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Clean energy and environement 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

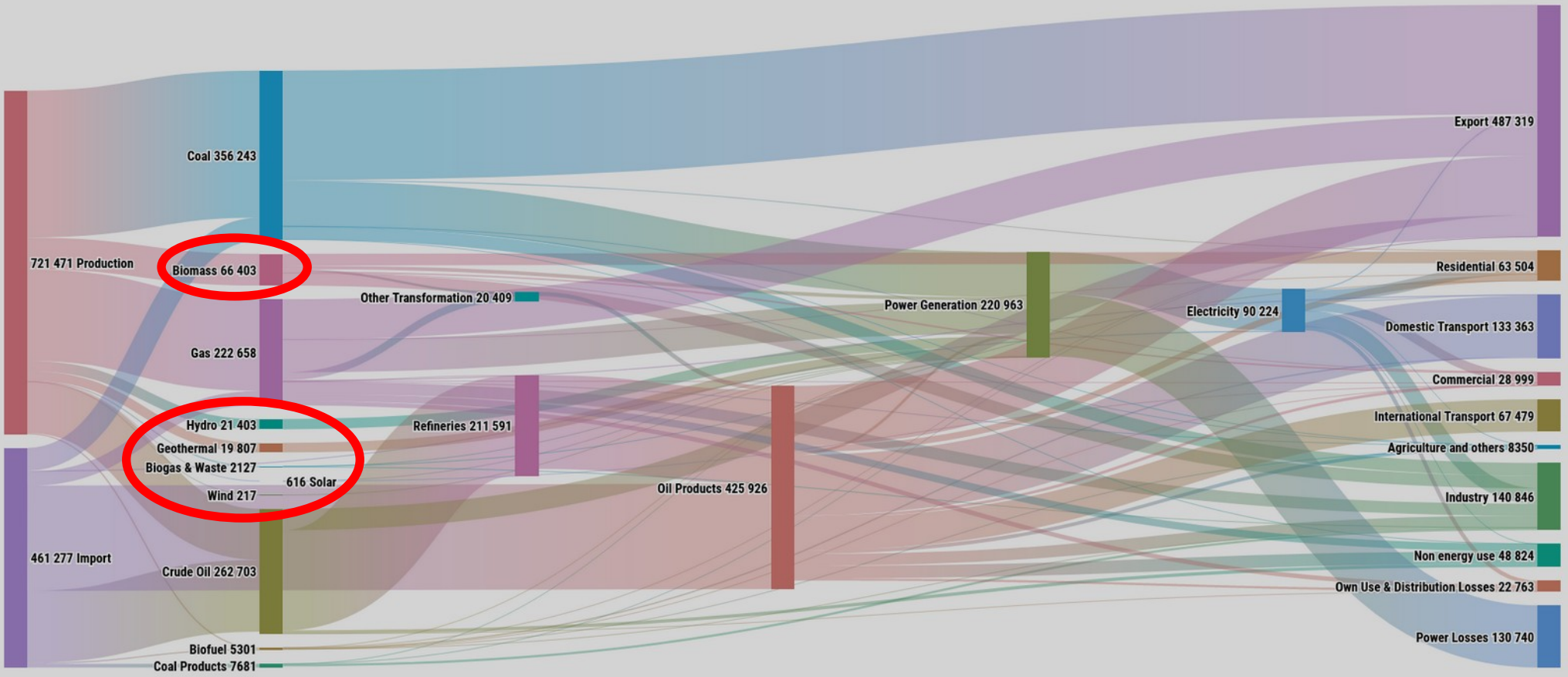
References:

ASEAN Centre for Energy
One Community for Sustainable Energy

IRENA
International Renewable Energy Agency

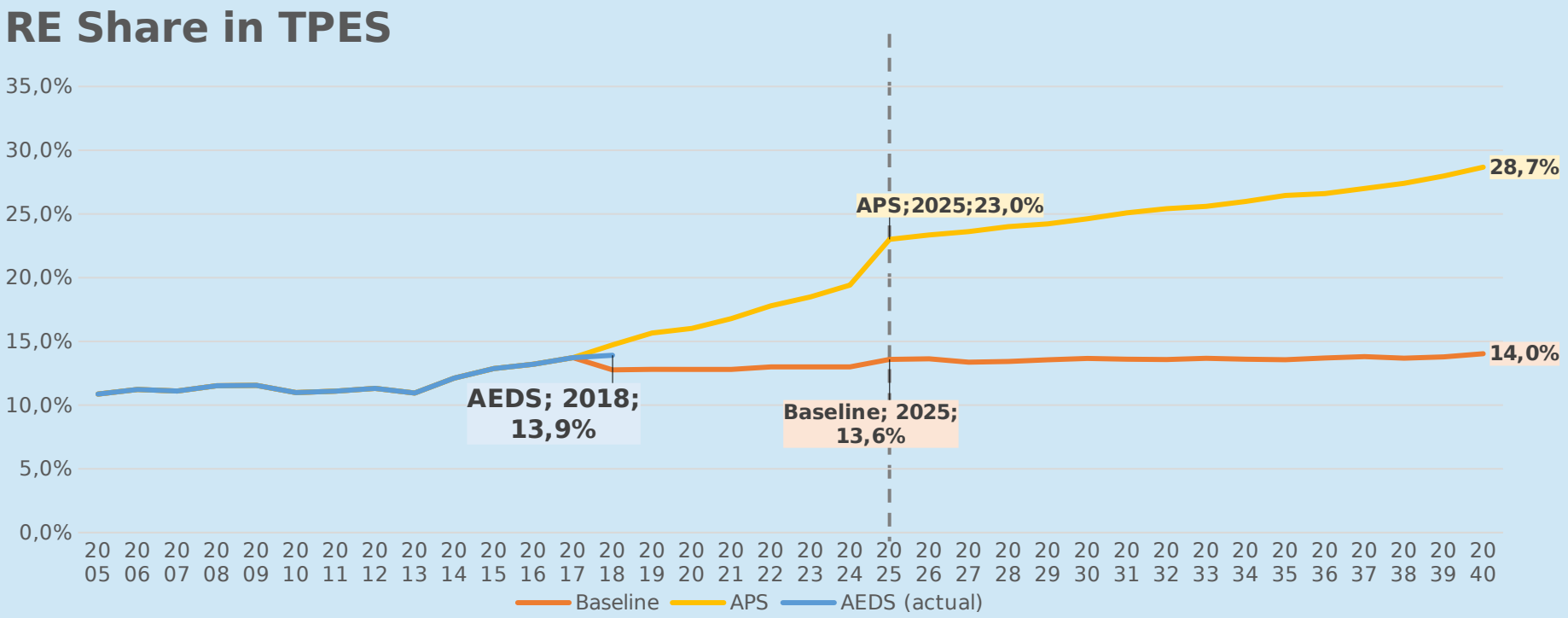
The Latest ASEAN Energy Balance (2017)

(in ktoe)



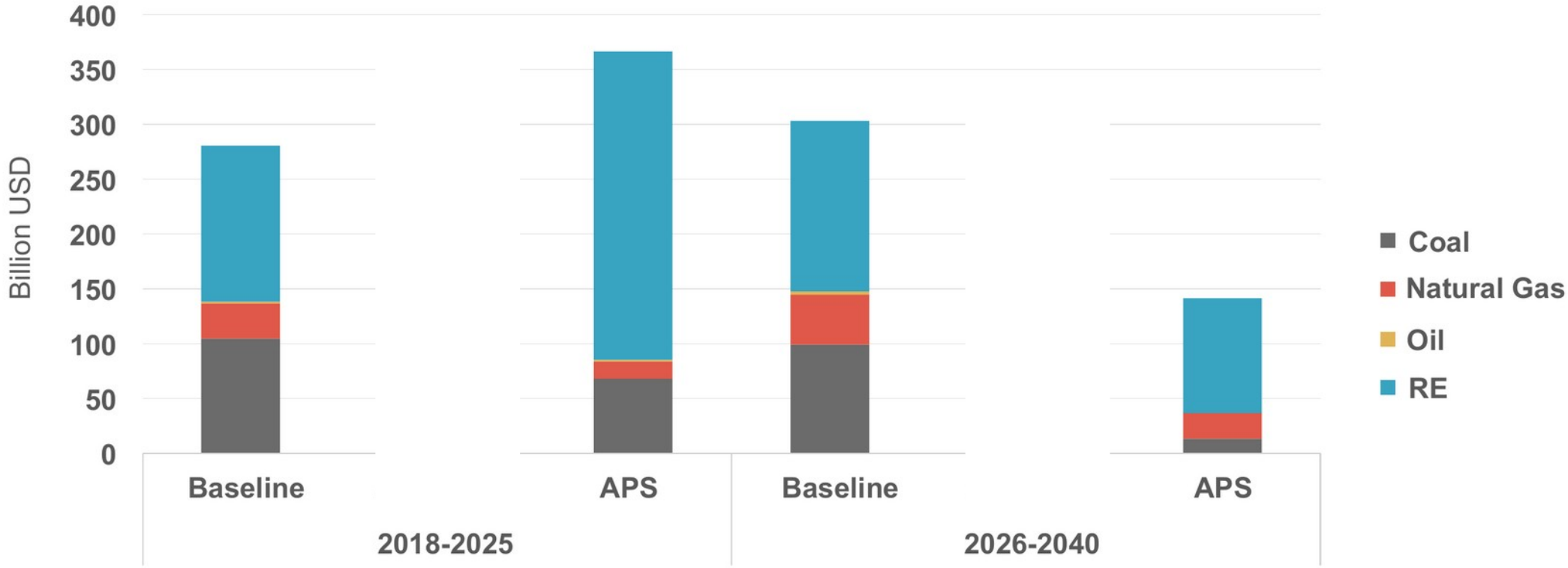
Source: https://aeds.aseanenergy.org

Regional target: 23% RE by 2025



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

Investment shift to meet the target



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

Source: 6th ASEAN energy outlook, figure 62

Renewable energy in ASEAN: a diverse potential

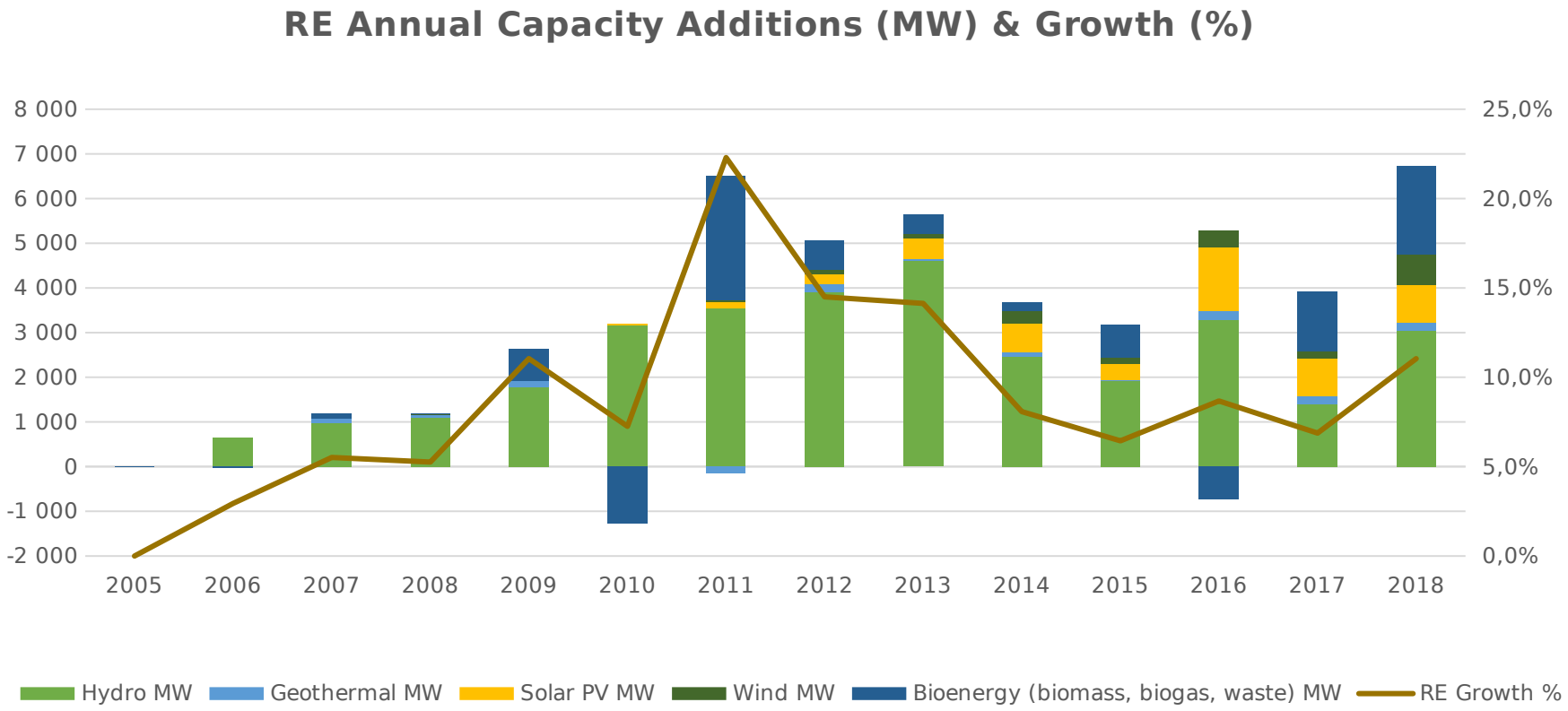
1) The ASEAN 2025 goal is 23% RE / TPES
2) The **resource diversity**

References:

ASEAN Centre for Energy
One Community for Sustainable Energy

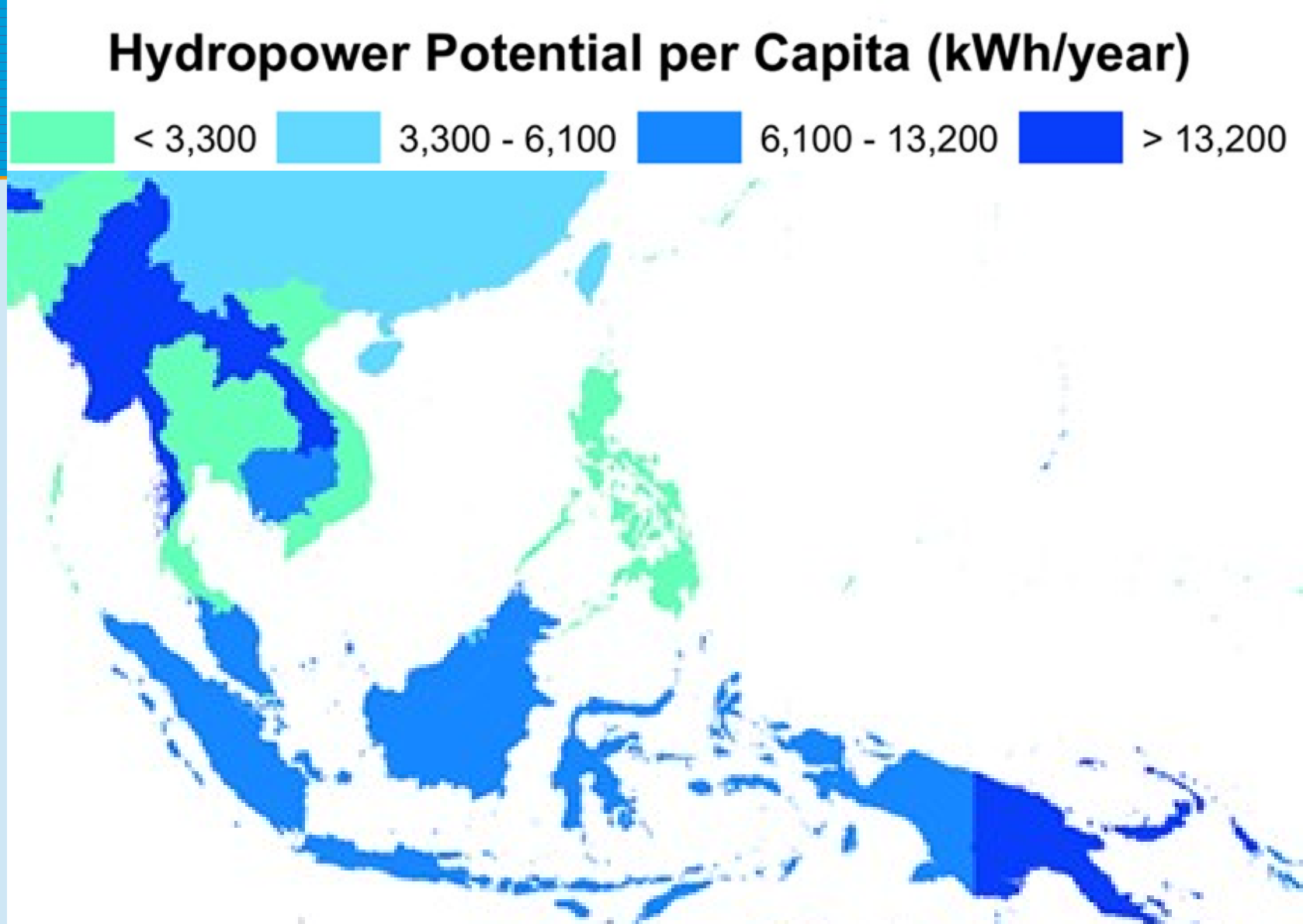
IRENA
International Renewable Energy Agency

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



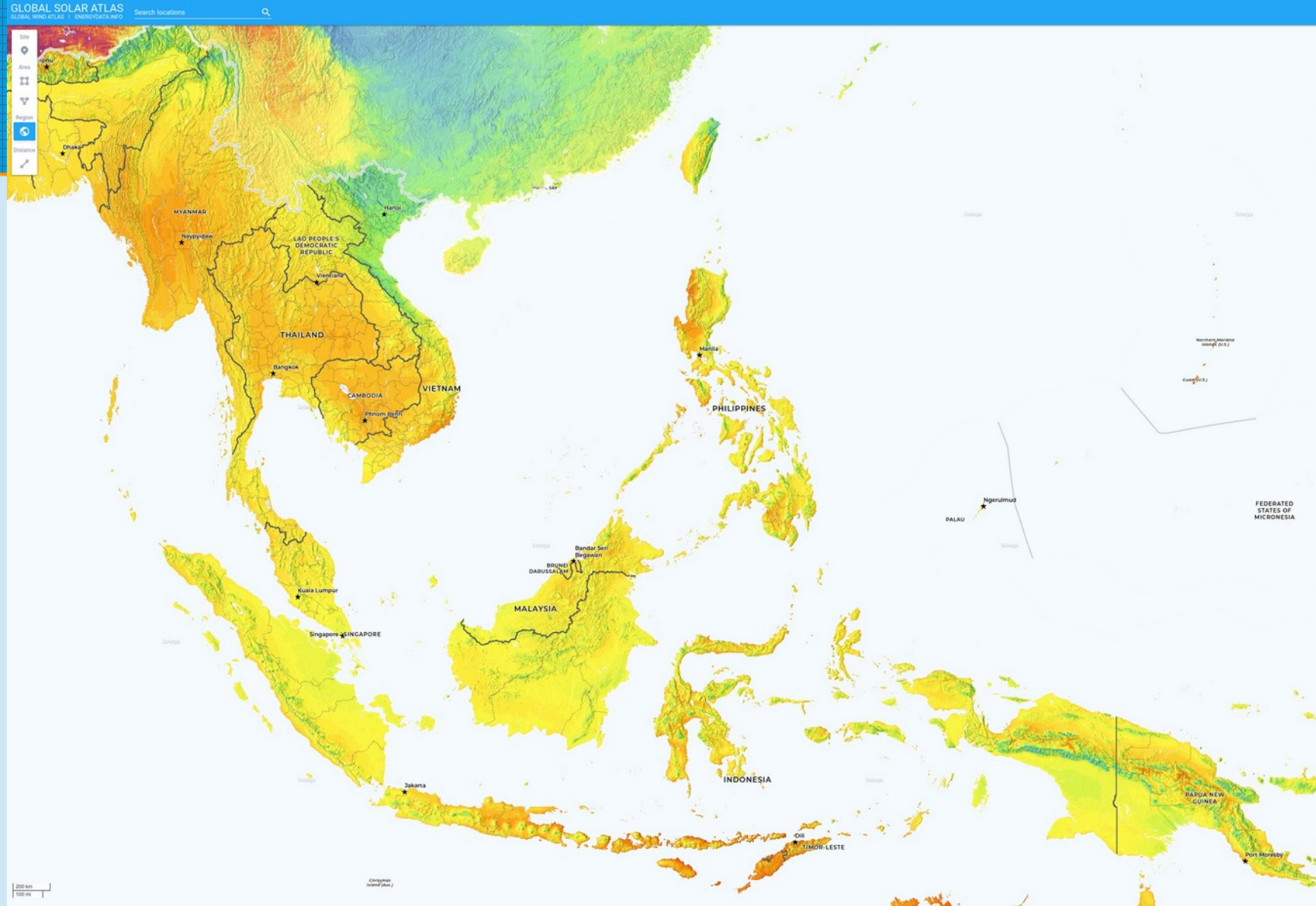
Source: Tirta (2021) 6th ASEAN energy outlook

Hydro



Source: Hoes et al. (2017)

Solar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Phnom Penh
VIETNAM
Manila
PHILIPPINES
Ngerulmud
PALAU
FEDERATED STATES OF MICRONESIA
Bandar Seri Begawan
BRUNEI DARUSSALAM
MALAYSIA
Kuala Lumpur
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Jakarta
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PAPUA NEW GUINEA
Port Moresby
200 km
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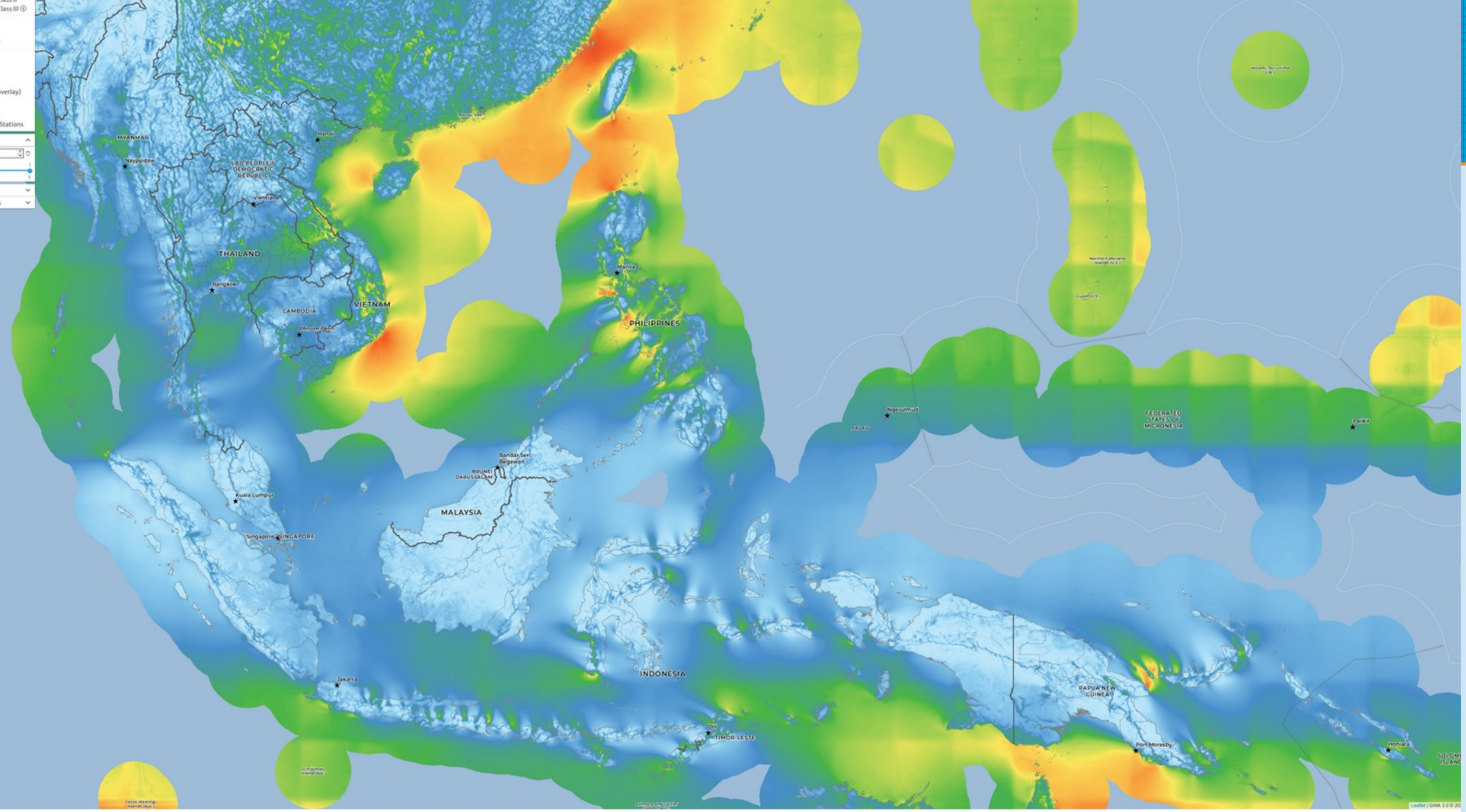
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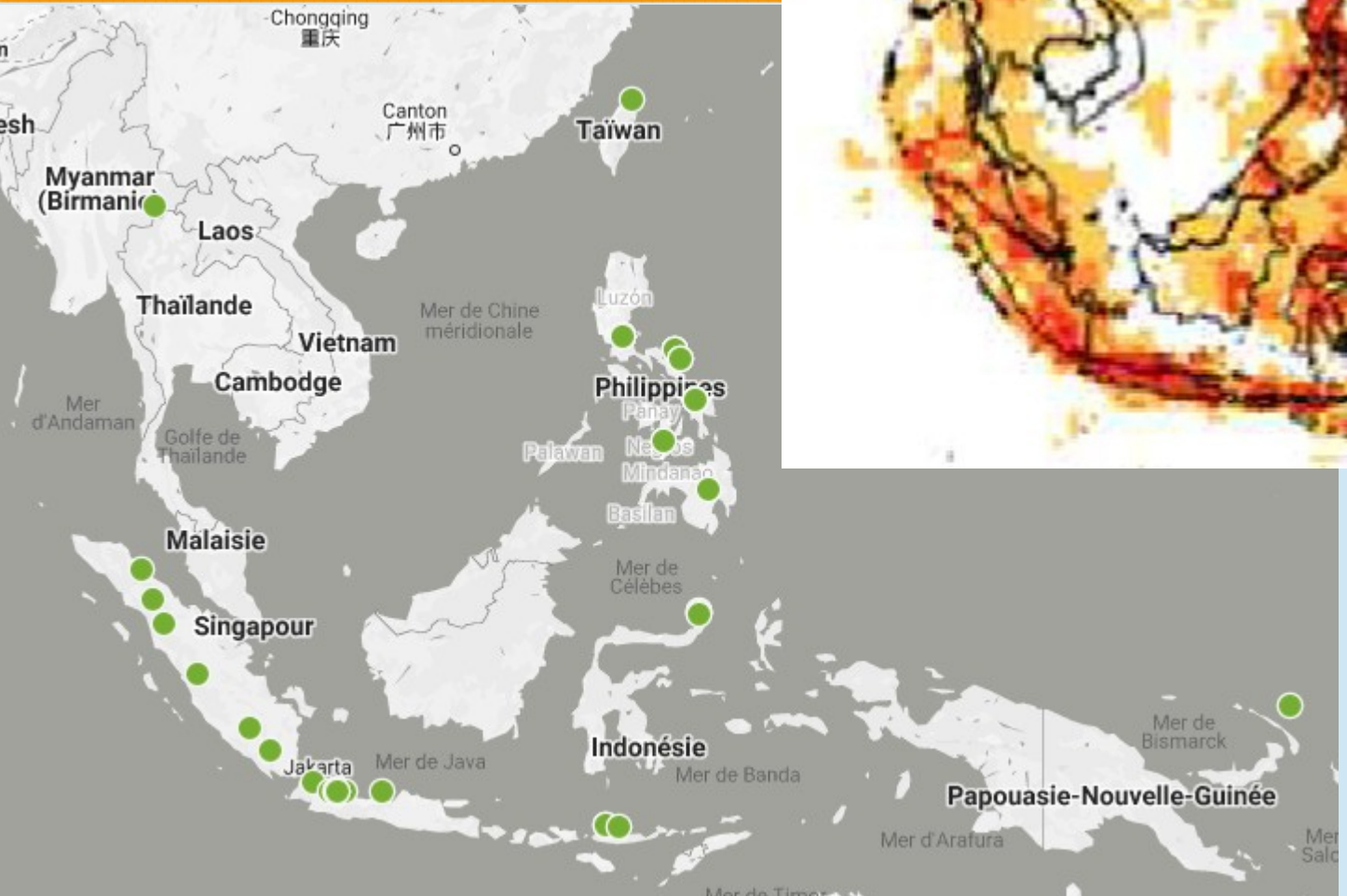
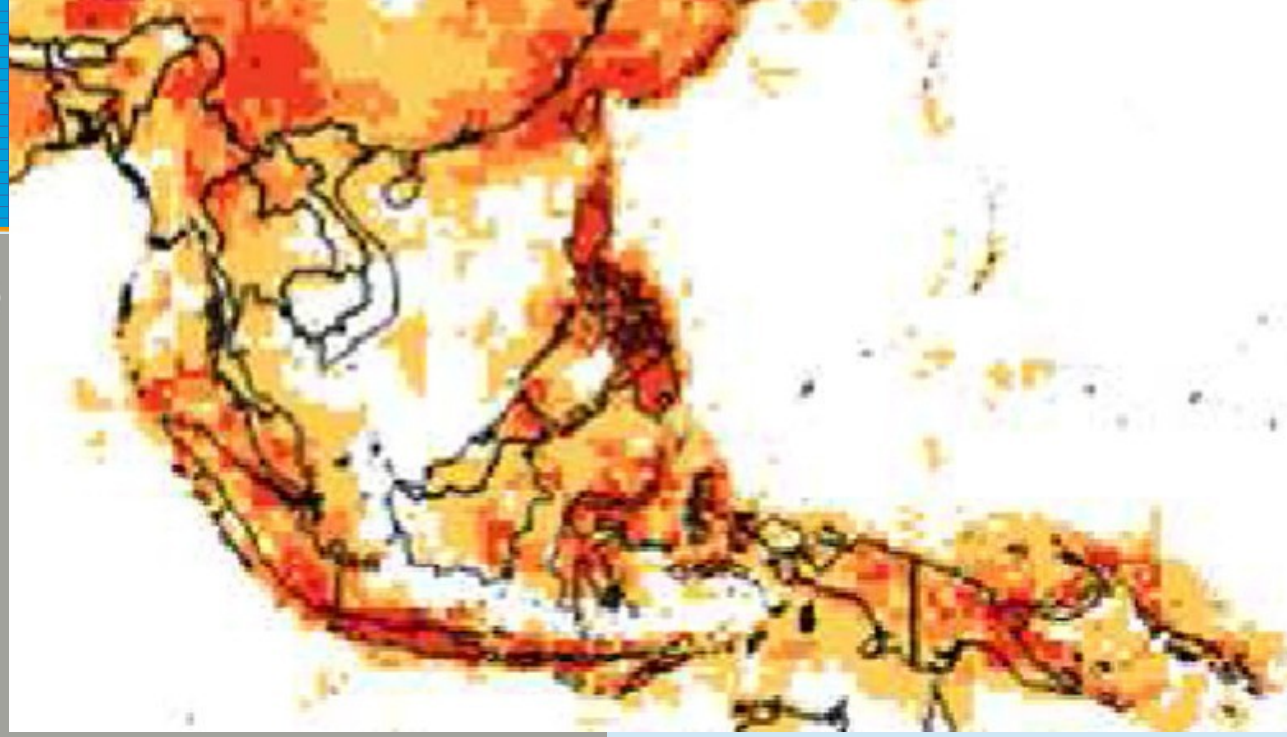
Geothermal





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

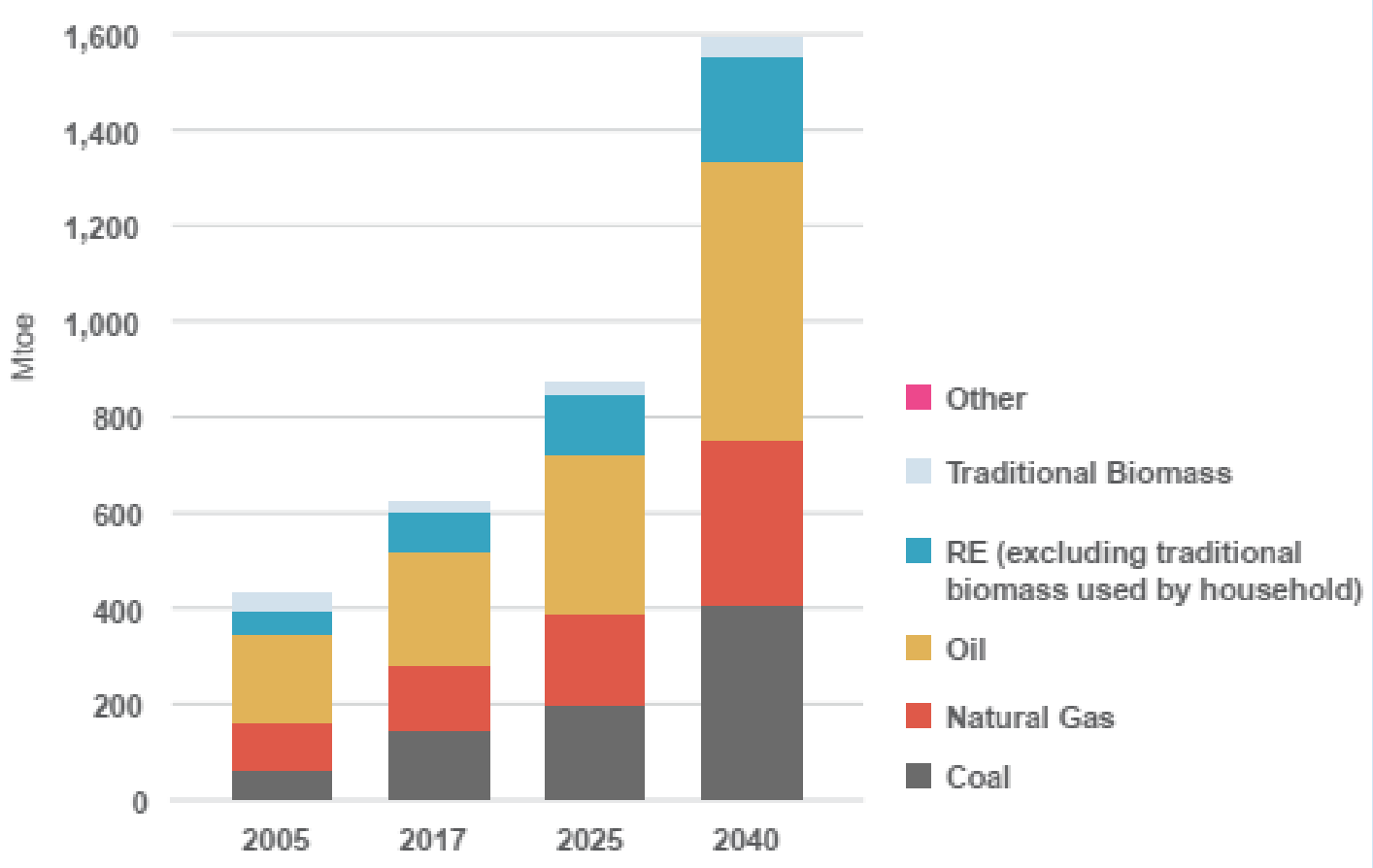
Technologies status

- 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



Source: 6th ASEAN energy outlook, figure 19

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

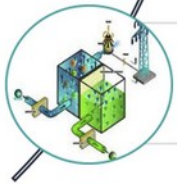
Quirapas et Taeihagh 2021, RSER

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.

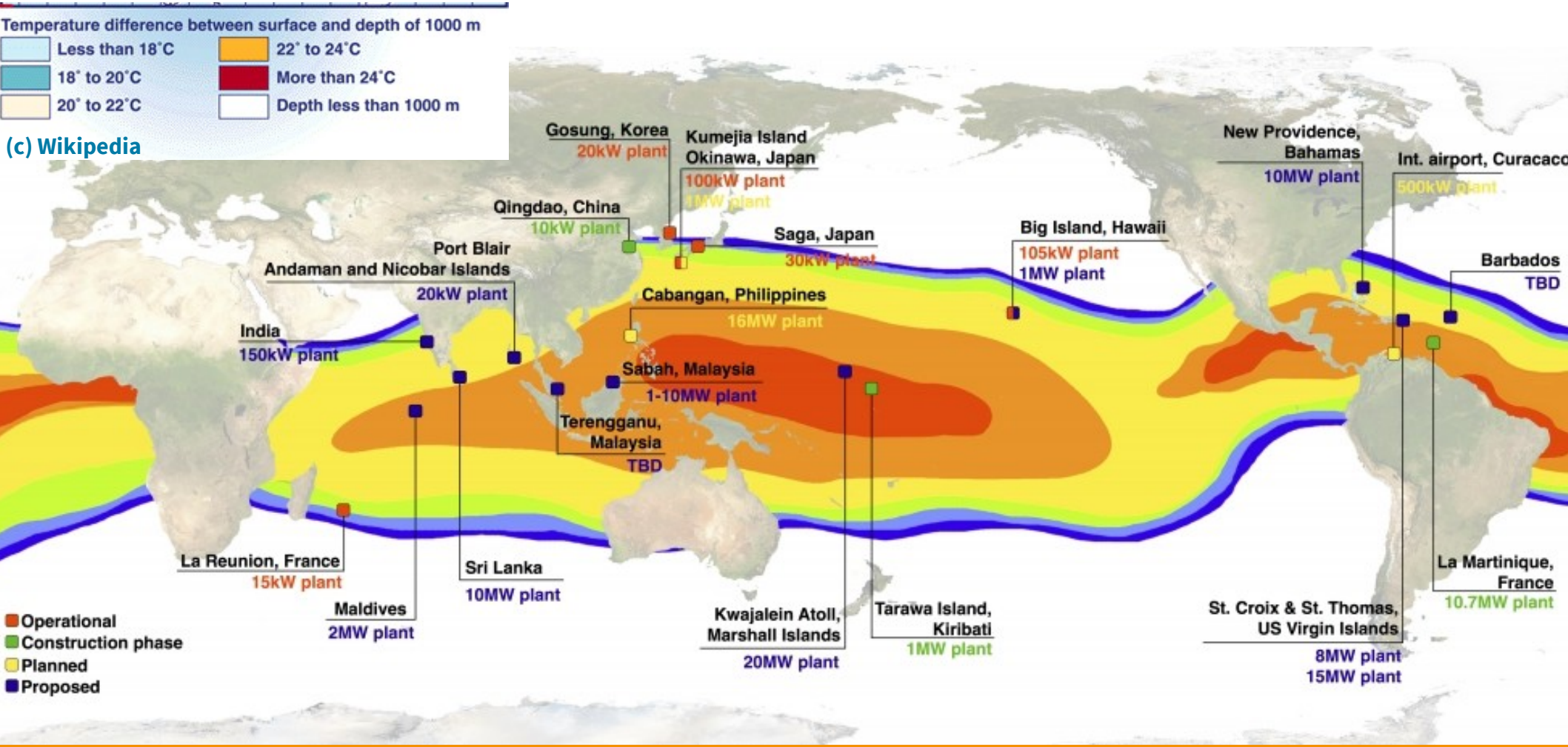
WAVE: Produced from surface motion of ocean waves or from pressure fluctuations below the surface.
Ireland is the leading country in wave power development with 5 MW of installed capacity.

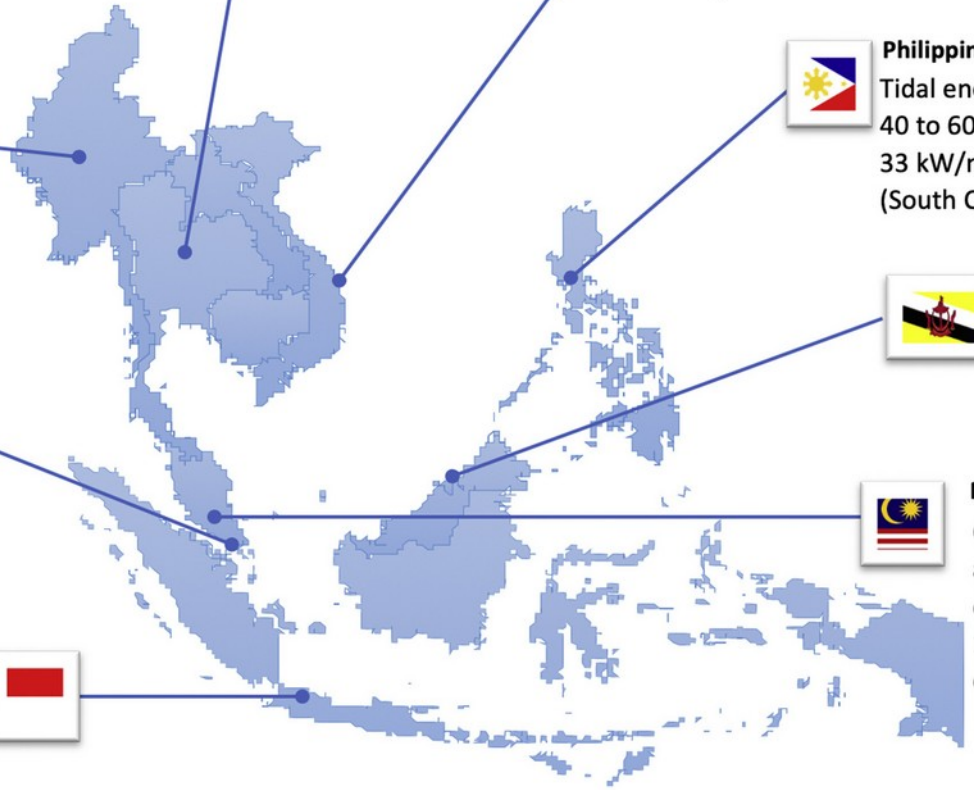
OCEAN THERMAL: Ireland is the leading country in wave power development with 5 MW of installed capacity.
Monaco has a 70 MW of ocean thermal power generation.



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)





Thailand
KMUTT has developed coastal wave power generation by using a laboratory prototype. Identified two sites for possible wave generation – Andaman Sea and the Gulf of Thailand

Vietnam
Tidal energy potential is 200–500 MW; wave energy is 350 MW

Philippines
Tidal energy potential of 35 TWh/yr (around 40 to 60 GW power potential); wave energy is 33 kW/m/yr (Pacific side) and 35 kW/m/yr (South China Sea side)

Myanmar
Tidal currents of 4–6 knots during spring tides and a tidal range of around 5 to 7 metres. Wave energy implemented in Sittwe Reclamation Project along the Pyisakanadi River.

Brunei
335 kW tidal energy potential (in theory) and 0.66 GW wave energy potential (in theory)

Singapore
250 MW extractable tidal energy (in theory) in Southern Islands; wave energy potential: 47.2 (early estimates from ERI@N and TMSI)

Malaysia
OTEC Research Centre in KL; looking at Sabah as potential site for OTEC studies. In terms of deployment, UTM is planning to deploy a 1kW combined ocean energy system demonstration platform in Pulau Tinggi.

Indonesia
1.995 MW wave energy (practical), 41.001 MW for tidal energy and 17.989 MW for OTEC