

# APERC Updates

**EGEEC 62 & EGCFE 2024 Joint Meeting**  
21-23 May 2024 – Nanjing, China

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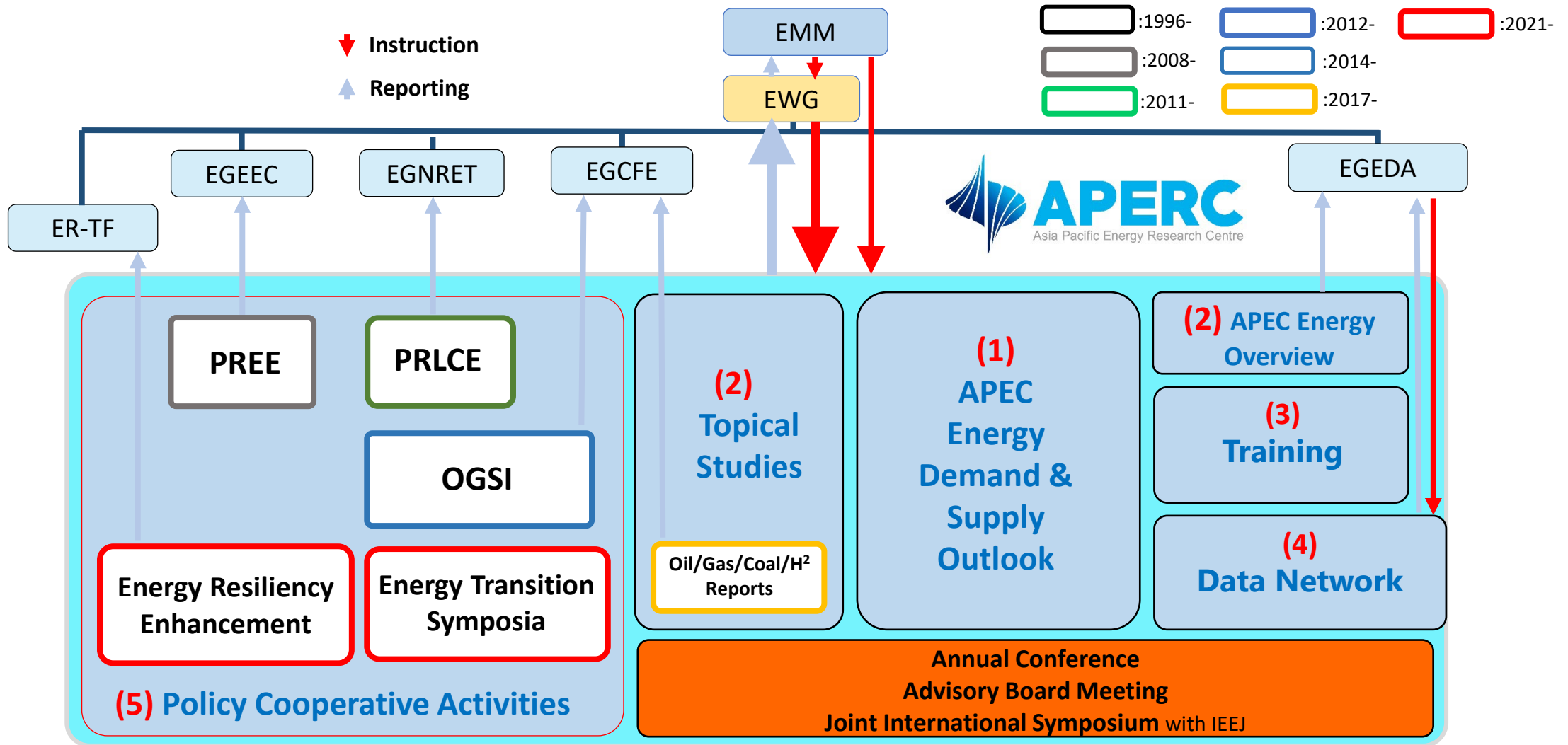
# Outline

- APERC Mission
- APERC Activities
- APEC Energy Demand and Supply Outlook
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- Recent Policy Cooperative Activities
  - Sectoral Symposia for Energy Transition
  - Peer Review on Low-Carbon Energy in Peru
  - Oil and Gas Security Network Forum
  - Peer Review on Energy Efficiency in Chile

# APERC Mission

- APERC is the energy research arm of the Asia-Pacific Economic Cooperation (APEC)
- Adopted by the Asia-Pacific Economic Cooperation (APEC) Economic Leaders at the Osaka Summit in November 1995
- Located in Tokyo, Japan
- Four pillars of activities
  - Research
  - Training
  - Data Management
  - Policy Cooperative Projects
- Two flagship publications
  - APEC Energy Demand and Supply Outlook
  - APEC Energy Overview

# APERC Activities



# **The APEC Energy Demand and Supply Outlook**

**A forward-looking exploration of potential energy futures in APEC**

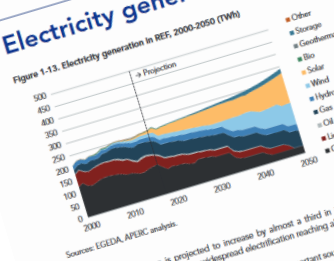
# APEC Energy Demand and Supply Outlook

- Priority task for APERC under the APEC Energy Action Programme adopted by leaders in 1995
- Analyses and policy insights for energy demand and supply projections for APEC economies
- The **8th Edition Outlook** published September 2022
- The **modelling tools developed for the Outlook** are used for training activities in APEC economies
- APERC researchers are modelling **the 9th Edition Outlook** to be published in 2025
  - Preliminary results are being shared with member economies, with projections now extending to 2060



## Electricity generation

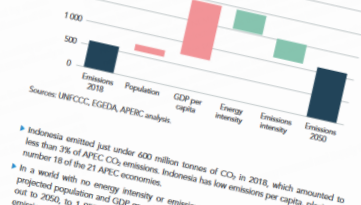
Figure 1-13. Electricity generation in REF, 2000-2050 (TWh)



- ▶ Electricity generation is projected to increase by almost a third in REF three-quarters in CN, owing to widespread electrification reaching almost all of Australia. Its relative prominence diminishes steadily through the 2040s.
- ▶ Coal (including lignite) has historically been the most important source of CN, though their use tapers off faster, reaching zero generation in the 2040s.
- ▶ Both coal and lignite still provide important baseload generation for Australia, though their use tapers off faster, reaching zero generation in the 2040s.
- ▶ Australian residential rooftop solar has posted world-leading growth and will continue to grow strongly in both scenarios.
- ▶ Utility scale solar surpasses rooftop generation in the Sun Cable project, which will export electricity to the Sun Cable project, which will export electricity to the Sun Cable project, which will export electricity to the Sun Cable project.
- ▶ Domestic natural gas supply is likely to be

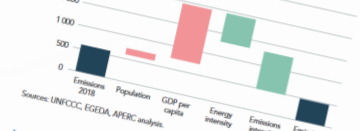
## Components of CO<sub>2</sub> emissions

Figure 7-51. CO<sub>2</sub> emissions components in REF, 2018 and 2050 (million tonnes)



- ▶ Indonesia emitted just under 600 million tonnes of CO<sub>2</sub> in 2018, which amounted to less than 3% of APEC CO<sub>2</sub> emissions. Indonesia has low emitters per capita, placing it number 18 of the 21 APEC economies.
- ▶ In a world with no energy intensity or emissions intensity improvements, Indonesia's projected population and GDP growth would lead to CO<sub>2</sub> emissions more than tripling out to 2050, to 1 950 million tonnes. Population increases place upward pressure on emissions, but it is the projected growth in GDP per capita that contributes to the most significant upward pressure on Indonesia's CO<sub>2</sub> emissions.
- ▶ In REF, improvements in energy intensity and emissions intensity mean that CO<sub>2</sub> emissions are less than double to 1 100 million tonnes in 2050. CO<sub>2</sub> emissions reductions are attributable to energy intensity and emissions intensity in a roughly even split.

Figure 7-52. CO<sub>2</sub> emissions components in CN, 2018 and 2050 (million tonnes)



- ▶ In CN, emissions fall to 484 million tonnes in 2050. This is a fall of almost 20% from 2018 levels, and is 50% lower than emissions in REF.
- ▶ Emissions intensity improvements in CN are double that which occur in REF. These improvements are associated with fuel switching and CCS technologies which are present for Indonesia in CN. Energy intensity improvements are 50% larger in CN than in REF. The improvements are bolstered by improved market incentives with low energy inputs, policy support by the Indonesian government in CN.
- ▶ To compensate for the positive CO<sub>2</sub> emissions by the energy sector in CN, CO<sub>2</sub> emissions sinks from the non-energy sectors, such as land use and forestry sector, are needed to achieve carbon neutrality ambitions.

Note: The above charts are a representation of the Kaya identity which is  $CO_2 \text{ emissions} = \text{Population} \times \frac{GDP}{\text{Population}} \times \frac{\text{Energy supply}}{GDP} \times \frac{CO_2 \text{ emissions}}{\text{Energy supply}}$

APEC Energy Demand and Supply Outlook 8th Edition, Vol. 2 | 235

# Updated scenarios for the 9th edition of the Outlook

## The Reference scenario (REF)

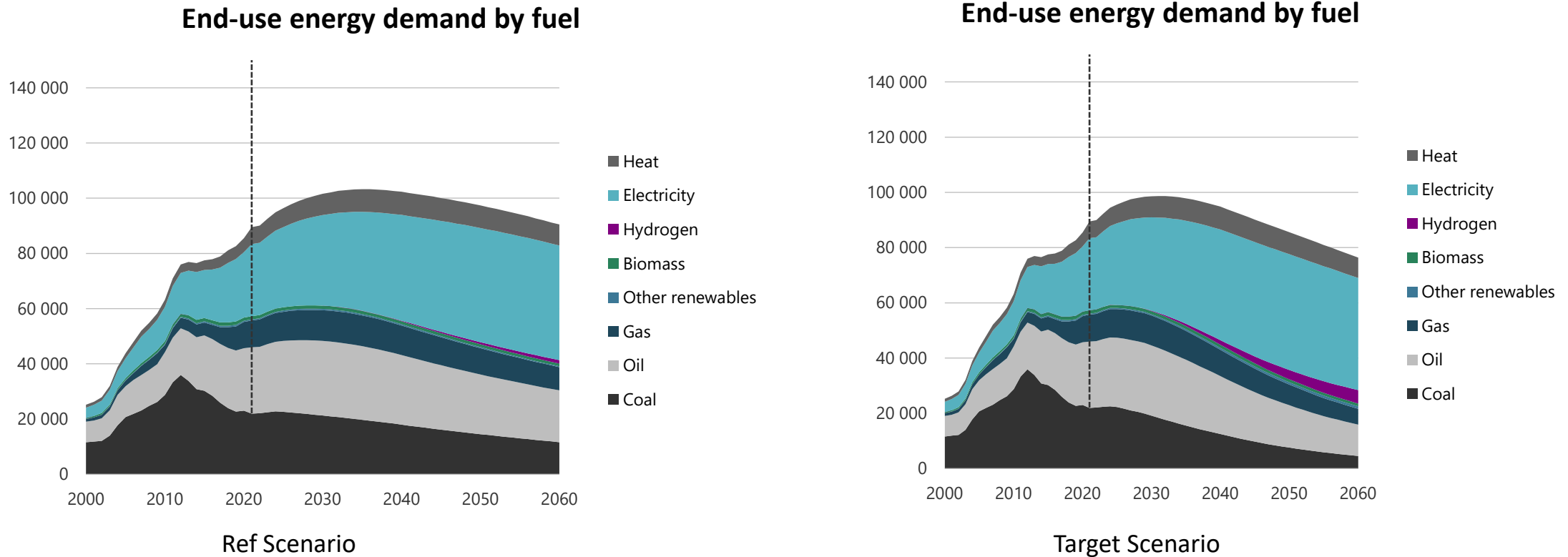
- A set of economy-specific pathways where existing policies are retained, and new policy measures are included if and only if they are supported by implementation detail.
- In the absence of details, energy intensity, fuel switching, investment, technology deployment, and energy supply are assumed to loosely follow historical trends.

## The Target scenario (TGT)\*

- Illustrates a hypothetical pathway for each economy toward realizing energy-related policy targets, even if implementation details are not available.
- When details are not available, economy targets provide directional guidance and a general sense of policy priorities to inform assumptions.

\* this scenario is different than the Target Scenario from the 7th Edition Outlook

# Preliminary Results for China – Energy Demand by Fuel

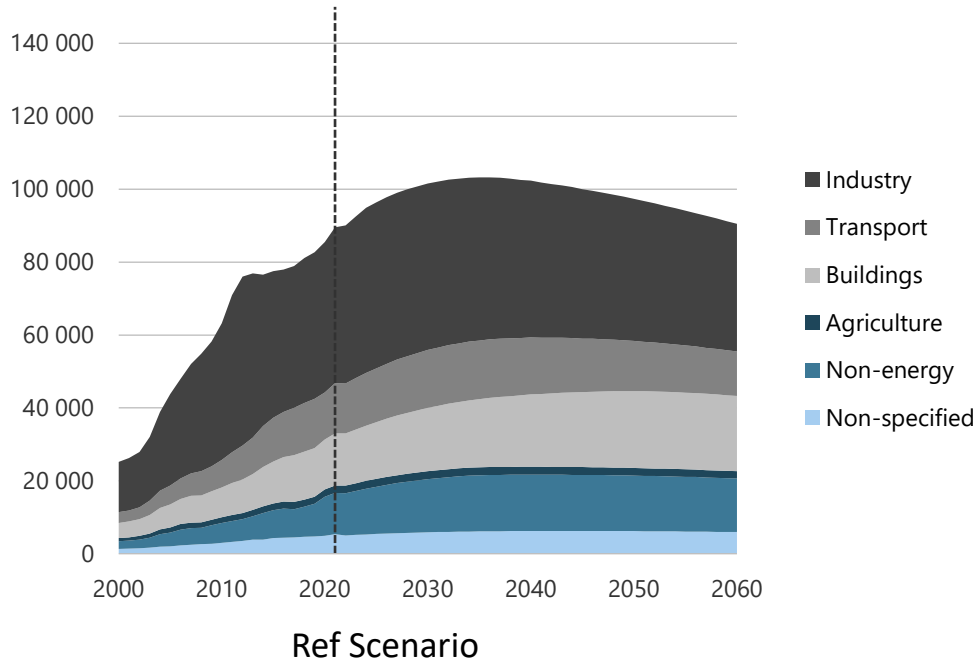


- In REF, energy demand peaks in the early 2030s with oil and gas peaking at the same period and electricity growing continuously.
- **Improved efficiency** and **electrification** will lead to lower energy demand in 2060. Coal and oil will contribute the largest reductions based on fuel switching like coal-to-gas, coal-to-electricity, and oil-to-electricity.
- Hydrogen will play an important role in Target Scenario

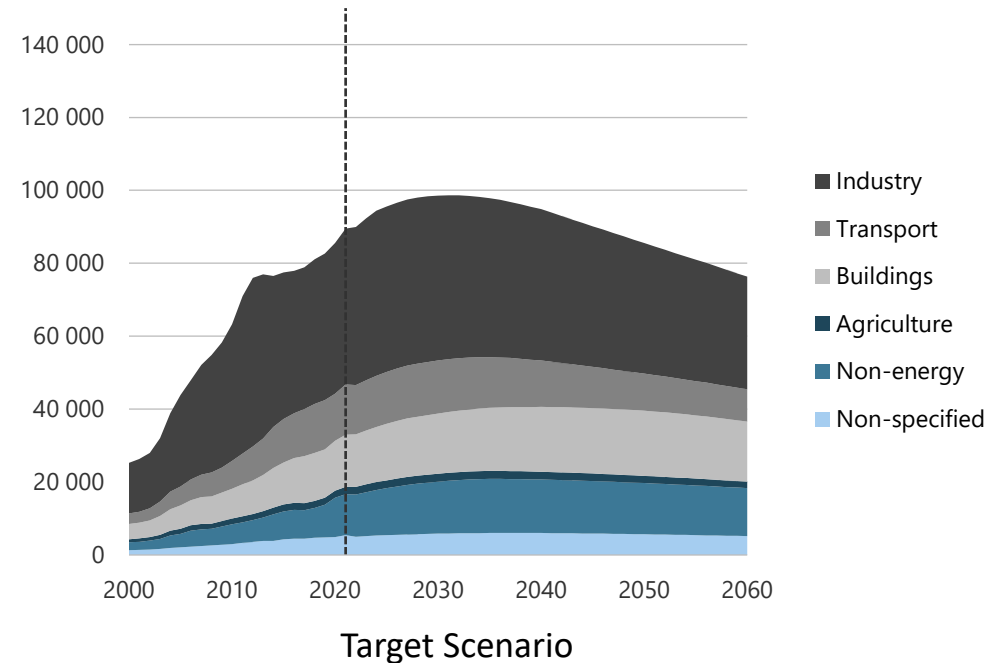


# Preliminary Results for China – Energy Demand by Sector

End-use energy demand by sector

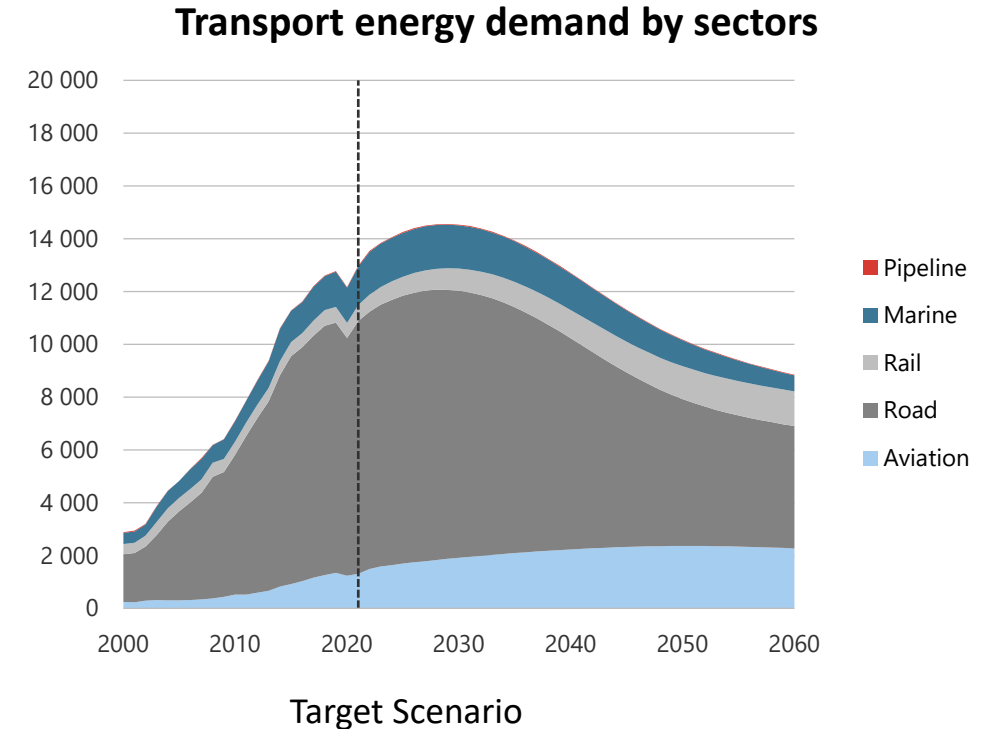
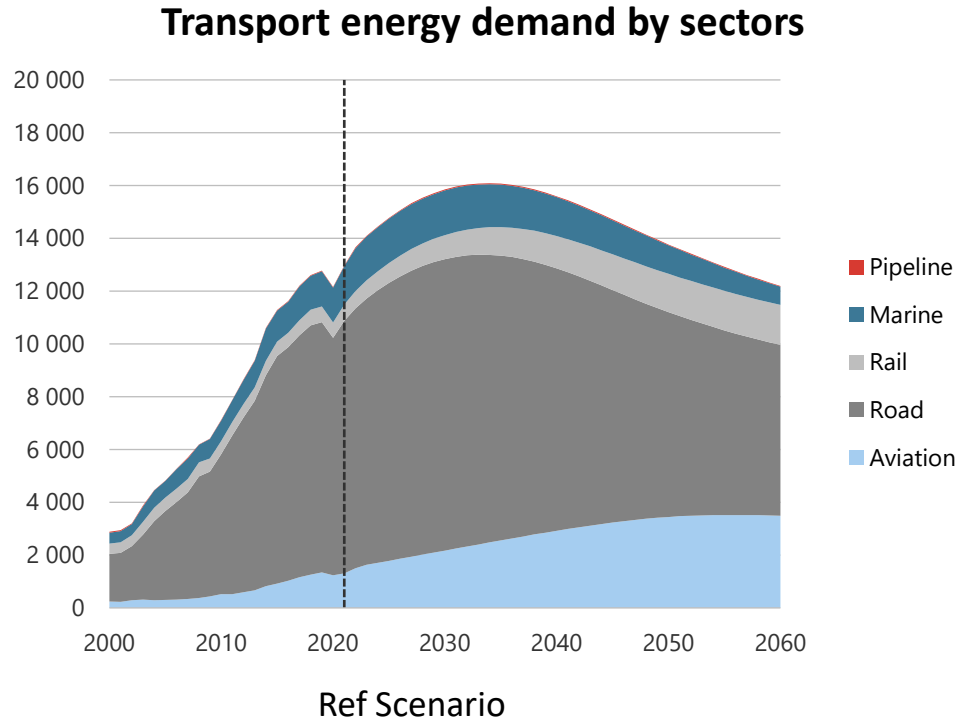


End-use energy demand by sector



- In both REF and TGT, industry, transport and buildings consume the most energy (more than 70%).
- In both scenarios, the industry will maintain around a 40-50% share, the largest share among all the sectors
- In TGT, the buildings sector will be the last one to peak around 2046, driven by continuous urbanization and the increase in household appliances.

# Preliminary Results for China – Transport Energy by Mode



- In both scenarios, the road sector is the largest energy consumer. In the current situation, EVs are the most-used method to implement the dual-carbon strategy in transport.
- The aviation sector will grow steadily along with per capita income; at the same time, it will be the hardest sector to decarbonize.

# **The APEC Energy Overview**

**Analyzing the current energy situation in APEC**

# The APEC Energy Overview

- Annual publication highlighting the current energy situation in each of the 21 APEC economies
- Important for monitoring progress of APEC in meeting its aspirational energy goals:
  - Doubling the share of renewables from 2010 to 2030
  - Improving energy intensity by 45% from 2005 to 2035
- The 2023 edition included a section devoted to energy transition challenges
  - Emissions and energy security and the role of new and renewable energy technologies
- Drafting of the 2024 edition is ongoing and is expected to be published in mid-2024



# Topical Reports

## Renewable Energy Certificates in Six APEC Southeast Asia Economies— July 2023

- Analysis of market developments and challenges

## APERC Coal Report— Feb 2024

- Recent developments and trends for Coal & CCUS

## APERC Oil Report— Feb 2024

- Recent developments and trends for Crude Oil and Petroleum Products

## APERC Gas Report – May 2024

- Recent developments and trends for Natural Gas, including LNG

## APERC Hydrogen Report – May 2024

- First report on this emerging market

**Renewable Energy Certificates (RECs) in Six APEC Southeast Asia Economies**

- RECs are one of various forms of energy attribute certificates (EACs). RECs, as well as other forms of EACs, are market-based instruments and tradable commodities that represent the environmental and other non-power attributes of renewable electricity.
- The US is one of leading countries to initiate the RECs system and RECs markets to promote RE. The first trading of RECs started in California in 1995 under jurisdiction of the Public Utility Act (1978)<sup>1</sup>.
- A REC is measured in megawatt hours (MWh) at the point of generation on the grid. Typically, one REC represents one MWh of generated electricity.
- Each Certificate has unique identifying elements, including its facility identification, nameplate capacity, issuance date.
- In general, there are two types of REC markets:
  - The compliance market where electricity generators are required to generate a certain amount of RE to meet their obligations. RECs can be used to meet these obligations.
  - The voluntary market where business firms set voluntary targets to use a certain amount of RE electricity. One example is the RE100, which is a forum where global leading companies announce their RE targets. In order to achieve these targets, RECs are an important tool to certify RE consumption.
  - There is also an increasing voluntary market for RECs.

requires utilities to produce a minimum share of electricity generation from renewable sources.

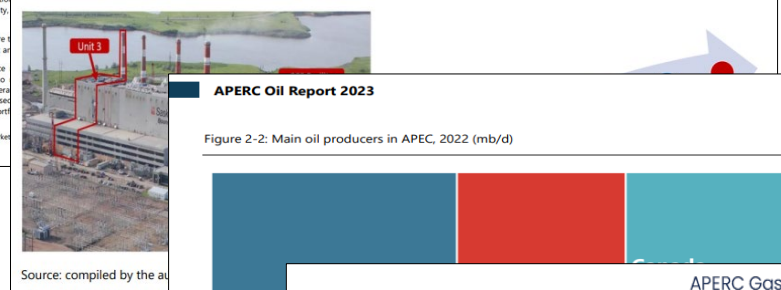
Electricity customers can use RECs to certify their efforts to reduce their Scope 2 CO<sub>2</sub> and other GHG emissions, which are the emissions produced as a by-product of the generation of electricity that they purchase from a third-party provider.

RECs cannot be used to reduce Scope 1 or Scope 3 emissions, which are the direct emissions of the electricity purchaser or the emissions of the purchaser's customers, respectively.

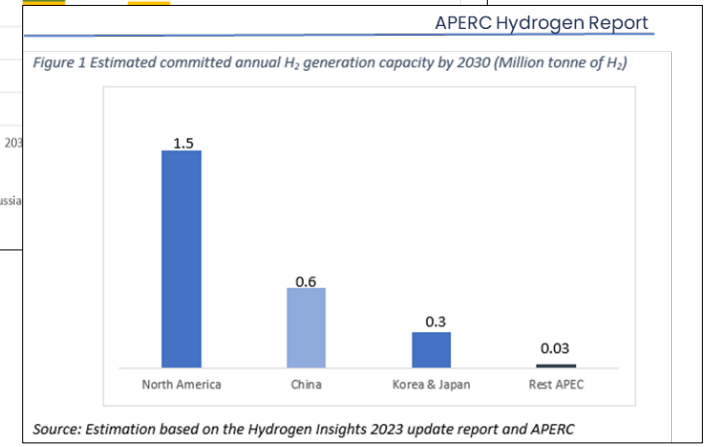
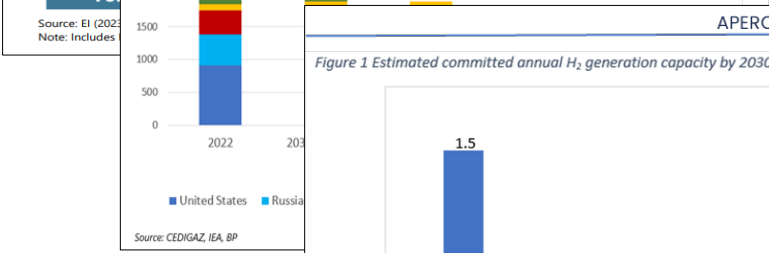
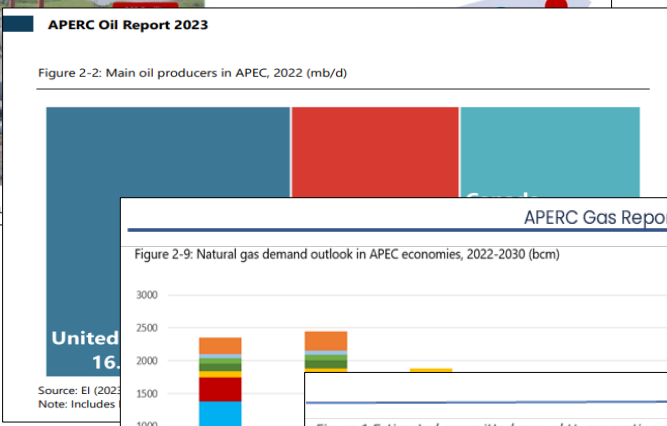
Note: <sup>1</sup> Green Power Market

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**APERC Coal Report 2023**  
Figure 1.10: CCUS-equipped coal-fired power plant - The Boundary Dam, Canada



Source: compiled by the author



# **Policy Cooperative Projects**

**APEC Symposia for Energy Transition**

**Peer Review on Low-Carbon Energy Policies in Peru**

**Oil and Gas Security Network Forum 2024**

**Peer Review on Energy Efficiency in Chile**

# APEC Symposia for Energy Transition

## The 1<sup>st</sup> Symposium on Pursuing Decarbonisation of Fossil Fuels (Kobe, October 11-12, 2023)

## The 2<sup>nd</sup> Symposium on Promoting Energy Efficiency and Energy Management Systems (Tokyo, January 23-24, 2024)

### Initiatives to Establish Hydrogen and Ammonia Supply Chain cont...

Jera



#### Cooperation in Upstream Area

- JERA has conducted an international competitive bidding process for the procurement of fuel ammonia. (2022.2-)
- In Jan 2023, JERA has executed MOUs with CFI and Yara, as a result of bid for development and sales of clean ammonia.

Number of bids sent	Approx. 30 companies
Duration	Long term from FY2027 into 2040s
Quantity	Up to 500,000 t/year
Delivery	FOB
Others	<ul style="list-style-type: none"> <li>CO<sub>2</sub> is not generated during ammonia production, or captured and stored.</li> <li>JERA has the opportunity to participate in ammonia production projects.</li> </ul>

#### Cooperation in Shipping Area

- JERA has signed MOU with "NYK" and "MOL" to cooperate in transporting fuel ammonia. (2022.11)

#### MOU covers :

- ✓ Developing fuel-ammonia carriers suitable for domestic thermal power plants and receiving stations
- ✓ Building a fuel ammonia transportation and receiving system
- ✓ Installing and operating propulsion engines that use ammonia as ship fuel
- ✓ Working with related parties to foster the formation of rules related to the reception of fuel ammonia



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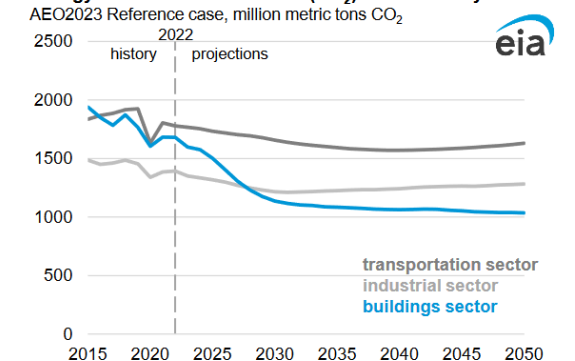


New energy supply chain challenges are being explored by many companies due to opportunities that align with decarbonisation ambitions

### Energy-related CO<sub>2</sub> emissions fall across all AEO2023 cases because of increased electrification and higher equipment efficiencies

- In the residential and commercial sectors, higher equipment efficiencies and compliance with building codes extend ongoing declines in energy intensity
- Changes in the buildings fuel mix reduce energy-related CO<sub>2</sub> emissions, which decline faster in buildings than any other end-use sector

#### Energy-related carbon dioxide (CO<sub>2</sub>) emissions by sector



Data source: U.S. Energy Information Administration, Annual Energy Outlook 2023 Reference case (AEO2023)

Note: Figure includes emissions associated with electric power generation. Electric power sector emissions are distributed to each end-use sector according to their share of electricity consumption.

eia Courtney Sourmehi, Tokyo, Japan  
January 23, 2024

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Example of the role of efficiencies in different sectors in assisting with decarbonization challenges as analyzed by the EIA

## The Next 3<sup>rd</sup> symposium

- Bioenergy will be the next topic, to be held in Thailand, in December 2024
- Participants will include government officials, policymakers, researchers, and representatives from industry
  - No single 'best' solution to advancing energy transition



# Peer Review on Low-Carbon Energy Policies (PRLCE)

- **PRLCE events typically involve low-carbon energy supply considerations**
  - Complement Peer Review on Energy Efficiency (PREE) which focuses more on energy demand
- **PRLCE Phase 5**
  - Conducted in Lima, Peru on December 5-7, 2023
  - 7<sup>th</sup> APEC economy to host the PRLCE since it started in 2012
  - Involves discussion with five experts who provided economy-specific recommendations
  - PRLCE in Peru report is tentatively scheduled for publication in mid-2024
  - Hydrogen is the key focus alongside other renewable energy sources



Mr Mauricio Riveros Rodriguez



Dr Jose Ignacio Medina



Mr Tony Susandy  
**Indonesia**



Mr Muhammad Hanif Idris  
**Malaysia**

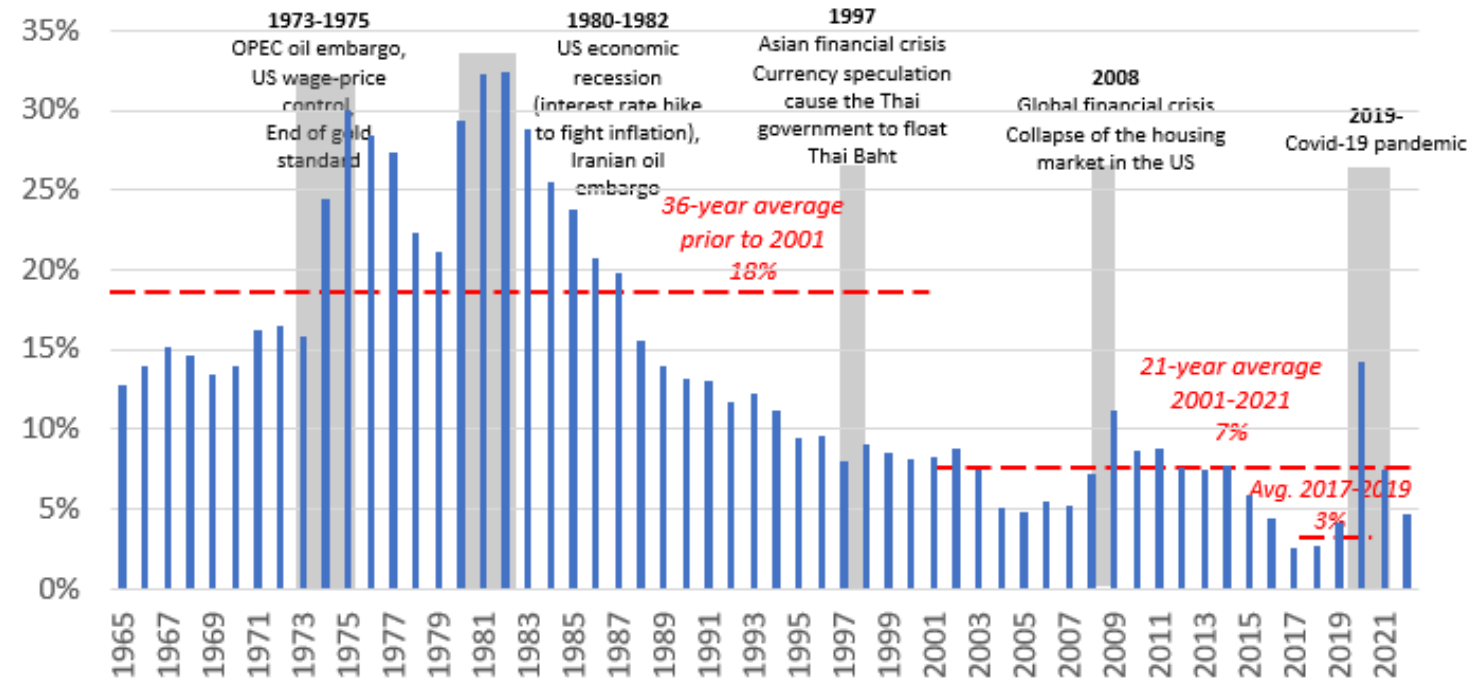


Dr Amgad A. Elgowainy  
**The USA**

# Oil and Gas Security Network Forum 2024

- Held in Osaka on March 20-21, 2024.
- Collaboration is facilitated by APERC to better understand these issues
- Recent analysis of declining spare capacity was discussed in Osaka
  - Declining spare capacity has hampered resilience to shocks.
- Biofuels can play a role in improving energy security.

**% of Global Spare Refinery Capacity to Consumption**



(<sup>1</sup> Atmospheric distillation capacity less petroleum products consumption)

Source: BP Energy Statistics 2022 and APERC analysis

# Peer Review on Energy Efficiency (PREE)

- **PREE focuses on energy demand**

- **Peer Review** of volunteer member economies on the progress towards their goals in energy efficiency improvement including **following up** on implementation of recommendations of former hosting economies of Peer Review (Follow-up PREE) since 2012; and

- **Energy Efficiency Policy (EEP) Workshop** which provides a capacity-building opportunity for robust policymaking development in APEC.

- **PREE Phase 12 and 13**

- Phase 12

- The 7th EEP workshop on “**Electrification and Energy Efficiency**” was held in conjunction with EGEEC 61 and EGNRET 59 in October 2023 in the Philippines. 28 participants from 10 economies, including experts, attended the workshop discussing and exchanging the issues on energy efficiency and electrification toward a decarbonized power system. Its summary report is published in March 2024.

- Phase 13

- The Follow-up PREE in Chile will be held in Santiago, Chile, from 6 to 10 May 2024. Experts (from Australia; China; Chinese Taipei; the United States and UNEP) are currently drafting the preliminary recommendations.
    - The 8th EEP WS will be held in the second half of 2024 in conjunction with EGEEC63.

**Thank you.**

**<https://aperc.or.jp>**

