

# Can the regional trade of electricity advance ASEAN's net zero transition?

**Energy Transition Masterclass**  
**Session 4 – Recap on Key Message**

## INTERNATIONAL RENEWABLE ENERGY SYSTEMS

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# 1

## TRADING ELECTRICITY

### **SUPER GRID**

Super-grids are high-capacity power transmission lines using either high-voltage direct current or ultra-high-voltage direct current power lines.

Expanding regional power interconnection with super-grids will allow higher RE penetration and a more reliable power system.

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## ASIA PACIFIC SUPER GRID SCENARIO

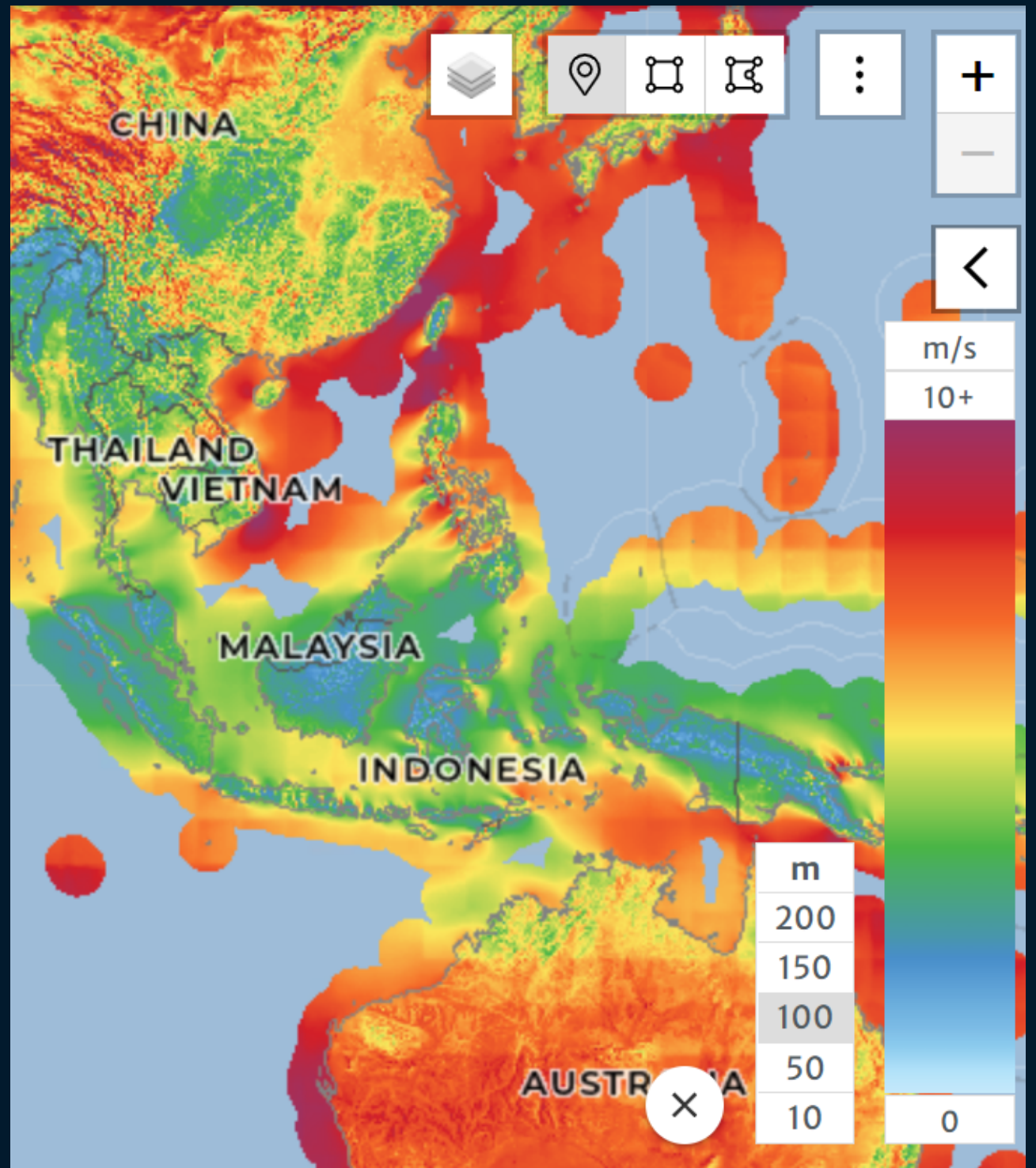
An Asia Pacific super grid connecting Southeast Asian countries and further extended to Australia, China and India would significantly **smooth out** the power demand and variability of renewable energy.

The Asia-Pacific Super Grid: a high-voltage direct-current backbone in the Super Grid scenarios. Source: Lu et al, 2021. Low-cost, low-emission 100% renewable electricity in Southeast Asia supported by pumped hydro storage. Energy 236, 121387.



## ASIA PACIFIC SUPER GRID SCENARIO

The super grid will integrate the high wind energy potential areas (offshore Vietnam and Philippines) with the rest of ASEAN and further reach the enormous solar resource in North Australia.



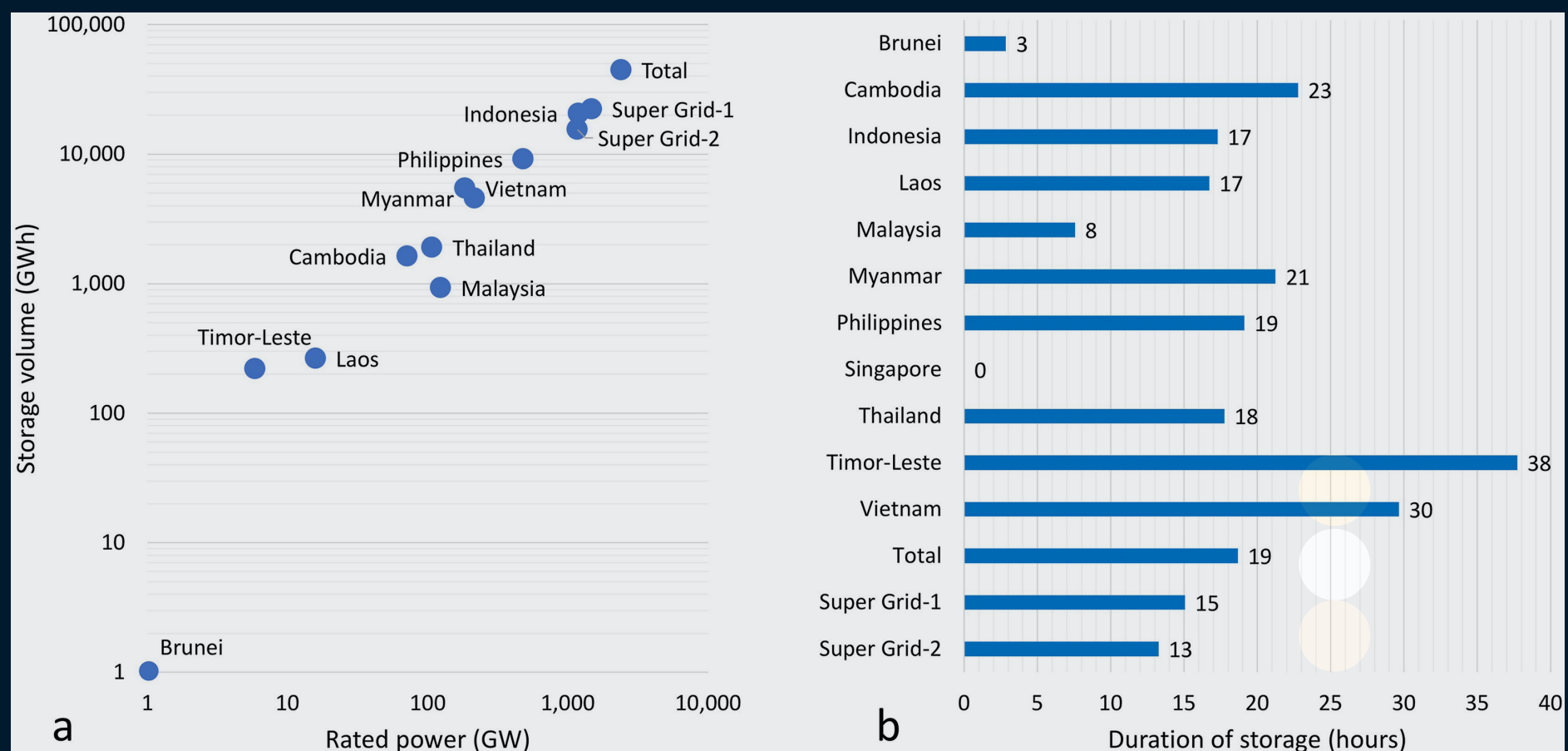
Mean wind speed. Source: <https://globalwindatlas.info/>





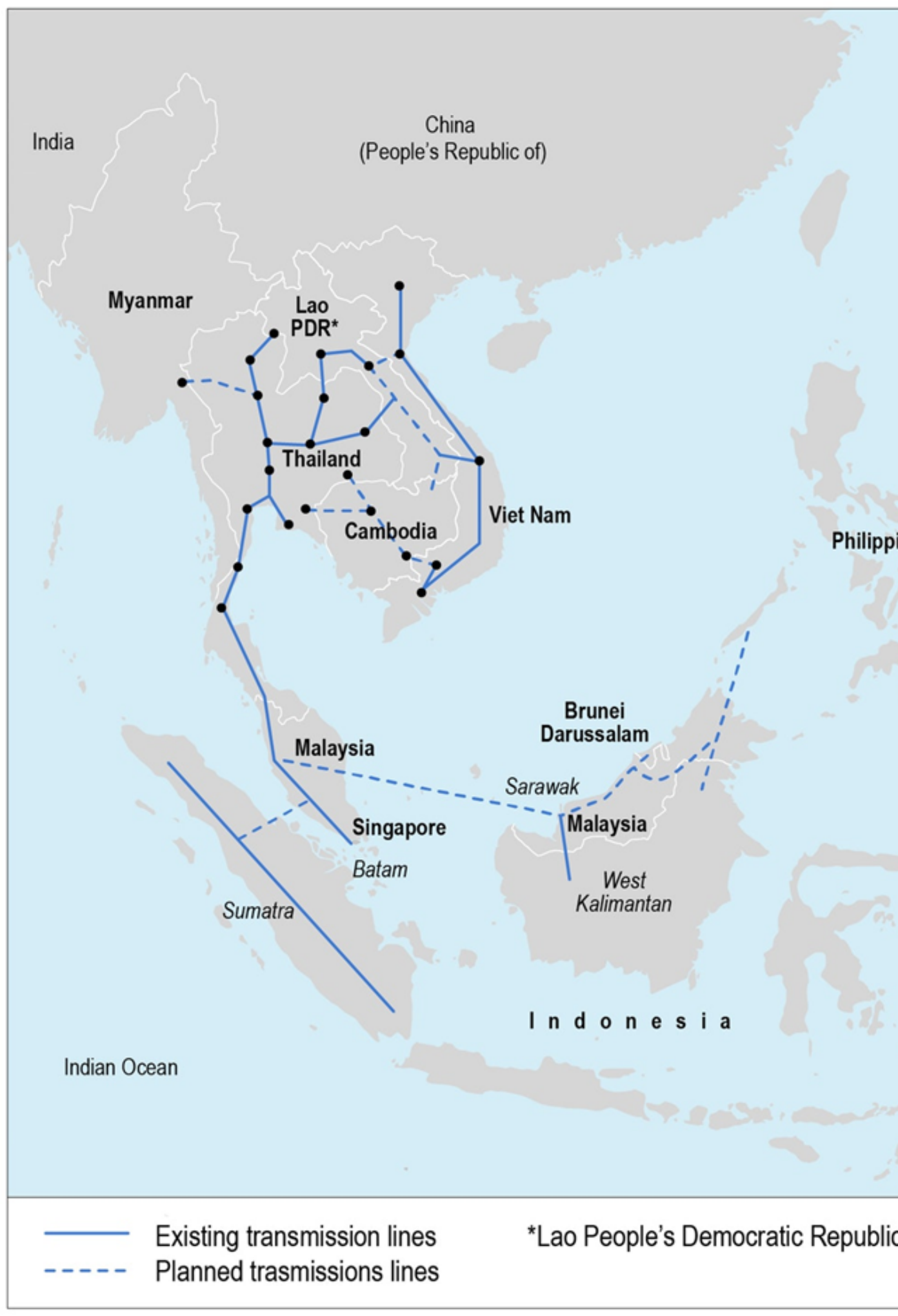
# ASIA PACIFIC SUPER GRID SCENARIO

It would **save 50-89%** of the storage required to support a complete renewable electricity in Southeast Asia.



The storage requirements (a) and the duration of energy storage (b) in the high electricity scenario. Note: Super grid 1: ASEAN super grid; Super grid 2: ASEAN super grid with connection to Australia, China and India. Source: Lu, B., Blakers, A., Stocks, M., Do, T.N., 2021. Low-cost, low-emission 100% renewable electricity in Southeast Asia supported by pumped hydro storage. Energy 236, 121387.





## ASEAN POWER GRID - THE PROGRESS

ASEAN countries have explored the potential for regional power trade since the late 1990s, but progress has been limited.

To date power trade has mainly consisted of project-level trade between generation in one country exported for consumption to a neighboring country.

ASEAN Power Grid. Source: IEA, 2019. Establishing multilateral power trade in ASEAN.



## SIGNING OF THE ENERGY PURCHASE AND WHEELING AGREEMENT (EPWA) OF THE LAO PDR-THAILAND-MALAYSIA-SINGAPORE POWER INTEGRATION PROJECT (LTMS-PIP)

27 SEPTEMBER 2017 | MANILA, PHILIPPINES



The first multilateral power trading arrangement was the **Lao PDR-Thailand-Malaysia-Singapore** Power Integration Project (LTMS-PIP). Actual trading has started among Lao PDR, Thailand, and Malaysia since 2017 and will soon further include Singapore.

Under this project, a total of **30.2 GWh** of electricity was traded as of August 2020.

Reference: ASEAN Centre for Energy, 2020. ASEAN plan of action for energy cooperation (APAEC) 2016-2025, Jakarta.



# WAYS FORWARDS FOR ELECTRICITY TRADING IN SOUTHEAST ASIA

Enhance political and social support.

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Continue extending experience with  
bilateral and multilateral trade.

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Increase sharing of information on  
hydropower dam operations.

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Pair abundant solar and wind  
development with equally abundant  
off-river pumped hydro energy storage.

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HVDC interconnection.

*These initiatives would form the basis for a  
gradual transition to a regional power system*



# 2 TRADING ENERGY CARRYING MOLECULES

At present **hydrogen is niche fuel** for industrial thermal energy demands.

Almost all traded hydrogen **is produced using fossil fuels**. With solar and wind now the cheapest form of generation on the planet, there is a potential for hydrogen to be a zero carbon fuel for electricity generation.



# EARLY TRADE FLOWS

Brunei for the first time exported hydrogen to Japan in December 2019. Singapore has MoUs with Chile, Australia and Japan to enhance the cooperation in hydrogen.

Low-carbon hydrogen could be produced in renewables rich countries like Australia and exported to energy intensive colder countries with limited domestic RE potential (like Japan, Korea).



Envisaged trade routes for hydrogen as of 2021. Source: IRENA, 2021. Green hydrogen supply: A guide to policy making, International Renewable Energy Agency, Abu Dhabi.





Electrons or molecules – regional energy trade has the potential to connect ASEAN's diverse renewables potential and accelerate the region's net zero transition.





**NEXT SESSION**

# **ENERGY STORAGE**

**Dr Cheng Cheng**

10:00-12:00 HANOI-JAKARTA TIME

11:00-13:00 MANILA TIME

20 APRIL

**ETP Round Tables** is a two-year capacity building and networking program of the ETP in Indonesia, the Philippines, and Vietnam. The program aims to build awareness and understanding of practical solutions and pathways that can support Indonesia, the Philippines, and Vietnam accelerate their transition to 100% zero-carbon energy.

Over a 24-week structured online training programme, the ETP Roundtables – **Energy Transition Masterclass** will provide a suite of tailored professional forums (training sessions) to enable the exchange of information, develop leadership among the region's energy transition stakeholders, and endow participants with the latest understanding and tools to accelerate energy transition for both policy and market contexts.

**See more:** <https://www.energytransitionpartnership.org/>

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