Towards Carbon Neutrality in Building Sector in ASEAN

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One Community for Sustainable Energy

Outline

1. Pathways of ASEAN Member States towards Carbon Neutrality
2. Energy Efficiency is main strategy towards Carbon Neutrality
3. Energy Consumption in Building Sector
4. Policy Status and Roadmap towards Net Zero Building in ASEAN
5. Policy Package Recommendations for Building
6. Conclusion and Outlook

Pathways of ASEAN Member States towards Carbon Neutrality

MYANMAR

No announcement

VIETNAM

NZE by 2050

LAOS

NZE target by 2060

THAILAND

Carbon neutrality by 2050; NZE by 2065

CAMBODIA

NZE/carbon neutrality by 2050 but no target

PHILIPPINES

No announcement

MALAYSIA

Carbon neutrality target by 2050

BRUNEI

NZE/carbon neutrality by 2050 but no target

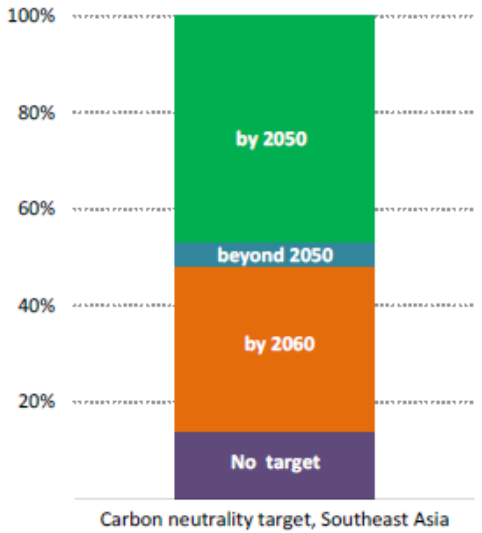
SINGAPORE

NZE target by 2050

INDONESIA

NZE target by NZE target by 2060

Share of total energy supply covered by carbon neutrality targets in Southeast Asia reductions in the NZE Scenario



Source: IEA (2022), Southeast Asia Energy Outlook 2022

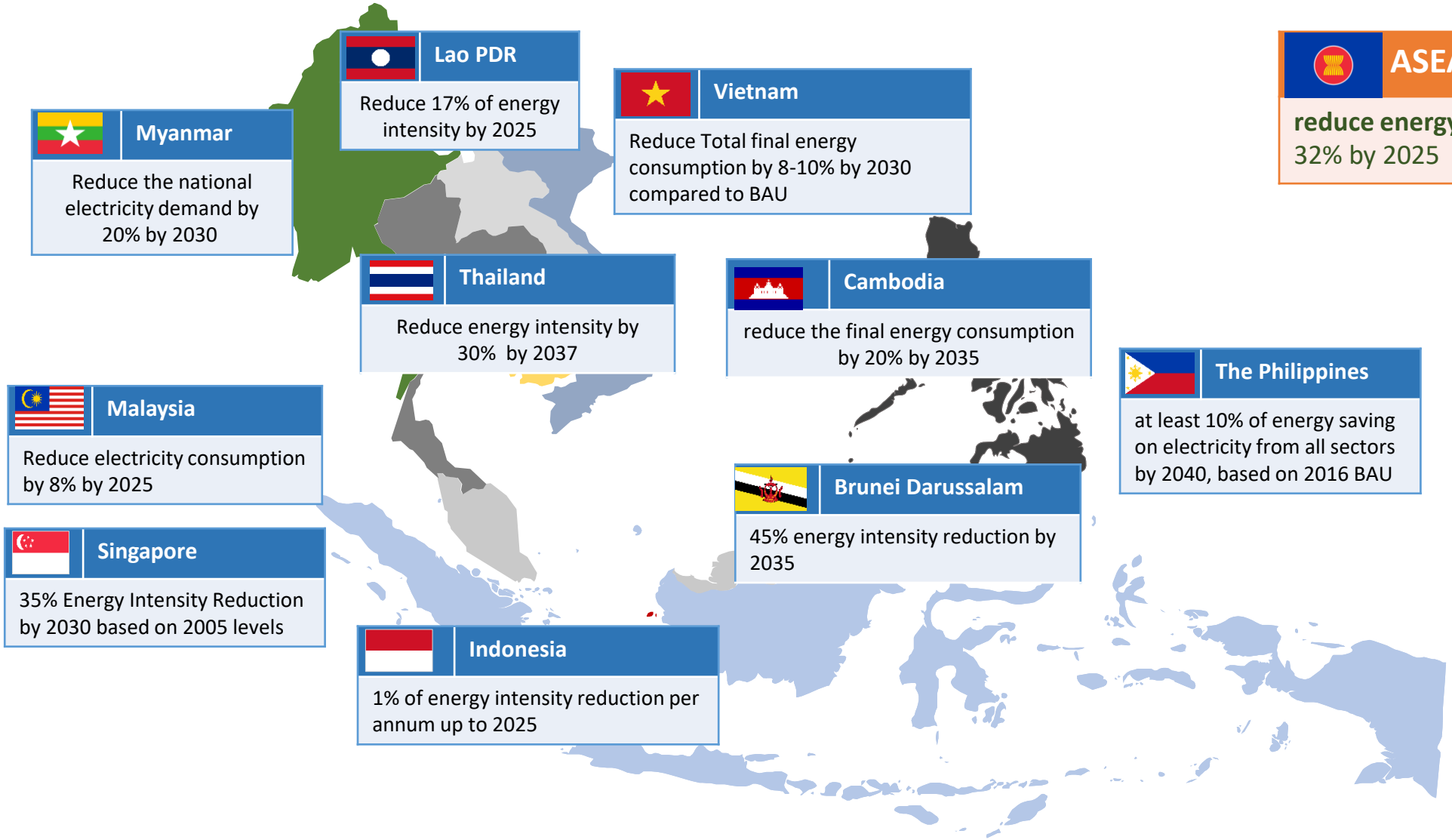
Most ASEAN Member State (AMS) have announced carbon neutrality targets by 2050 and NZE by 2065 but will require international cooperation and support

Energy Efficiency and Conservation and Renewable Energy are the main strategies for achieving Carbon Neutrality in AMS

	Singapore	Thailand	Indonesia	Brunei Darussalam	Vietnam	Malaysia	Cambodia	Lao PDR
Carbon Neutrality Target	**2050**	**2050**	**2060**	**2050**	**2050**	**2050**	**2050**	**2050**
Energy Efficiency and Conservation								
Renewable Energy								
Electric Vehicle								
Digitalisation								
Grid Modernisation								
Low-Carbon Alternatives								
Carbon Tax/Pricing								
No New Coal Plants								

Source: Kick-off Meeting AJEEP Scheme 5

ASEAN Member States have set up energy efficiency and conservation-related targets



Lao PDR

Reduce 17% of energy intensity by 2025

Myanmar

Reduce the national electricity demand by 20% by 2030

Vietnam

Reduce Total final energy consumption by 8-10% by 2030 compared to BAU

ASEAN

reduce energy intensity by 32% by 2025

Thailand

Reduce energy intensity by 30% by 2037

Cambodia

reduce the final energy consumption by 20% by 2035

The Philippines

at least 10% of energy saving on electricity from all sectors by 2040, based on 2016 BAU

Malaysia

Reduce electricity consumption by 8% by 2025

Brunei Darussalam

45% energy intensity reduction by 2035

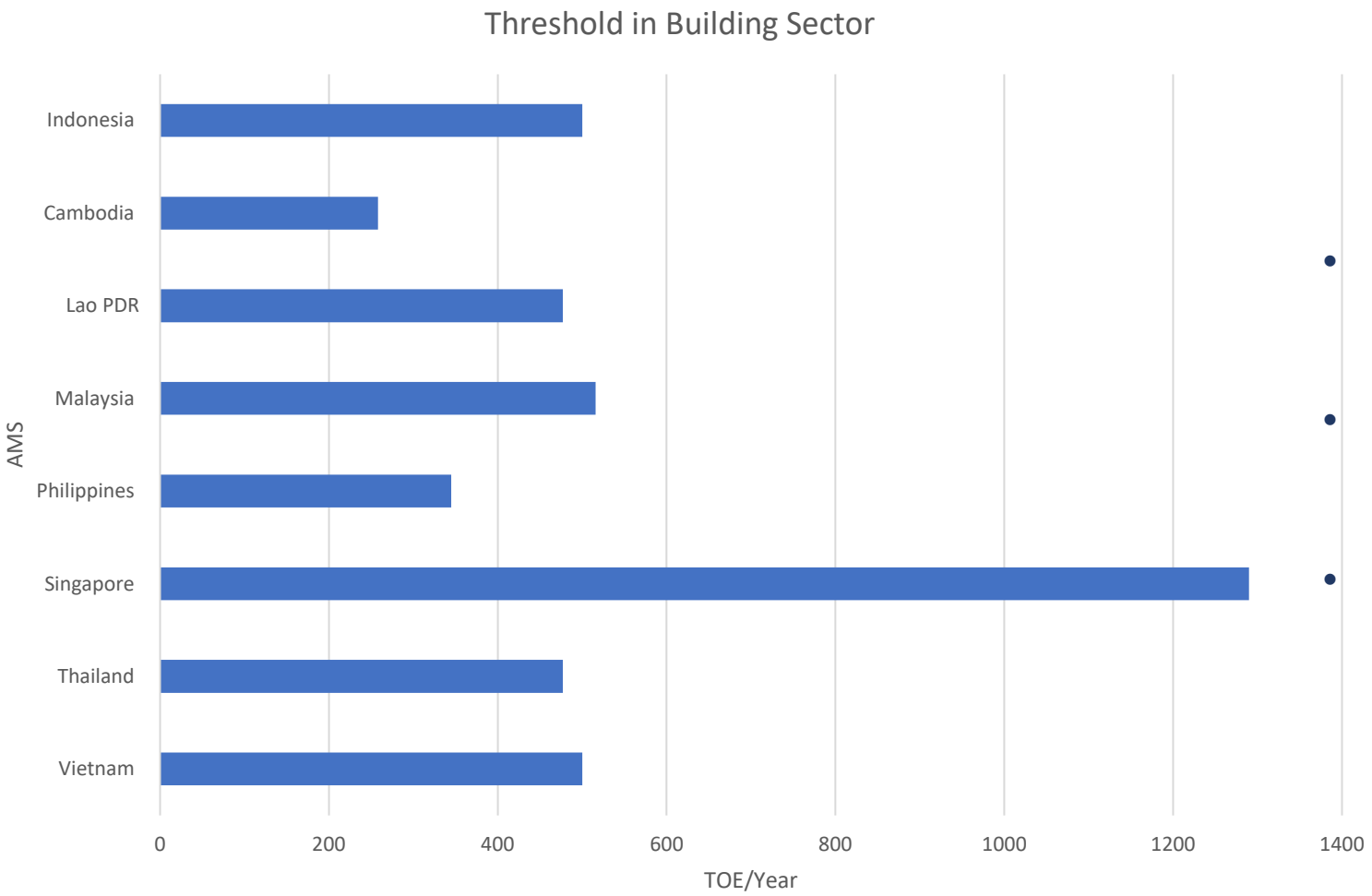
Singapore

35% Energy Intensity Reduction by 2030 based on 2005 levels

Indonesia

1% of energy intensity reduction per annum up to 2025

Mandatory Energy Management System is a common policy for the application of EE&C practices in AMS….

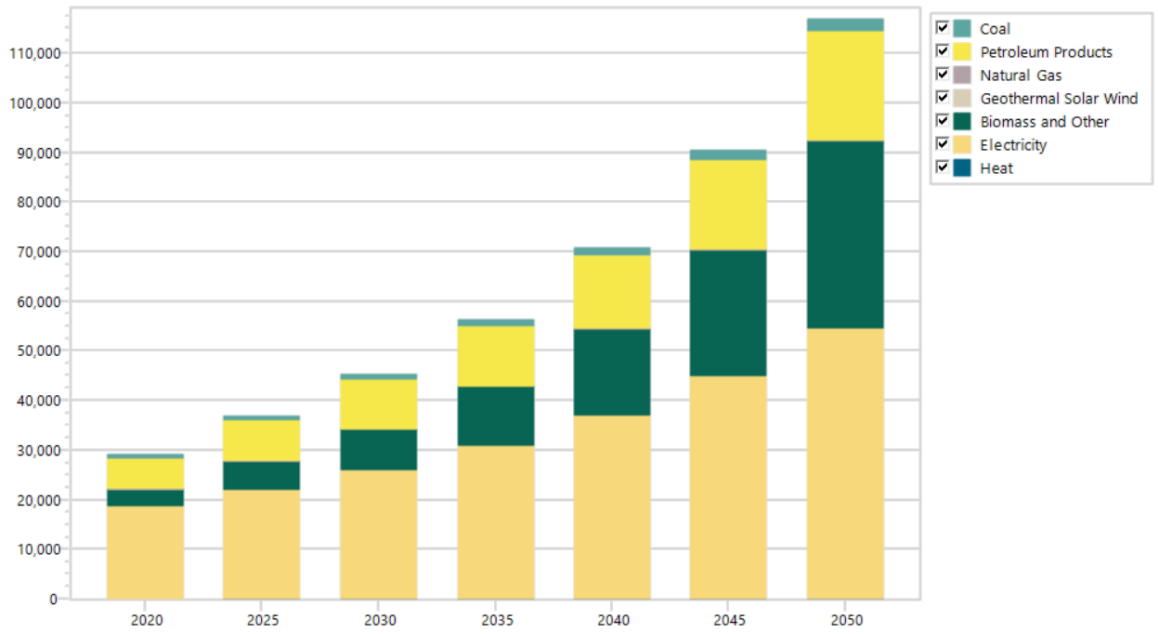


- AMS required the energy intensive establishments to implement EMS in their respective energy efficiency Law, Act, or Decree.
- The threshold value and units are varied among the countries.
- All of AMS includes commercial building within the scope of coverage.
- Malaysia and Cambodia only covers electrical system.

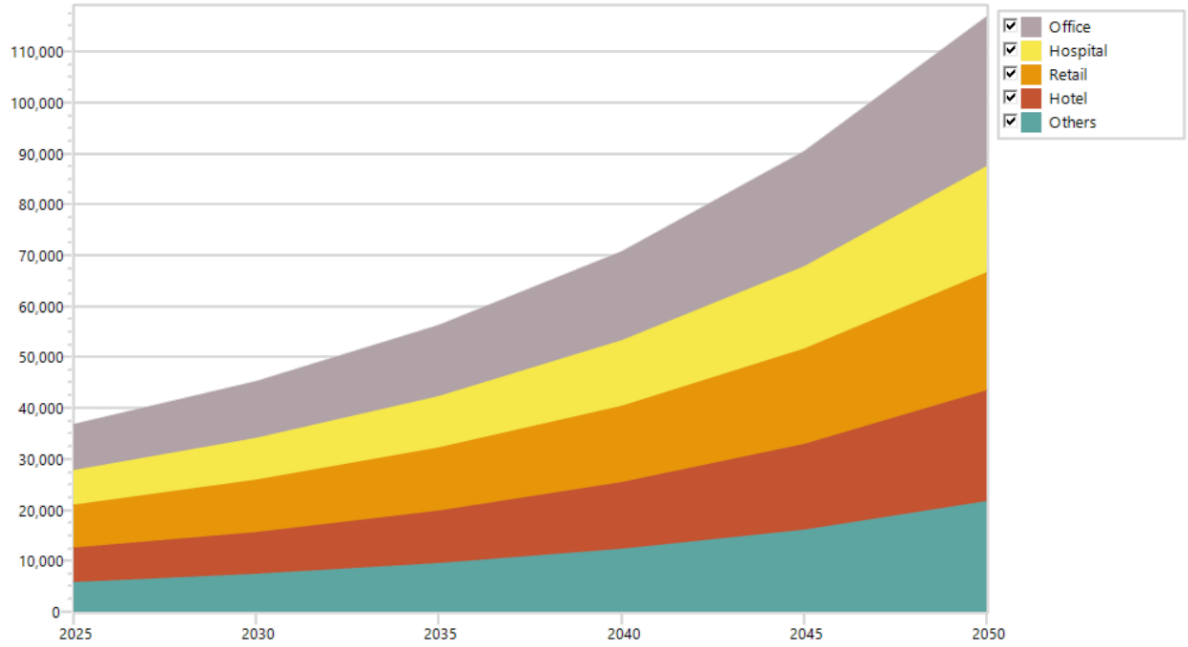
Why buildings play a pivotal role towards Carbon Neutrality in ASEAN?

Energy consumption trends in buildings (commercial sector)

ASEAN Commercial Sector Demand in ktoe



ASEAN Energy consumption per commercial sub-sector in ktoe



Source: The ASEAN Energy Outlook 7th (AEO7)

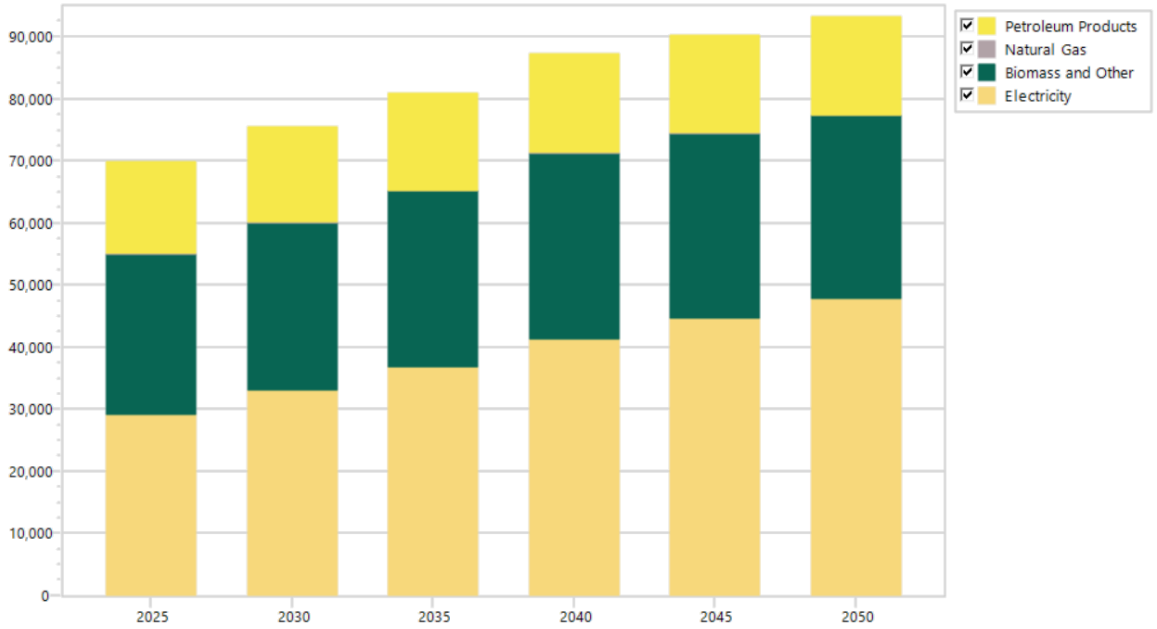
Commercial sector consumption will increase by 4 times in 2050 (2020 levels). The sector is highly electrified and consume significant biomass, LPG, and diesel. Efficient lighting and appliances and increased electrification is beneficial.

Energy intensity reduction in facilities of office, hospital, retail, hotel, and other commercial space will lead to significant improvement.

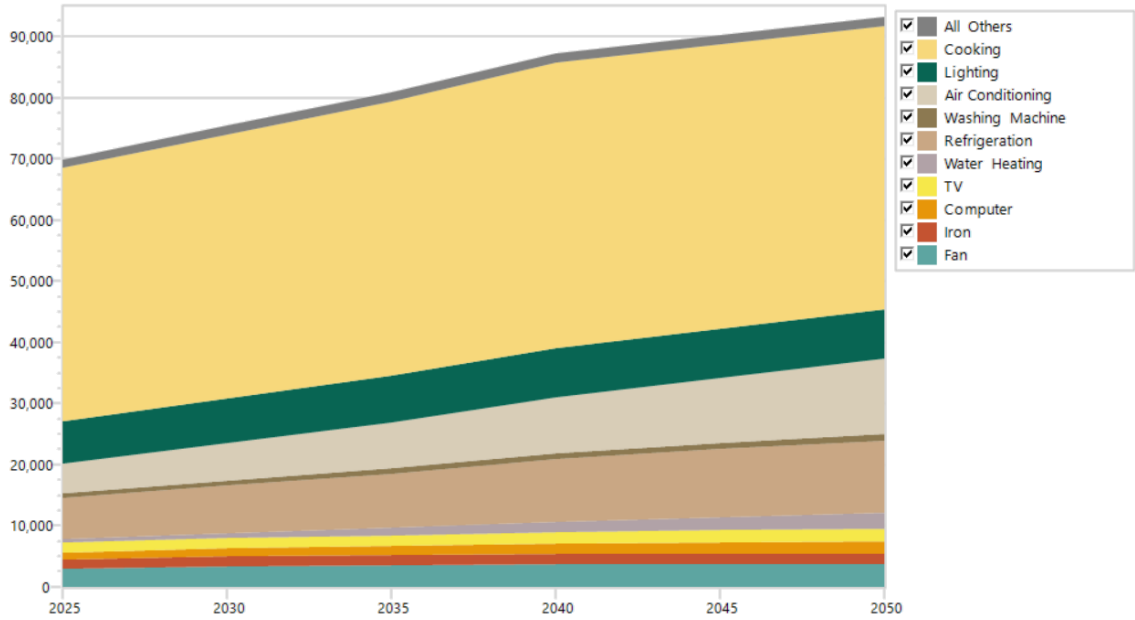
Why buildings play a pivotal role towards Carbon Neutrality in ASEAN?

Energy consumption trends in buildings (residential sector)

ASEAN Residential Sector Demand in ktoe



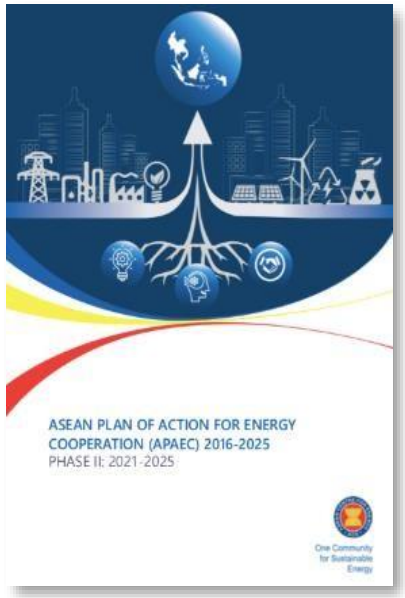
ASEAN Energy consumption per residential end-users in ktoe



Source: The ASEAN Energy Outlook 7th (AEO7)

- Residential sector energy consumption is expected to increase by 1.5 times in 2050 (2020 levels). The Sector is mainly electrified and consumes a large share of biomass for heating and cooking.
- Efficient lighting and appliances policies on increased electrification and clean cooking are crucial.
- MEPS and labelling were seen as effective policies in several AMS that could be adopted by the region as a whole.

Energy Efficient Buildings Become Increasingly Important in ASEAN

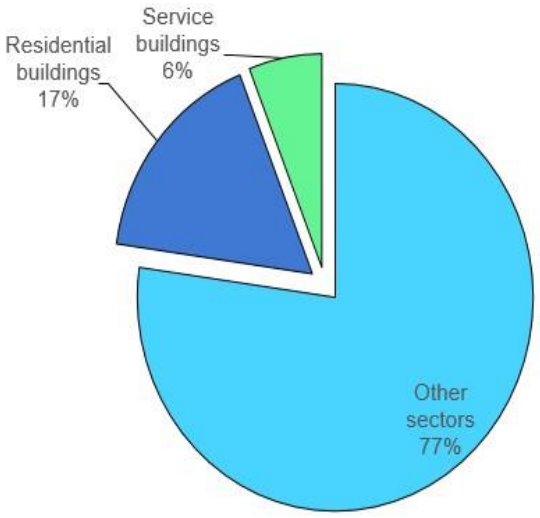


APAEC Phase II:

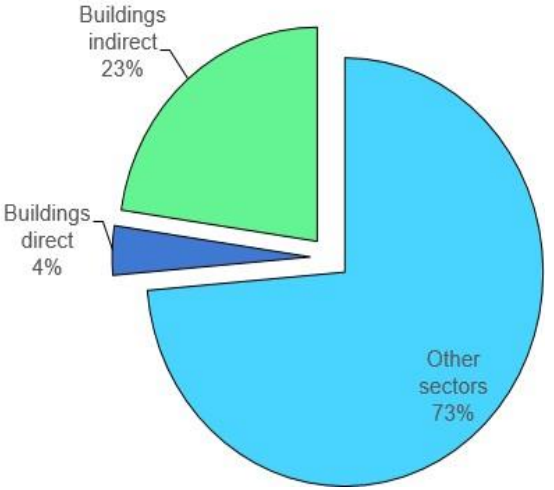
Energy intensity reduction target of 32% by 2025 based on 2005 level.
Renewable energy share of 23% in total primary energy supply (TPES) Renewable energy share of 35% in power generation by 2025

To meet the goals, ASEAN's buildings will need to become **highly energy-efficient** and **use primarily zero-carbon energy source**

Buildings' share in total final energy consumption in ASEAN, 2020

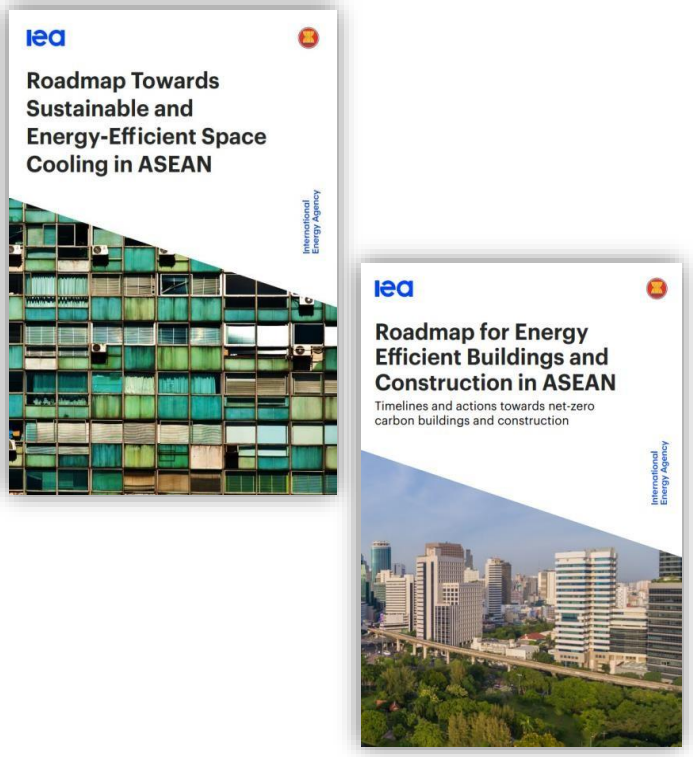


Buildings' share of energy and process related CO2 emissions in ASEAN, 2020



- **Urbanisation rate** is expected to increase from 50% in 2018 to 60% by 2040, adding 120 million of urban dwellers, and increasing floor area by 60%.
- **ASEAN's building energy consumption** is expected to grow by around 60% by 2030 and by 120% by 2040, while energy efficiency measures could help to mitigate this growth by at least 20%.

Roadmap for Energy-Efficient Buildings and Construction and the Roadmap towards Sustainable and Energy-Efficient Space Cooling in ASEAN



- A joint collaboration of the **International Energy Agency (IEA)**, the **ASEAN Centre for Energy (ACE), the ASEAN Secretariat**, and the **Energy Efficiency and Energy Conservation Sub-Sector Network (EE&C-SSN).**
- The project aims to develop a detailed **roadmap for the buildings and construction sector** and a **roadmap for space cooling** in the ASEAN region, to help reduce energy demand in the sectors and improve stakeholder collaboration.
- The project is funded by the **ASEAN-Australian Development Cooperation Project Phase II (AADCP II)** and supports outcome-based strategies (OBS):

OBS 1.
Expand, Harmonise, and Promote Energy Efficiency Standards and Labelling on Energy-related Product

OBS 3.
Strengthen Sustainability of Energy Efficiency in Buildings

- This Roadmap for Energy Efficient Buildings and Construction in ASEAN should be considered alongside the **Roadmap towards Sustainable and Energy-Efficient Space Cooling in ASEAN.**
- This will ensure that **space cooling**, as one of **the fastest growing electricity-consuming end uses** in the region, is approached holistically.

Roadmaps' objectives and key principles

Roadmaps intend to support policy-makers in developing, adopting, and enforcing energy efficiency and low-carbon policies and programmes for energy efficiency in buildings and space cooling

The Roadmaps provide milestones for the short-term (2025), mid-term (2030), and long-term (net-zero carbon). These milestones and timelines are not intended to represent the views of AMS, but to provide guidance towards energy-efficient, low-carbon and eventually net-zero carbon buildings and space cooling in the region.

- ***Adaptability*** – configuration of the Roadmaps recommendations into an effective implementation plan based on in-depth knowledge of the local context
- ***Holistic approach*** – applying an integrated view, while acknowledging complexity and fragmentation of buildings and space cooling issues
- ***Strategic planning*** – integrating the selected from the Roadmaps actions into specific policy processes and strategic plans or developing new ones, where it is needed
- ***Multi-stakeholder collaboration*** – establishing effective communication channels and coordination mechanisms between national, subnational, and local governments, as well as considering the interests of various stakeholder groups

The Roadmap's Implementation Brings Multiple Impacts

- Contribution to the achievement of low carbon initiatives
- Contribution to the improvement of regional energy access and energy security
- Creation of a new business and industry
- Green Recovery

Enhancing Industry Innovation and Business Innovation

GHG reduction in buildings is a **common challenge** in ASEAN countries.

Zero Energy Building (ZEB) is a key measure for achieving **Low carbon cites**

Renewable energy at building is **"local production for local consumption business model".**

Enhancing the value of buildings
Reduction in utility costs, improvement of real estate value, comfortable office environment, etc.

Due to difficulties in implementing energy saving measures in existing buildings, **early action in the new urban development stage is key to success**.

Creating new markets in the fields of new construction, reform, supply of materials/ hardware, maintenance/ operation, energy management, etc.

Policy package approach for ASEAN Roadmaps

Regulation

Regulations "push" up energy efficiency across the market, including:

- Minimum energy performance standards
- Building energy codes
- Mandatory disclosure programs

Information

Information programmes to 'lift the market' by support regulations and incentives and informing consumer choices, including:

- Certification & Labelling
- Audit programmes
- Product registries
- Information campaigns
- Education, training, capacity building
- Smart meter and controls

Incentives

Incentives provide a "pull" to shift the market towards high-efficiency, and include:

- Rebates and loan programmes
- Bulk and public procurement programmes
- Manufacturing and innovation grants
- Equity programmes
- Non-financial incentives

PUSH → LIFT → PULL

Status of building energy codes, certification and MEPS in ASEAN

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	AC, R, L
Thailand			AC, R, L	AC, R, L, F
Viet Nam			AC, R, L, F	AC, R

Building Energy Codes, Certification, Labelling for buildings	MEPS for appliances, Labelling for appliances
Mandatory for all buildings	Mandatory
Mandatory for certain building types	-
Voluntary	Voluntary
Under development	Under development
No known policy	No known policy

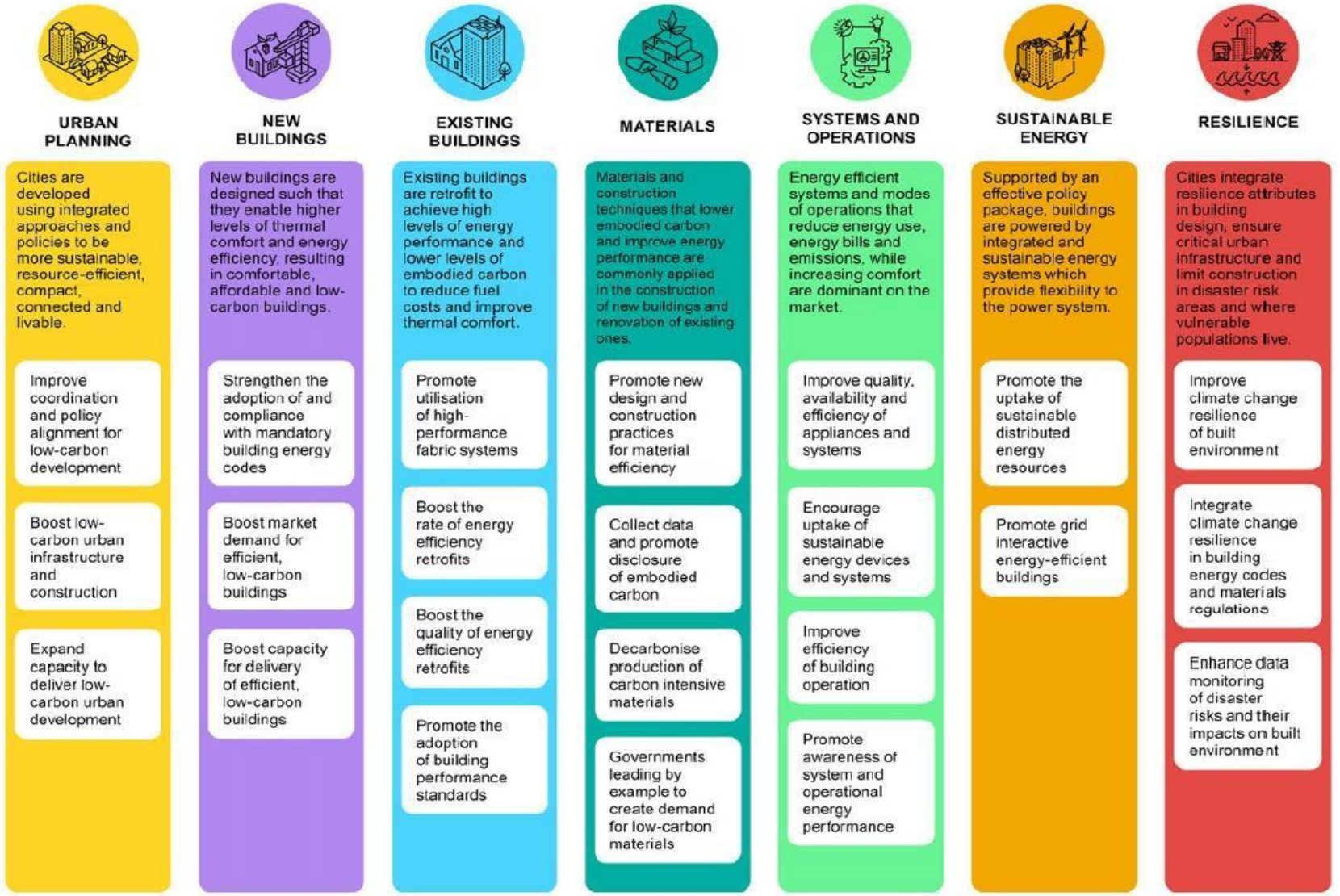
AC - air-conditioners

R - refrigerators/ freezers

L - lighting

F - fans

ASEAN Buildings Roadmap: Action Areas



Introduction
- Vision
- Guiding principles

Current context
- Trends and challenges
- Current policies

Summary of strategy
- Milestones to Net Zero Carbon
- Summary of strategy elements
- Stakeholder mapping

Actions, Activities and Timelines
- Timelines
- Actions, Activities, Near-term recommendations
- Examples

Tracking progress
- Proposed regional and national indicators for tracking

Summary of Proposed Milestones towards Net Zero Building

	By 2025:	By 2030:	For NZC:
URBAN PLANING	Urban planning decisions and strategies not integrated across themes, and exclude the informal city	Incremental integration of sectors and stakeholders in planning to incorporate energy efficiency, emissions and equity	Integrated and efficient planning for low-carbon and equitable cities
NEW BUILDINGS	Net zero carbon compatible standards and guidelines adopted across AMS	Most new construction meets Zero Carbon Ready standard	All new construction meets Zero Carbon Ready standard
EXISTING BUILDINGS	Large buildings targeted for energy efficiency improvement during major renovations. Development of baseline information.	Increased renovation rate and scope and increased repair and refurbishment, increased labelling and disclosure	Most buildings operating at net-zero carbon emissions
MATERIALS	Standard methodologies developed for assessing embodied carbon and increasing material efficiency. Stronger and consistent materials criteria in green building rating systems	Benchmarks developed for all building types across AMS; 40% reduction in upfront carbon	All new buildings zero embodied carbon over entire lifecycle
SYSTEM AND OPERATIONS	Promote use of tools for energy performance, disclosure and management	Sustained adoption of energy performance tools, systems and standards	Widespread use of tools and disclosure to reach operational net-zero carbon
INTEGRATION OF CLEAN ENERGY	Increase access to clean cooking to 90% and electricity to 70%	Increased share of hydro, wind and solar PV to reduce carbon intensity of grid. Increased distributed generation	Most buildings net-zero carbon emissions over whole life. Universal access to electricty and clean cooking

Policy package for buildings

- The roadmap explores potential policy measures under these three categories and across seven action areas, including:
  - Current status of policies and initiatives across ASEAN
  - Milestones to drive improvements across 2025, 2030 and zero-carbon
  - Near-term actions to support improvements
  - Examples and case studies.
- We know that there is no silver bullet for improving energy efficiency in buildings and a 'policy package' approach is key
- Effective and timely policy development and implementation are crucial.

Regulation

Product standards | **Procurement regulation** | **Regulation on materials**

Framework regulations | **Building Energy Codes and Building Standards**

- Minimum energy and thermal performance requirements, requirements for renewable energy systems installation or utilisation, covering all building types, new and existing buildings.
- Mandatory minimum energy performance standards (MEPS) for all types of appliances and building systems that are progressively and regularly updated, etc.

Information

Certification | **Labelling** | **Disclosure & benchmarking** | **Training programs**

Education programs | **Awareness raising** | **Digital tools and data**

- Certification of energy and carbon performance for new and existing buildings; Mandatory rating labels, disclosure and benchmarking schemes for new and existing buildings based on energy and carbon performance.
- Mandatory labelling for appliances based on their energy efficiency
- Training on integrated policy portfolio and solutions for net zero carbon buildings; Accreditation systems for professionals; Awareness raising programs for consumers on benefits of net zero carbon buildings

Incentives

Financial incentives | **Non-financial incentives** | **Tariff policies**

- Grants, preferential loans, tax rebates, tied to energy and carbon performance levels of new or renovated buildings, building materials, systems, appliances, reflective energy pricing, etc.

Conclusion and Remarks

- To meet the goals of APAEC Phase II, ASEAN's buildings will need to become highly energy-efficient and use primarily zero-carbon energy sources.
- In commercial building, energy efficiency can potentially reduce the total energy demand from 92 Mtoe to 43 Mtoe between Baseline and Advanced Scenario Policy (APS) of AEO7.
- While policies and financing frameworks provide support for low carbon and sustainable building, regulations and standards can present effective means to force buildings to higher efficient technology , thus adopting a push-pull strategy
- The ASEAN Centre for Energy (ACE), as the regional grouping's hub, can act as a catalyst in supporting the implementation of relevant initiatives in building energy efficiency by conducting studies, managing project implementation, capacity building and providing other facilities to foster the adoption of efficient technologies in buildings
- ACE and the IEA recently published the Roadmap for Energy-Efficient Building and Construction in ASEAN **to support policy-makers in developing, adopting, and enforcing energy efficiency and low-carbon policies and programmes for energy efficiency in buildings**

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