



Status Update on Implementing Regional Phase II MEPS for RACs to Achieve APAEC Targets

Singapore Study Tour
Wednesday, 6 November 2024

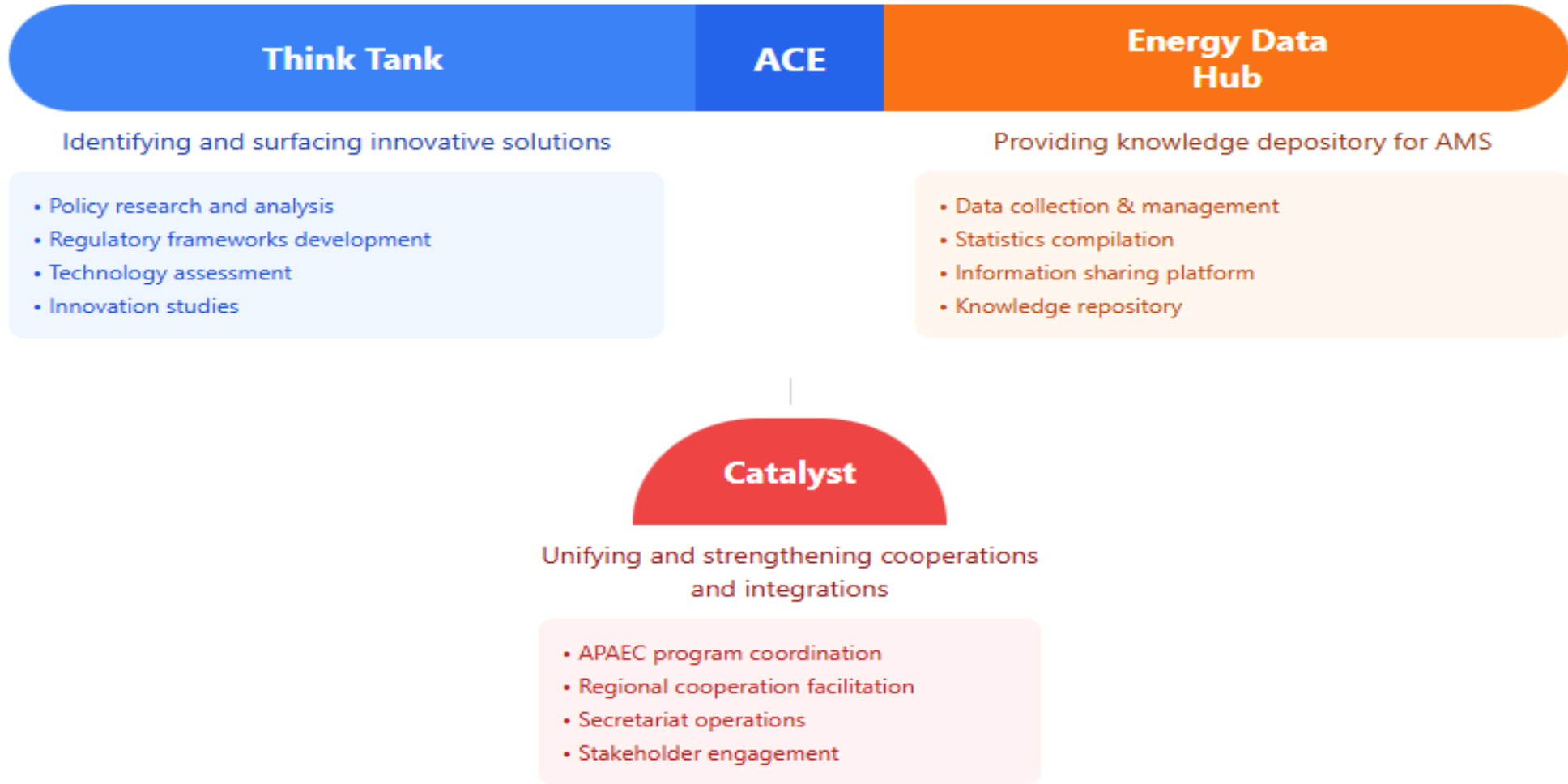
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- Overview of APAEC (ASEAN Plan of Action for Energy Cooperation)
- Outlook of ASEAN Sustainable Cooling
- Context of RACs (Room Air Conditioners) in ASEAN Energy Consumption (AEO8)
- Current Status of MEPS Implementation across ASEAN Region
- Status of EE Regulation: MEPS & Building Energy Codes
- Regional Programme to Support the MEPS Implementation
 - Product Registration Database
 - Green Public Procurement
- Ongoing Initiative with IOs to Enhance AC Energy Efficiency
- Formation of ASEAN EE&C Working Group for Appliances
- Challenges and Opportunities
- Moving Forward



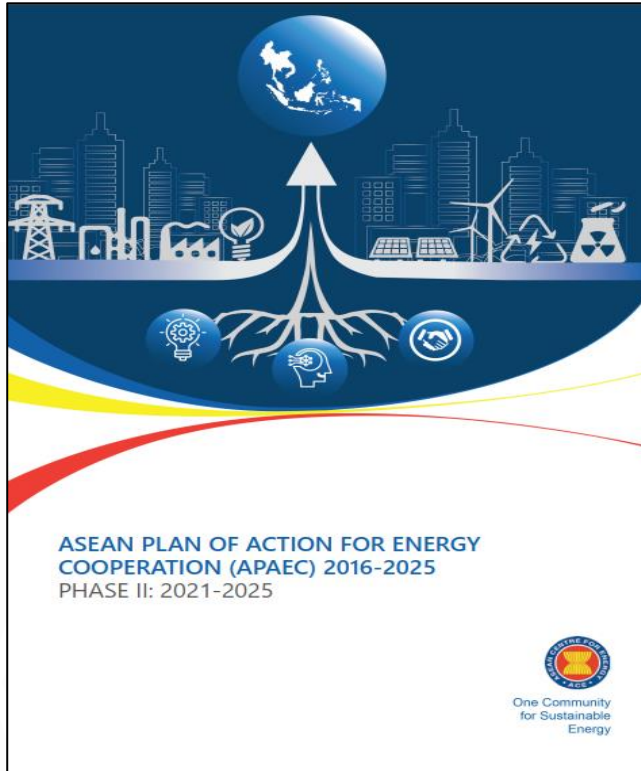
*"Established in January 1999, ASEAN Centre for Energy (ACE) is an **intergovernmental organisation** within ASEAN structure that **represents the 10 ASEAN Member States'** interests in the energy sector".*

ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 Phase II: 2021-2025



Outcome-Based Strategies (OBS)

(APAEC) Phase II: 2021-2025



Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability and Sustainability for All

Accelerating Energy Transition and Strengthening Energy Resilience Through Greater Innovation and Cooperation

APAEC Programme Areas

- 1 ASEAN Power Grid
- 2 Trans-ASEAN Gas Pipeline
- 3 Coal and Clean Coal Technology
- 4 Energy Efficiency and Conservation ✓
- 5 Renewable Energy
- 6 Regional Energy Policy and Planning
- 7 Civilian Nuclear Energy

To reduce energy intensity by 32% by 2025 and encourage EE&C efforts, especially in transport and industry

OBS1: Expand, harmonise, and promote EE S&L (energy efficiency standards & labeling)

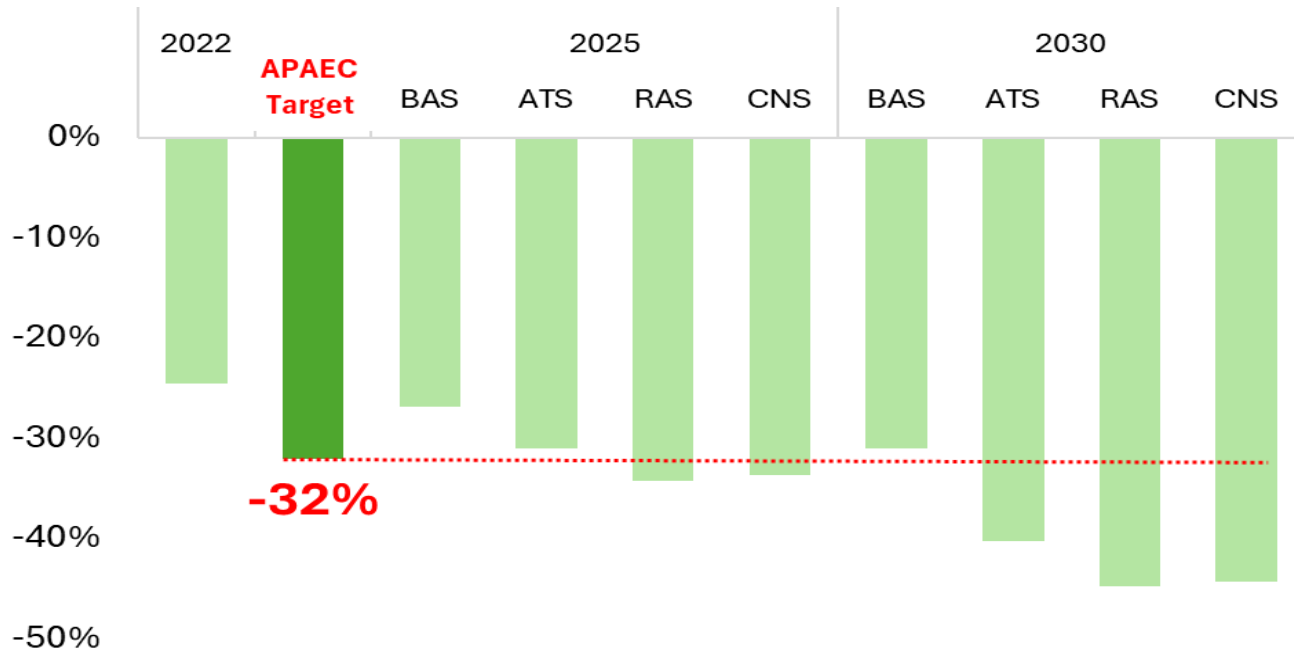
OBS2: Enhance participation of private sector, financial institutions and clusters

OBS3: Strengthen sustainability of EE in buildings

OBS4: Pursue energy efficiency in transport sector

OBS5: Advance energy efficiency and energy management in industry

ASEAN Energy Intensity Reduction Update and Status



- ASEAN has set a goal to reduce **energy intensity (EI) by 32% from 2005 levels by 2025**, as part of APAEC Phase II.
- **By 2022, a 24.5% reduction was achieved**, indicating progress but still short of the target.
- Projections suggest that the **ATS would reach 31% by 2025**, slightly missing the target, while the **RAS and CNS** are on track to with reductions of **34.2%** and **33.7%**, respectively.

Source: 8th ASEAN Energy Outlook (AE08) (2024)

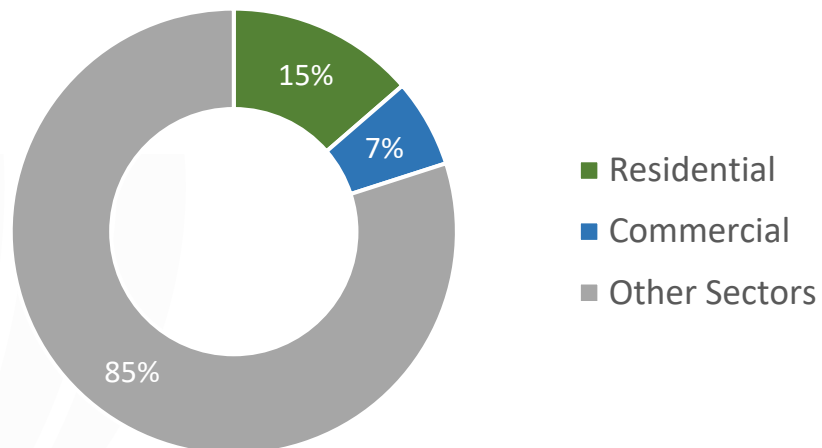
APAEC targets for 2025 are projected to be **met** or **exceeded** under specific scenarios by **2030**, with particularly strong outcomes under ATS, RAS and CNS

Note: Baseline Scenarios (BAS); AMS Target Scenario (ATS); Regional Aspiration Scenarios (RAS); Carbon Neutral Scenario (CNS)

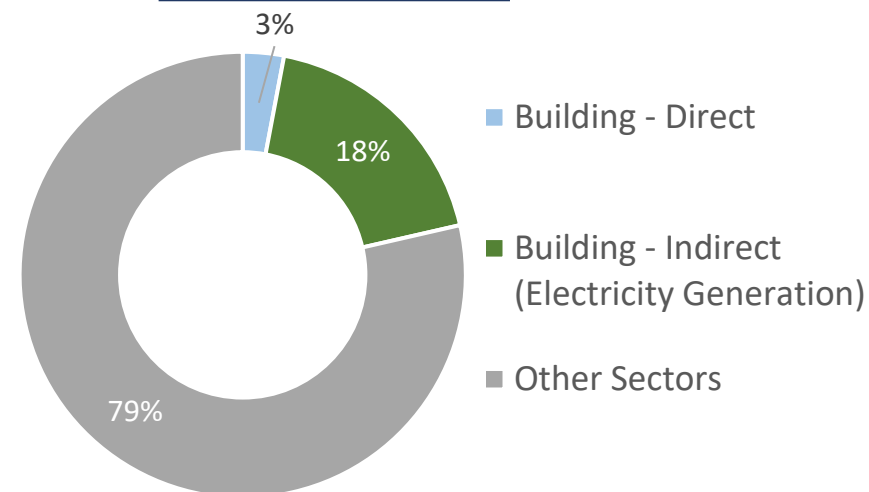
The Building Sector's Share of Energy and CO₂ Emissions in 2022



Building (Commercial & Residential)'s Share of Energy Consumption in 2022



Building Operation's Share of CO₂ Emissions in 2022



Source: 8th ASEAN Energy Outlook (AEO8) (2024)

- The region's energy consumption is projected to increase by **2.6 times** by 2050 from 2022 levels.
- Building is responsible for **22% of energy consumption** in 2022, which is used around **55% by electricity for its appliances**, oil (22%) as well as traditional biomass (18%) for cooking).
- GHG emissions from energy-related building operations account for **21% region's energy-related emissions**, with 18% from the generation of electricity used in the building.

The Outlook of ASEAN Sustainable Cooling



Roadmap Towards Sustainable and Energy-Efficient Space Cooling in ASEAN

Timeline and Key Milestones

Current Status

- MEPS in place for air conditioners in most AMS
- Variable adoption of testing standards
- Limited regional harmonization
- Air conditioner ownership at 18% of households

2025 Milestones

- Regional harmonized MEPS of CSPF 3.7 (2023) and 6.09 (2025)
- Mandatory air conditioner labels across all AMS
- Regional product registration database
- MV&E framework implementation
- Harmonized testing standards (ISO 5151 & 16358)

2030 Milestones

- Double efficiency of air conditioners at regional level
- Complete transition to low-GWP refrigerants
- Regional fan standards & labeling programs
- Advanced MV&E capabilities across region
- Widespread smart & connected cooling devices

Net Zero Carbon Milestones

- Universal access to sustainable cooling
- All cooling products are super-efficient
- Zero emissions from cooling sector
- Fully digital & integrated cooling systems
- Complete market transformation achieved

Regulation

- MEPS
- Testing Standards
- MV&E Programs

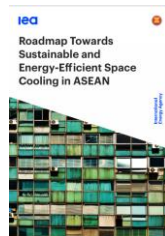
Information

- Labeling
- Education Programs
- Training & Audits

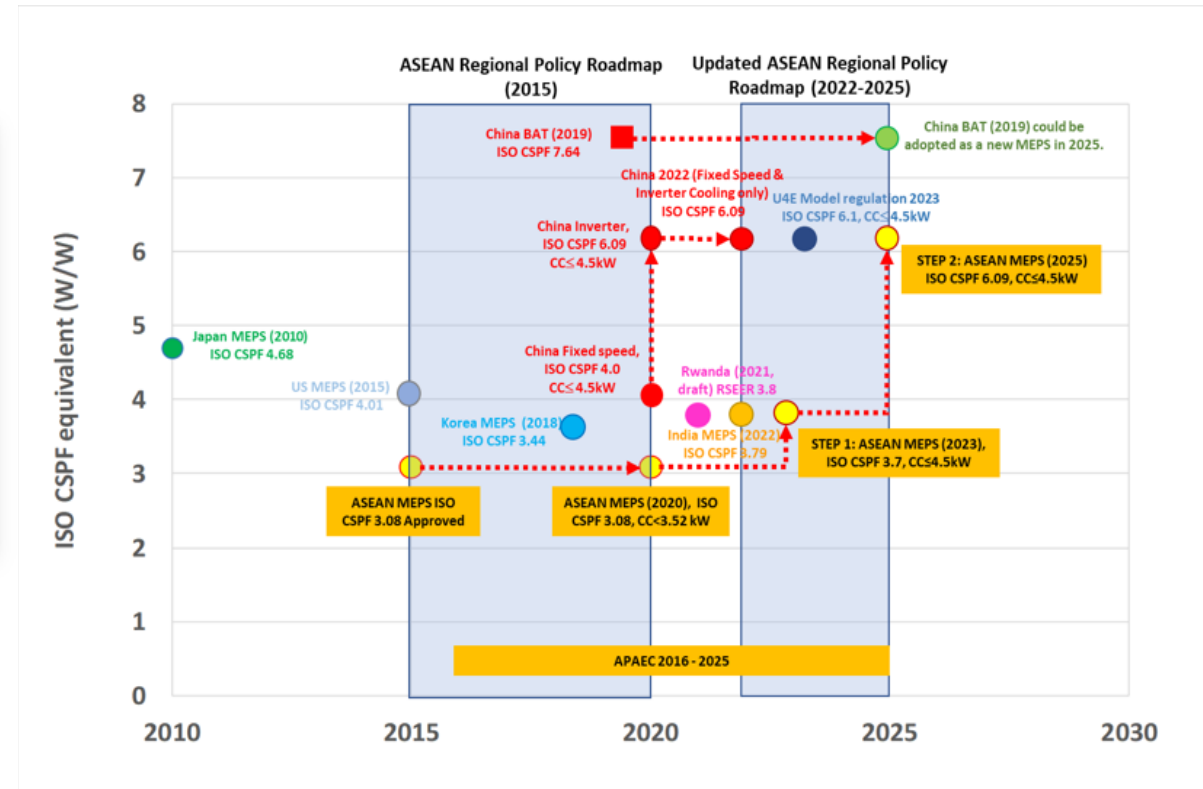
Incentives

- Financial Support
- B&P Procurement
- Market Mechanisms

Source: ACE and IEA (2022)



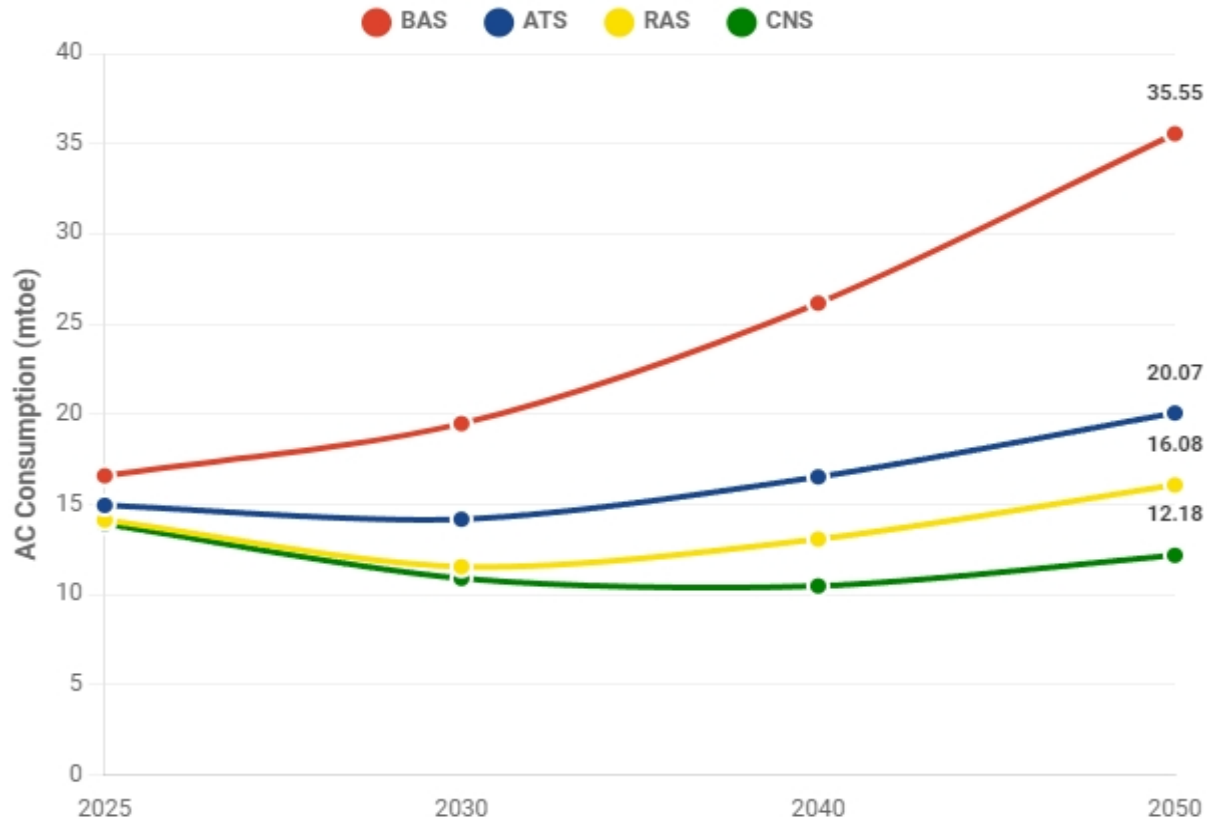
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Source: ACE (2021)

- The current ASEAN regional MEPS for RACs adopted in 2020 is **3.08 ISO CSPF** for models **below 3.52 kW cooling capacity**
- Updated ASEAN Regional Policy Roadmap (2022-2025) aims to achieve ISO CSPF of **3.7 by 2023** and **6.09 by 2025**

AC Consumption Over Years by 2050 Scenario

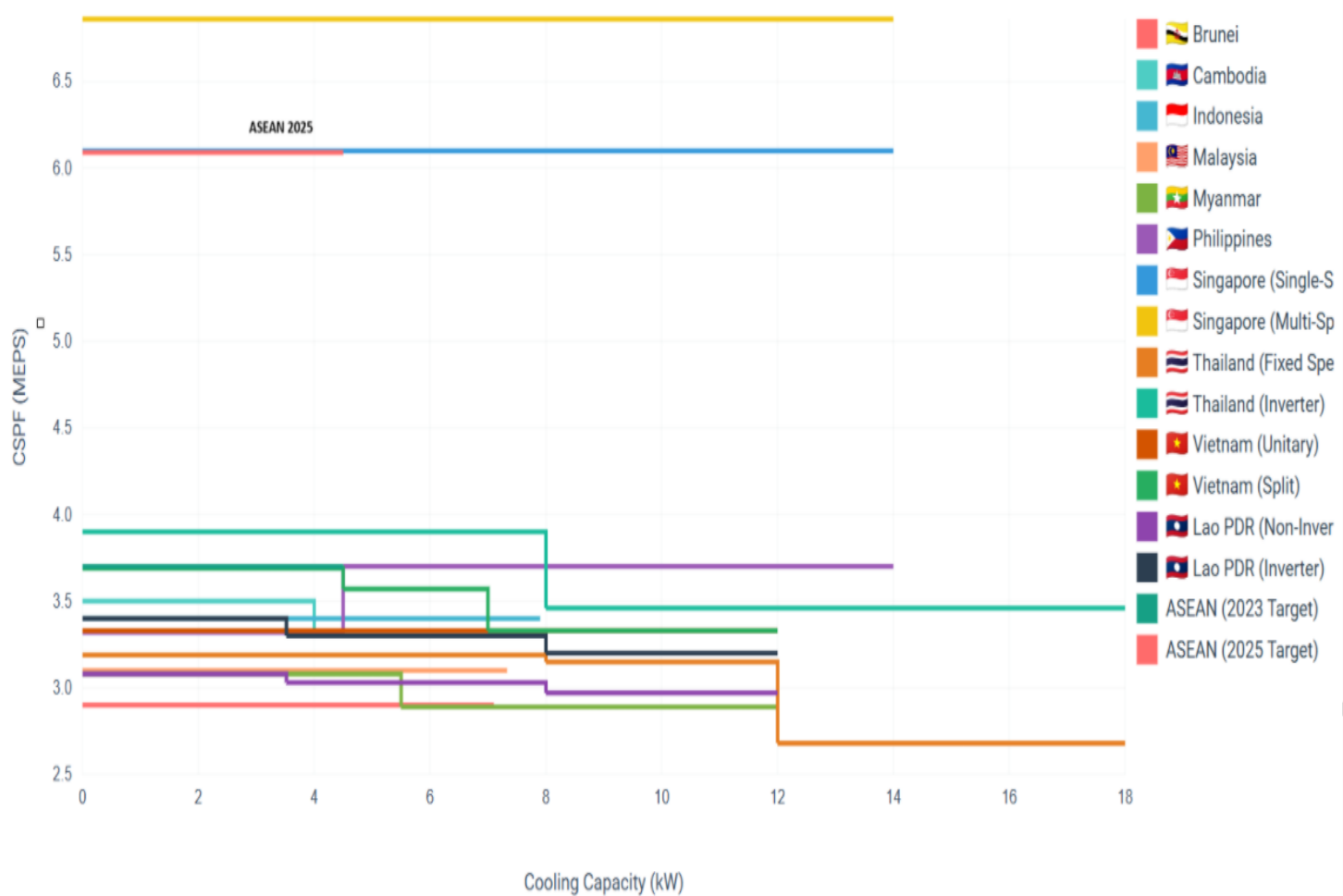


Source: 8th ASEAN Energy Outlook (AEO8) (2024)

- Total energy demand for AC in the buildings sector in ASEAN will reach 35.5 Mtoe in 2050 in the Baseline Scenario, approximately 25% of the total energy demand in the building sector
- As global temperatures increase, the demand for AC is expected to rise, particularly in regions with hot climates.
- Innovations in AC technology, such as more efficient units, could mitigate the growth in energy consumption.

Note: Baseline Scenarios (BAS); AMS Target Scenario (ATS); Regional Aspiration Scenarios (RAS); Carbon Neutral Scenario (CNS)

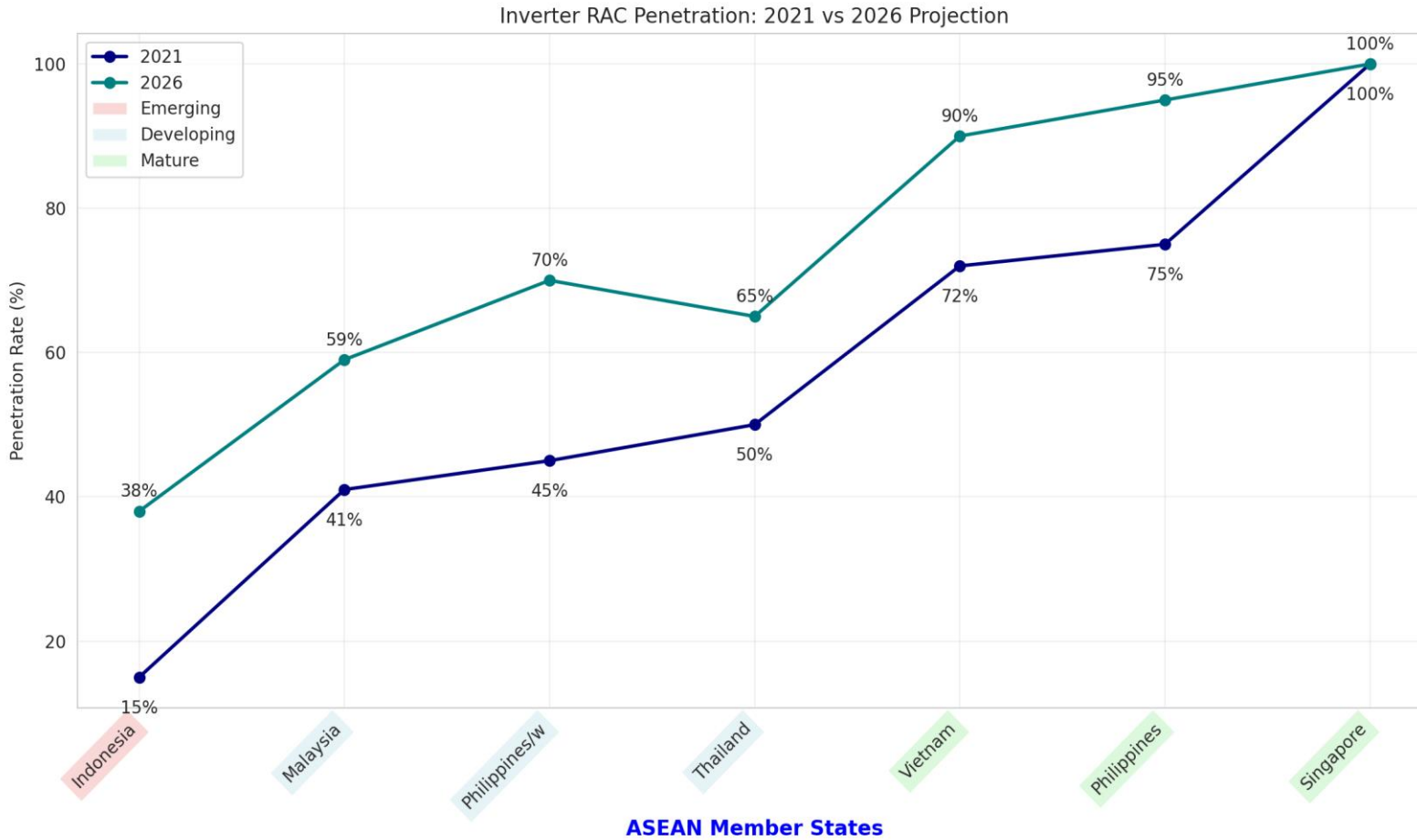
Current Status of ASEAN RAC MEPS



- Singapore stands out with higher standards, for inverter and non-inverter ACs, showing potential for sustainable development
- Thailand has distinct MEPS for fixed-speed and inverter air conditioners, with inverter systems showing higher CSPF values.
- Most ASEAN Member States (Indonesia, Malaysia, Philippines, Vietnam) have converged around similar MEPS levels
- Standards vary by cooling capacity (kW), with stricter requirements for smaller units

Source: ACE Database 2024

ASEAN Inverter RAC Market Maturity



Source: All Sources

- **Growth Potential:** Emerging markets like Indonesia show significant growth potential, with a projected increase of over 150% in penetration rates from 2021 to 2026.
- **Market Maturity:** Mature markets such as Singapore have already reached saturation, with no expected growth, indicating a stable market environment.
- **Regional Development:** Developing markets, including Malaysia and Thailand, exhibit moderate growth, reflecting ongoing development and increasing market penetration.

Assessing the Impact of ASEAN's Harmonised Minimum Efficiency Performance Standards on AC Manufacturers

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Abstract. The residential sector in ASEAN is highly dependent on cooling as a primary energy use along with cooking, making up about 82% of the sector's demand in 2050. Air conditioner (AC) is one of the cooling appliances in ASEAN that will drive energy demand growth in ASEAN. Consequently, this surge in demand also contributes significantly to the region's CO2 emissions. Recognizing the impact of AC utilisation, energy efficiency in AC is considered the most effective way to propose energy savings and environmental impacts. In order to improve energy efficiency in AC, ASEAN has committed to stringent Minimum Energy Performance Standards (MEPS) by achieving a target for a Cooling Seasonal Performance Factor (CSPF) of 3.7 by 2023 and 6.09 by 2025. However, an update of MEPS across the ASEAN region has key two challenges: Firstly, the financial investment required by manufacturers; and secondly, the development and evolution of AC technology. This study aims to utilise Techno-Economic Assessment (TEA) to evaluate the impact of increased MEPS on AC manufacturers in the ASEAN region, with MEPS levels forming the framework for the TEA. The findings from this study offer valuable insights to manufacturers and policymakers, particularly regarding the impact of increased MEPS on AC manufacturers.

1. Introduction

The energy demand within the ASEAN region has been escalating significantly over the past few decades. This has largely been propelled by robust economic growth, industrialization, population growth, and urbanization. The residential sector, in particular, accounts for a substantial fraction of total final energy consumption in most ASEAN countries, which stood at 16.6% of total final energy consumption (TFEC) in 2020, according to the 7th ASEAN Energy Outlook (AEO7) [1].

Several factors have been instrumental in driving residential energy demand, including rising incomes, expanding building floorspace, and increased ownership of appliances. Notably, air conditioning (AC) represents a significant end-use due to the prevailing hot and humid climates in the region. The total annual room AC market in ASEAN expanded from approximately 6 million units in 2013 to 8 million units in 2018 [2]. This trend is reflected in the growing ownership of air conditioners, with over 30 million units estimated to be currently installed across ASEAN households.

Electricity is the primary energy carrier in the residential sector, satisfying the requirements of lighting, appliance use, and cooling. Residential electricity consumption is forecast to rise significantly with an Average Annual Growth Rate (AAGR) of 1.9% over the period 2021-2050 [1].

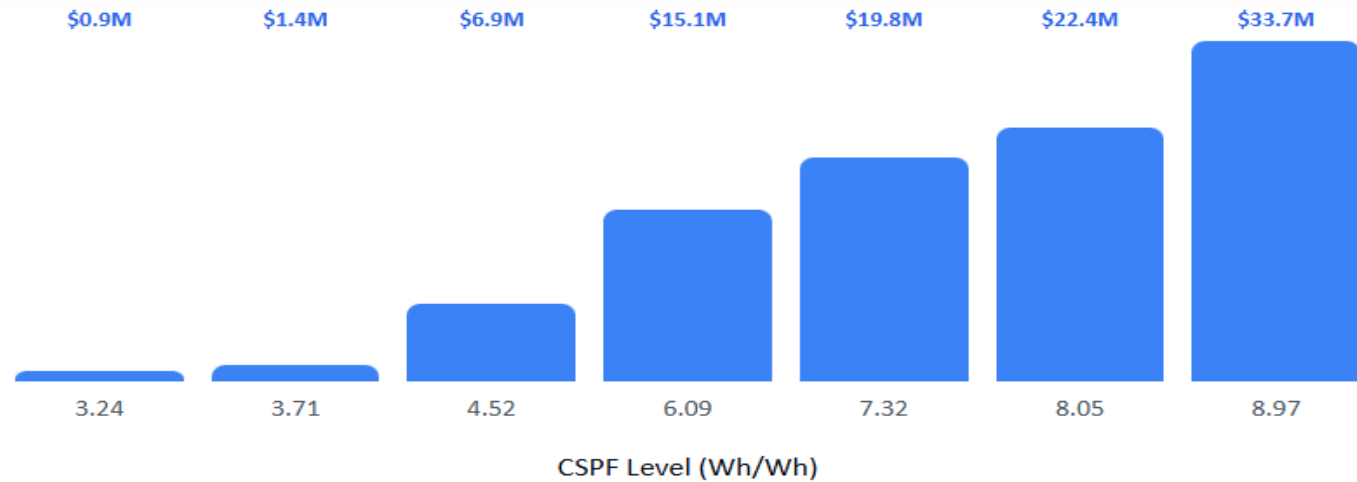
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Source: ACE International Journal 2024



Economic Benefits of Higher Efficiency ACs for Manufacturers

Analysis of MEPS Impact on Industry Net Present Value (INPV)



Investment Required

- Low MEPS (CSPF 3.24): \$1.1M
- Medium MEPS (CSPF 6.09): \$3.9M
- High MEPS (CSPF 8.97): \$22.4M

Financial Benefits

- Positive INPV from CSPF 4.52+
- Highest return at CSPF 8.97
- Long-term revenue growth

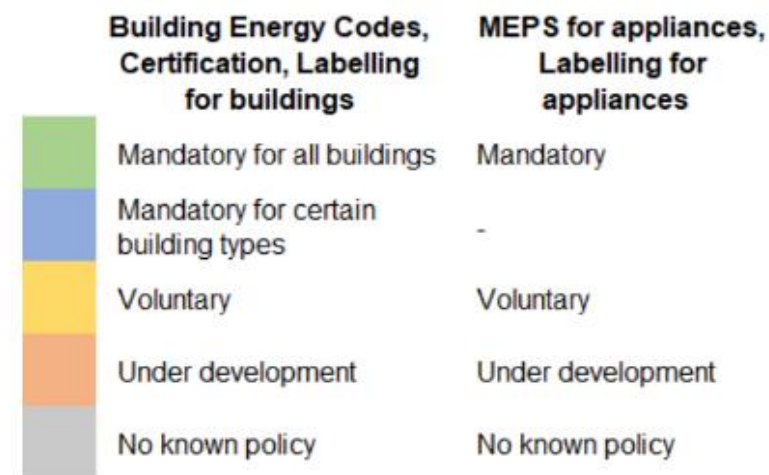
Key Takeaways

- Higher efficiency = Better returns
- Investment costs manageable
- Strong business case for MEPS

Status of EE Regulation: MEPS & Building Energy Codes



Country	Building Energy Codes	Certification/ Labelling for buildings	MEPS for appliances	Labeling for appliances
Brunei Darussalam			AC	AC
Cambodia			AC, R	AC, R
Indonesia			AC, R, L, F	AC, R, L, F
Lao PDR			AC	AC
Malaysia			AC, R, L, F	AC, R
Myanmar			AC	
Philippines			AC, L	AC, R, L
Singapore			AC, R, L, D	AC, R, L, D
Thailand			AC, R, L	AC, R, L, F
Viet Nam			AC, R, L, F	AC, R

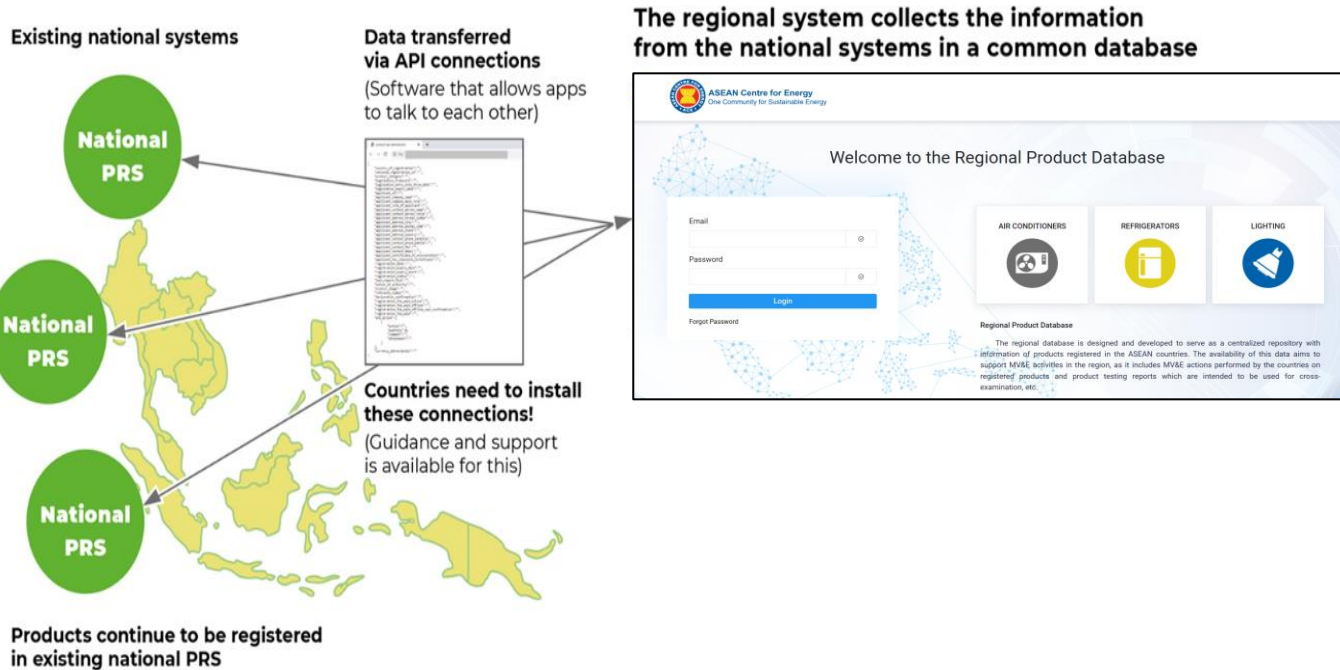


AC – air-conditioners
 R – refrigerators/freezers
 L – lighting
 F – fans
 D – clothes dryer

Source: ASEAN & IEA (2022)

- Almost all AMS have adopted MEPS for AC, with some countries still in the development stage.
- Half of AMS have mandatory standards and labelling for AC, while TH status is voluntary, and the other country is still developing.
- Compared to other appliances, AC has become the top priority for implementing MEPS and labelling standards across all ASEAN countries, followed by refrigerators and lighting.

Overview of Regional Product Registration Database



ASEAN Regional Product Database: Progress Update

Completed Milestones

- Integration with ACE website domain (aseanenergy.org)
- Basic system infrastructure deployment

Ongoing Development

- Improving upload functionality and access design
- Wire frame optimization
- Implementation of API integration

Interim Solutions & Next Steps



- Manual data sharing via Excel templates
- ACE validation process before website upload
- Consultation with AMS on API implementation and understanding

Website: <https://prs.aseanenergy.org/>

Benefits of Using the Database:

- Increased visibility of products approved for sale in other countries
- A centralized platform for monitoring and verifying product compliance across AMS
- Timely notifications of new and revoked products in other countries
- Streamlined application of Mutual Recognition Agreements

Guidelines for Integration of Energy Efficiency into ASEAN EEE MRA



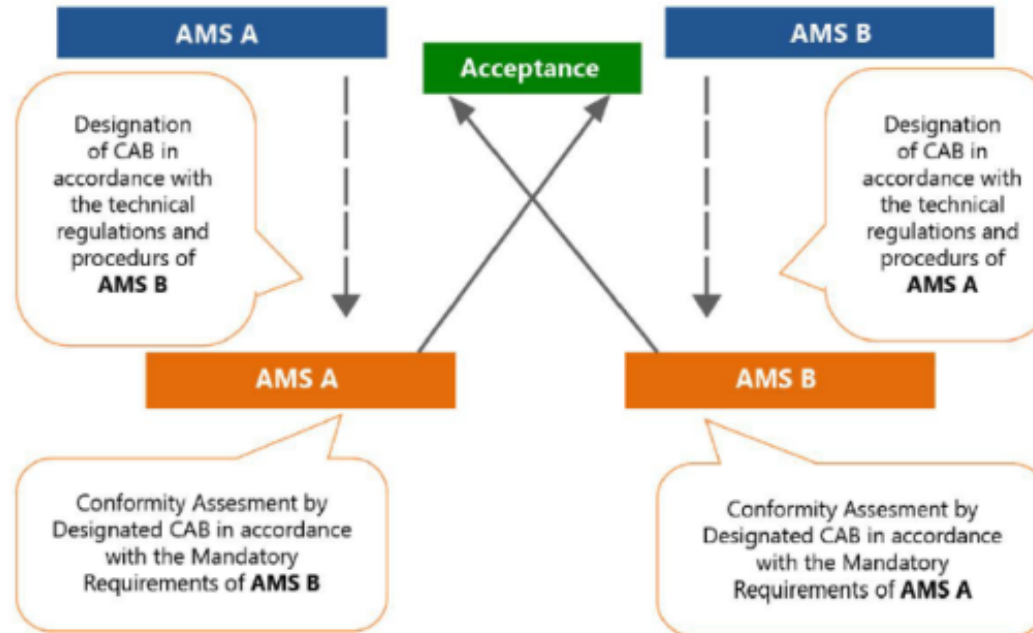
Harmonisation of Energy Performance Standards for Lighting A Regional Policy Roadmap

Endorsed by
37th ASEAN Ministers on Energy Meeting (37th AMEM)
4 September 2019
Bangkok, Thailand

Source: ACE (2020)



[Click Here](#)



“One Standard, One Test, Accepted Everywhere”

- A reference document providing action steps and harmonized guidelines, processes, and documentation to enable ASEAN Member States to integrate energy efficiency (EE) regulations into the ASEAN EEE MRA
- The MRA Guidelines apply to Room Air Conditioners (RACs) and will be expanded to lighting and other appliances, namely refrigerators, transformers, and motors.

Green Public Procurement (GPP) Guidelines for Energy-Efficient Cooling in ASEAN



Components of the Guideline

- **Market Assessment**
 - Best Available Technologies (BAT) for energy-efficient cooling
 - Market penetration and pricing
 - Regional product database
- **Policy Analysis**
 - Existing GPP policies in ASEAN
 - Refrigerant regulations
- **Green Procurement Criteria**
 - Existing GPP policies in ASEAN
 - Refrigerant regulations
- **Life Cycle Assessment (LCA) Tools**
 - Energy efficiency metrics (e.g., EER, COP, CSPF)
 - Alignment with ASEAN Taxonomy for Sustainable Finance
- **Cost Analysis Framework**
 - User-friendly Excel-based tools
 - Energy savings calculations
 - Cost-benefit analysis

Final Product



1. Regional GPP Guideline

- Energy-efficient cooling technologies
- Best practices in procurement
- Process recommendations
- Case studies and success stories



2. National GPP Guidelines

- Country-specific market analysis
- Tailored policy recommendations
- Implementation strategies
- Capacity building plans



3. LCA and Cost Analysis Tools

- Excel-based tools
- Energy savings calculations
- Environmental impact assessments
- Cost-benefit analysis



4. Capacity Buildings

- Workshops and webinars

Ongoing Initiative with IOs to Enhance AC Energy Efficiency



Funding Partner



The
Federal Government

Consortium Lead



Asia Low-Carbon Building Transition (AsbuilT) (2023 – 2028)

Support the transition towards low carbon building in Cambodia, Indonesia, Thailand, and Vietnam, through development of tools, capacity building, financing pathways facilitation, and technical assistance for pilot projects.

Project Activities by ACE:

1. Development of a **regional one-stop-shop platform** for low carbon buildings, including for cooling appliances
2. Integration **Best Available Technology of Cooling** Products to green public procurement guidelines
3. **Market and policy assessment** for readiness on on-bill financing and ESCO for increase penetration of efficient cooling products
4. **Building a pipeline of EE investment pilot projects**, including efficient and sustainable cooling procurement, and technical assistance for financial institutions and ESCOs
5. **Replication and dissemination** to ASEAN Member States



*Kick-Off Meeting of the ALCBT Programme in Indonesia
(Sep 2024)*



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USAID Smart Power Program (USAID SPP) (2023 – 2026)

Support implementation of APAEC Phase II 2021-2025 through study development and capacity building to strengthen Energy Efficiency, including the appliances sector

Project Activities:

1. Workshop on MEPS, Production Registration System, and Bulk Procurement **(May 2024)**
2. Develop MVE Guidelines for AC **(2024 - 2025)**
 - **Potential National Stakeholders**
 - a) Government Agencies (e.g. Ministry of Energy, Energy Regulatory Agencies, Ministry of Industry and Trade)
 - b) Standards and Certification Bodies
 - c) AC Manufacturers and Industry Associations
 - **Way Forward**

ACE will seek support from AMS (through EE&C Working Group on Appliances) to gather the MVE policies which support the implementation of MEPS for air conditioners



Workshop on MEPS, Production Registration System, and Bulk Procurement in Lao PDR (May 2024)



ASEAN Cool Initiative (2023 – 2025)

Support development of MEPS and labels for Malaysia and Singapore and acceleration of the regional roadmap on energy efficient air conditioner, with potential replication to other AMS

Project Activities:

- 1st Regional Workshop ASEAN Cool Initiative (**Nov 2023**)
- Report on the market assessment of high-efficient & climate-friendly AC in Malaysia (**Completed**)
- Report on the market research of high-efficiency room air conditioner models in key markets & proposed new labelling efficiency tiers for Singapore (**Completed**)
- MEPS Guidelines for Room Air Conditioners for Cambodia (**On-Going**)
- Study Tour in Singapore (**5-6 Nov 2024**)
- 2nd Regional Workshop ASEAN Cool Initiative (**Q1 2025**)



1st Regional Workshop in Malaysia (Nov 2023)

Formation of ASEAN EE&C Working Group (WG) for Appliances



Purposes

Proposed by the 28th EE&C-SSN Meeting, the EE&C WG for appliances was established to identify and address challenges to **expedite the completion of remaining milestones** for the APAEC EE&C Programme Area, with a specific focus on the Action Plans for appliances (AC, Lighting, Refrigerators, Transformers) including supporting progress towards MEPS harmonization.

Member of WG

- ASEAN Energy Efficiency & Conservation Sub-Sector Network (EE&C-SSN)
- Nominated experts from each ASEAN Member State

28th EE&C-SSN Meeting
(Lao PDR)
17 May 2024

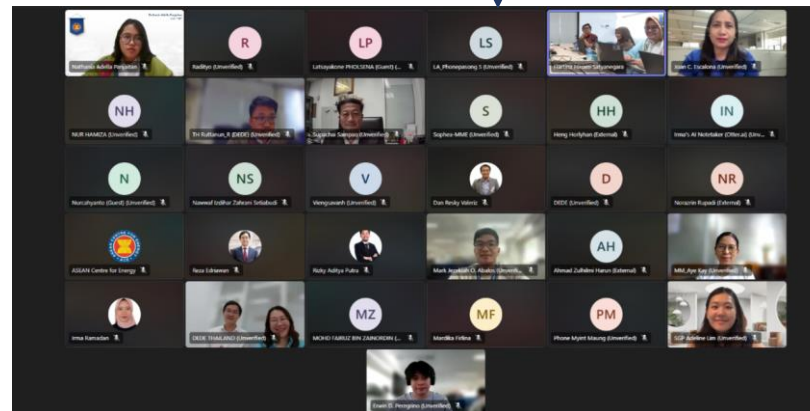
Nomination of Working
Group Members
15 Jul 2024 – 8 Aug 2024

EE&C Working Group Kick Off
Meeting (Online)
9 Aug 2024

ASEAN EE&C Working Group
Workshop for Appliances (Indonesia)
22 Aug 2024



28th EE&C-SSN Meeting



EE&C Working Group Kick Off



EE&C Working Group Workshop for Appliances

Challenges



Technical Capabilities

- Limited testing facilities
- Lack of calibration and verification
- Insufficient technical expertise
- Limited R&D



Infrastructure Readiness

- Manufacturing capacity
- Supply chain constraints
- Limited laboratory infrastructure
- Investment needs



Market Maturity

- Different development levels
- Price sensitivity
- Consumer awareness
- Implementation timelines

Strategic Solutions:

Accelerated Capacity Building

- Enhanced testing laboratory network
- Technical training programs for verification and compliance
- Knowledge sharing platforms for best practices
- Manufacturing capability development support

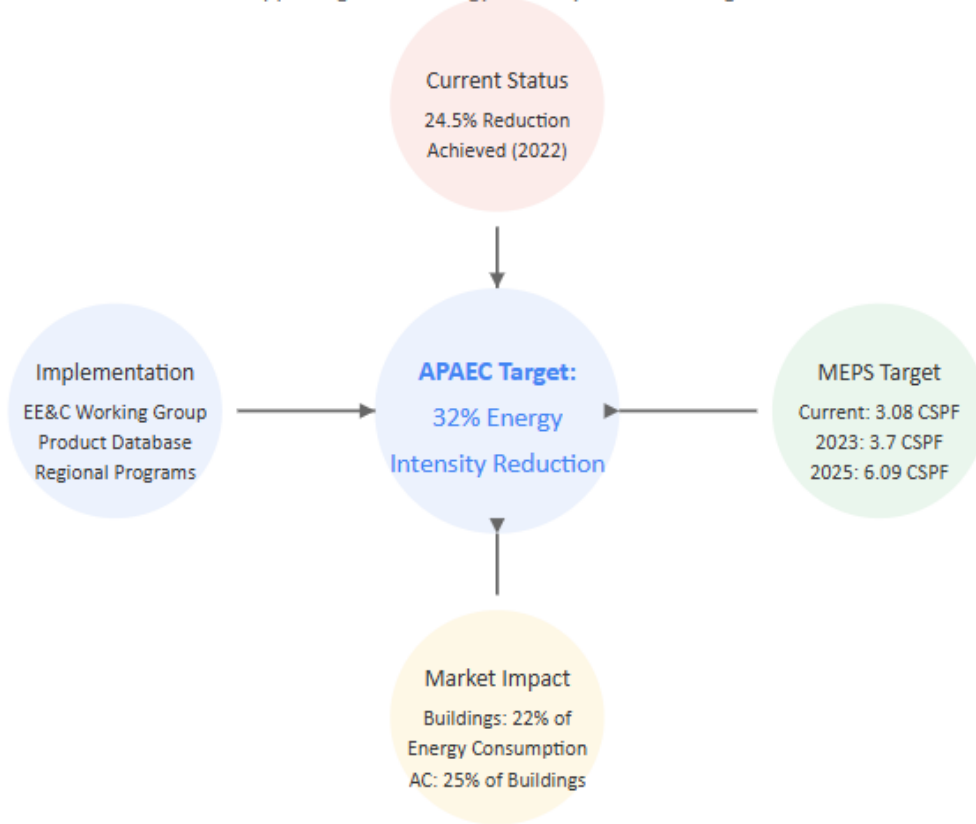
Regional Collaboration

- Harmonized testing standards
- Unified regional product registration system
- Coordinated market surveillance and enforcement
- Shared resources and expertise across member states

Key Implementation Priorities

1. Mutual Recognition
2. Regional Database
3. Joint Training

Supporting APAEC Energy Intensity Reduction Target



Join Us in Transforming ASEAN's Cooling Future

Our Vision

Supporting ASEAN's ambitious target of 6.09 CSPF by 2025

Collaboration Opportunities

- Technical Expertise & Knowledge Sharing
- Testing Facility Development
- Manufacturing Capability Support
- Market Transformation Programs

Contact ASEAN Centre for Energy

Together we can achieve sustainable and energy-efficient cooling across ASEAN

8th ASEAN ENERGY OUTLOOK

2023 - 2050



One Community
for Sustainable
Energy



DOWNLOAD HERE



<http://go.aseanenergy.org/AEO8>



ASEAN Centre for Energy
One Community for Sustainable Energy

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