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## Clean energy and environnement in Southeast Asia

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# Clean energy and environment in Southeast Asia

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# Agenda

- Introduction
- Renewable energy in ASEAN: potential and current status (Minh)
- Environmental pressure, climate change mitigation (Fabby)
- Case 3: Offshore wind in Vietnam (Group 7)
- Case 1: Biofuels in Indonesia (Group 2)
- Cultural intermission: Which kind of Indonesian are you
- Case 2: Solar for Singapore (Group 6)
- Concluding summary

# Renewable energy in ASEAN: potential and current status

- 1) The ASEAN 2025 goal is **23% RE / TPES**
- 2) The resource diversity

References:



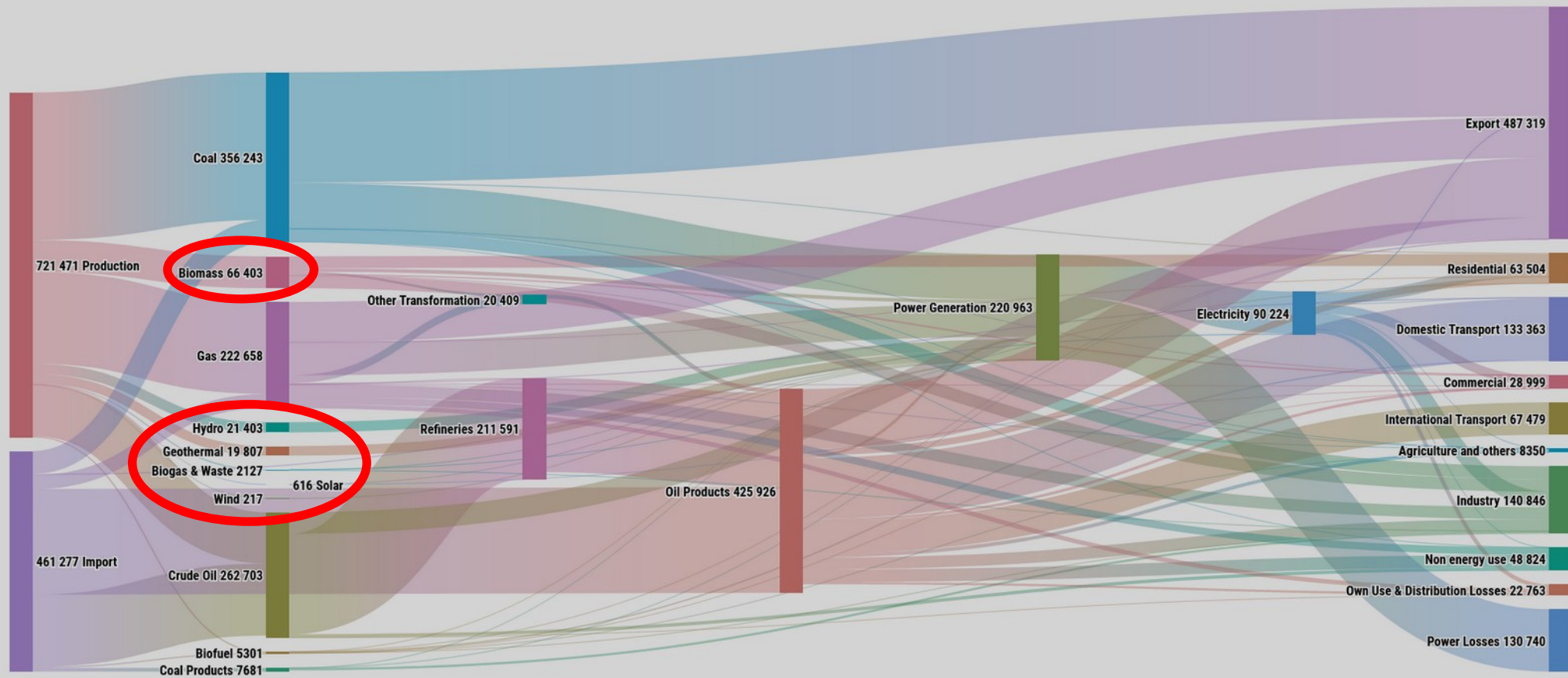
**ASEAN Centre for Energy**  
One Community for Sustainable Energy



**IRENA**  
International Renewable Energy Agency

# The Latest ASEAN Energy Balance (2017)

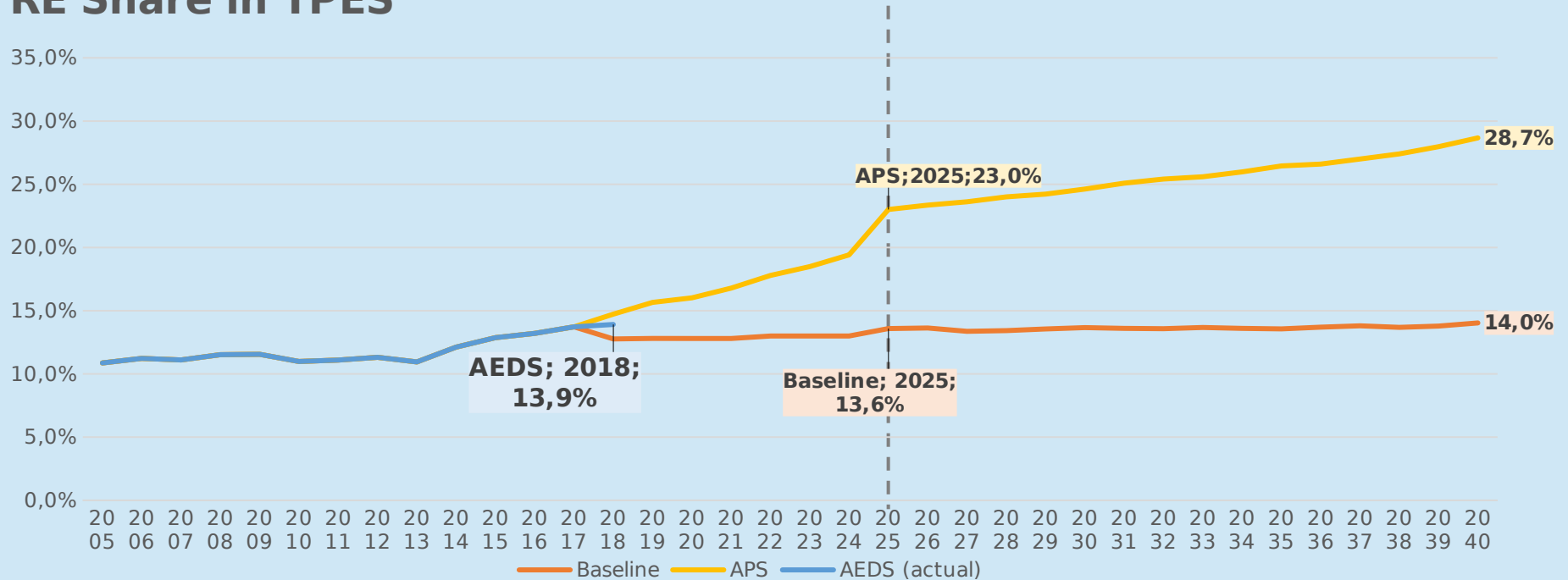
(in ktoe)



Source: <https://aeds.aseanenergy.org>

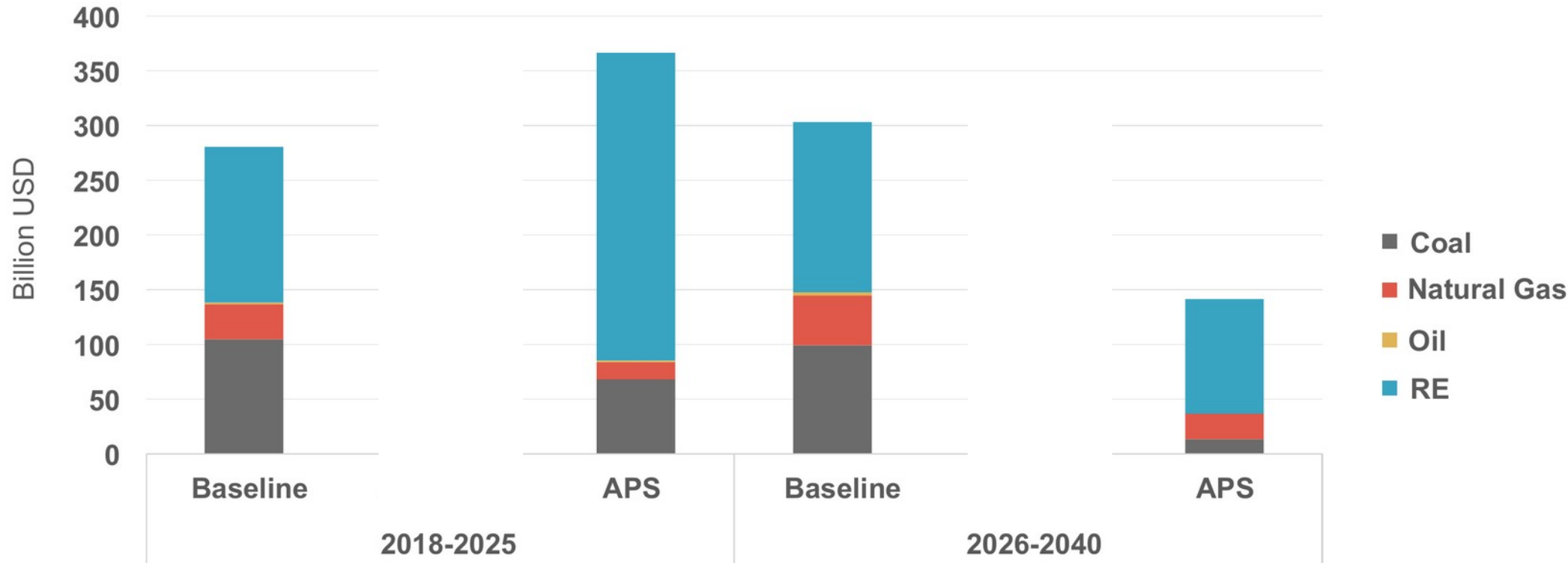
# Regional target: 23% RE by 2025

## RE Share in TPES



Target endorsed at 2020/11 ASEAN ministers meeting  
Source: 6<sup>th</sup> ASEAN energy outlook, figure 44

# Investment shift to meet the target



Note: Cumulative investment is discounted at 3% to present value (year 2020).

# Renewable energy in ASEAN: a diverse potential

- 1) The ASEAN 2025 goal is 23% RE / TPES
- 2) The **resource diversity**

References:



**ASEAN Centre for Energy**  
One Community for Sustainable Energy

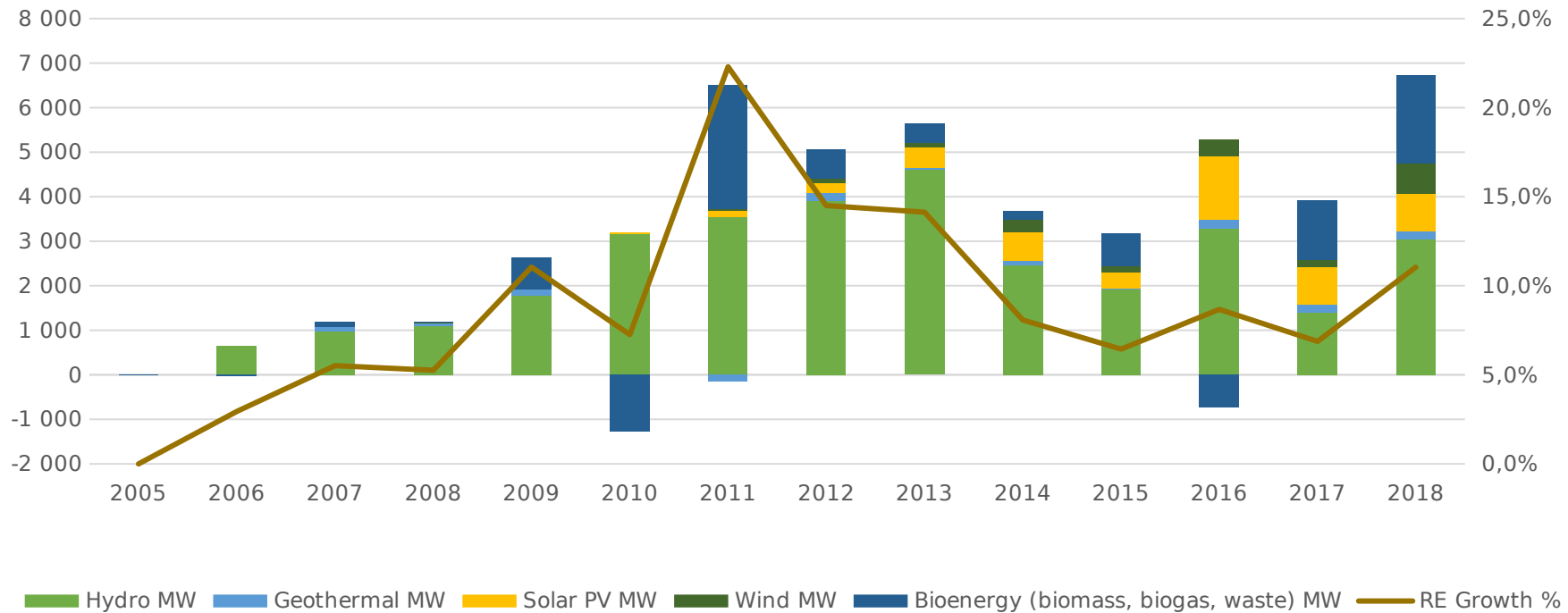


**IRENA**  
International Renewable Energy Agency



New power capacity additions in 2018 was 18.8 GW, where 6.7 GW (36%) coming from RE

**RE Annual Capacity Additions (MW) & Growth (%)**

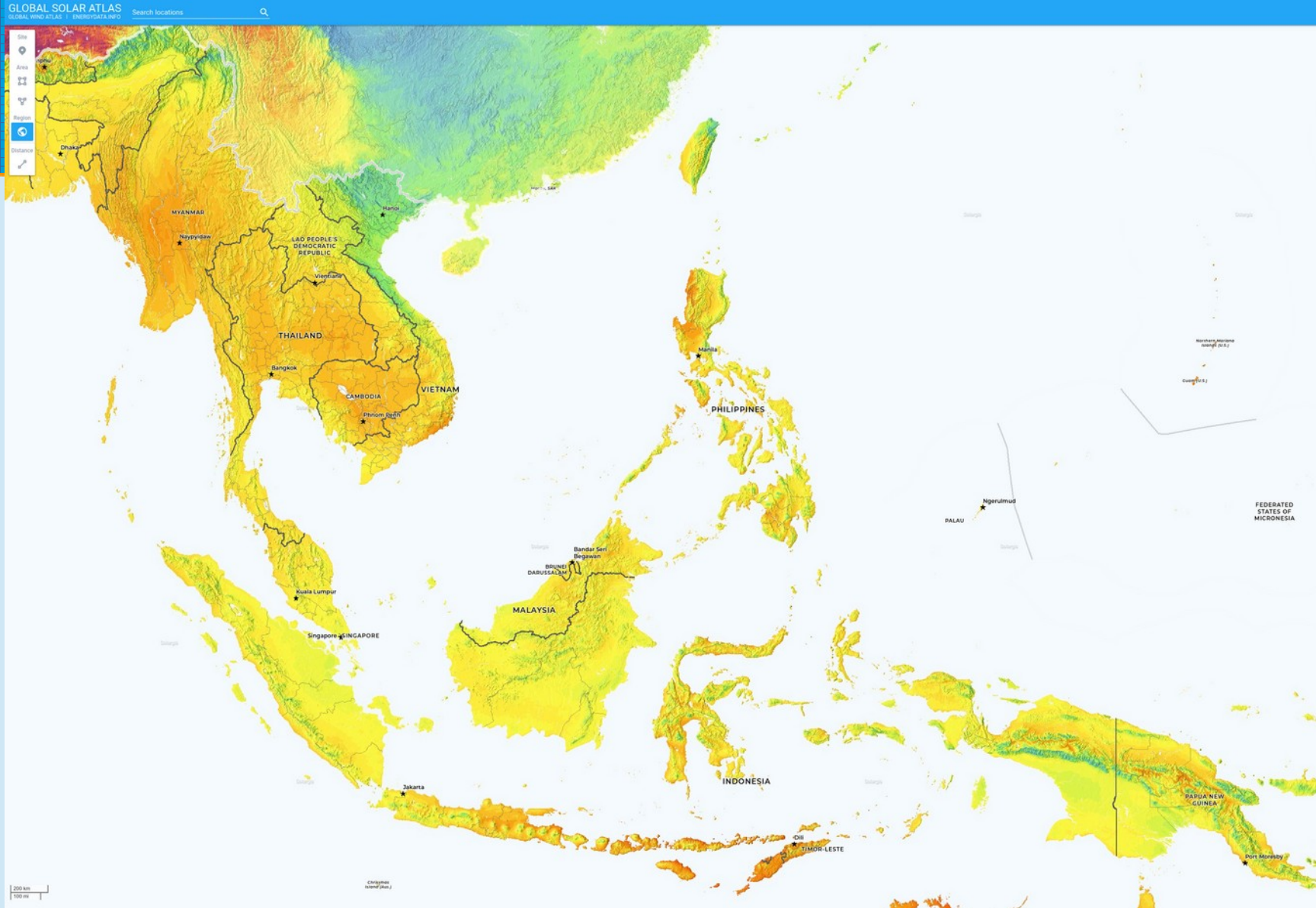


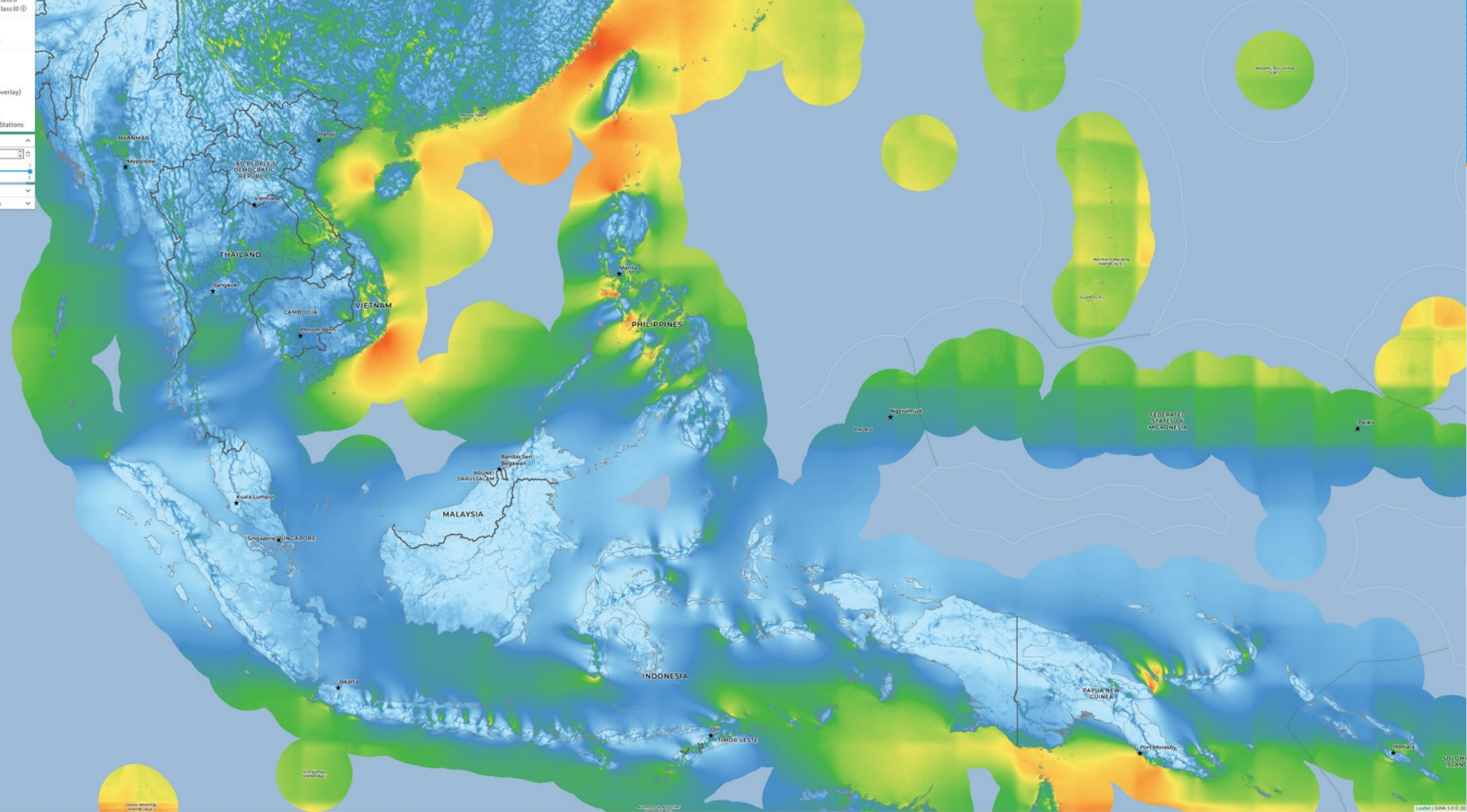
# Hydropower Potential per Capita (kWh/year)

Hydro



# Solar





overlay)

Stations

0

1

2

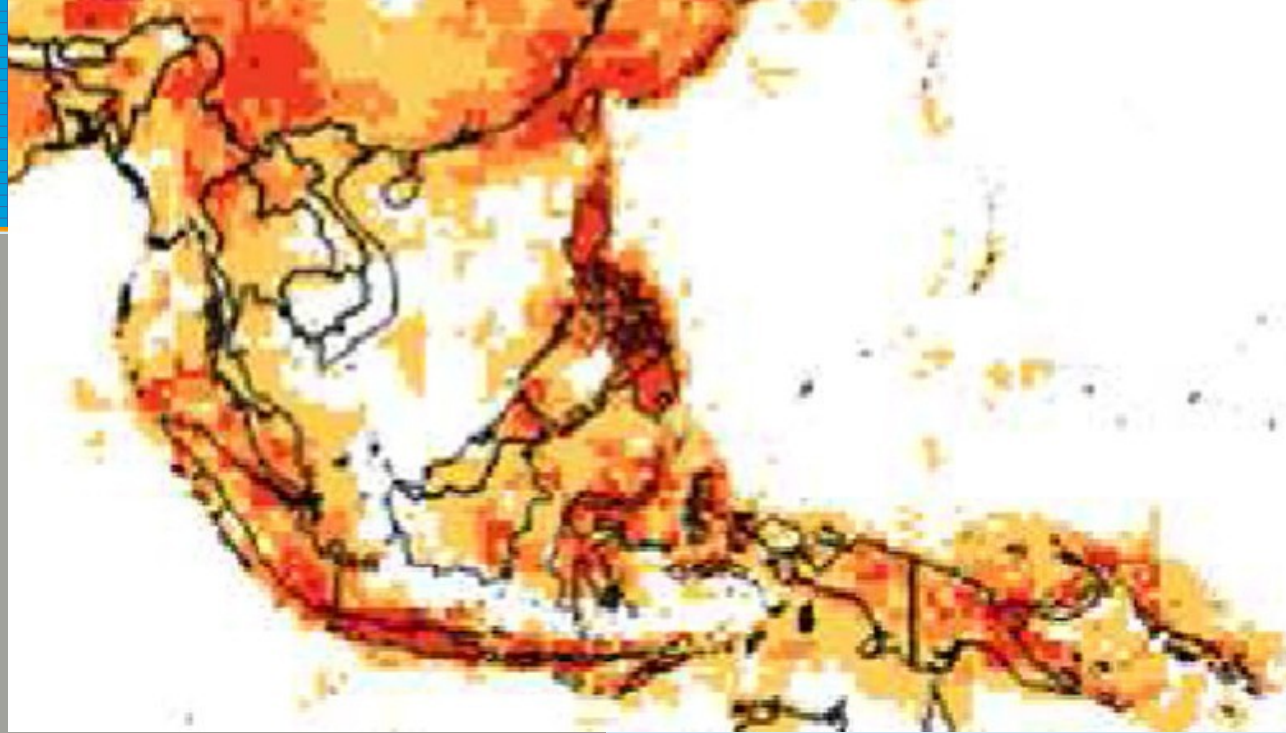
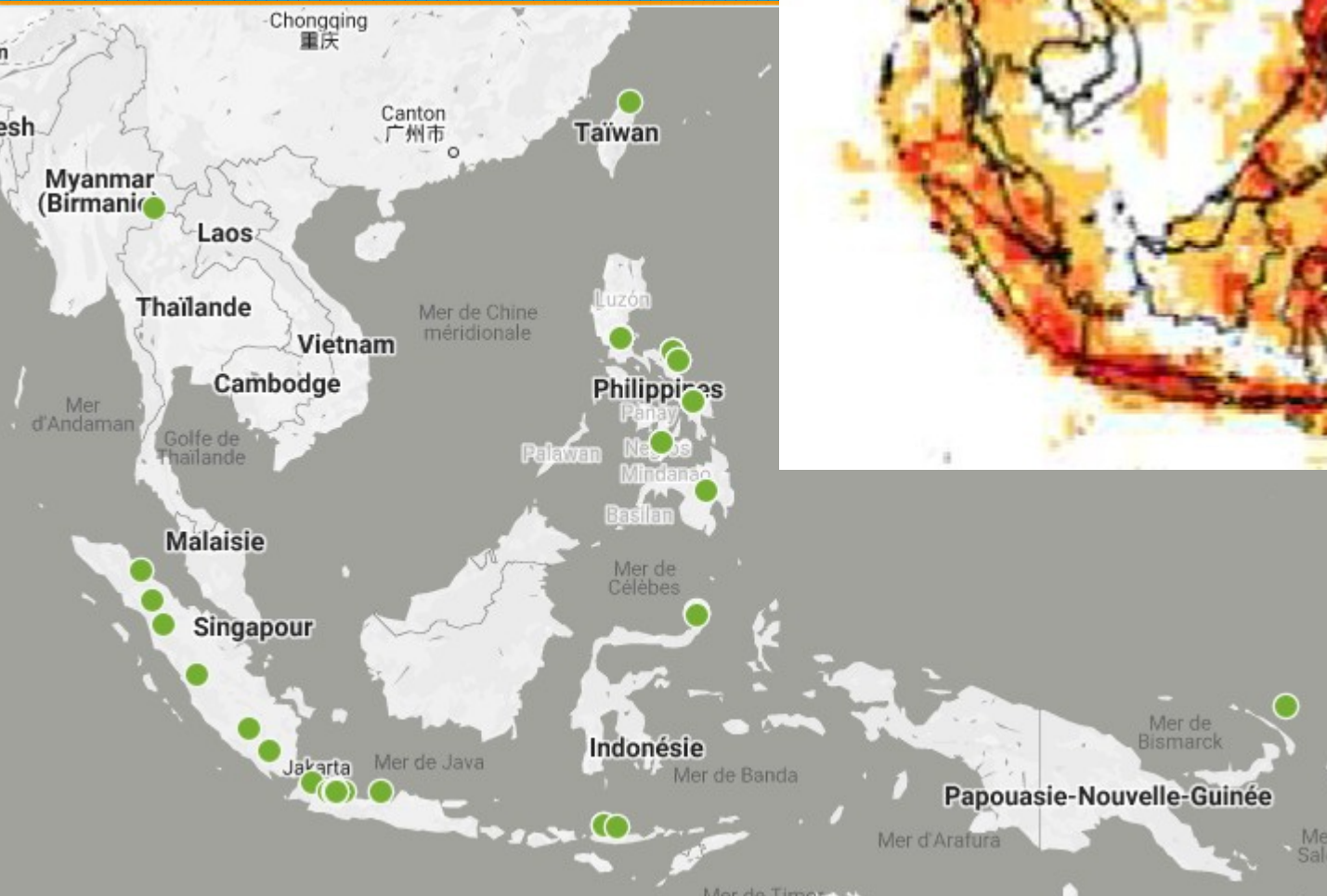
3

4

5



# Geothermal



Sources:

Coro et Trumpy (2020)

<https://www.thinkgeoenergy.com/map/>

# Conclusion

- Renewables: small fraction of capacity, large fraction of investment
- Solar good/very good everywhere.
- Hydro/geothermal/wind very good in many countries.

# Topic presentations

- 10 mn presentation
- 2mn reply and comments
- 2mn reply and comments

# Summary remarks

- Renewables key to reduce GHG emissions → 23% RE/TPES by 2025
- Renewables small share of capacity but big share of investment
- Vietnam renewables market boomed, others can follow easily



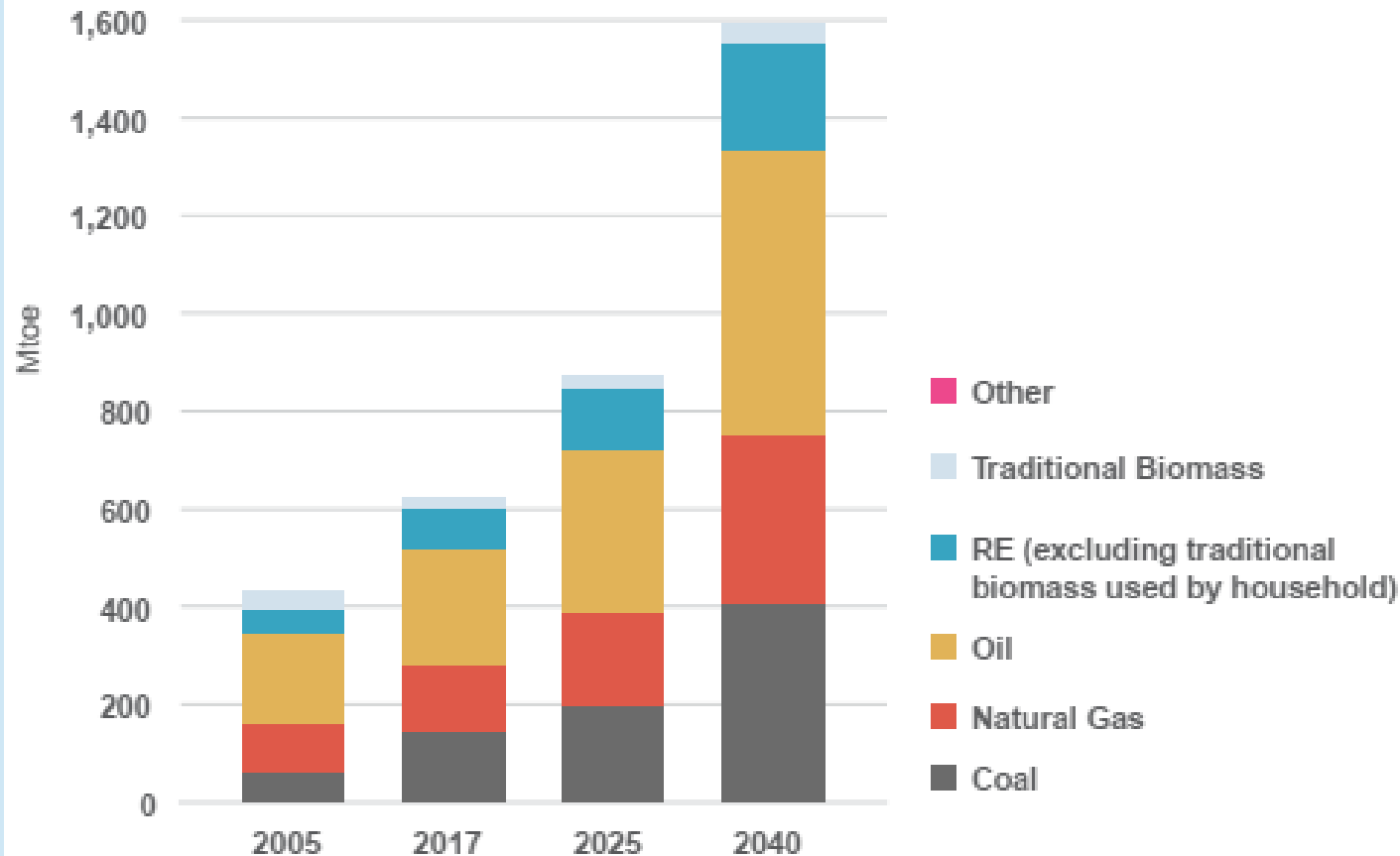
# Technologies status

- Hydro first in Myanmar and Lao
- Geothermal hot in Philippines and Indonesia
- PV is good everywhere, but storage is not cheap yet.
  - SG: International trade, competition by innovation.
- Wind is the frontier
  - VN case: Need marine protection laws, going (too?) fast.
- Biofuel and Biomass: Sustainability is still in the future
  - ID case: It's the economy. Answer to high oil prices.

# Extra slides

- ASEAN Primary Energy Supply Baseline
- Biomass policies in ASEAN
- ASEAN and ocean renewable energy

# ASEAN Total Primary Energy Supply, Baseline Scenario



# Biofuel and biomass

- Mandated biofuel policies in Indonesia, Philippines, Thailand, Malaysia
- Plans to mandate one in Cambodia, Lao PDR, Myanmar, Vietnam
- No plans in Brunei, Singapore

# Ocean Renewable Energy

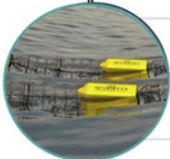
Quirapas et Taihagh 2021, RSER



**TIDAL BARRAGE:** Utilise energy from the difference in height between high and low tides.  
Largest installation is 250 MW in South Korea.



**TIDAL IN-STREAM:** Leverages fast flowing currents to turn hydrokinetic turbines located underwater.  
A 1.5 megawatt of tidal in stream facility was installed in Scotland in 2016.



**WAVE:** Produced from surface motion of ocean waves or from pressure fluctuations below the surface.  
Ireland is the leading country in wave power development with 5 MW of installed capacity.



**OCEAN THERMAL:** Ireland is the leading country in wave power development with 5 MW of installed capacity.  
Monaco has a 70 MW of ocean thermal power generation.



**SALINITY GRADIENT:** Available energy from the differences in salt concentration between fresh and seawater.  
Salinity gradient is still in the emerging development stage with 50 kW facility in Netherlands.

# Status of OTEC and Resource Assessment (Ikegami, 2017, OES)

