



Thailand Perspective on Future Energy Market

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Presentation Outline

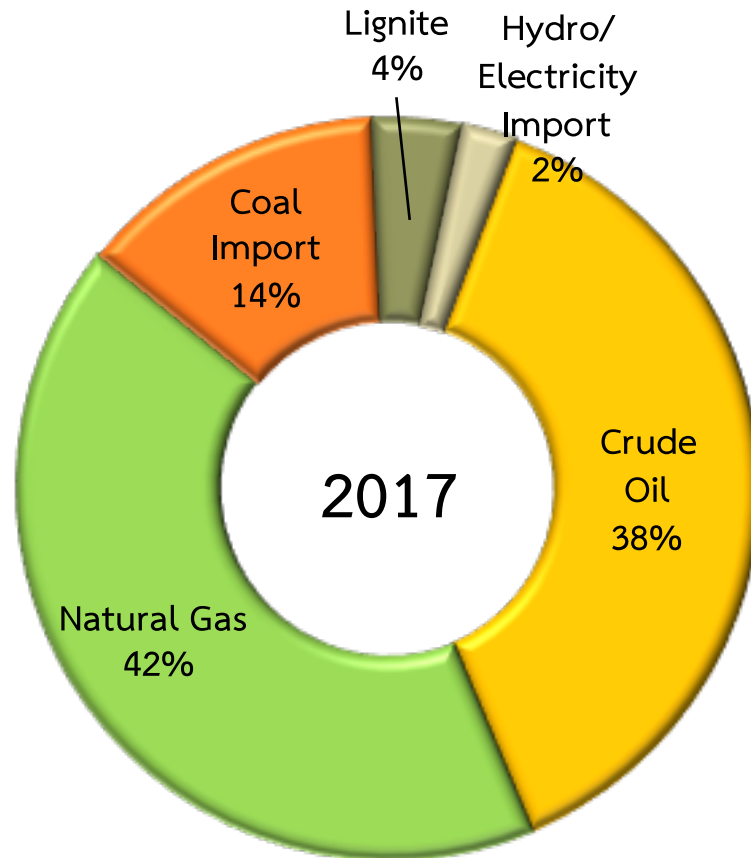
- Thailand's Natural Gas Situation
- Fuel Mix for Thailand's Electricity Generation
- Nuclear in Power Development Plan (PDP)
- History of Nuclear in Thailand
- Importance of Sustainability in the Future Energy Market
- Conclusion



Thailand's Natural Gas Situation

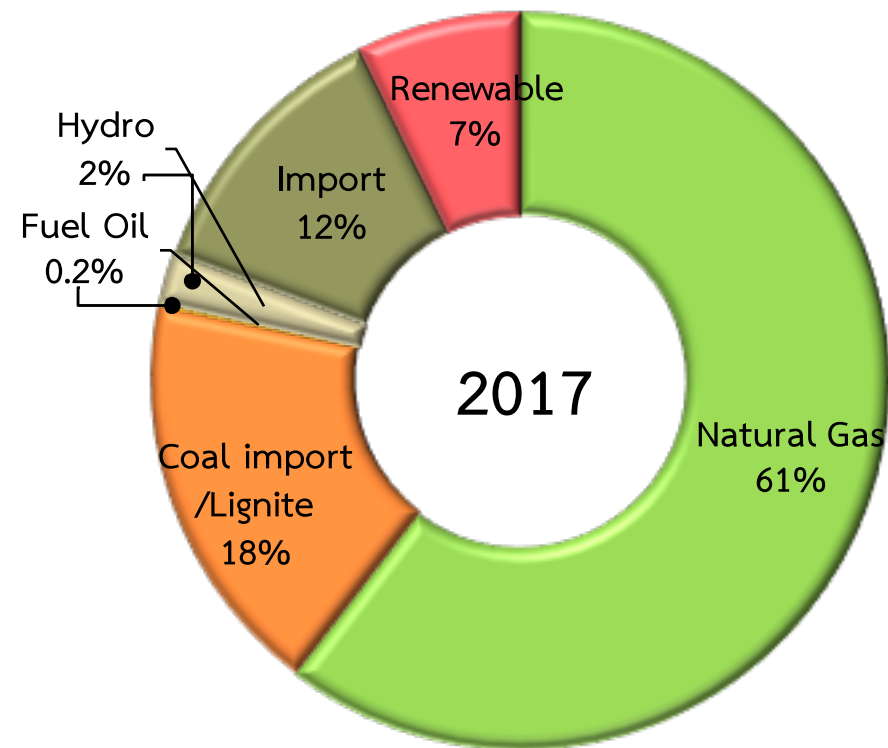
Thailand's Primary Energy Demand and Electricity Generation (EPPO 2017)

Primary Energy Demand



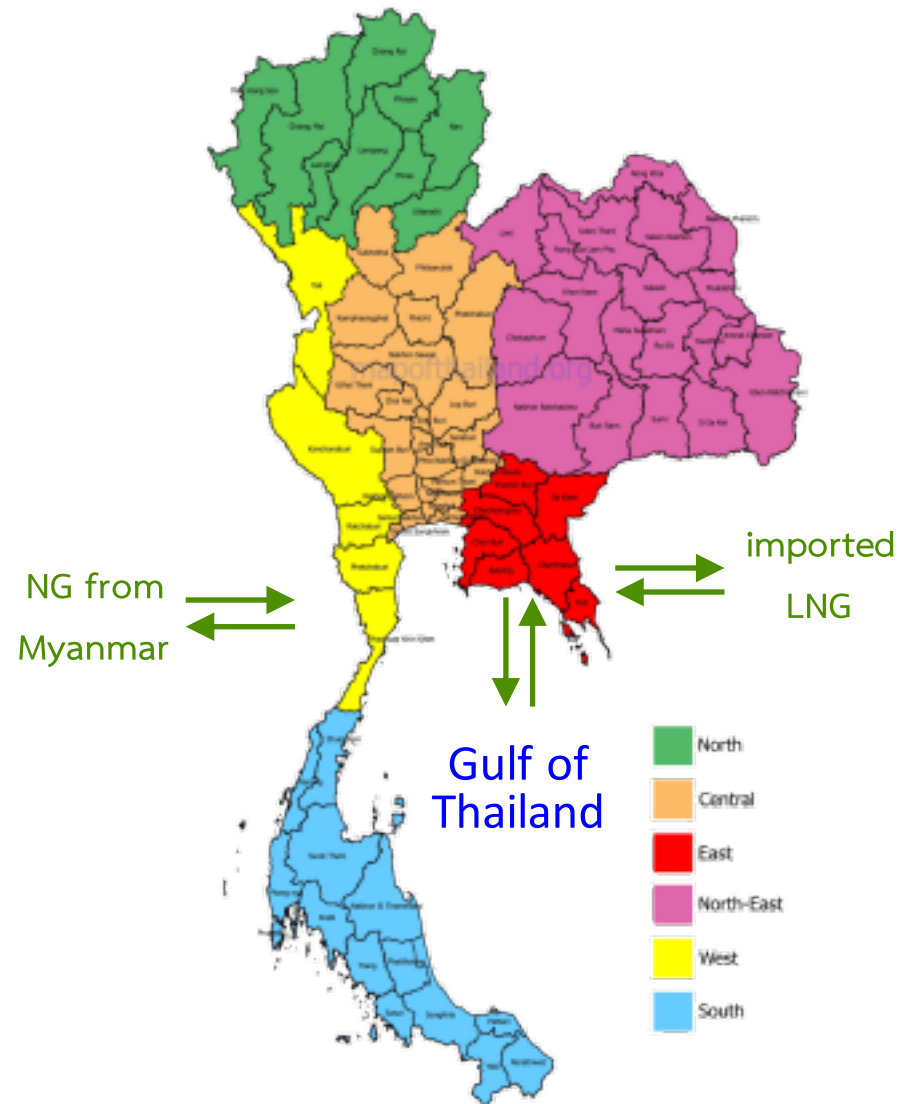
Total of 2,133 MBOEPD

Electricity Generation



Total of 185,674 GWh

Where are the sources of Thailand's Natural Gas ?

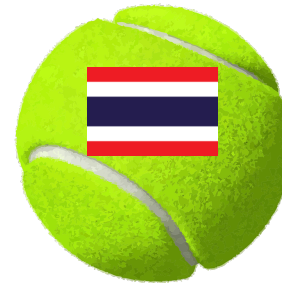




Unfortunately . . .

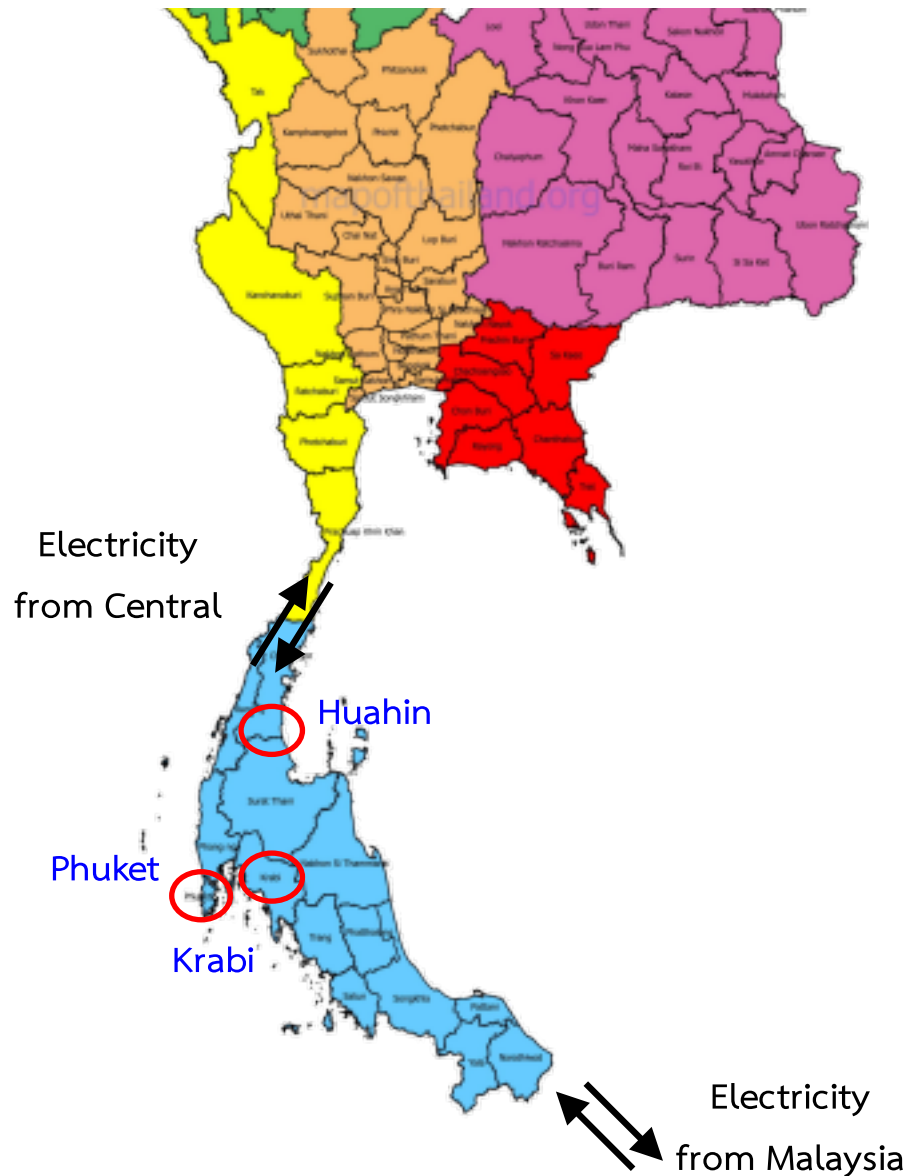


Petronas Towers

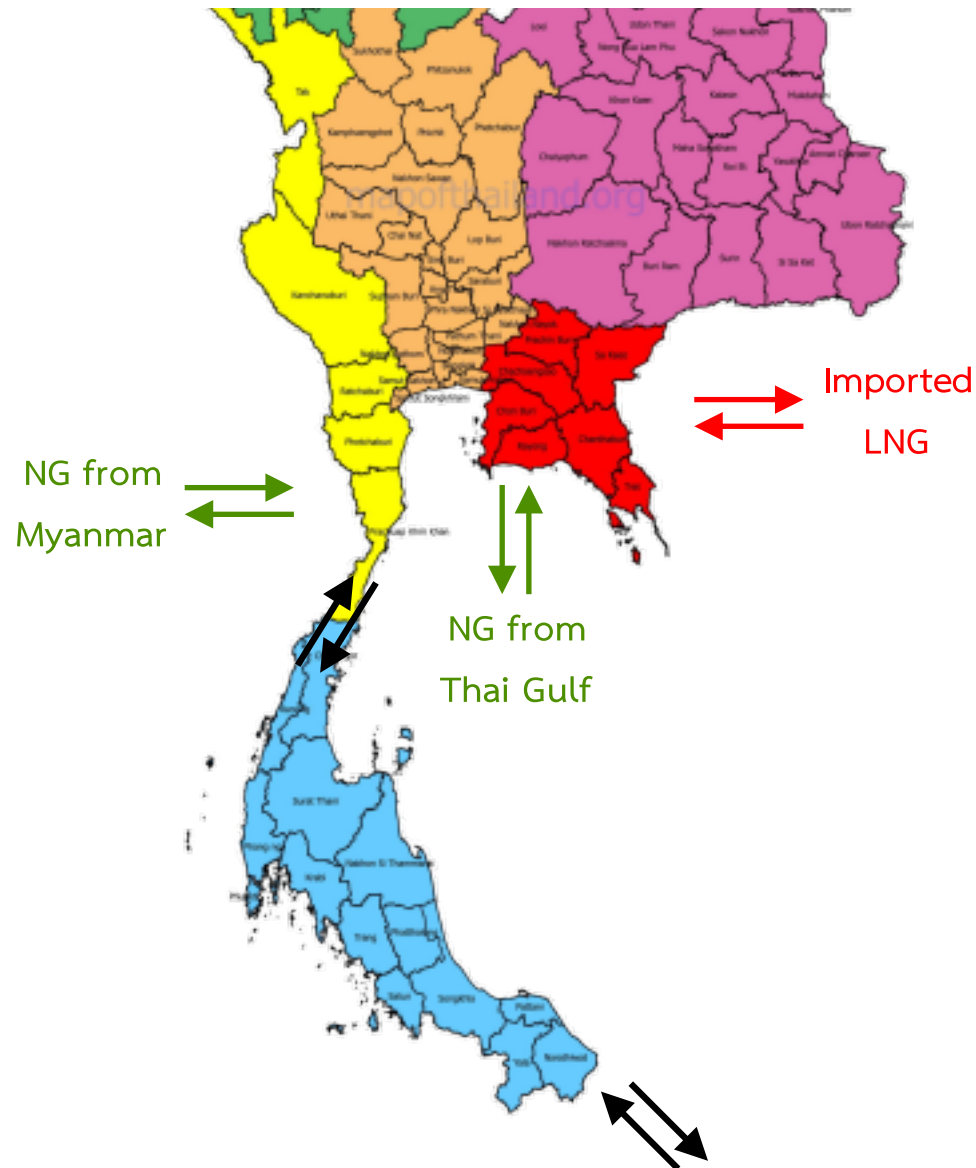


Not to scale

Electricity Consumption in Southern Thailand

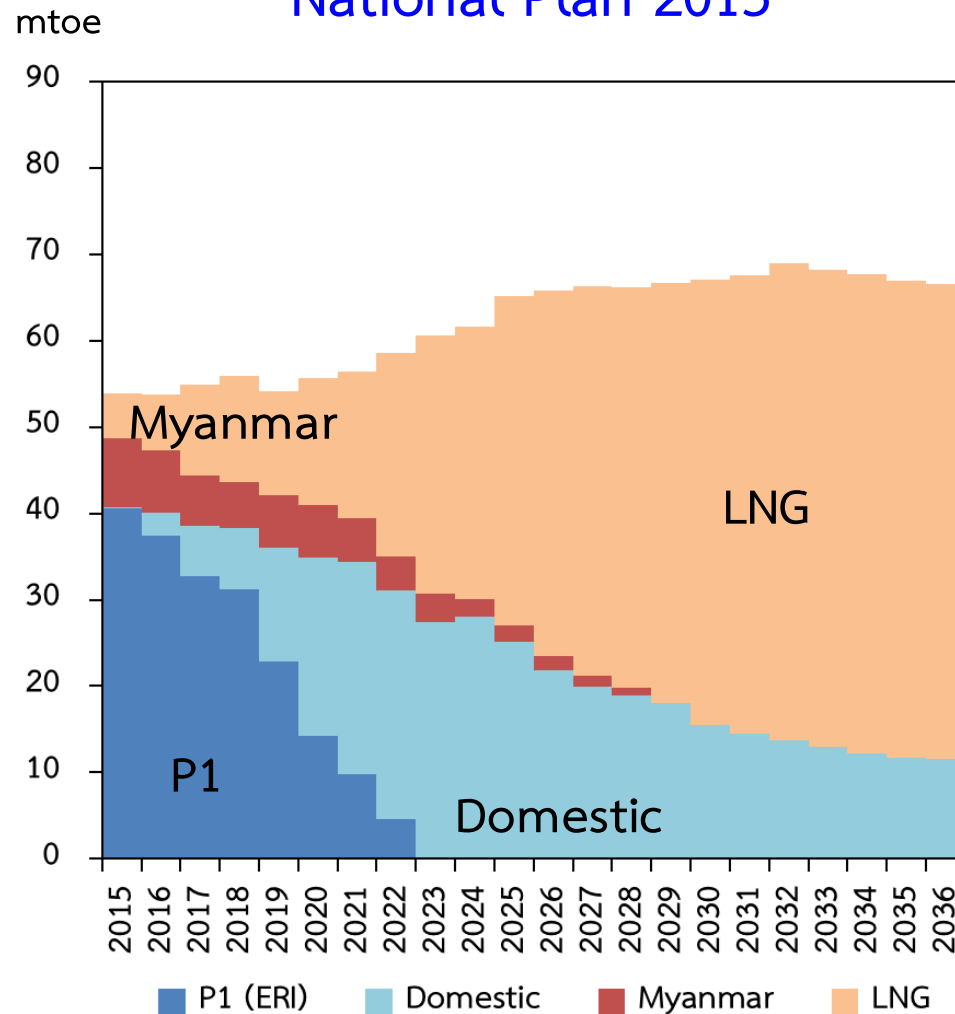


Natural Gas vs Electricity Generation

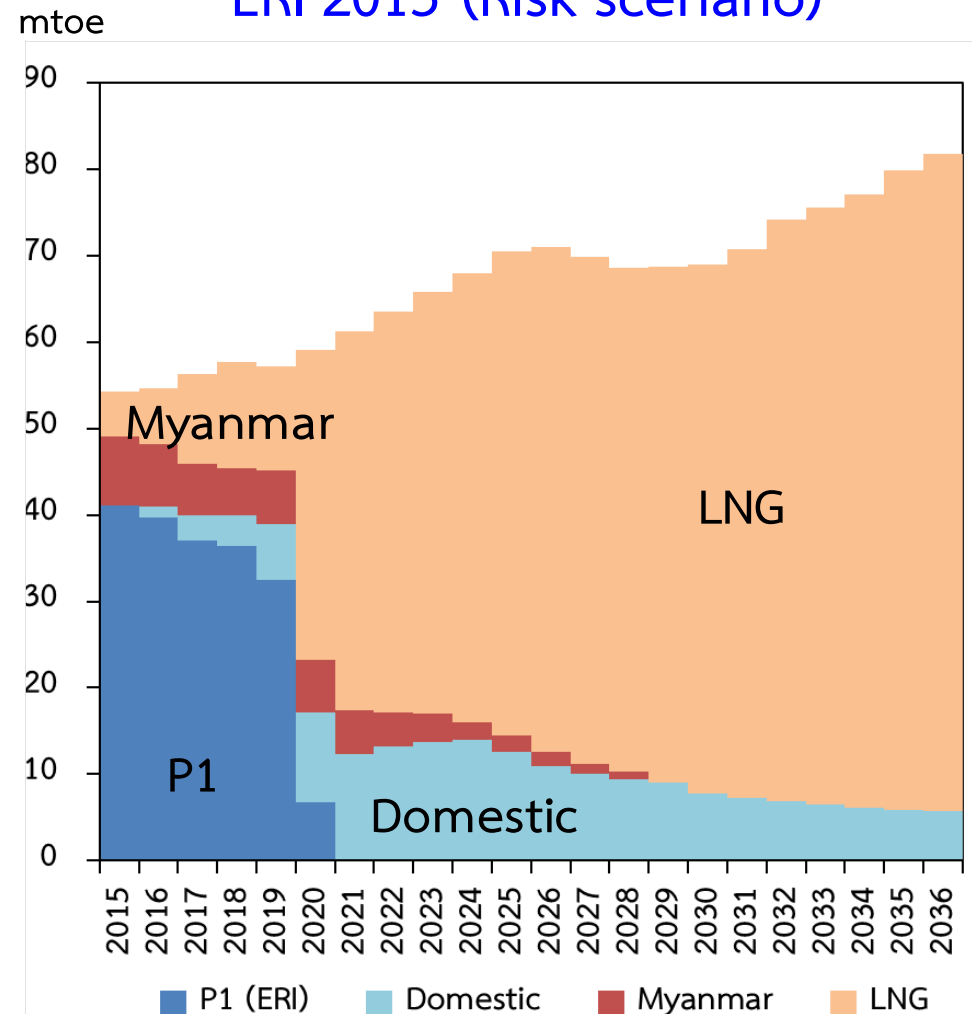


Thailand's Natural Gas Supply (ERI 2016)

National Plan 2015



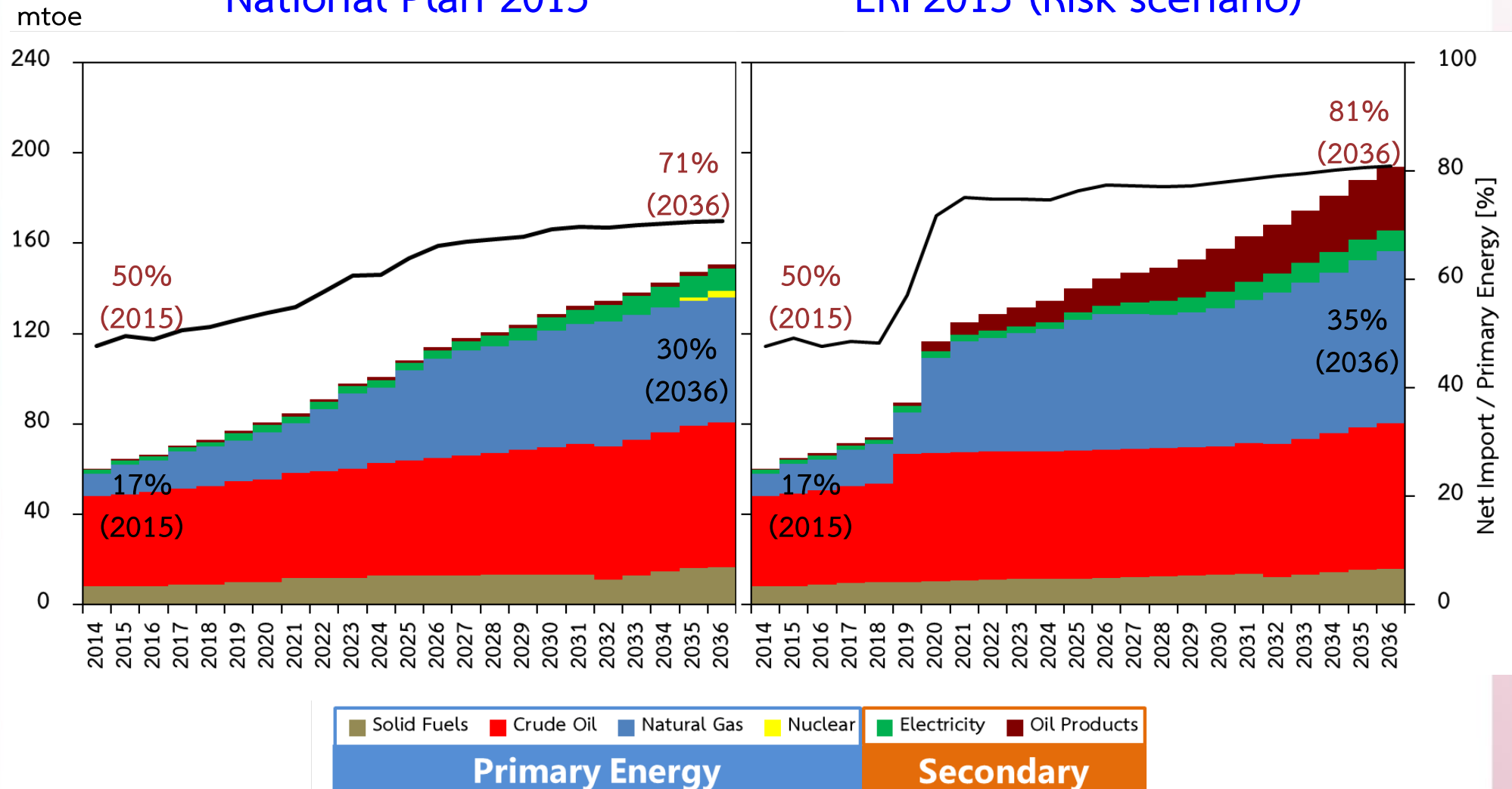
ERI 2015 (Risk scenario)



Thailand's Net Import (ERI 2016)

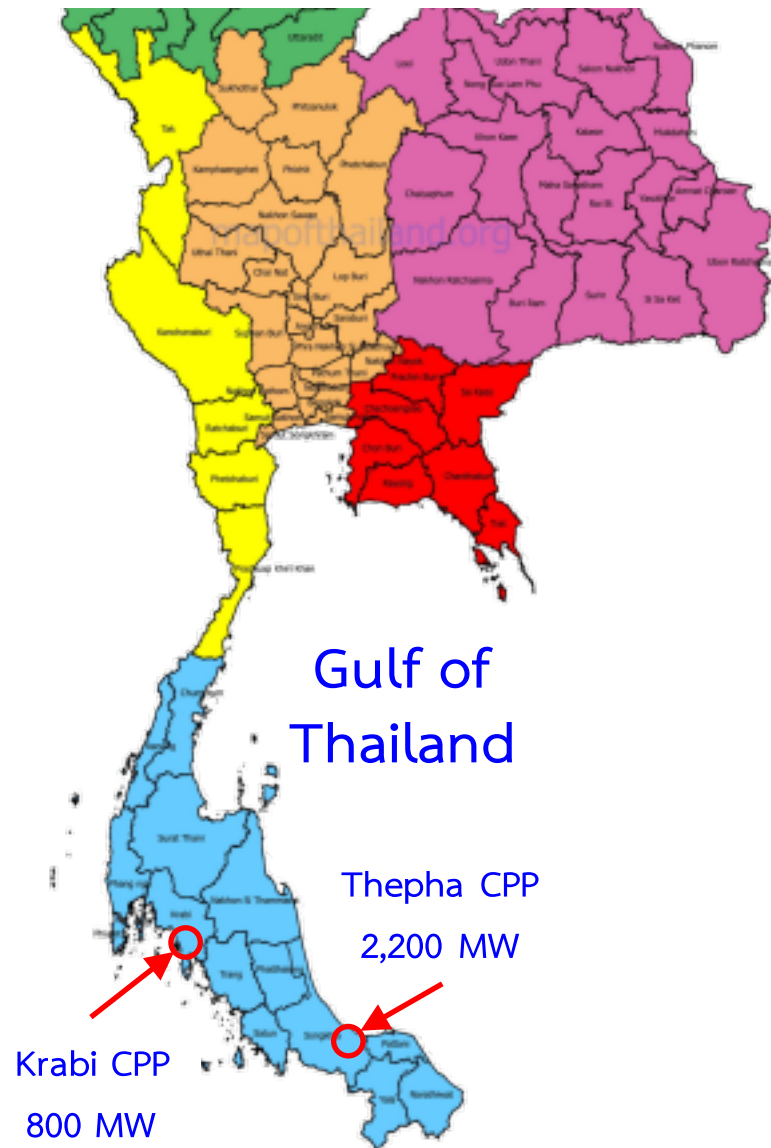
National Plan 2015

ERI 2015 (Risk scenario)

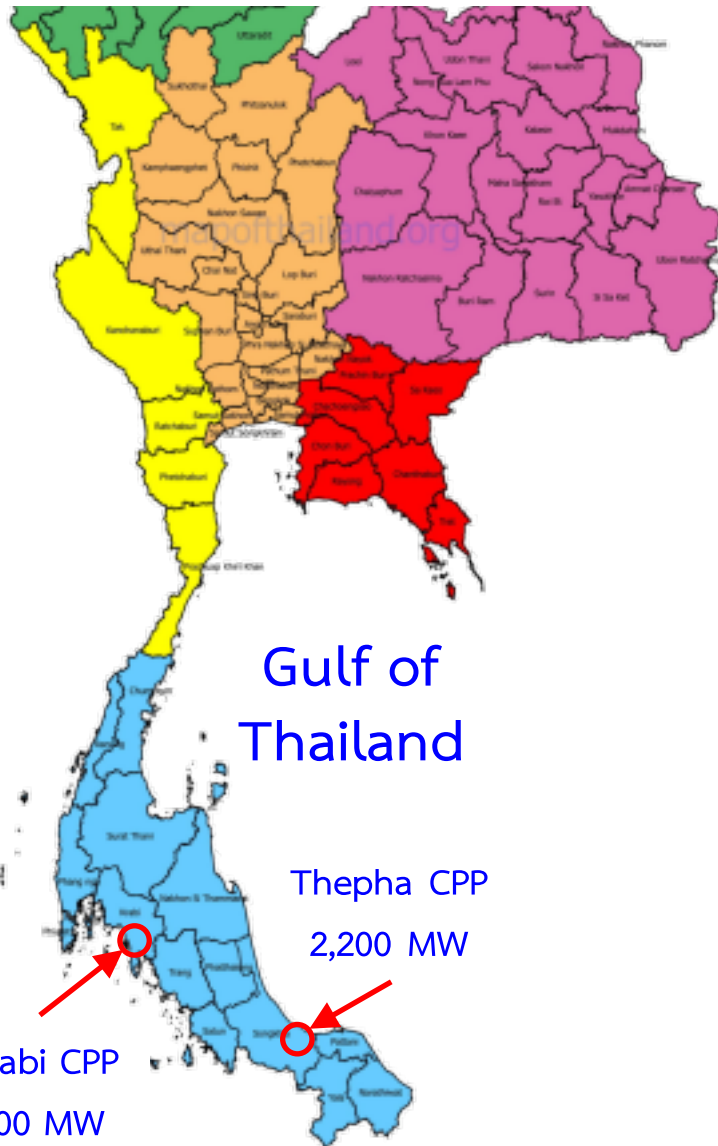




Coal-fired Power Plant



~~Coal-fired Power Plant~~



Coal-fired power plant projects in Krabi and Thepha put off for 3 years

in **Business, Editor's Choice** | February 03, 2018 | (959 views) | By **Thai PBS**

Like 12 Share Tweet G+

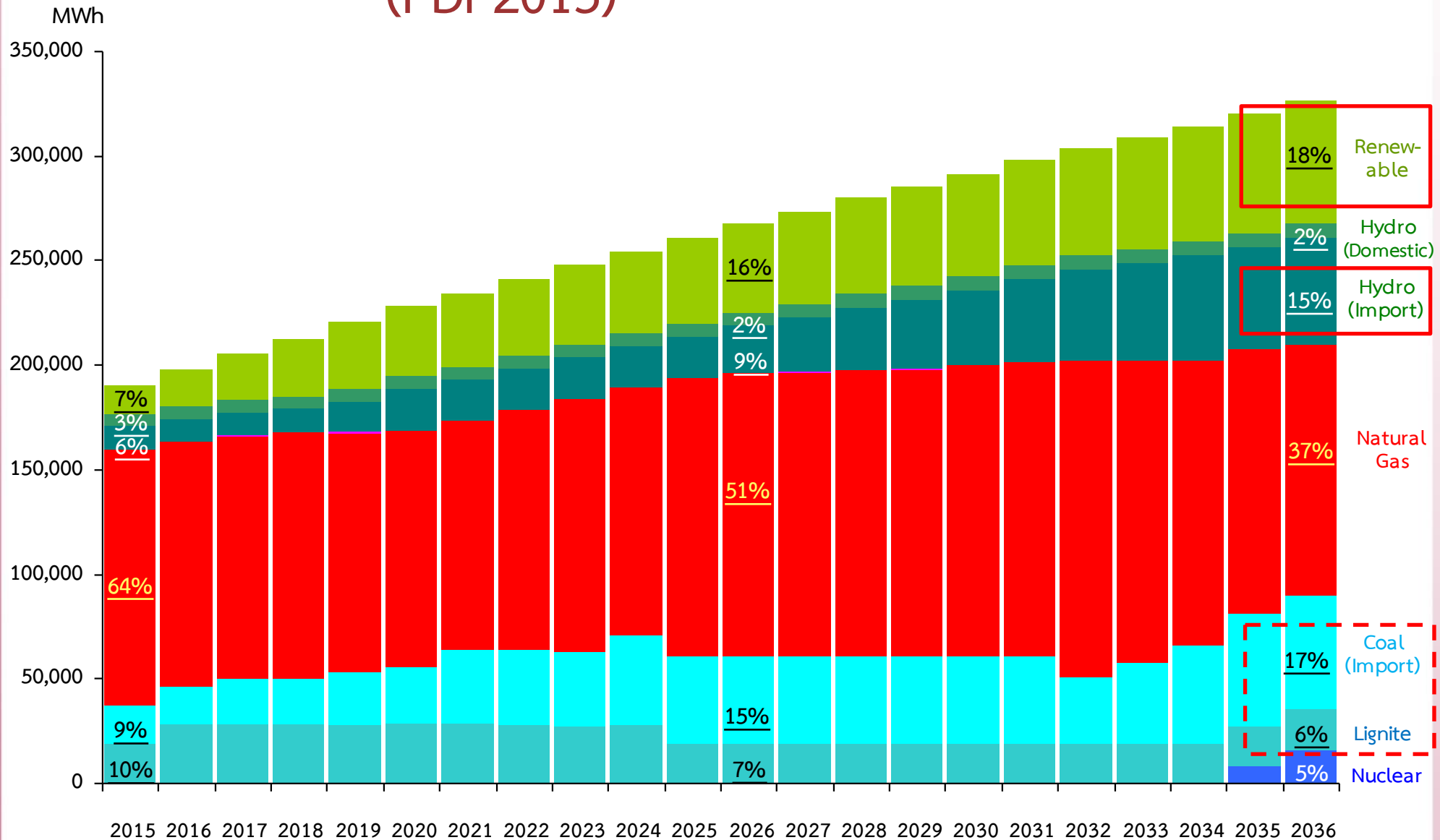


The Ministry of Energy has decided to put on hold two coal-fired power plant projects in Krabi and Thepha district of Songkhla for three years pending additional EHA (environmental and health impacts assessment) and EIA (environmental impacts assessment) studies.



Fuel Mix for Thailand's Electricity Generation

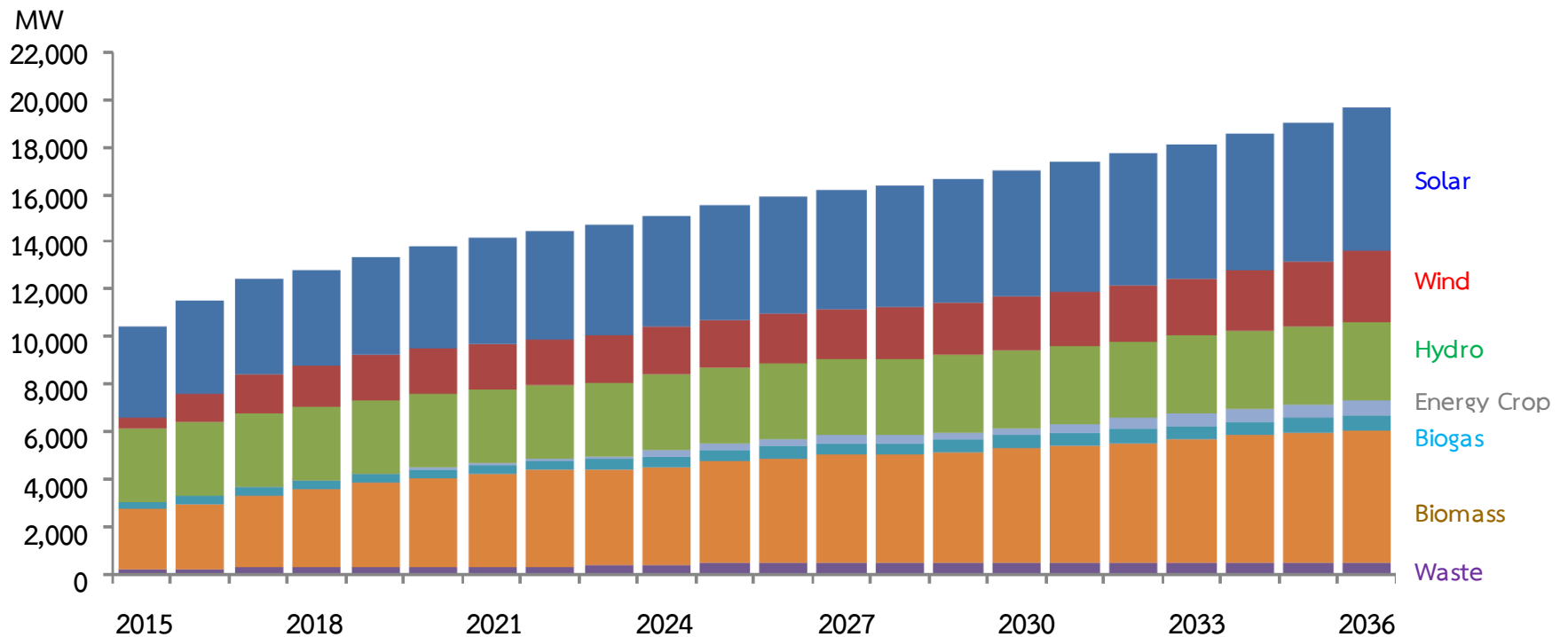
Fuel Mix in Power Development Plan (PDP2015)





Renewable Energy Promoting Policy

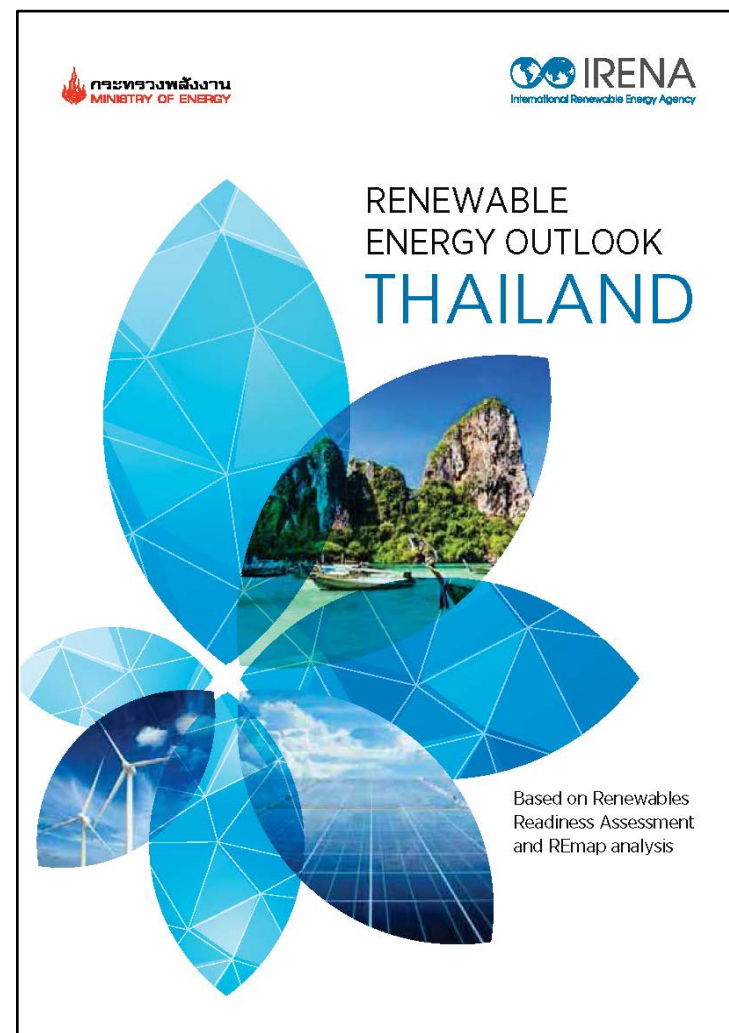
| | | Waste | Biomass | Biogas | Energy crop | Hydro | Wind | Solar | Total |
|---------------|-------------------|-------|---------|------------|-------------|---------|--------|------------|--------|
| | ประเภท | ขยะ | ชีวมวล | ก๊าซชีวภาพ | พืชพลังงาน | พลังน้ำ | พลังลม | แสงอาทิตย์ | รวม |
| Capacity 2014 | กำลังผลิต ปี 2557 | 48 | 2,199 | 226 | - | 3,016 | 220 | 1,570 | 7,279 |
| Capacity 2036 | กำลังผลิต ปี 2579 | 501 | 5,570 | 600 | 680 | 3,282 | 3,002 | 6,000 | 19,635 |



Renewable Energy Outlook: Thailand

by IRENA, November 2017

- Renewable Energy can account for 37% of Thailand's Energy Mix by 2036
- Fuel Mix in Power Development Plan (PDP2015) is 18%
- Renewable Energy can be **DOUBLE** from PDP2015

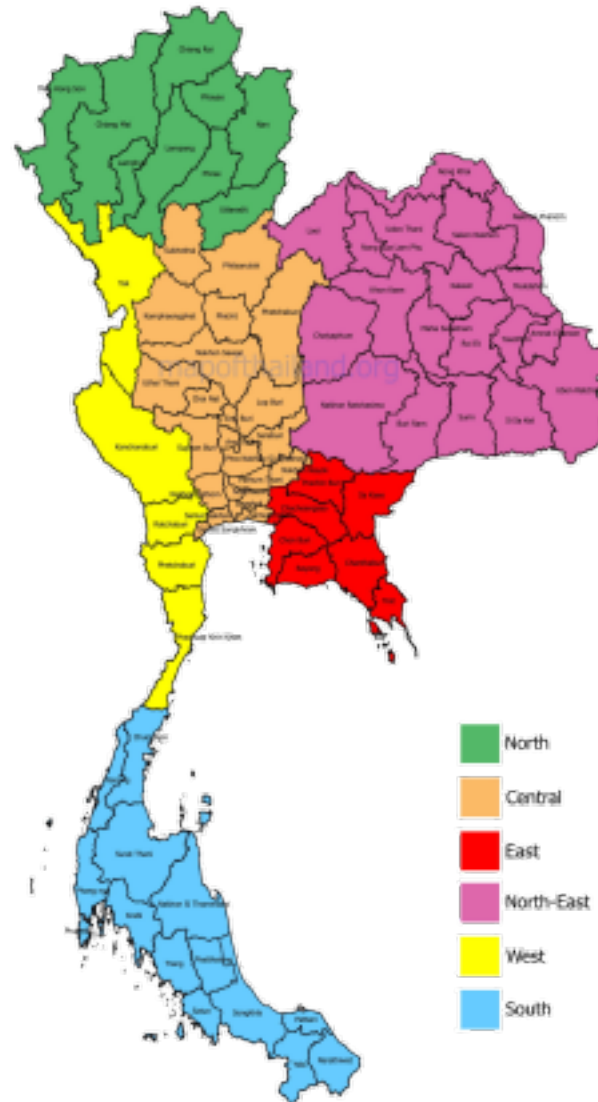




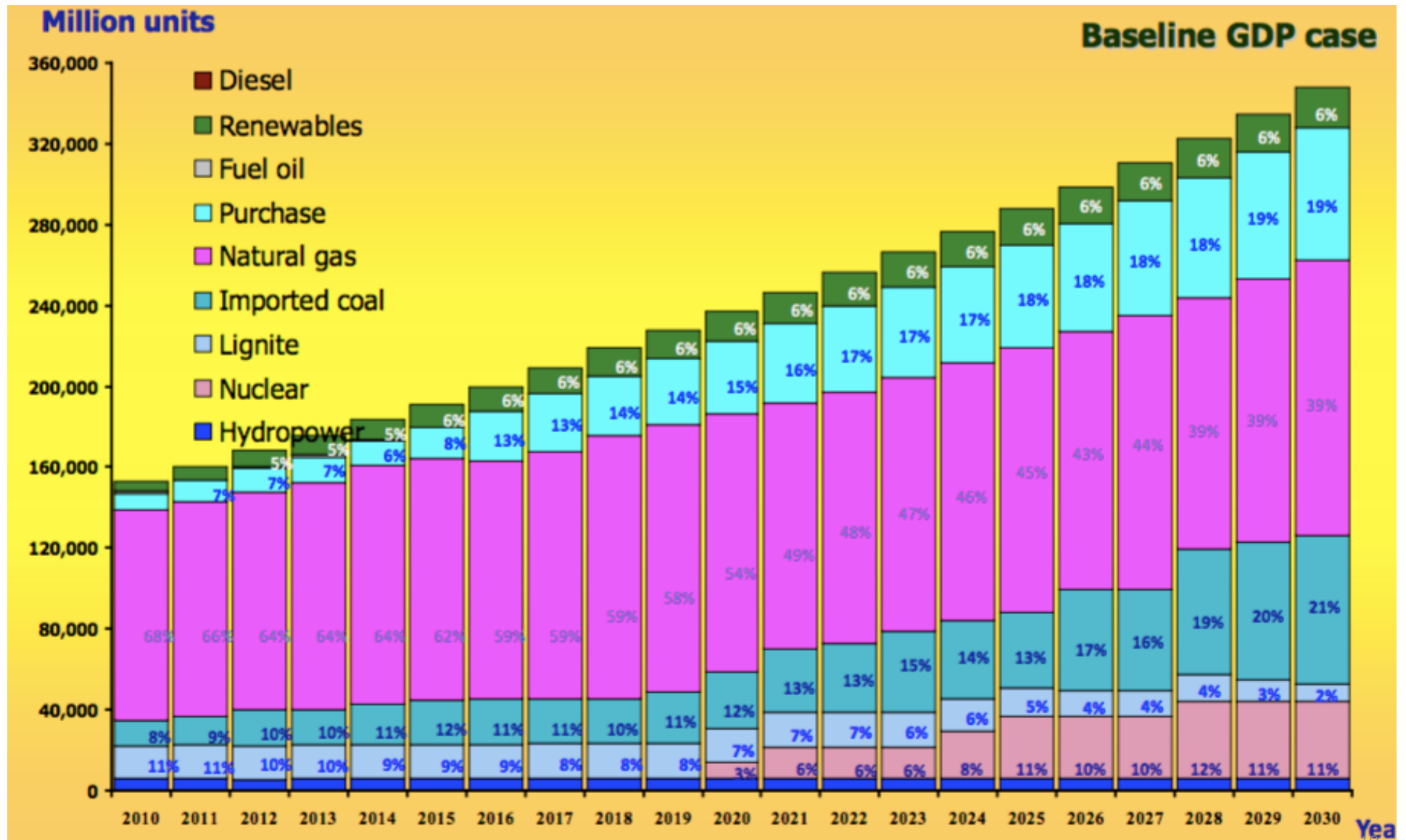
Nuclear in Power Development Plan (PDP)



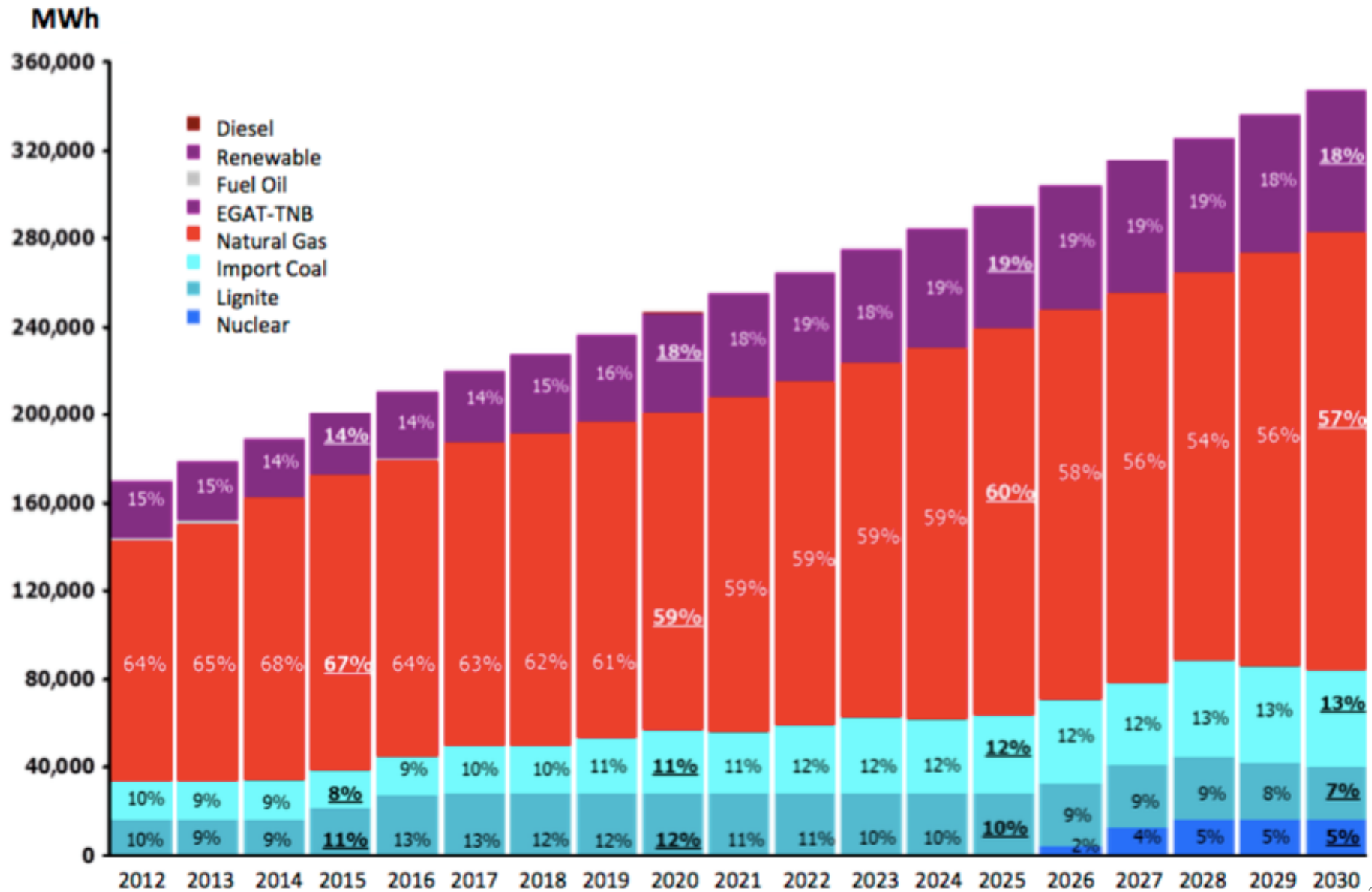
Where is the best place for NPP ?



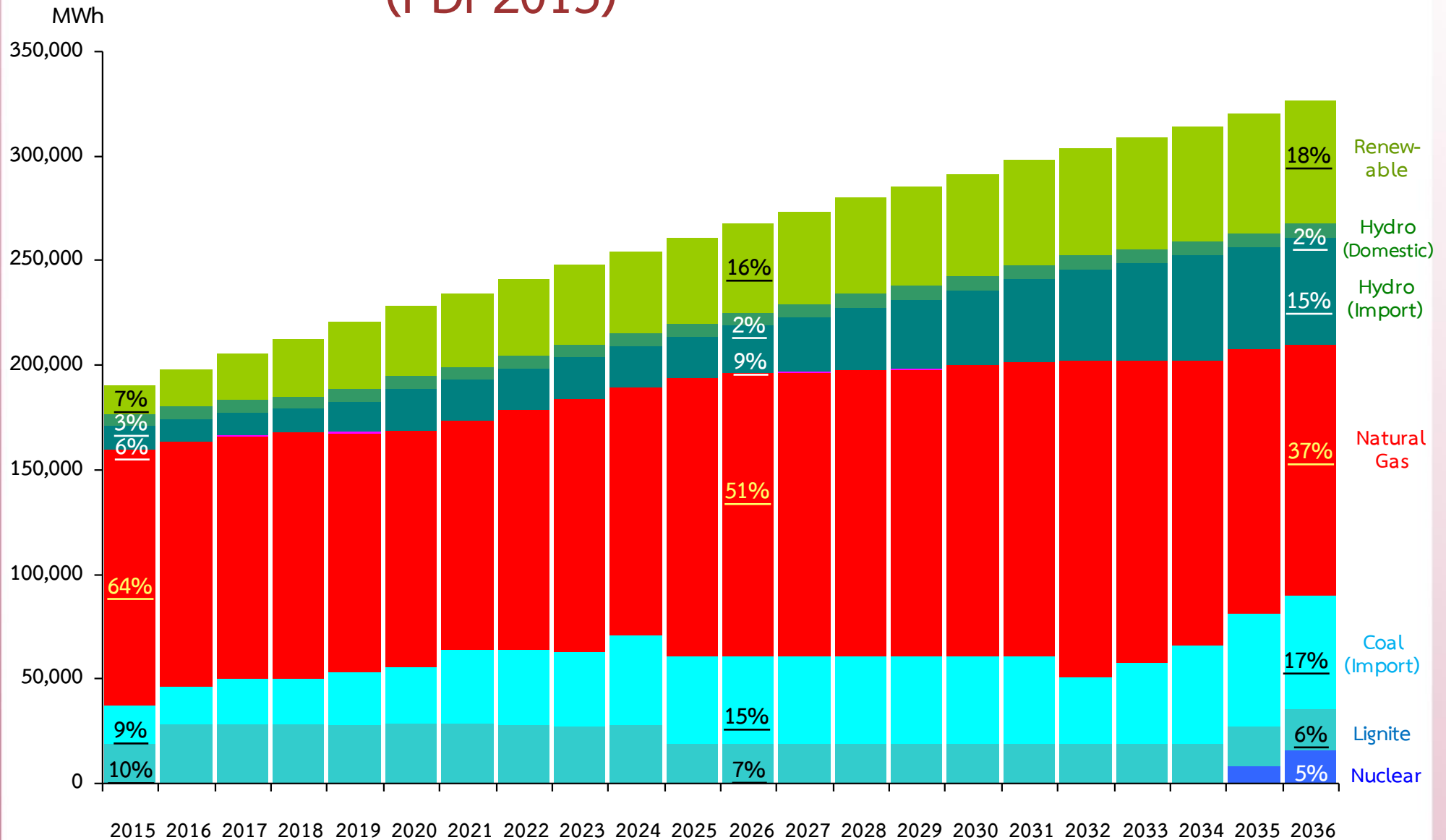
Fuel Mix in Power Development Plan (PDP2007)



Fuel Mix in Power Development Plan (PDP2010)



Fuel Mix in Power Development Plan (PDP2015)





History of Nuclear in Thailand

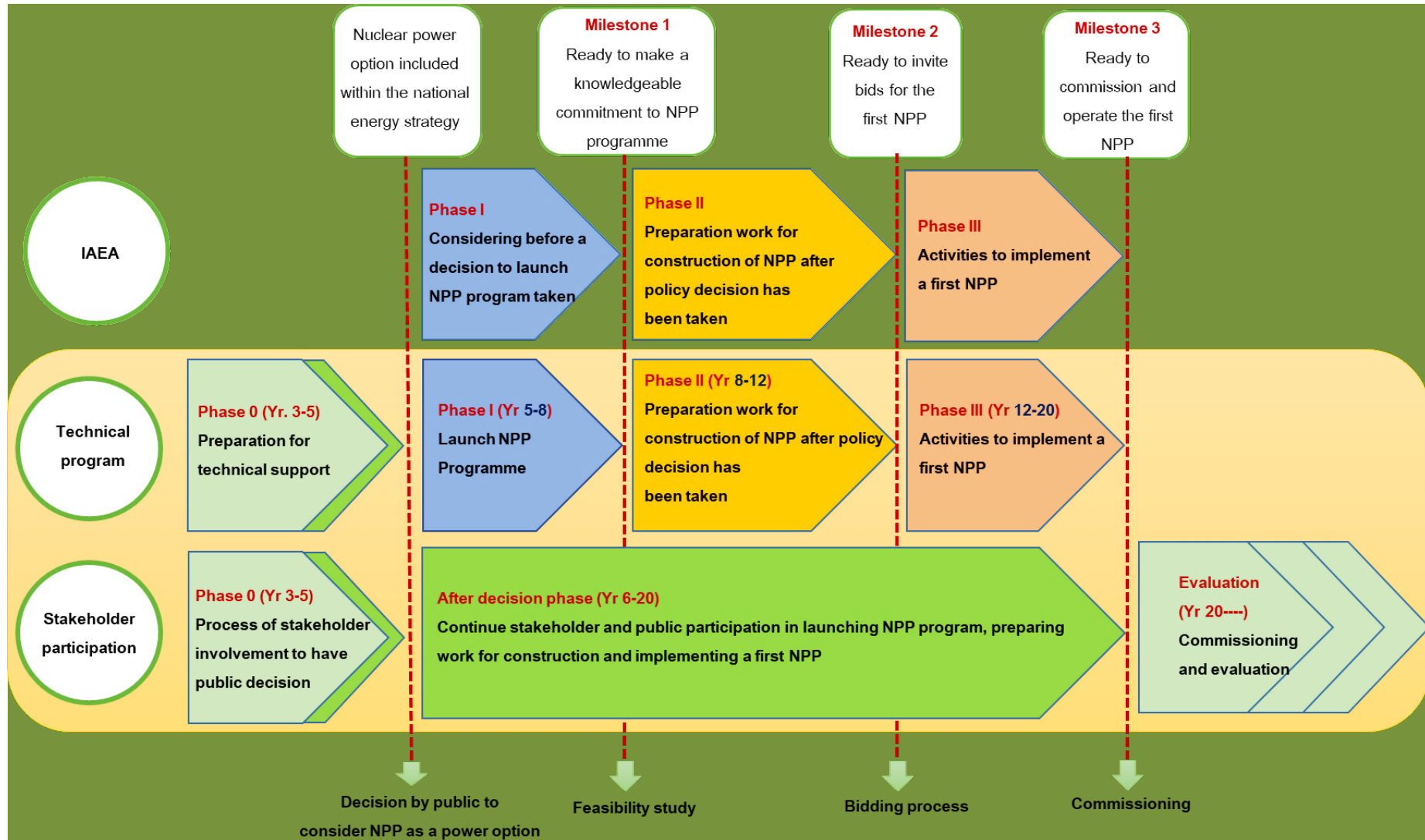
Nuclear Power Plant Project in Thailand

- 1966 : EGAT proposed NPP project to the government
- 1970 : IAEA agreed with the preparation site for NPP in Chonburi
- 1972 : Government agreed with 600 MWe of BWR
- 1976 : Proposed for a bidding process
- 1978 : **Indefinite suspended** (Natural Gas found)
- 1982-1991 : EGAT found 5 appropriately sites
- 1992-1995 : Detailed study, Environmental study
- 1997 : Cabinet set up NPP committee
- 2007, 2010, 2015 : **Cabinet approved PDP2007, PDP2010, PDP2015**

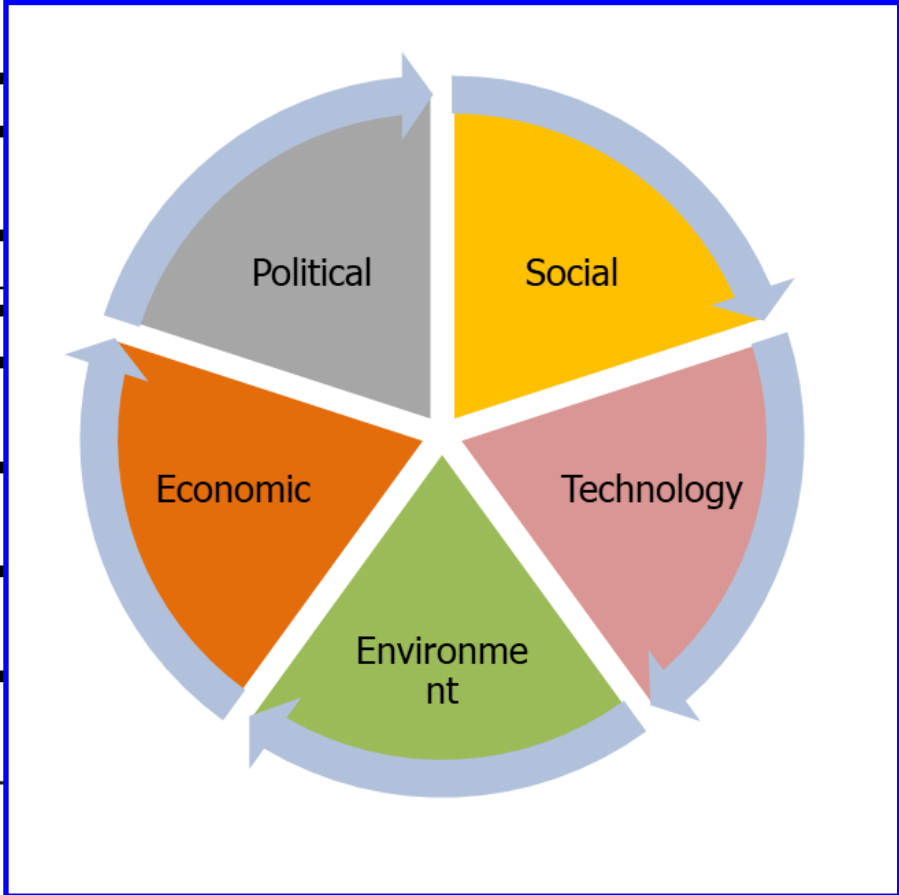


A Study on Readiness Preparation for the Safe Utilization of Nuclear Energy for Electricity Generation, 2016

Thailand's Nuclear Power Infrastructure Development Plan



Importance and Opportunity to the success of NPP

| | | Importance | | |
|------------|----------|---|---|---|
| | | Low | Medium | High |
| Likelihood | Certain | <ul style="list-style-type: none"> กระจายแหล่งและชนิดเชื้อเพลิงในการ | <ul style="list-style-type: none"> ความก้าวหน้าของการพัฒนาเทคโนโลยี | <ul style="list-style-type: none"> อำนาจตามกฎหมาย (Authority) และความเป็นเจ้าของ (Ownership) การเข้าร่วมพันธกรณีและความสัมพันธ์ระหว่างประเทศ ข้อผูกพันของภาครัฐสำหรับการใช้นิวเคลียร์อย่างสันติและปลอดภัย |
| | Possible | |  | <ul style="list-style-type: none"> Public Acceptance in NPP Uncertainty and continuity of nuclear power policy Benefit from NPP to the community Development of nuclear safety technology Corruption and good governance Political groups and networks that influence local communities |
| | Rare | | <ul style="list-style-type: none"> ความเชื่อ ค่านิยม และวัฒนธรรมของชุมชน | |

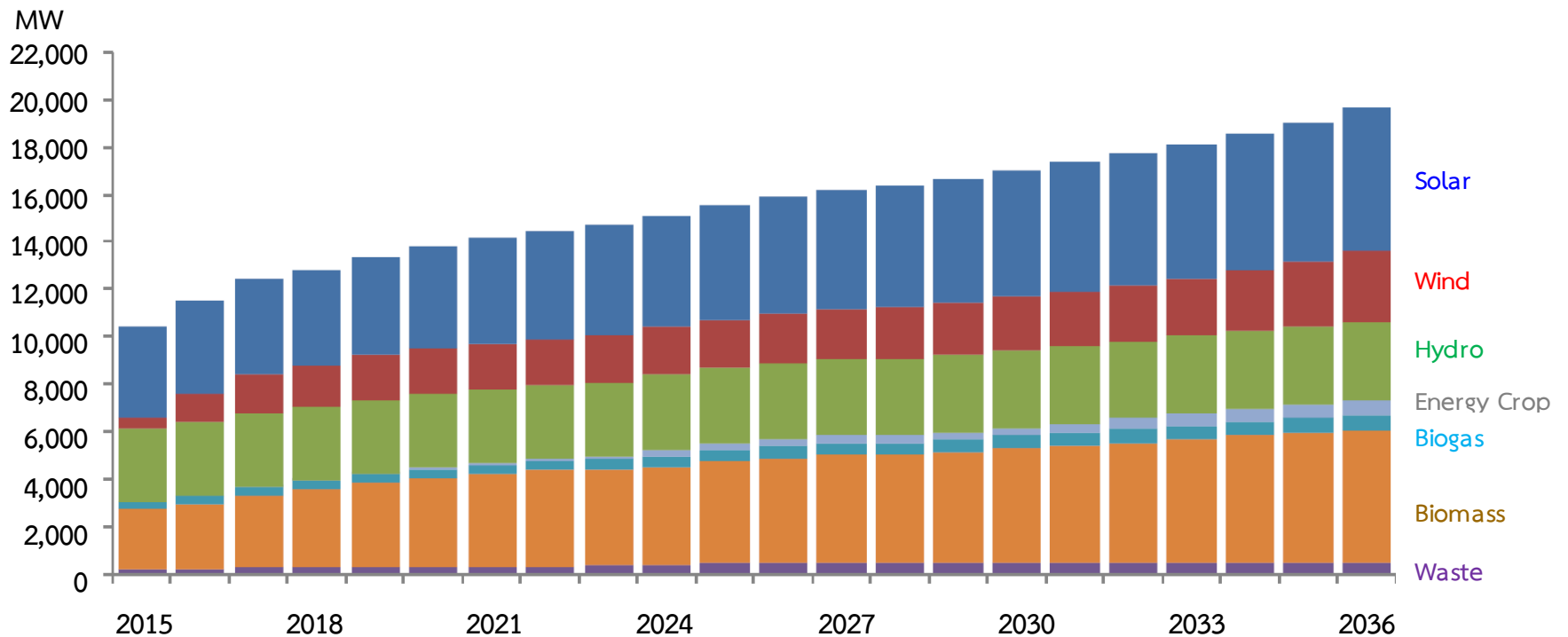


Importance of Sustainability in the Future Energy Market

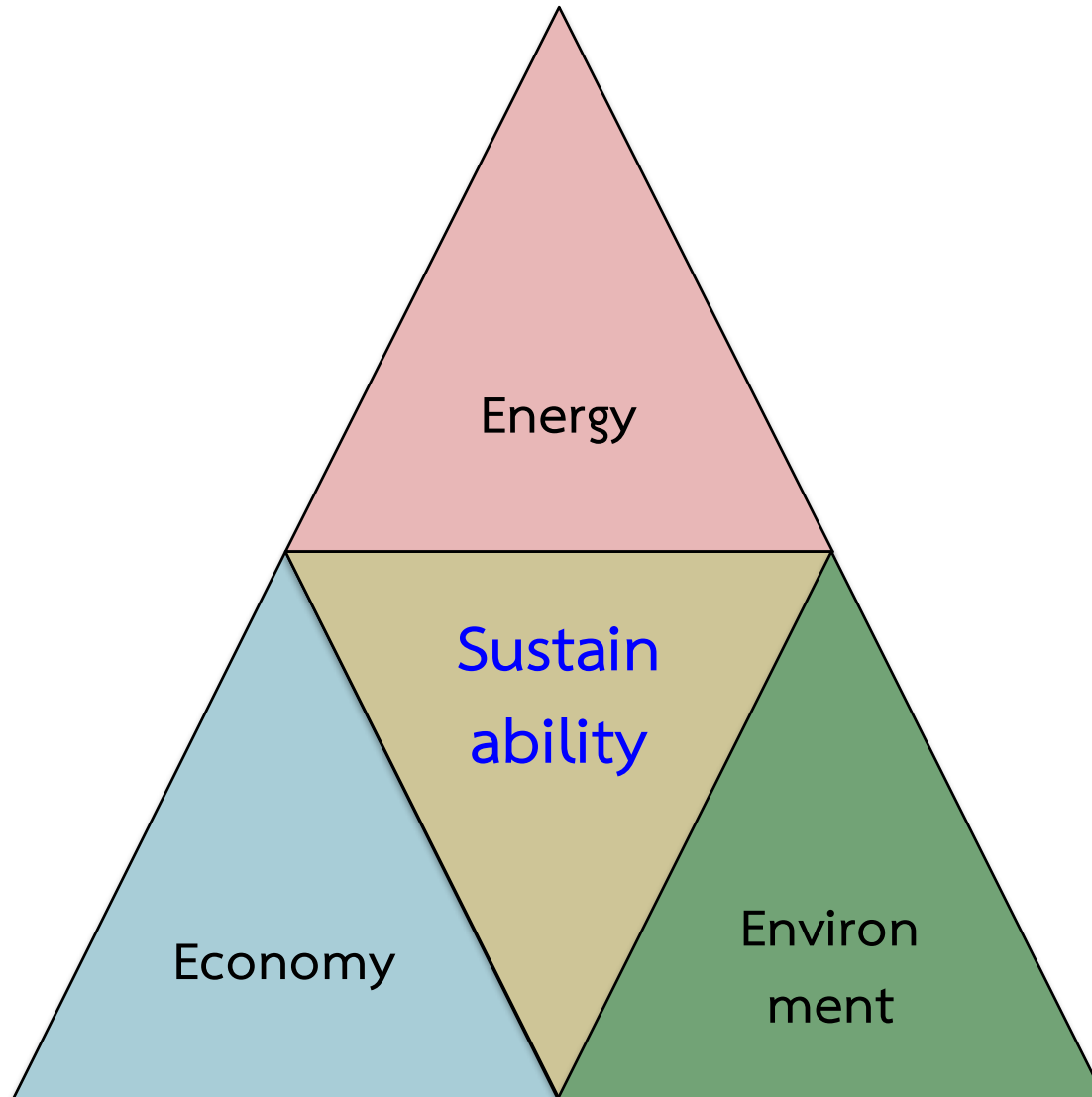


Renewable Energy Promoting Policy

| | | Waste | Biomass | Biogas | Energy crop | Hydro | Wind | Solar | Total | |
|---------------|-------------------|-------|---------|------------|-------------|---------|--------|------------|--------|---------------|
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3E Trilemma



The Waste Problem

Final Disposal - 40 Years' Journey



Start of disposal
in early 2020's

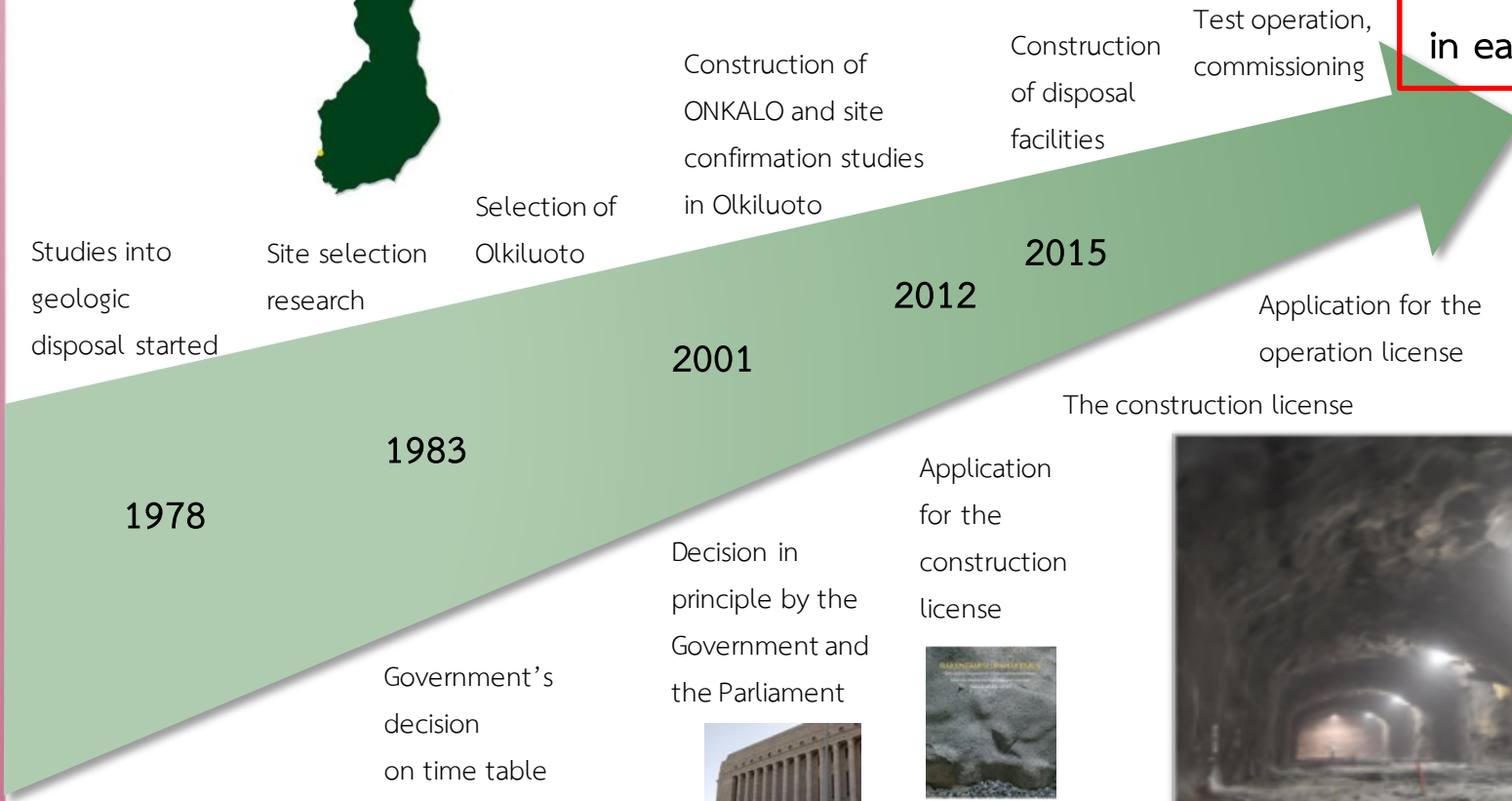
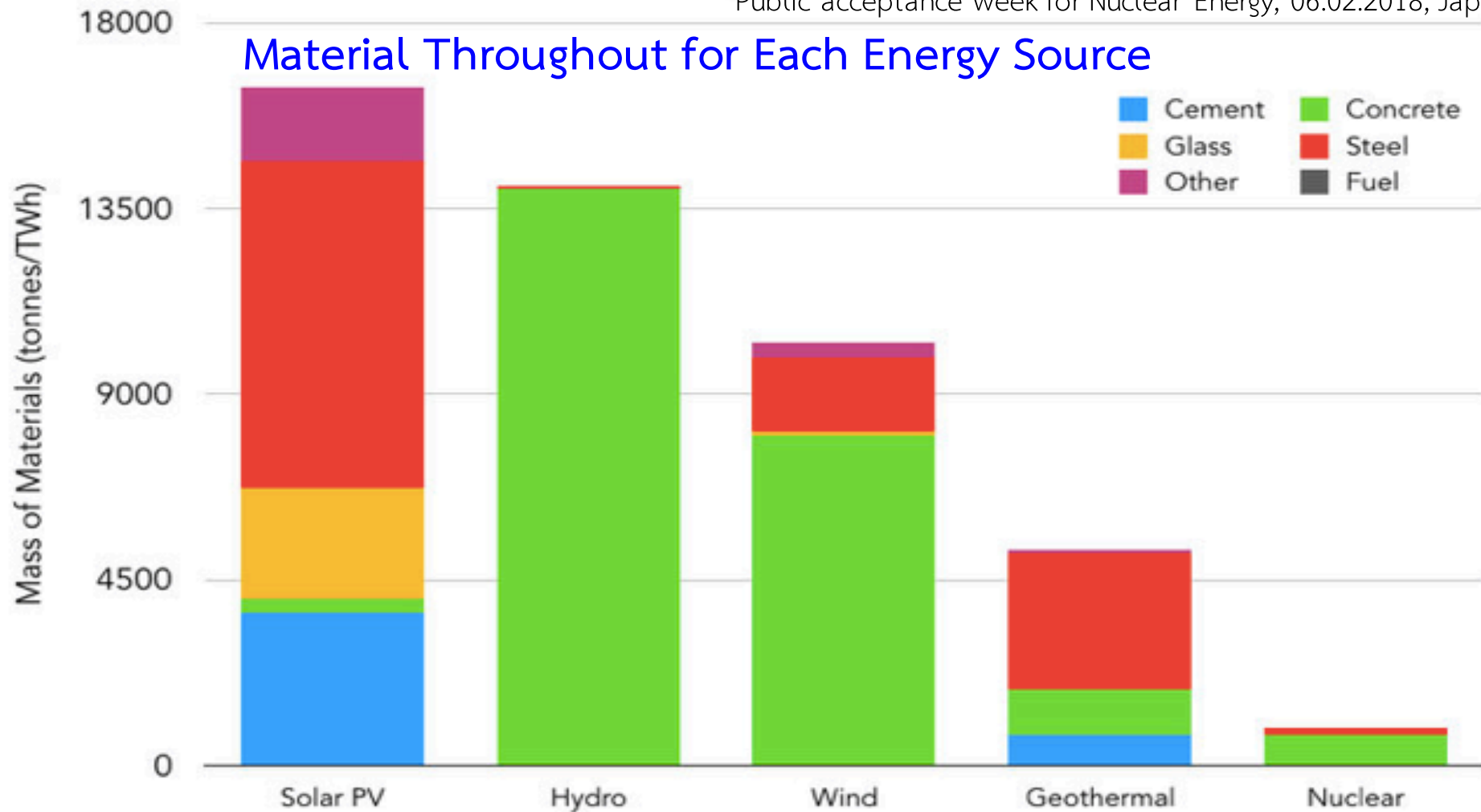


Photo: Posiva Oy

The Waste Problem

Eija-Riitta Korhola, PhD, Nuclear energy The Pros & Cons and the Public,
 Public acceptance week for Nuclear Energy, 06.02.2018, Japan

Material Throughout for Each Energy Source



Sources: DOE Quadrennial Technology Review, Table 10.4
 Murray, Raymond L. Holbert, Keith E.. (2015). Nuclear Energy - An Introduction to the Concepts, Systems, and Applications of Nuclear Processes (7th Edition). Elsevier. page 97

Conclusion

- Thailand is facing with shortage in natural gas
- Thailand tends to increase Renewable Energy in Energy Mix from the current plan
- Nuclear is an alternative
- Sustainability for future energy is required

THANK YOU

For more information, please visit www.eri.chula.ac.th.

