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THE 4TH ASEAN ENERGY OUTLOOK

Symposium on Sustainable Power
Supply Mix in the Future,
20 November 2015, Bangkok, Thailand

OBJECTIVES AND PROGRESS

Main Objectives:

1. to provide policy makers with an understanding of the energy trends and challenges being faced by the region up to the year 2035,
2. to strongly involve all ASEAN Member States (AMS) in the process.

Progress:

First Phase

February-May 2015

1. General discussion about potential possibilities of energy demand forecasting for the AEO4 and future Outlooks
2. Scenario definition BAU scenario / Advancing Policy scenario
3. **1st AMS Workshop, February 2015**

Second Phase

May-June 2015

1. Finalization of the BAU and APS scenarios
2. Modification of the national models and implementation of the country results
3. **2nd AMS Workshop, May 2015**

Third Phase

June-September 2015

1. Final review of the regional models
2. Internal data review and result discussions
3. *Development of analysis chapters for the AEO4*
4. **3rd ACE Workshop, September 2015**



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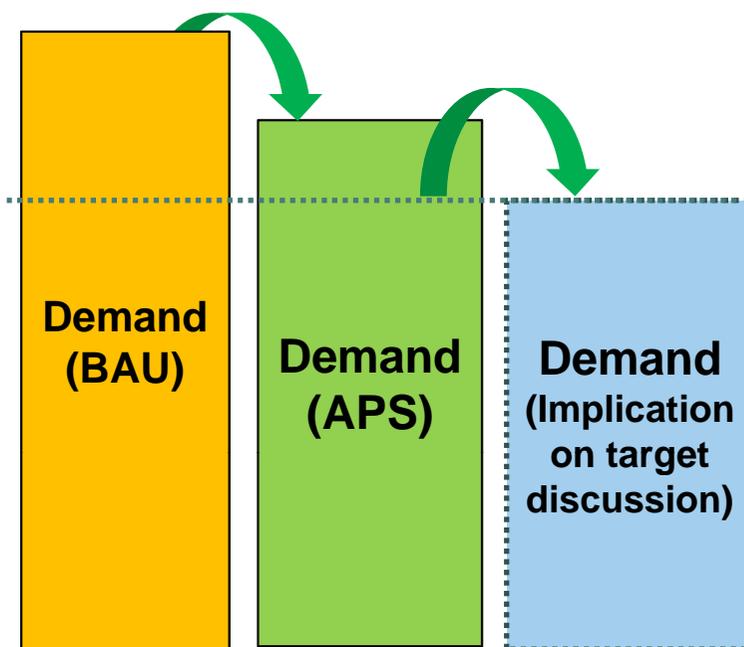
- 1. Methodology and Scenario Definitions**
- 2. Key Figures and Assumptions**
- 3. ASEAN Energy Demand and Supply Outlook**
- 4. Challenges and Key messages for ASEAN Energy Policy**

APPROACH OF 4AEO

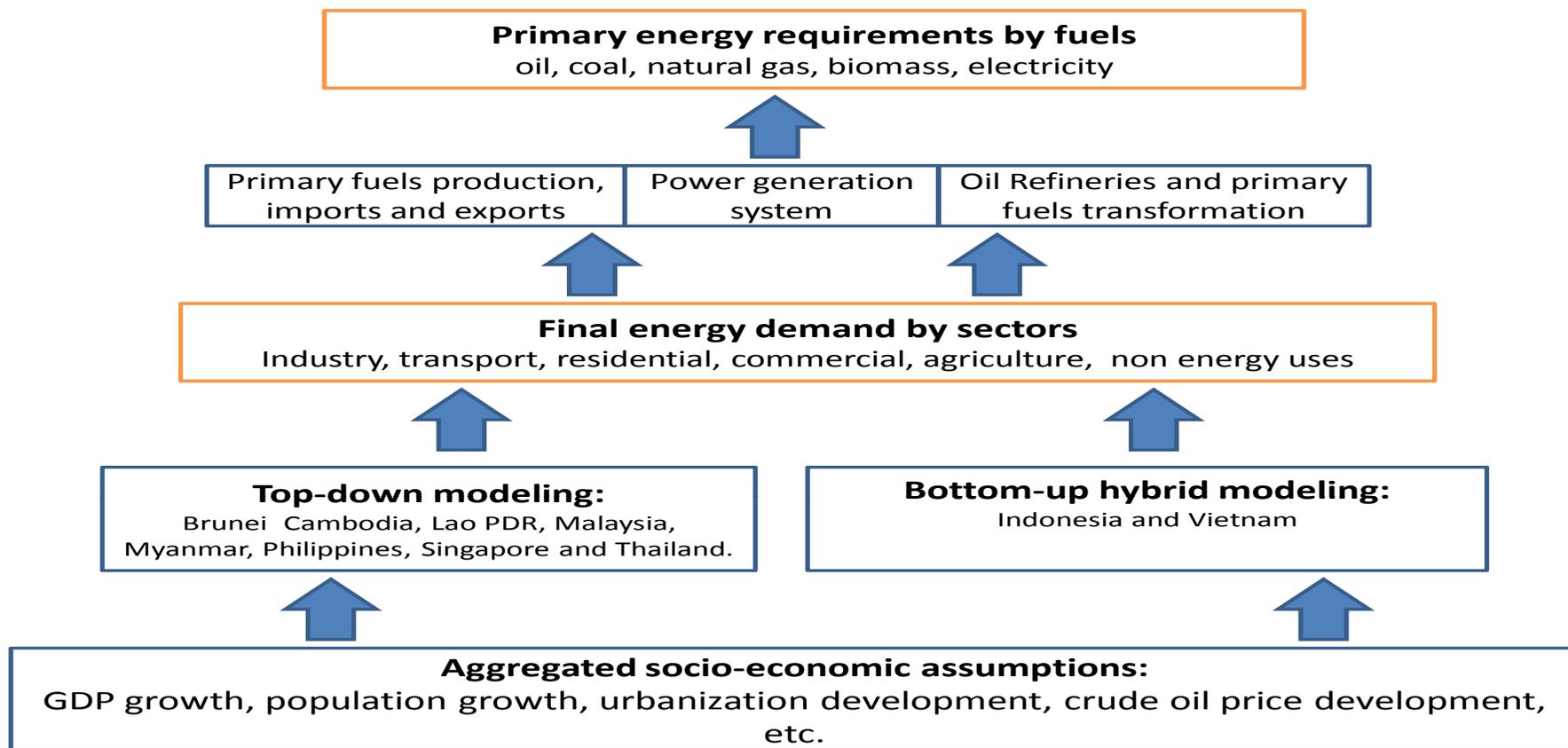
- **Cooperative approach:** national ASEAN officials developed country projections and included knowledge on national policies and projections
- **Harmonized approach:** The ASEAN Centre for Energy ACE and Fraunhofer guided country representatives in the development of national models
- **Controlled approach:** Fraunhofer developed a regional model to countercheck and discuss findings

METHODOLOGY AND SCENARIOS

- ❑ **Business as Usual Scenario (BAU):** past developments continue in absence of influential modifications while still taking into consideration impacts in activity changes
- ❑ **Advancing Policies Scenario (APS):** successful implementation of stronger policies as defined by the AMS' official targets for renewable energy and energy efficiency.
- ❑ **Both scenarios based on AMS socio-economic and policy framework assumptions.**
- ❑ Econometric top-down as well as bottom-up models for each AMS + regional model



MODELLING OF THE 4AEO



KEY FIGURES

GDP growth 2000-2013:
5.1%

Remarkable sustained growth rate

population: 615 million
area: 4,480,106 km²

8.5 % of world's population

56% living in rural areas

GDP per capita:
2,250 USD

High disparity within the region

coal and lignite reserves
23 billion tones

Over 4.1 % of world's coal reserves

3.4 % of world's natural gas reserves

electricity consumption: 1477
kWh/cap

About half of world's average

energy intensity:
0.435 koe/ USD 05

About half of world's average

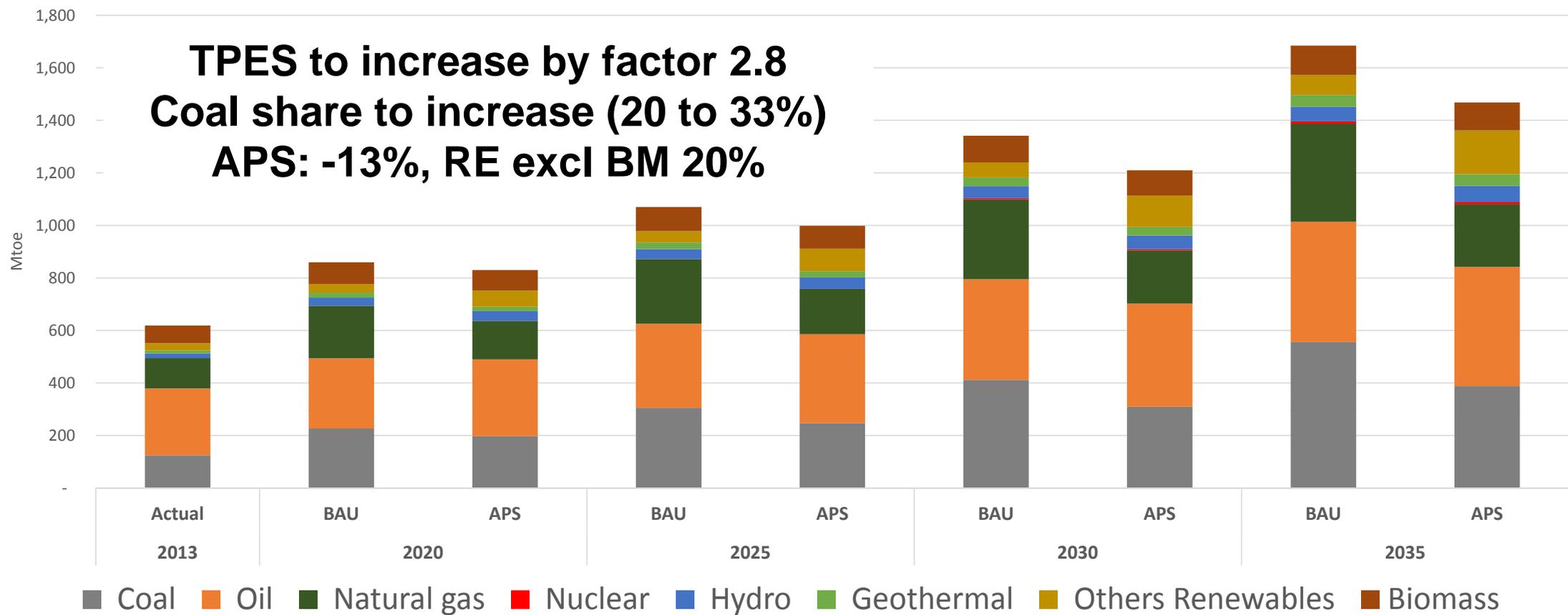
Source: ASEAN, Enerdata, World Bank

KEY ASSUMPTIONS

- 6.1% GDP annual average growth rate between 2013 and 2035
- By 2035 ASEAN population is 762 million inhabitants (yearly average growth rate of 1% per annum)
- Oil prices are expected to be at 130 USD₂₀₁₂ per barrel in 2035

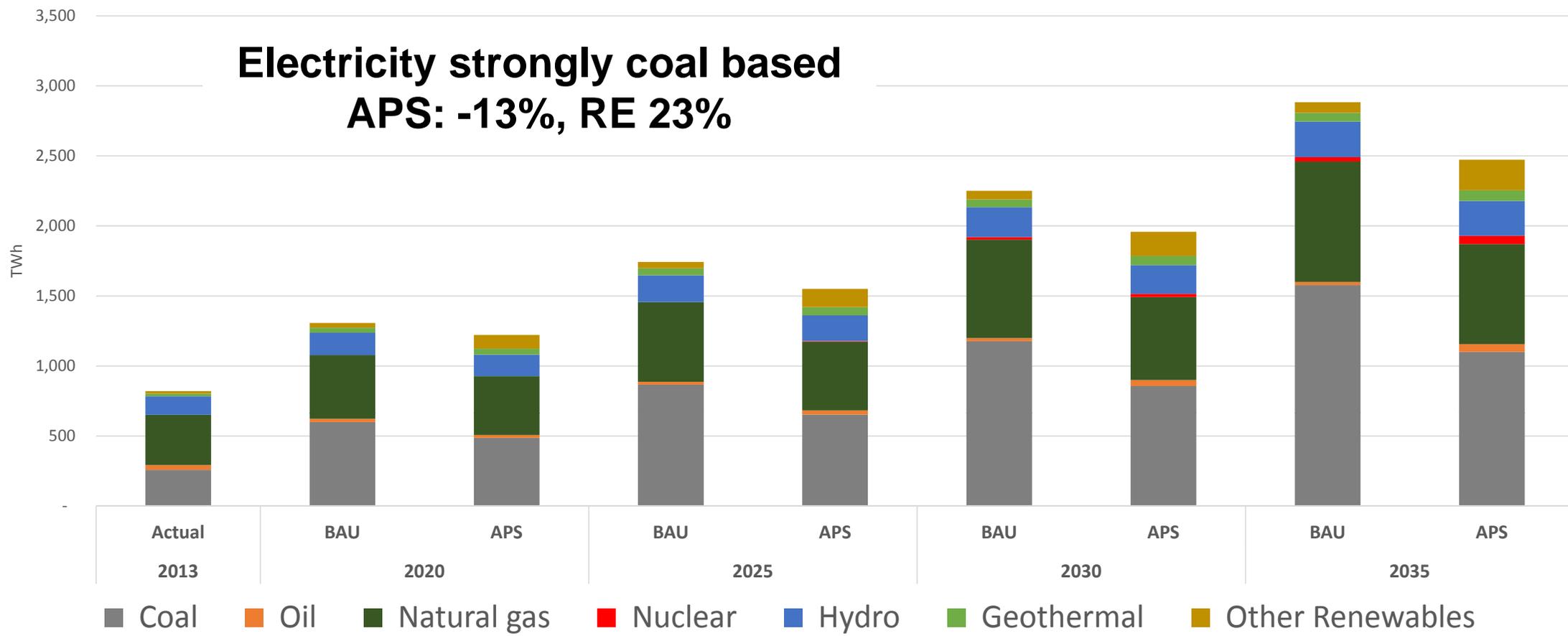
Strongly growing economy

TOTAL PRIMARY ENERGY SUPPLY



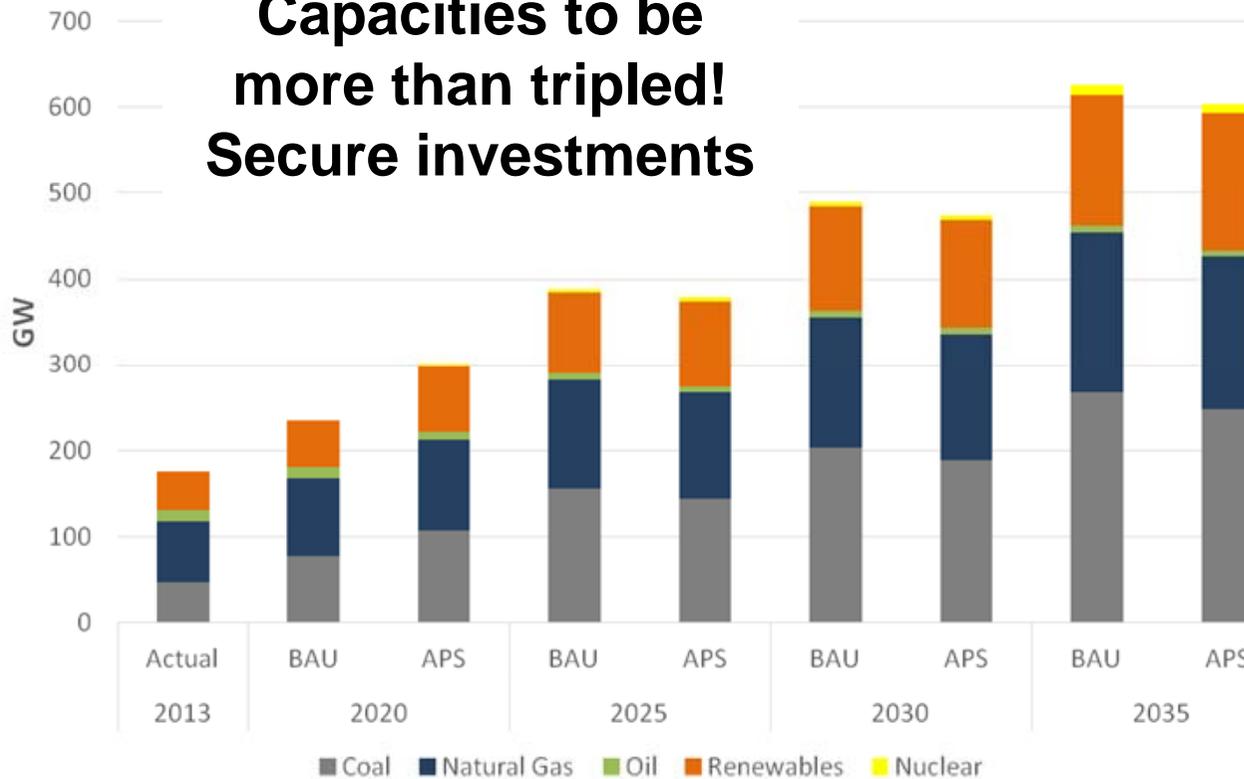
ELECTRICITY GENERATION

Electricity strongly coal based
APS: -13%, RE 23%

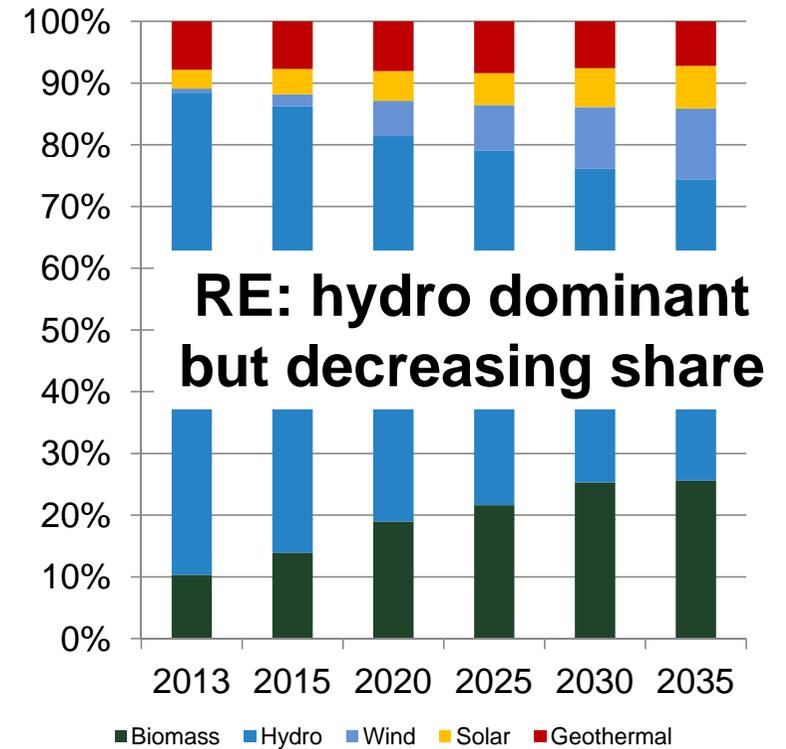


INSTALLED CAPACITY

Capacities to be more than tripled! Secure investments

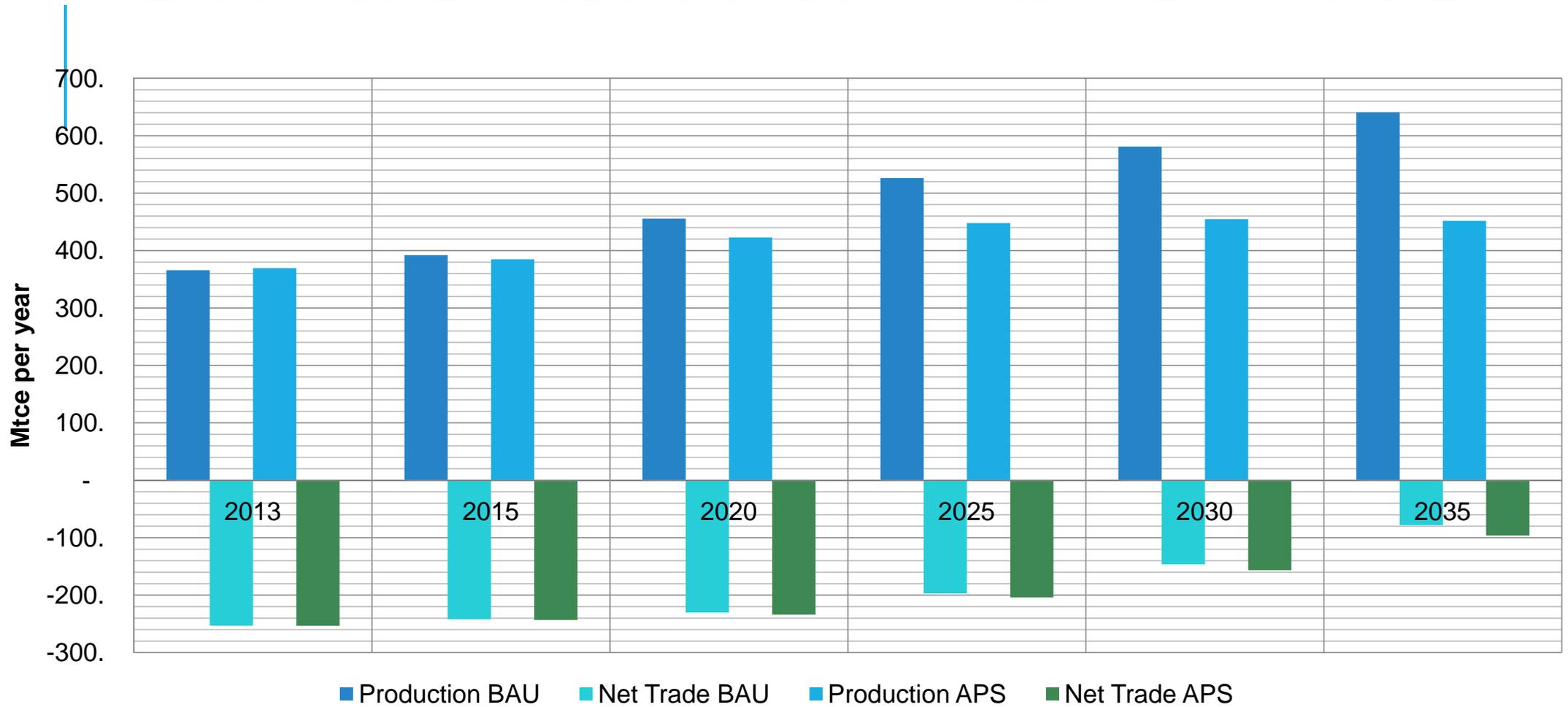


Shares of RE Technologies (APS)

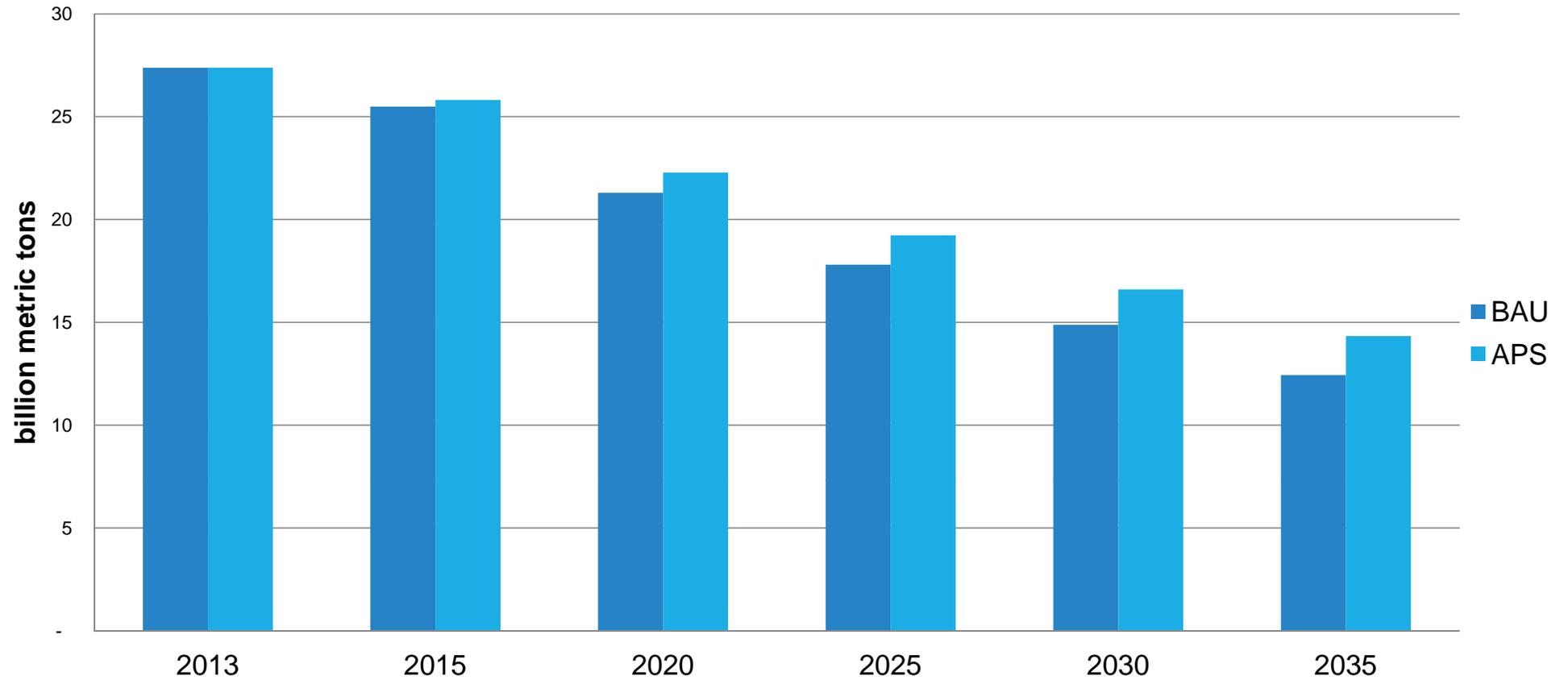


RE: hydro dominant but decreasing share

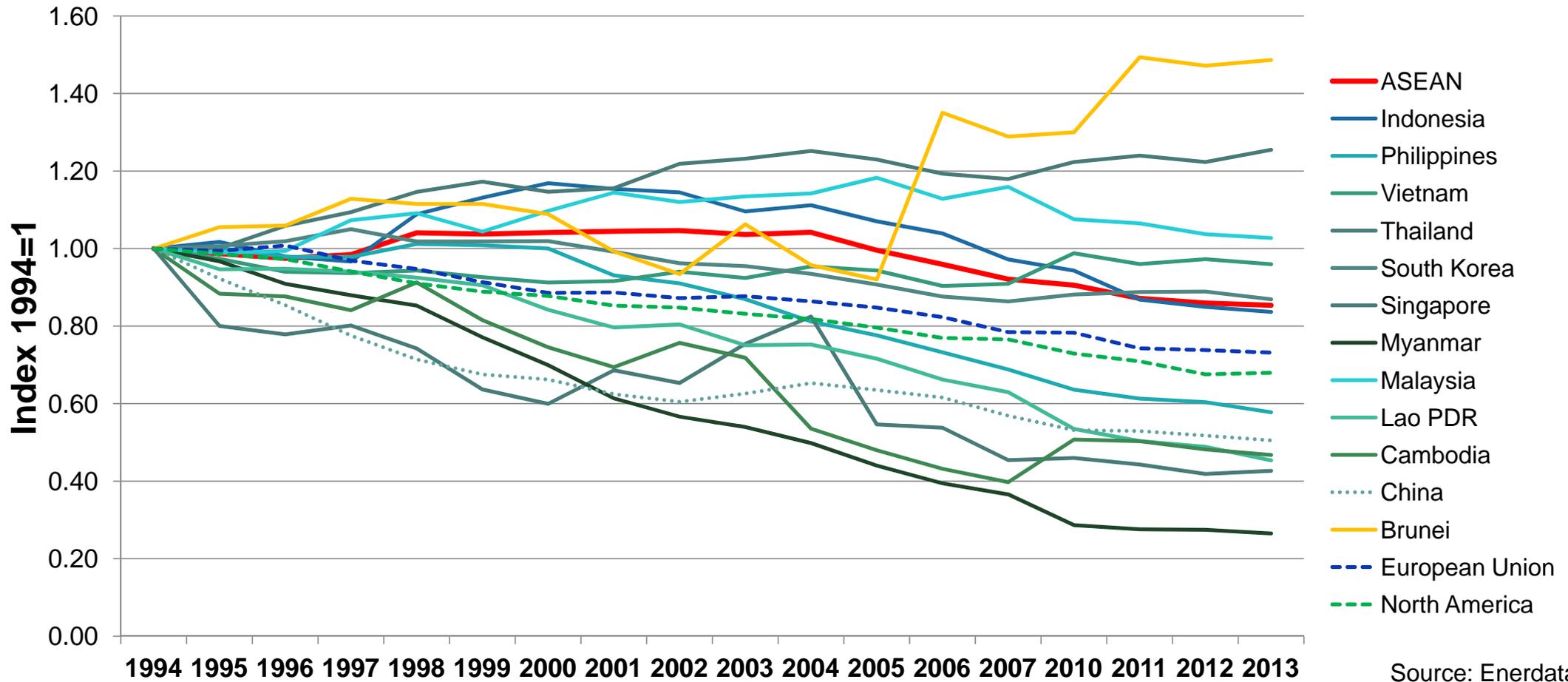
ASEAN COAL PRODUCTION AND NET TRADE



ASEAN COAL RESOURCE DEPLETION (FOR BAU AND APS)

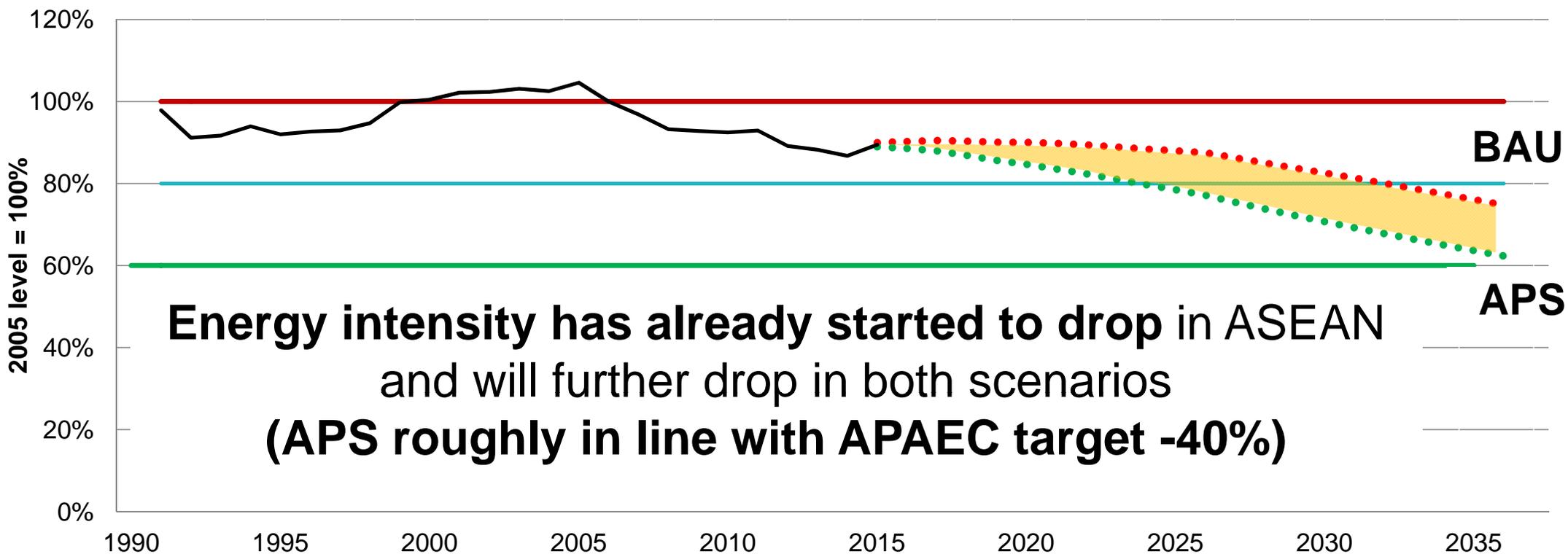


ENERGY INTENSITY DEVELOPMENT



Source: Enerdata

4AEO: ENERGY INTENSITY



ENERGY INTENSITIES IN OTHER REGIONS

1990-2013

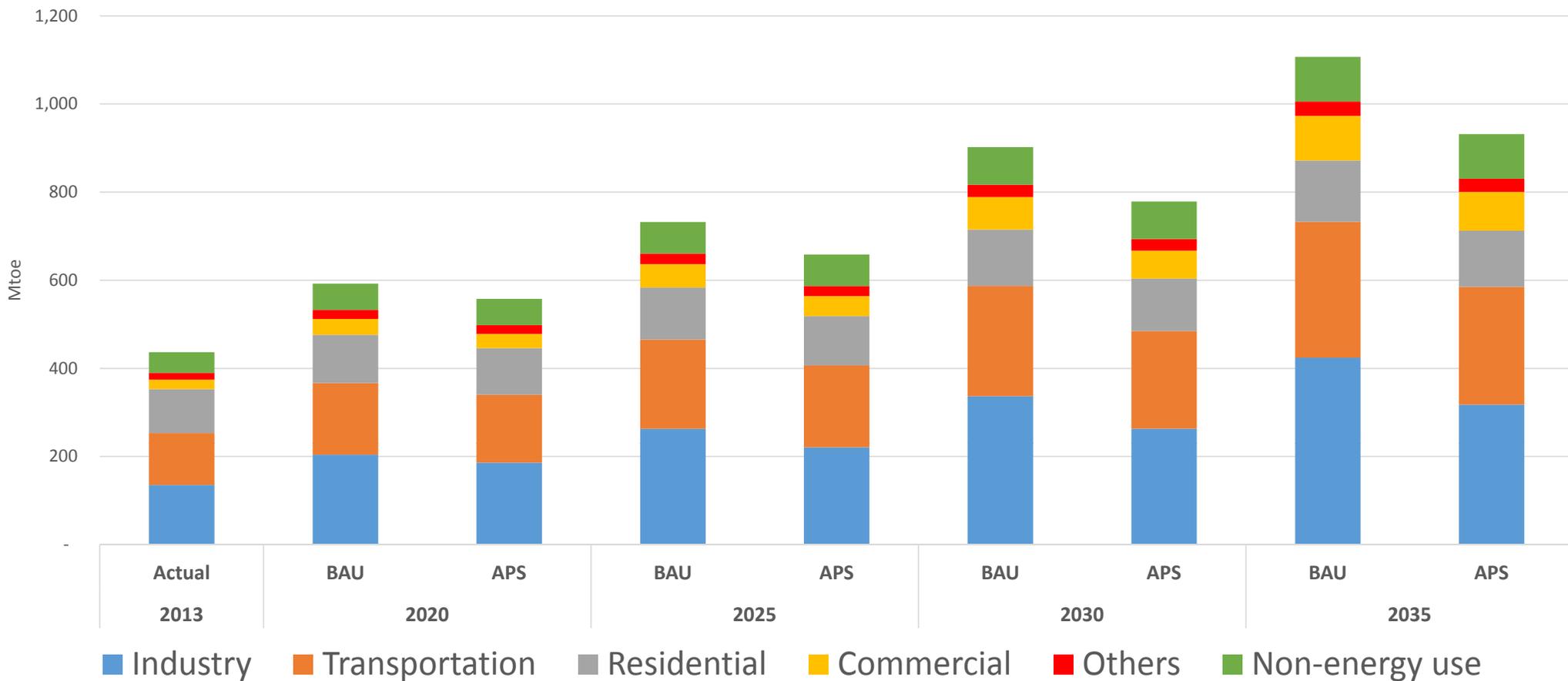
- China -56%
- North America -35%
- Europe -34%
- South Korea -11%
- ASEAN +8%

2013-2035

Energy intensity development not unrealistic compared to other regions. Taking China an even stronger decrease is feasible

- ASEAN 4AEO BAU -33%
- ASEAN 4AEO APS -41%

FINAL ENERGY CONSUMPTION



4AEO: CHALLENGES

- **(Local and global) Environment:** growth in use of coal
- **Supply security:** intensive use of gas/oil/coal reserves.
Rising imports
- **Strongly rising electricity demand** as a limitation to economic growth

4AEO: KEY MESSAGES

- **Demand challenge:** Export ratios coal/gas/oil less favourable, supply security problems, resource depletion; economic and environmental impacts
- **Major indicators** (electricity/energy/CO₂ per capita) approaching world average (2035: 5 tonnes CO₂ per capita, electricity about 4000 kWh/capita). Increasing international pressure
- **BAU falls well short to achieve APAEC energy efficiency target**, however:
 - APS comes close to EE target
 - Energy intensity started to decrease (economic growth, EE policies)
 - First (fragmented) national policies have led to RE penetration
- **Vast untapped RE/EE potential by 2035. Opportunity for high local manufacturing shares and competitive electricity generation**
- Enhancing national EE/RES policies through **mutual policy learning/coordination, regional market integration and interconnections** helps preventing system inefficiencies and reduce system costs

THANK YOU



This work is a joint output of the ASEAN Centre of Energy (ACE) with the National Working Group by 10 ASEAN Member States under directives of Regional Energy Policy and Planning Sub-Sector Network (REPP-SSN), with support of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) through the Renewable Energy Support Programme for ASEAN (ASEAN-RESP), and expert consultancy with the Fraunhofer Institute for Systems and Innovation Research (FhG ISI).

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