



APEC Sustainable Energy Center

# APSEC Research and Activities Updates

**Jinlong MA**

**APEC Sustainable Energy Center**

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**The 61<sup>th</sup> Meeting of APEC Expert Group on New and Renewable Energy Technologies  
16-17 January 2025, Chinese Taipei (online)**



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# Outline

1. APEC Projects Briefs
2. Activities Highlights
3. Inputs to Policy Dialogue
4. Progress Update: APEC Urban Energy Report

## APEC Projects Briefs

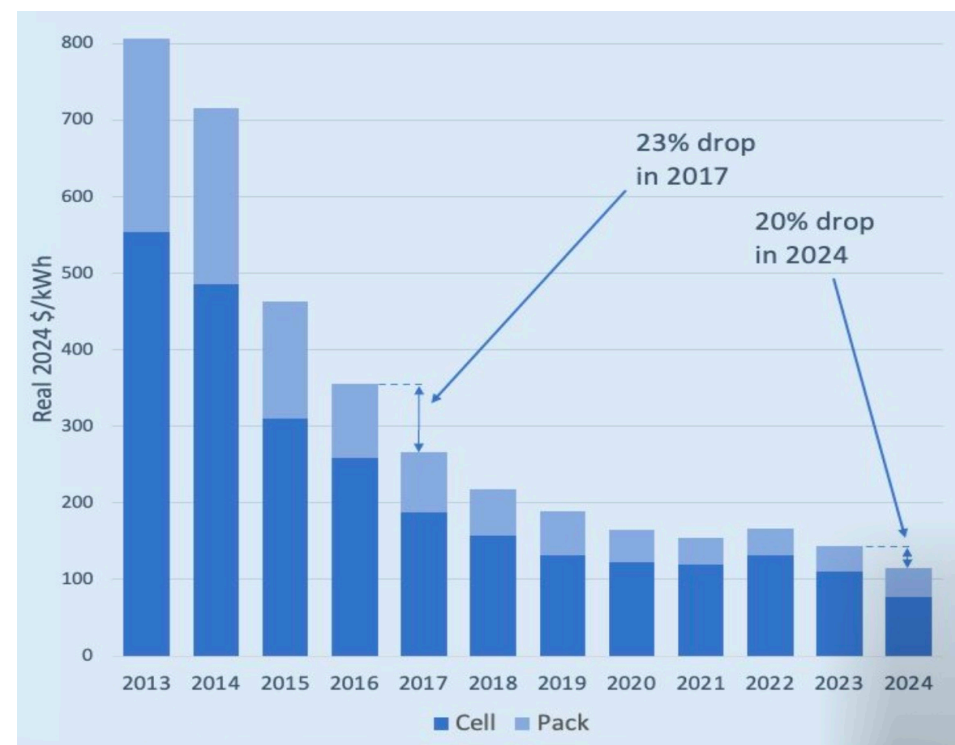


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### EWG 03 2024S Research on energy storage to enable energy transition in APEC cities

#### Project summary

- **Role of energy storage in the changing energy landscape:** with the rising proportion of variable and less predicable renewable electricity in the energy system, there is a strong need for more flexible and resilient energy system to ensure the security and reliability of the system operation and electricity supply.
- **Cities** count for 56% of the world population and for about 70% energy consumption and associated carbon emissions.
- **Technology** development: battery, BESS
- One of the foundations and cores for cities to cope with the increasing higher proportion of variable renewable energy and volatile loads in the system: **resilience of the system.**
- Aims at researching into the **development and applications** of energy storage technologies, the approach **to support the deployment of storage, and formulating strategies and policies** to accelerate energy transition in APEC cities.

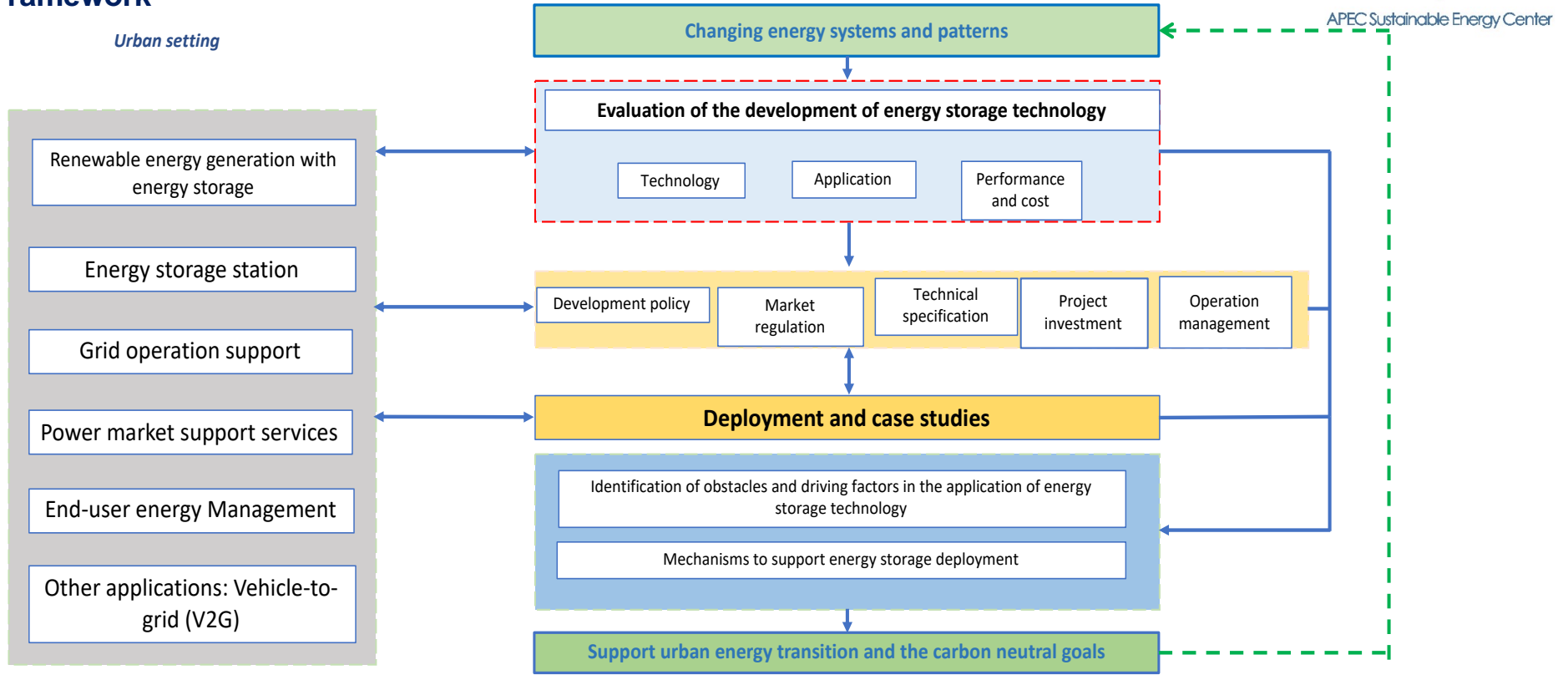


- The average price of a **lithium-ion battery pack** fell by 20 % in 2024 to \$115 per kWh -- the biggest drop since 2017.
- The global average cost for **turnkey storage systems (BESS)** falls to \$165/kWh in 2024, 40% drop compared to 2023.

# APEC Projects Briefs



## Research Framework



Activities, milestones and deliverable:

- Research and investigation
- Workshop on Deployment of Energy Storage Technologies, in line with the 10th Anniversary Forum of APSEC, Nov, 2024
- Project report

In progress

### □ EWG 05 2022S: Practical Experience and Prospect of Energy Access in APEC Region

#### Project Information

- Information collection
  - Analysis of advancement and best practices
  - Workshop
  - Project report
- ◆ Reviews the recent **advancements and best practices** in energy access within the APEC region
  - ◆ Investigates **strategies to enhance energy accessibility** throughout the region
  - ◆ The project workshop has been successfully held on the 10th anniversary event of APSEC.
    - Over 20 experts and scholars from four APEC economies participated in the workshop.
    - 9 experts from 3 economies, China, Malaysia and Papua New Guinea, presentations on key topics including APEC regional **energy transition policies** and advancements, **energy technologies**, **international cooperation** to enhance energy technology assessments and energy access, and speed up energy access.
  - ◆ **Final draft** report has been submitted.

### □ Data driven carbon neutral disaster resilient cities, APEC EWG 04 2022A

## Project summary

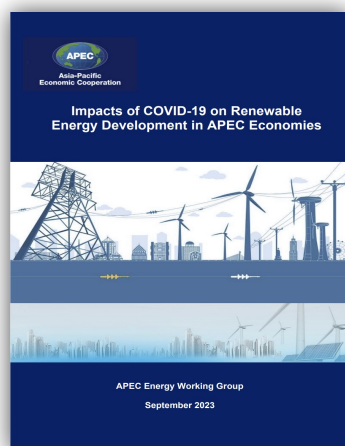
- Aims at accelerating the development towards carbon neutrality by increasing the number of APEC cities having the **capacity to collect relevant data** and **to use a multi-stakeholder dialogue** to become carbon neutral and disaster resilience.
- **Training of Trainers (ToT)** held in August 2023 empowered 67 local planning officers from 10 APEC economies, coached by leading experts of 10 organizations on collecting energy and climate data.
- **Multi-stakeholder dialogue (MSD)** was held in **North Sulawesi Province Indonesia** in February 2024 and brought together 102 online and in-person participants from 10 APEC economies and 12 international organizations to elaborate a **carbon neutrality vision** and for setting three specific **2030 targets**.
- The Final **Report “Promoting Carbon Neutrality in North Sulawesi: Vision, Targets, Benchmarking and Monitoring”** has been completed in October 2024, <https://www.apec.org/publications/2024/10/promoting-carbon-neutrality-in-north-sulawesi---vision--targets--benchmarking-and-monitoring> .

# APEC Projects Briefs



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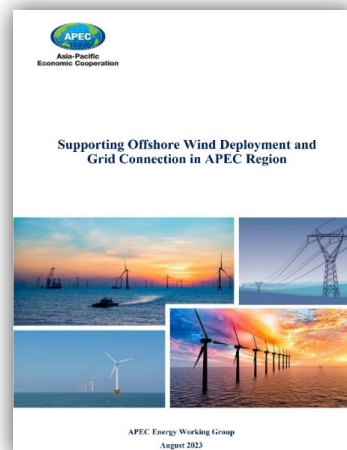
## Other Recent Reports



### Impacts of COVID-19 on Renewable Energy Development in APEC Economies

<https://www.apec.org/publications/2023/09/impacts-of-covid-19-on-renewable-energy-development-in-apec-economies>

CR submitted/accepted in March 2024



### Supporting Offshore Wind Deployment and Grid Connection in APEC Region

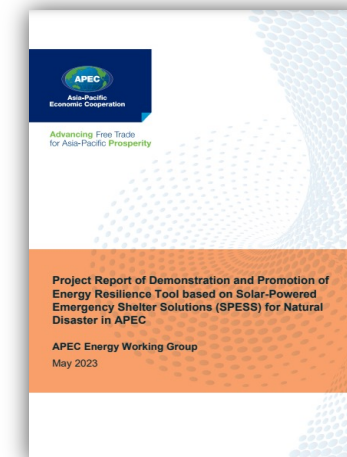
<https://www.apec.org/publications/2023/09/supporting-offshore-wind-deployment-and-grid-connection-in-apec-region>

CR submitted/accepted in May 2024



### APEC Green Finance Report – Unlocking the Urban Energy Transition

<https://www.apec.org/publications/2023/03/apec-green-finance-report-unlocking-the-urban-energy-transition>



### Project Report of Demonstration and Promotion of Energy Resilience Tool based on Solar-Powered Emergency Shelter Solutions (SPESS) for Natural Disaster in APEC

[https://www.apec.org/publications/2023/05/project-report-of-demonstration-and-promotion-of-energy-resilience-tool-based-on-solar-powered-emergency-shelter-solutions-\(speess\)-for-natural-disaster-in-apec](https://www.apec.org/publications/2023/05/project-report-of-demonstration-and-promotion-of-energy-resilience-tool-based-on-solar-powered-emergency-shelter-solutions-(speess)-for-natural-disaster-in-apec)



## The 10<sup>th</sup> APSEC Sustainable Energy Development Forum (the 10<sup>th</sup> Anniversary Event)



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- 5-8 November 2024, Tianjin, China
- More than 300 experts and officials from 15 APEC economies
- 16 international organizations, as well large number of domestic entities including research institutions, enterprises, universities and governments participated in the forum.



### ❖ Openings:

- Zhang Jianhua, Director, **National Energy Administration**
- Zhao Yali, Vice Chairman, the China Pacific Economic Cooperation National Committee
- Adriadne Benaissa, Lead Shepherd, **APEC EWG**
- Yang Xianjin, Secretary of the Party Committee, Tianjin University



## The 10<sup>th</sup> APSEC Sustainable Energy Development Forum (the 10<sup>th</sup> Anniversary Event)



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### ❖ **Keynote speeches**

- Michael Williamson, Section Chief in the Energy Division, United Nations Economic and Social Commission for Asia and the Pacific, **UN ESCAP**
  - Jie TANG, Former deputy mayor, **Shenzhen Municipal Government**/Board member, the Chinese University of Hong Kong (Shenzhen)
  - Kwok Ying POON, Director, **Electrical and Mechanical Services Department, Hong Kong, China**
  - Wenjie WANG, General Manager, **China Energy Technology and Economics Research Institute**
- ❖ Report on the **development and achievements of APSEC**, Prof Li Zhu, President, APSEC
- ❖ Opening ceremony for the **Future Clean Energy Technologies Joint Operations Center (CET)**, jointly with China Energy Investment Group

### **Concurrent meetings, workshops and sub-forums**

- The 63rd EGEEC Meeting
- The 8th EEP Workshop: APEC Peer Review on Energy Efficiency (PREE) Phase 13 (EWG 202 2023A)
- APEC Project Workshop: Practical Experience and Prospect of Energy Access in APEC Region (EWG 05 2022S)
- APEC Workshop on Sustainable Cities
- Future Clean Energy Technology Workshop
- APSEC Asia-Pacific Energy Transition Solutions Sub-forum
- The 10<sup>th</sup> meeting of the Steering Committee of APSEC

## APSEC Asia-Pacific Energy Transition Solutions Sub-forum



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- **7 November 2024**
- **Theme:** Establishing New Energy Systems: Approaches and Actions towards Carbon-neutral Future
- **Jointly organized by**
  - APSEC
  - China Renewable Energy Engineering Institute
  - ASEAN Center for Energy (ACE)
  - China Energy Storage Alliance
- **Participants:** More than **60** experts and scholars from **11** APEC economies, including the United States, Australia, South Korea, Singapore, Vietnam, Indonesia, Thailand, Malaysia, the Philippines, Hong Kong, and China
- **International Organizations:** UN ESCAP, IRENA, ASEAN Centre for Energy (ACE), CLASP, Asian Development Bank (ADB)
- **Opening remark**
  - Takayuki Niikura, Program Director, **APEC Secretariat**
  - Heping Gong, Deputy Director General, **China Renewable Energy Engineering Institute**
  - Zulfikar Yurnaidi, Head, Energy Modelling and Policy Planning Department, **ASEAN Centre for Energy**
- **Program:** expert presentation, panel discussion
  - Session 1: Asia-Pacific Low Carbon Development and Green Energy Transition Pathways
  - Session 2: Innovation and Technology Advancement for Carbon Neutral Future



# APSEC Research Highlights



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## APEC Urban Energy Report : 2023

## Driving Cities towards Carbon Neutrality

### Word and summary

- Focus on '**Urban Energy**' in APEC region, drive towards **carbon neutral** and actions on low carbon energy transition
- Technologies, policies, plans and tools achieving carbon natural goal
- **Establish database and indicator system** for sustainable cities
- Historical **changes and trends**: social economic, energy and emissions
- **Categorization** of the selected APEC cities, clustering analysis, the characteristics analysis of cities
- **Case studies** and **best practices** of urban energy transition
- **Scenario analysis**: simulation of selected city – Tianjin, China
- **Policy** recommendations
- Two reports: Chinese and English versions produced

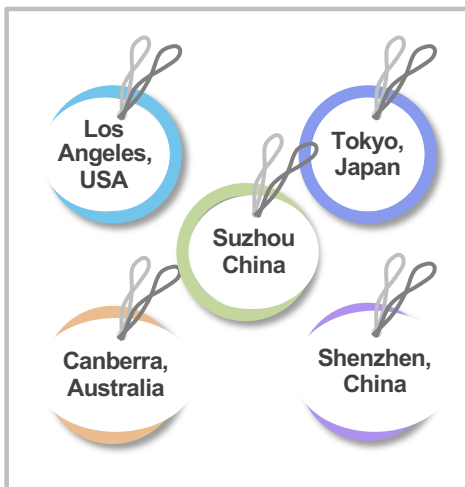


# Urban Energy Report 2023: Driving cities towards carbon neutrality



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## Inspirations from the cases of carbon neutrality in APEC cities



**1** Overview of carbon emissions and energy development

**2** Carbon neutrality goals, challenges and ways to achieve

**3** Urban clean energy development strategy analysis

- Improving building energy efficiency and building energy electrification
- Promote the use of renewable energy in buildings
- The development of green buildings and zero carbon buildings
- Promote the new energy vehicles such as electric vehicles or hydrogen fuel vehicles

**4** Urban carbon neutral investment and green finance application

- Step up government investment in clean energy projects and power infrastructure
- Attract private sector investment in green industries
- Develop various green financial products to channel the financial resources to low-carbon and sustainable projects

**5** Analysis of urban smart construction strategy

- Cloud computing, big data, artificial intelligence, Internet of Things, 5G, etc.
- Development of 'Digital twin cities'

# Urban Energy Report 2023: Driving cities towards carbon neutrality



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## Scenario analysis of carbon emission, Tianjin city, China

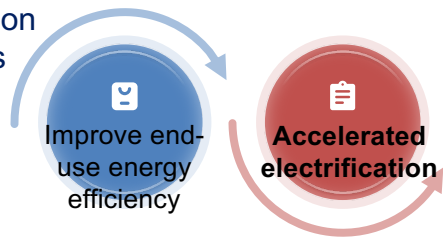
Base-year: 2020

The **energy demand** mode used to forecast and analyse the energy demand over **2021-60**

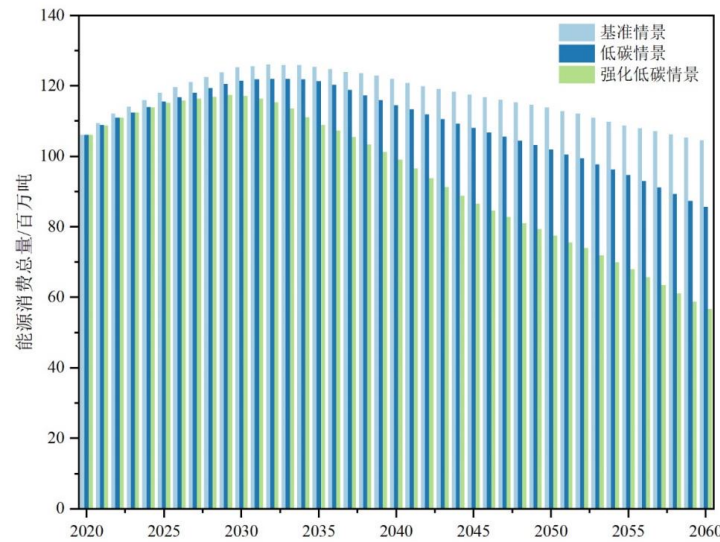
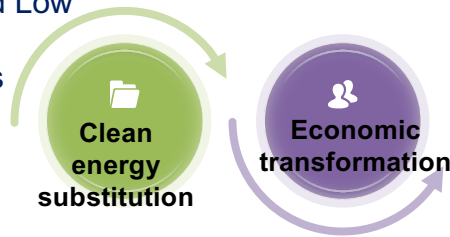
**Scenario analysis:** BAU, Low Carbon, and Enhanced Low Carbon Scenarios

### Analysis of the main measures of carbon neutrality

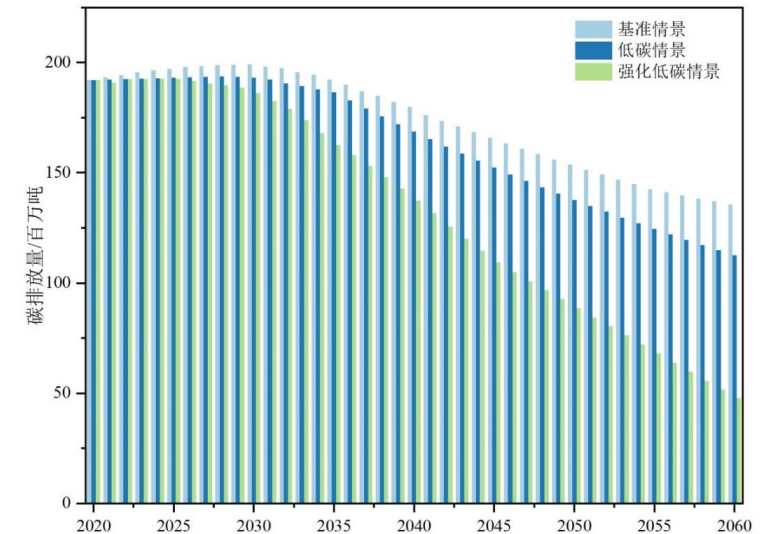
Low Carbon Scenarios



Enhanced Low Carbon Scenarios



Total energy consumption under different scenarios



Total carbon emissions under different scenarios



## APEC Urban Energy Report : 2024

### Storage Enables Transition

#### ❑ Satisfy urban energy demand

Energy storage technology can support **reliable supply** and **efficient usage**, and achieve flexible scheduling of urban energy, balancing energy demand in different periods.

#### ❑ Better urban energy management

Energy storage technology, combined with advance IT and telecommunication technologies AI, can contribute to achieve **smart urban energy management**, including analysis of energy system, accurate prediction and optimal scheduling of urban energy consumption, and reduce the energy bills of the customers..

#### ❑ Enhance resilience of urban energy systems

Energy storage technology can be used as a "buffer" of the urban energy system, providing backup energy, ensuring the normal operation of key facilities, and improving **the resilience** and security of the urban energy system.

#### ❑ Support scaling-up RE deployment

Energy storage technology support the optimization of the urban energy structure, **support the penetration of renewables** in the energy system, and promote low carbon and sustainable development of the cities.

#### ❑ Promote green industries and green economic growth

The development and operation of energy storage technology and facilities drive the improvement and upgrading of the relevant **industrial chain**, including the manufacturing, engineering, and technical services, which will incentives industrial innovation and development, and promote the transformation and **green economic growth**.



## **1 ENERGY STORAGE TECHNOLOGY: STATUS AND PERSPECTIVES**

### **1.1 Technology by type**

### **1.2 Research and development**

### **1.3 Industrial value chain**

### **1.4 Areas of applications**

#### 1.4.1 Generation site

#### 1.4.2 Grid side

#### 1.4.3 Behind the meter

#### 1.4.4 Sector coupling

## **2 EVALUATION AND ASSESSMENT OF THE STORAGE TECHNOLOGIES**

### **2.1 Methodology for the assessment**

### **2.2 Technical standards and guidelines**

### **2.3 Techno-economic performance: cost and performance**

### **2.4 Safety issues**

## **3 STORAGE SUPPORTING GREEN ENERGY TRANSITION: POLICY AND PLANS**

### **3.1 Policy and planning**

### **3.2 Regulation mechanism**

### **3.3 Incentives measures**

## **4 GRID INTEGRATION OF STORAGE FACILITY**

### **4.1 Grid connection requirement, technical regulation of system operation – grid codes**

### **4.2 Storage and energy system operation**

### **4.3 Storage and micro-grid**

### **4.4 Community storage**

## **5 MARKET DEVELOPMENT FOR STORAGE FACILITIES**

### **5.1 Market regulation and rules**

### **5.2 Mechanism for market participation**

#### 5.2.1 Development of different market mechanisms: capacity and energy

#### 5.2.2 Market participation: spot market, ancillary services market

#### 5.2.3 Energy storage and the customer direct electricity transition

## **6 DEPLOYMENT OF STORAGE – COMMERCIAL AND SCALING-UP**

### **6.1 Supply chain development**

### **6.2 Environment for developers and operators: commercial, financing and investment**

### **6.3 Innovative business models**

### **6.4 International collaboration**

## **7 SUMMARY AND RECOMMENDATION: STORAGE ENABLES ENERGY TRANSITION IN CITIES**

## Inputs to the Policy Dialogue: Green and low carbon hydrogen development



- ❑ Worked with the **Peruvian Ministry of Energy and Mines** and the **host of the 2024 APEC Energy Ministers' Meeting** to deeply participate in the development of high-level policy initiative.
- ❑ At the **14th APEC Energy Ministers' Meeting** in August 2024, unanimously adopted the "**Policy Guidelines for APEC to Develop and Implement Low Carbon Hydrogen Policy Framework**", which serves as an important component of this year's APEC cooperation, supporting the formation of the Leaders' Declaration.
  - **Provided feedback on the Policy Dialogue Concept Note prepared by Peru**
  - **Organised hydrogen energy progress survey**
    - Organized survey on hydrogen energy policy
    - 14 of 21 APEC economies have adopted hydrogen-related development policies
  - **Organised a green hydrogen expert meeting:** in China, policy discussions
  - **Participated in Policy Guidance Revision**
    - Submitted proposed feedback, "Discussion Paper: APEC Policy Guidance" to Peru
    - Participated in two virtual workshops on May 17, 2024, and May 28, 2024
    - Engaged in drafting sessions and submitted additional comments to Peru in July 2024.
  - **Contribution to the workshop**
    - Workshop on "Exchange of best practices for the development of green and low carbon hydrogen roadmaps in the Asia-Pacific region", 11 Aug 2024, Lima

# THANK YOU !

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