

Japan-Asia CCUS Forum 2020
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Online Forum – JCCS and GCCUSI

ASEAN Could Need CCUS

Shigeru Kimura

Special Adviser to the President on Energy Affairs

www.eria.org

Economic Research Institute for ASEAN and East Asia



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EAS Energy Outlook

- EAS stands for East Asia Summit
 - ASEAN 10 + 8 (Australia, China, India, Japan, Korea, New Zealand, Russia and USA)
- EEC and RE are high priority energy policies in EAS region
 - EEC and RE targets by each EAS country
- The targets have been assessed periodically using energy outlook models
 - Energy saving potential defined as BAU-APS in terms of TFEC, TPES and CO2 emissions
- Focus on ASEAN 10 countries
 - ASEAN 10 countries are very diverse
 - Analyze ASEAN Total

Macro Assumptions for ASEAN Energy Outlook by ERIA

Economic Growth

ASEAN:

4.3% from 2017 to 2050

Population Growth

ASEAN:

0.7 % P.A. from 2017 to 2050

636 million persons in 2017
to increase to **809** million
in 2050

GDP per capita

ASEAN:

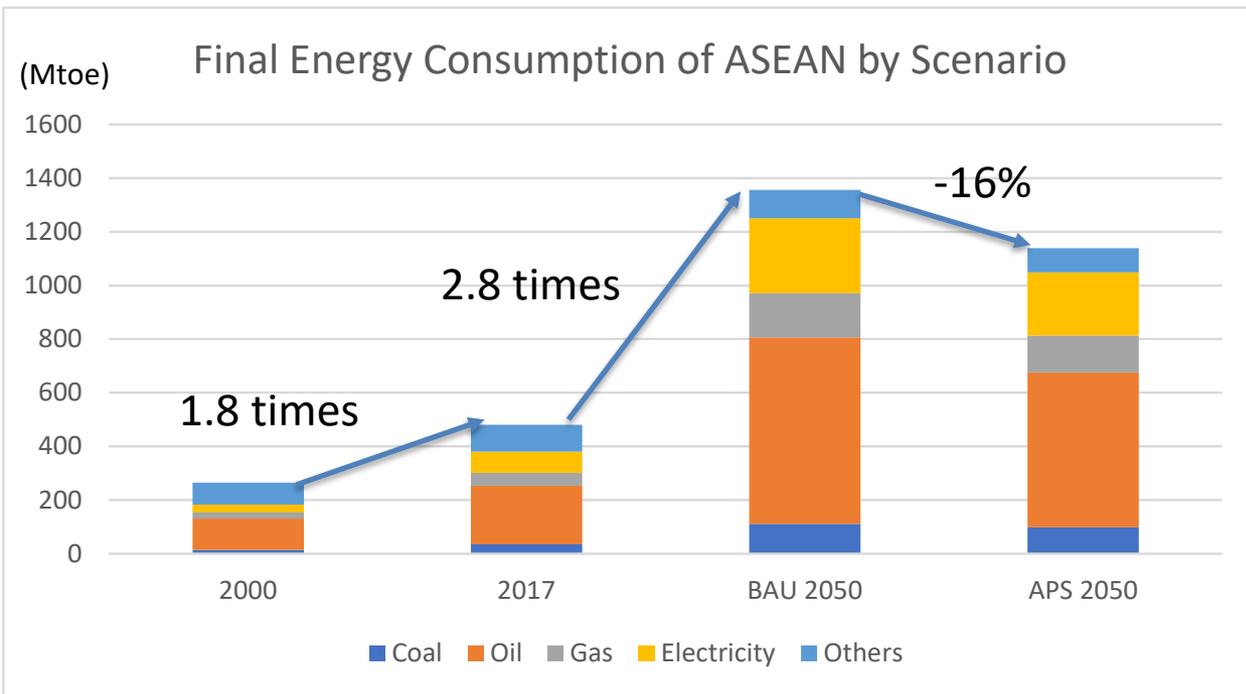
4,880 US\$/person (constant
2010 price and US\$) in
2017 increases to **15,100**
US\$/person in 2050

Crude Oil Price (nominal price)

Increase to about **200**
US\$/barrel in 2050 due to
tight balance between oil
demand and supply

ASEAN Energy Outlook by ERIA

- Final Energy Consumption



TFEC of ASEAN total (BAU):
 2017: 480 MTOE
 2050: 1,138 MTOE
 Growth rates (2017-2050):
 TFEC: 3.2% PA
 Coal: 3.6%
 Oil: 3.6%
 Gas: **3.8%**
 (industry and transport use)
 Electricity: **3.9%**
 Biomass: 0.1%

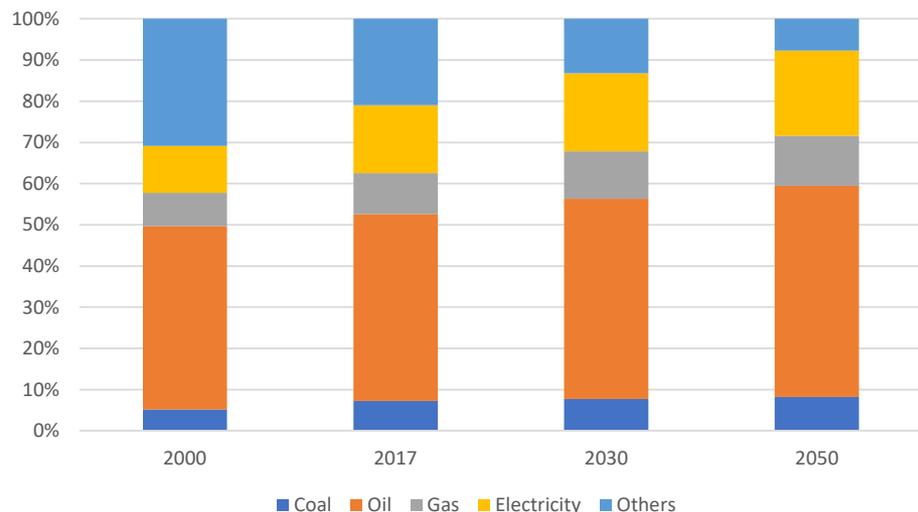
BAU: Business As Usual to apply existing EEC and RE policies
 APS: Alternative Policy Scenario to apply ambitious EEC and RE polies



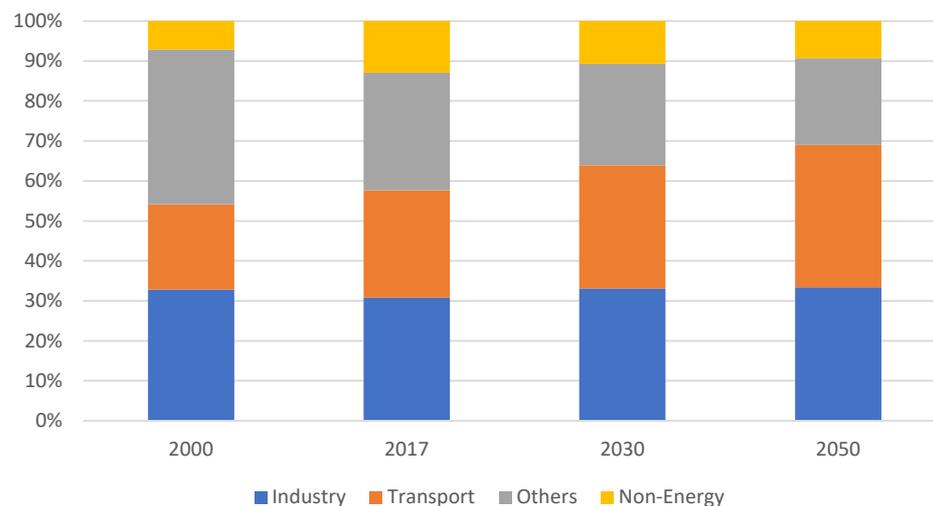
ASEAN Energy Outlook by ERIA

- Final Energy Consumption (BAU)

Final Energy Consumption of ASEAN (Share by Energy)



Final Energy Consumption of ASEAN (Share by Sector)



Energy share from 2017 to 2050:

Oil: 45% to 51%

Electricity: 16% to 21%

Gas: 10% to 11%

Coal: 7% to 8%

Biomass: 21% to 8%

Sector from 2017 to 2050:

Industry: 31% to 33%

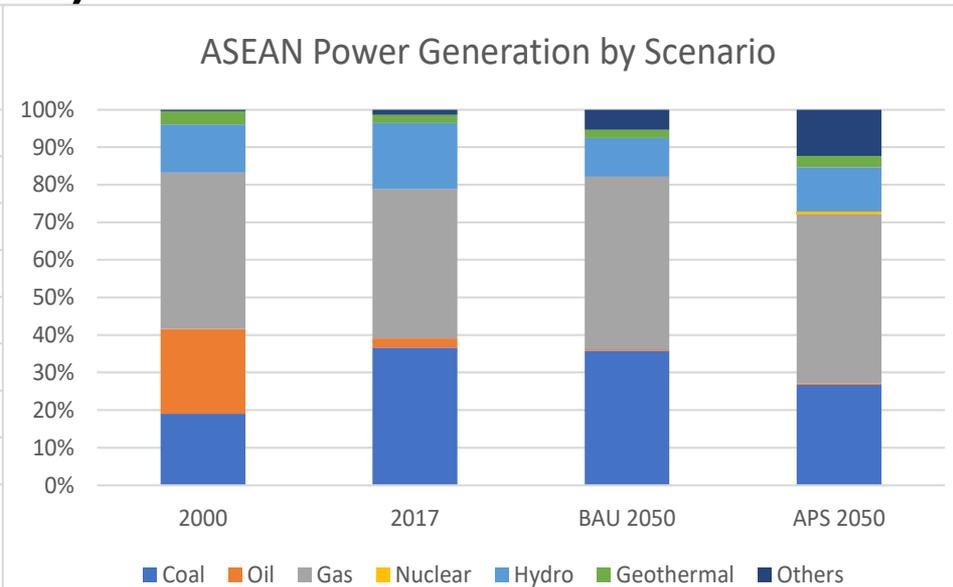
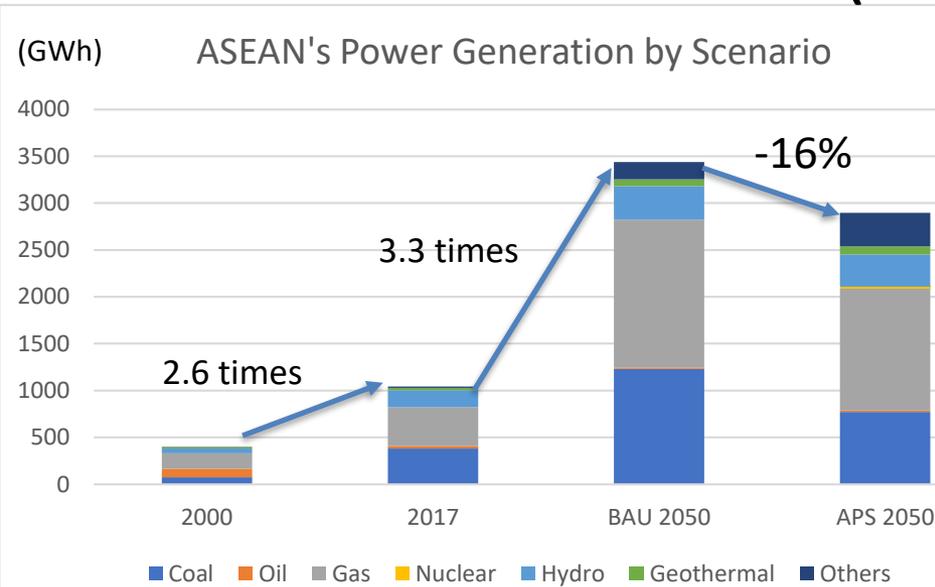
Transport: 27% to 36%

Others: 29% to 22%

Non-energy: 13% to 9%

ASEAN Energy Outlook by ERIA

• Power Generation (BAU)



Power generation in ASEAN (BAU)
 2017: 1,041 TWh
 2050: 3,439 TWh

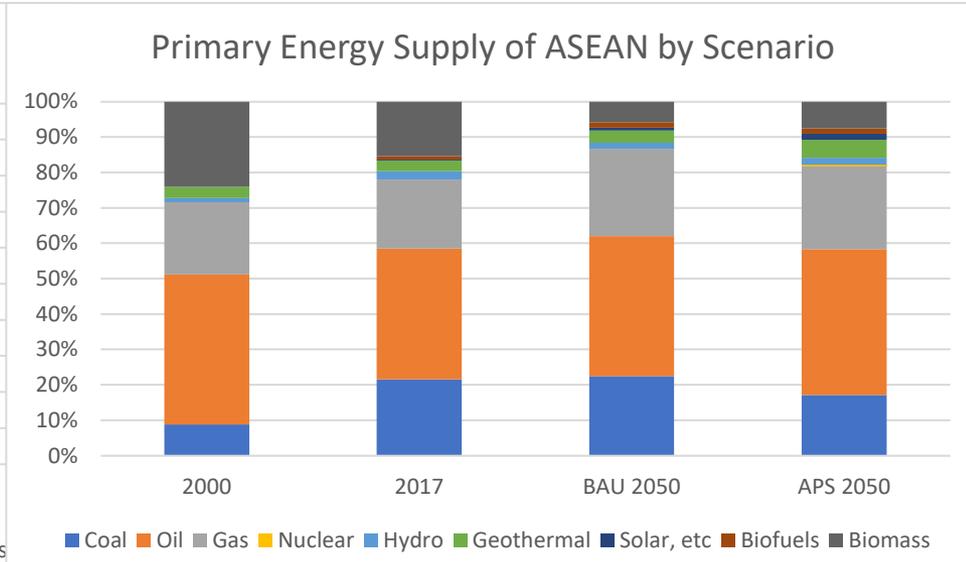
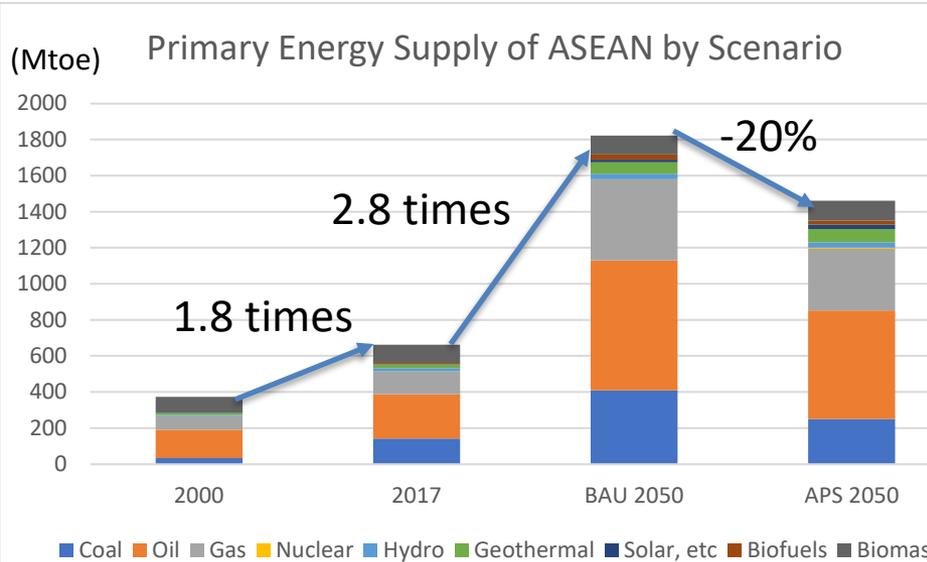
Growth rate by each power source in 2017-2050
 Coal: **3.6%**
 Oil: -2.4%
 Gas: **4.1%**
 Hydro: 2.0%
 Geothermal: 3.6%
 Others: **8.0%**

Share by each power source from 2017 to 2050 (BAU)
 Coal: 37% -> **36%** (**27%** of APS)
 Oil: 3% -> 0%
 Gas: 40% -> **46%**
 Hydro: 18% -> 10%
 Geothermal: 2% -> 2%
 Others: 1% -> **5%** (**12%** of APS)



ASEAN Energy Outlook by ERIA

- Primary Energy Supply (BAU)



TPES of ASEAN (BAU)

2017: 662 MTOE

2050: 1,822 MTOE

Growth rate in 2017-2050

Total: 3.2%

Coal: 3.2%, Oil: 3.3%, Gas: 3.8%

Hydro: 2.0%, Geothermal: 3.6%

vRE: 6.7%, Biofuels: 4.5%

Biomass: 0.1%

Share by energy sources from 2017 to 2050 (BAU)

Coal: 22% -> **22%**

Oil: 37% -> **40%**

Gas: 20% -> **25%** (Fossil fuels in 2050: 87%)

Hydro: 2% -> 2%

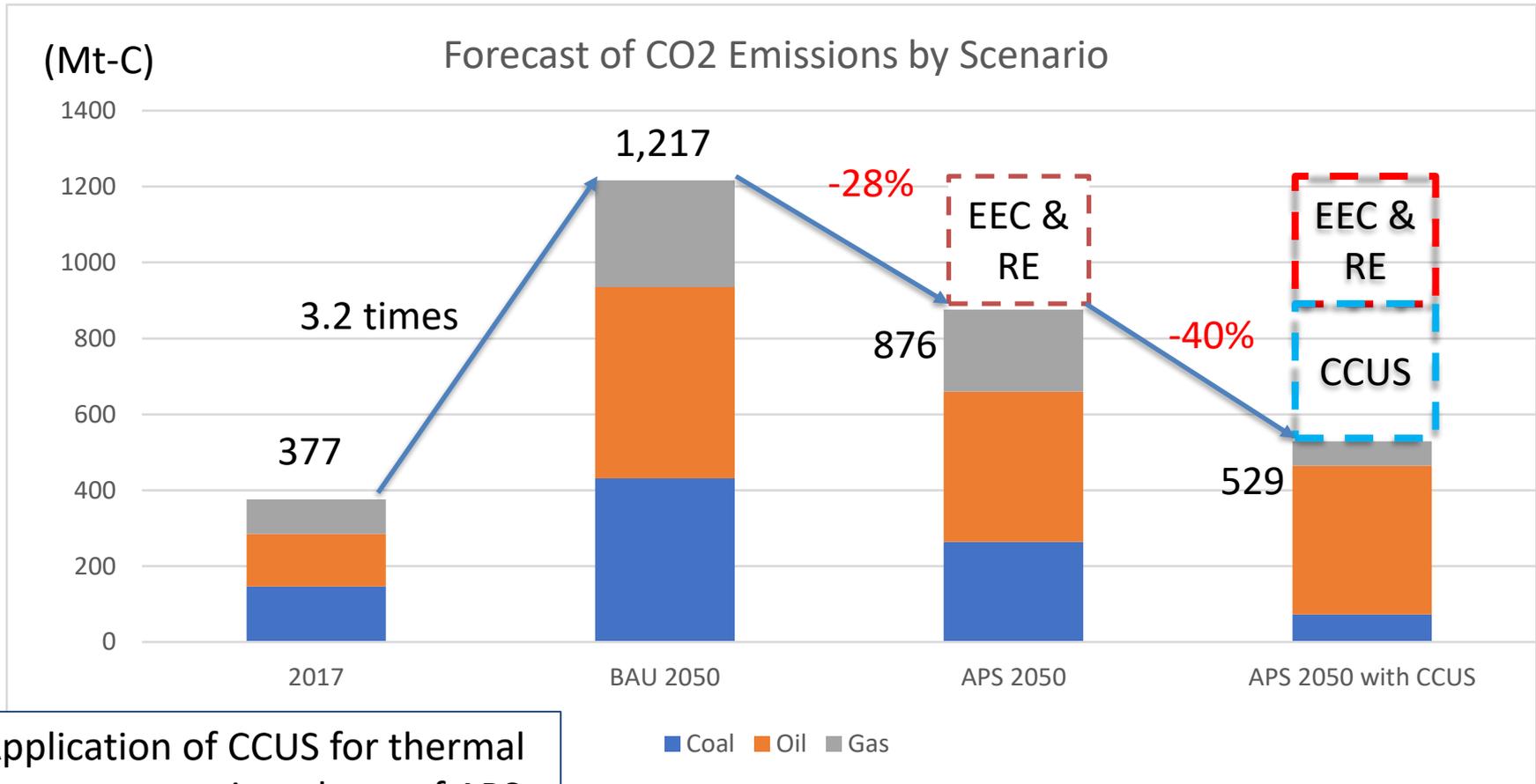
Geothermal: 3% -> 4%

vRE: 0.2% -> 0.8%, Biofuel: 1% -> 2%

Biomass: 15% -> 6%

ASEAN Energy Outlook by ERIA

- CO2 Emissions



Conclusions

- **TFEC** will increase significantly **2.8** times from 2017 to 2050 in ASEAN region due to stable economic growth assumption and **Oil and Electricity** will continuously dominant until 2050.
- **Transport fuels such as gasoline and diesel oil** will continuously increase until 2050.
- **Coal and gas consumption** will also largely increase because both power generations will be major power sources in ASEAN region until 2050. (more than 80% of BAU in 2050 and 70% of APS).
- At **TPES** level, share of **fossil fuels of BAU** in 2050 will be less than **90%** and it will go down to **80%** in case of **APS**. ASEAN will continuously depends on fossil fuels; coal and gas for power generation and oil for road transport.
- Consequently **CO₂ emissions** in ASEAN region will surely increase from **377 Mt-C** in 2017 to **1,217** in 2050 (**3.2** times). If ASEAN countries could achieve their ambitious EEC and RE targets (**APS**), CO₂ emissions will reduce to **876 Mt-C** (-28%). In addition, ASEAN could apply CCUS technology commercially for large scale power generation plants until 2050, CO₂ emissions will decrease to **529 Mt-C** (43% of BAU in 2050).
- **CCUS** will be an option of future energy technologies to accomplish sustainable energy development in ASEAN and region-wide framework will be needed to deploy CCUS in ASEAN/EAS such as Asia CCUS Network.

Thank You for your Attention!!