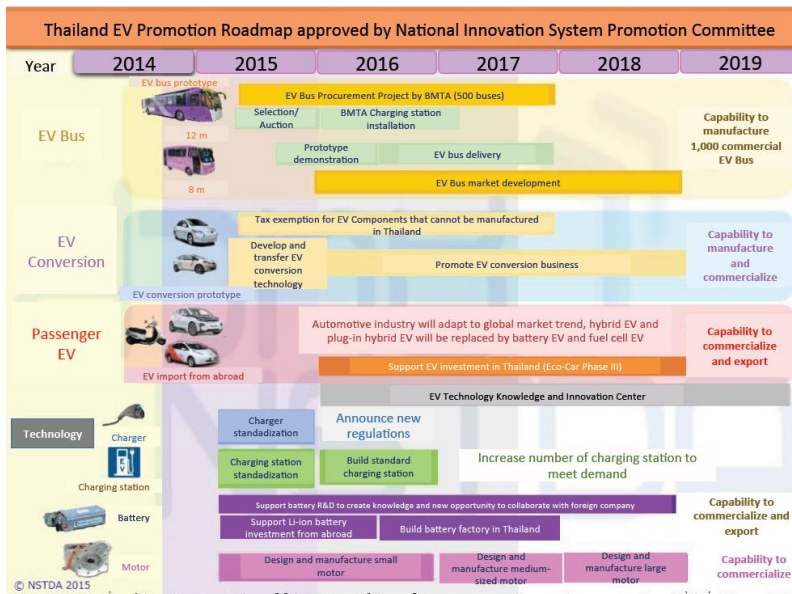


# 10 Measures for Energy Efficiency (3/4)

## 7. Measure on energy conservation in the transportation sector



	Energy saving potential (ktOE)	2015	2021	2036	%
EE7-1	Adjust fuel price structure		67	456	2%
EE7-2	Adjust vehicle excise tax structure	813	4,242	13,731	45%
EE7-3	Introduce car labeling		83	469	2%
EE7-4	Logistics and transportation management	9	160	1,360	5%
EE7-5	ECO driving		22	1,491	5%
EE7-6	Revolving fund for transport sector		104	588	2%
EE7-7	Financial mechanism (transport) SOP+DSM		394	1,216	4%
EE7-8	Transportation infrastructure (passenger, fuel)	894	1,151	4,857	16%
EE7-9	Double track train infrastructure		2,040	4,922	16%
EE7-10	Electric vehicles		75	1,123	4%
		1,716	8,338	30,213	100%



EV roadmap approved by National Innovation System Development Committee on 7 Aug 2015 (chaired by PM Gen. Prayut Chan-o-cha)

- ❑ Assumption of EV numbers refers to EPPO model 2013
- ❑ EV starts from 2018 with 1% annual growth rate till 1.2 million EVs in 2036
- ❑ EV targeted to replace gasoline car



# 10 Measures for Energy Efficiency (4/4)

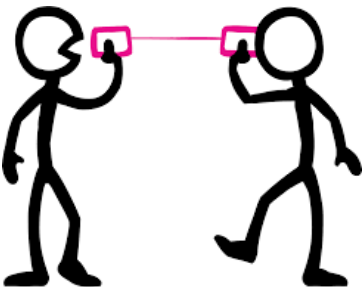
8. Measure for promotion of education, research, technology development on energy conservation



9. Measure on personnel development in energy conservation fields

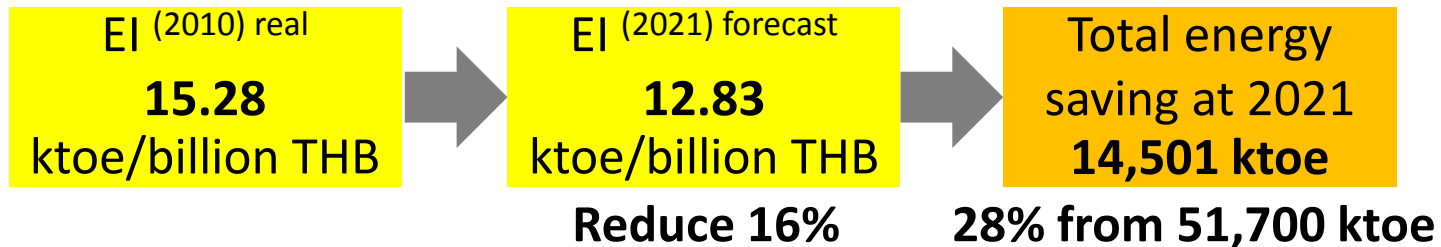


10. Measure to create public awareness on energy conservation



# Expected Outcome

- Funding from ENCON 123,200 Million THB or ~ 5,600 Million THB/year
- Reduce total energy consumption of 558,600 ktoe or 8,500 Billion THB over 22 yrs
- 1<sup>st</sup> 7-year of action plan (2015-2021)



	Measure	Output	Energy saving (ktoe) @2021
EE1	Energy management	Controlled factory 5,285 → 7,260 units Controlled building 3,008 → 4,400 units	2,237
EE2	Building code	New building 2,700 units	66
EE3	Equipment code	Improve 4 products, Label 27 products Improve A/C rated no 5 EER → SEER	1,277
EE4	EERS	Prepare law and regulation	
EE5	Financial	Standard Offer Program (SOP), DSM Bidding, Soft loan, ESCOs, Tax incentive	2,424
EE6	LED	Change 13 million bulbs (street light, govt building)	159
EE7	Transportation	Change excise tax structure (1 Jan 2016) / MRT 10 lines Double track railway 3,000 km / Expand fuel pipeline 600 km (North @2021) Energy saving tires 7.5 million units / Logistic system / 80,000 to truck	8,338
EE8,9,10	R&D, HRD, PR		
<b>Total energy saving (ktoe)</b>			<b>14,501</b>







Energy Policy  
and Planning Office

**MINISTRY OF ENERGY**

**Thank you for your attention**  
**[www.eppo.go.th](http://www.eppo.go.th)**



"We can't afford long term planning. We may not even be here tomorrow."

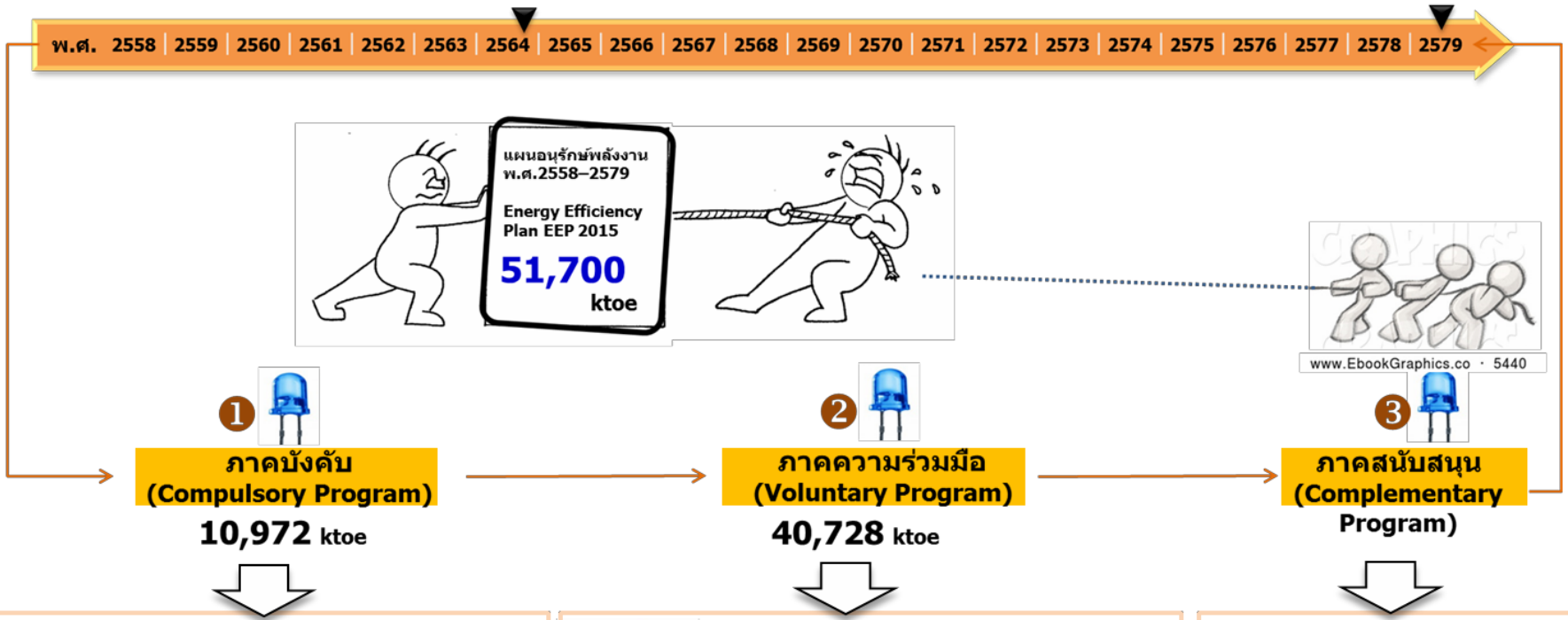


**TIEB**

THAILAND INTEGRATED ENERGY BLUEPRINT

# Energy Efficiency Strategic Plans

## 3 Strategies 10 Measures



**Energy Efficiency Resource Standards (EERS)**  
EGAT, PEA, MEA

พรบ อนุรักษ์พลังงาน, กฎกระทรวง

ค่าธรรมเนียมพิเศษ

โรงงานควบคุม, อาคารควบคุม,  
อาคารของรัฐ อาคารใหม่  
เครื่องจักร อุปกรณ์ ยานยนต์

Standard Offer Program, DSM Bidding,  
Soft loan, ESCOs, Tax Incentive,

LED

R&D  
New product technology

ทุนวิจัยอุดมศึกษา ทุนปริญญา ตรี โท เอก  
ผู้รับผิดชอบด้านพลังงาน อาวุโส, สามัญ  
ผู้ตรวจสอบและรับรองการจัดการพลังงาน

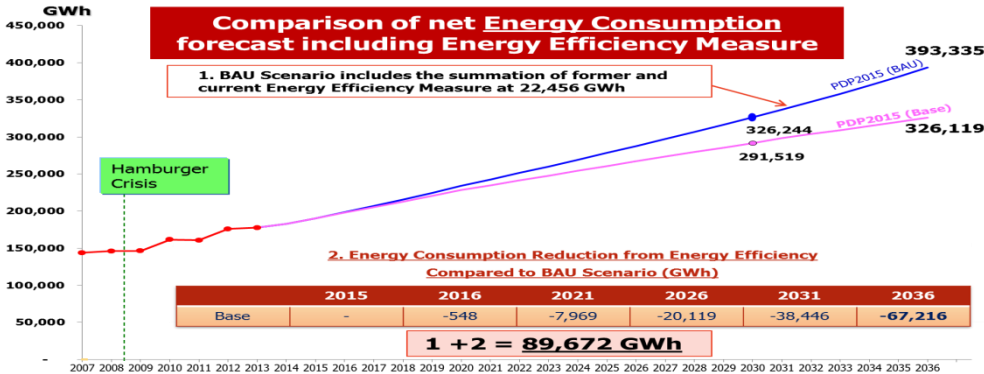
PA+ PR

ติดก่อนใช้

PDP

- **Increase Energy Balance**
- Clean coal Technology
- Coal Center

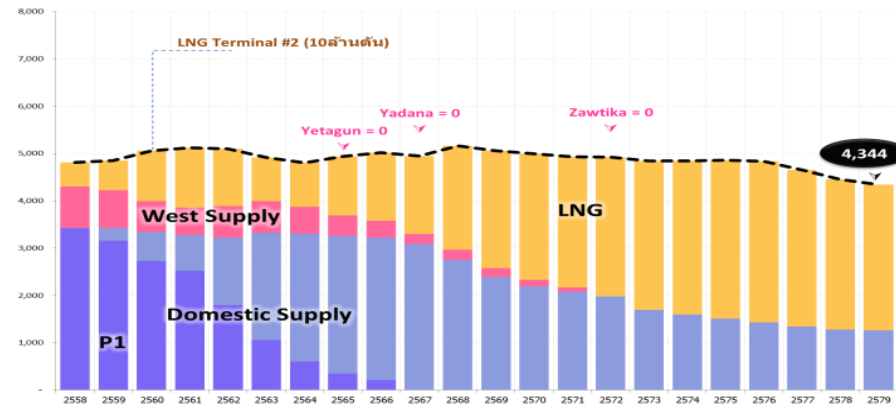
Load Forecast from 2015 - 2036



Gas Plan

- **Extend Natural Resources**
- Support Exploration & Production in Thailand

ล้านลบ.ฟุตต่อวัน ที่ความดัน 1000 บาร์เทียบเป็นลบ.ฟุต



Oil Plan

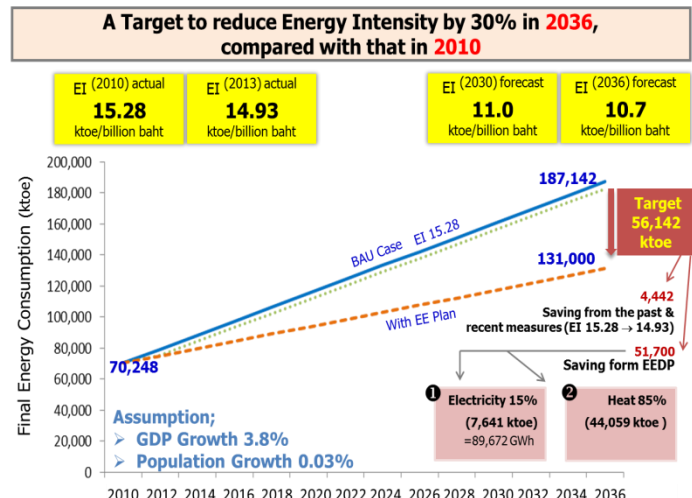
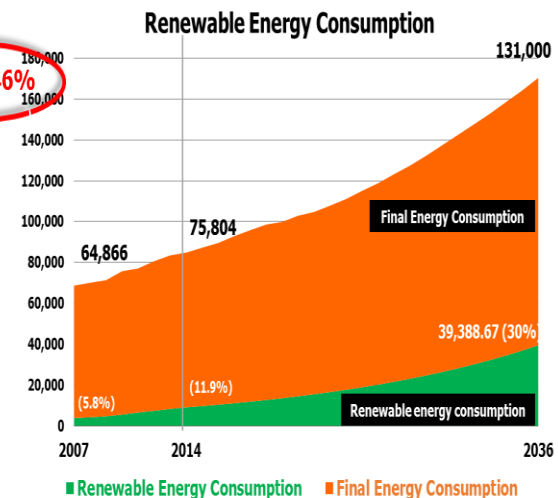
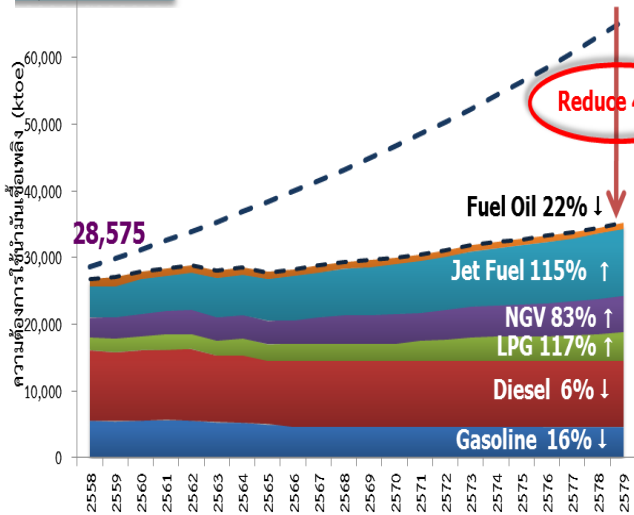
- **Extend Natural Resources**
- Support Exploration & Production in Thailand

AEDP

- **Promoting : Waste to Energy, Biomass, Biogas, Solar Energy**

EEP

- **Reflexing World Oil Price**
- **Energy Efficiency Mitigation**



# Thailand's opportunity in light of emerging technology, market condition and resource base

## Thailand resource base

- **Biomass/biofuels:** Abundant agricultural feedstock
- **Solar PV:** Good radiation because Thailand is only 1,500 km. away from equator
- **Hydro Power, Oil & Gas:** Proximity to countries with untapped resources (Laos, Myanmar, Cambodia)

## Technology

- **Renewable Power:** Rapidly declining cost of solar
- **Biofuels:** Prospect of 2<sup>nd</sup> generation (Cellulose) and 3<sup>rd</sup> generation (algae)
- **Coal Power:** High efficiency, low emissions clean coal technology now on-stream (USC, IGCC)
- **Oil & Gas:** Breakthroughs in extraction and recovery (Shale Gas, Unconventional Oil)

## Window of opportunity for Thailand

## Market condition

- **Oil price decline:** and growing momentum for **subsidy reform** across ASEAN
- **AEC integration:** catalyst for cross-country projects and infrastructure interconnections

# Plans need to include “bold moves” to shape Thailand outcomes

## Conventional power (PDP)



### Description

- **Rebalance power mix** with clean coal technology deployment for half of all new thermal plants
- **Coal Center**

### Impact

- Reach **25% coal in power mix** vs. 20% today
- **20% clean coal** vs. only normal coal today

## Energy Efficiency



- **Remove subsidies** to convey market price signal
- **Accelerate EE execution** via benchmarking, accountability and enforcement

- Achieve **30% energy intensity reduction**

## Renewables (AEDP)



- **Three pronged approach for cost effective scale up of renewables:**
  - Drive: Waste Biomass and Biogas
  - Pace: Solar
  - Monitor: Wind

- **Achieve cost < LNG** parity for 20% RES share in power mix (vs. ~8% today)

## Biofuels (AEDP)



- **Improve yield** to limit oil imports, increase bio-fuels and benefit rural community

- **~20% substitution in transport** (vs. 4% today)
- Up to THB 50 Bln/y GDP impact

## Oil & Gas



- **Counter production decline** with E&P activity stimulus policies (“Reimagine Gulf of Thailand”)

- Limit domestic gas **decline rate at ~2-5% p.a.** (vs. -11% BAU)

## Economics



- **Channel subsidies directly** to target segments in need

- Unleash **THB ~380B** for productive use



# Incorporating “bold moves” will make Thailand internationally competitive along the five energy dimensions

## Outcome of plans

### Oil & Gas

- Domestic gas @ ~2% decline rate i.e. 2.2 bcf/d in 2036

### EEDP

- 30% energy intensity reduction
- Fossil fuel subsidy removal, tgt. subsidies

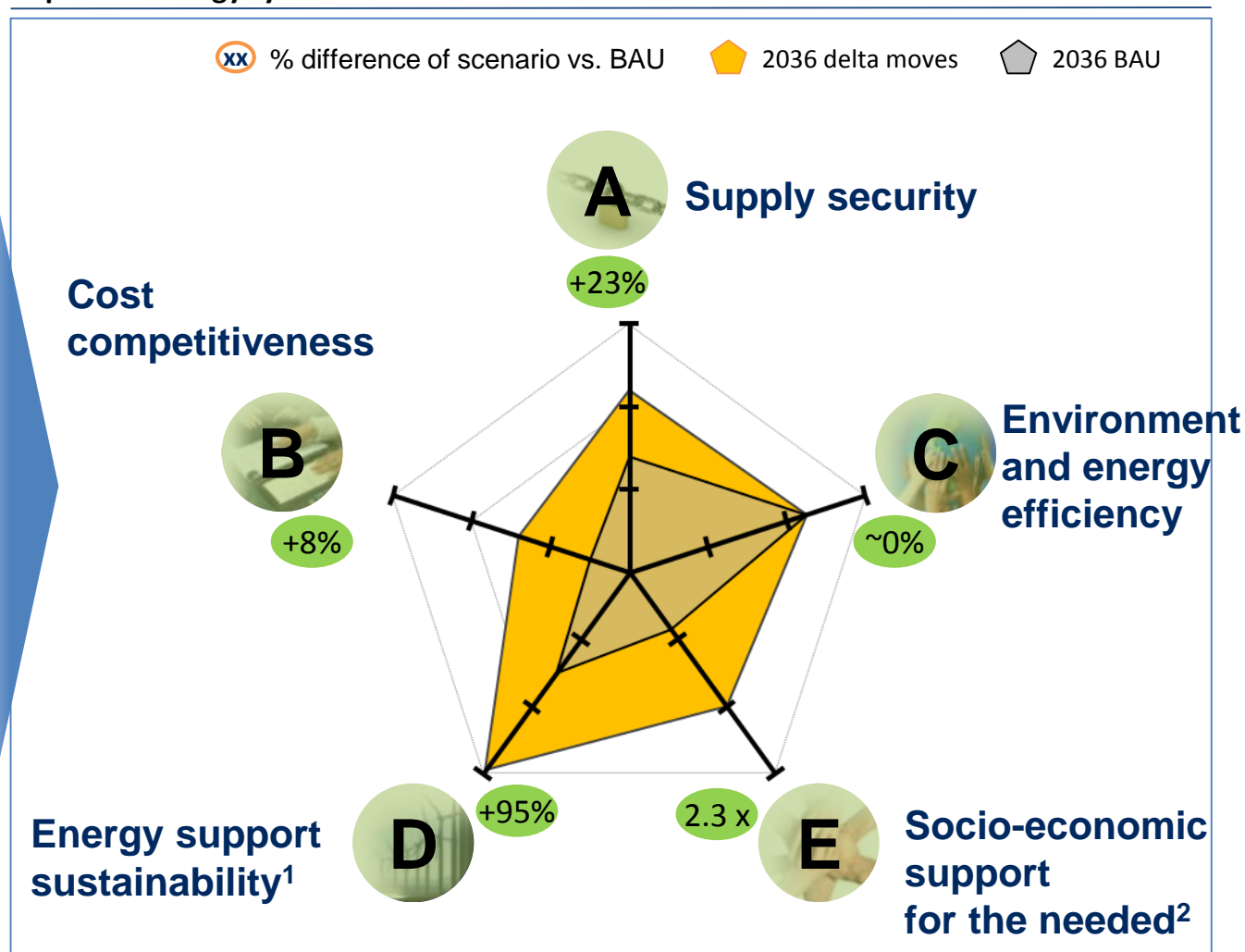
### PDP

- (conventional power)
- 30% coal fired power

### AEDP

- 20% RES generation
- 19% oil demand met by biofuels @ cost parity

## Impact on energy system



1 Assuming fossil fuel subsidies are removed, but renewables are still subsidised; estimates based on Brazil case study

2 Assuming similar average success rate as other targeted subsidy schemes such as Bolsa Familia in Brazil