# 2023 ANNUAL REPORT

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REPORT

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# Acknowledgment

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This report highlights the shared commitment to the vision, mission, and key roles of ACE. The collective efforts of each contributor, whether in crafting content or presenting information, have resulted to capture the achievements and initiatives of ACE but also reflects a commitment to contribute in advancing the energy development in the ASEAN region.

Heartfelt gratitude is extended to all ASEAN Ministers on Energy, Senior Officials on Energy, all SEBs and SSNs Focal Points, and ASEAN Secretariat for their constructive feedback and steadfast support to ACE throughout the year 2023.

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| **A** | | |
| | ACCEPT II | ASEAN Climate Change and Energy Project Phase II |
| | ACDIS | ASEAN Coal Database Information System |
| | ACE | ASEAN Centre for Energy |
| | ACEP | Asia Clean Energy Partners |
| | ADB | Asian Development Bank |
| | AEBF | ASEAN Energy Business Forum |
| | AEDS | ASEAN Energy Database System |
| | AEDP | Alternative Energy Development Thailand |
| | AEMAS | ASEAN Energy Management Accreditation Scheme |
| | AEO7 | The 7th ASEAN Energy Outlook |
| | AERN | ASEAN Energy Regulatory Network |
| | AFOC | ASEAN Forum on Coal |
| | AFREC | African Energy Comission |
| | AICEE | ASEAN International Conference on Energy and Environment |
| | a.i | Ad Interim |
| | AIIB | Asian Infrastructure Investment Bank |
| | AIMS III | ASEAN Interconnection Masterplan Study |
| | AJEEP | ASEAN-Japan Energy Efficiency Partnership |
| | AMEM | ASEAN Ministers on Energy Meeting |
| | AMEM+3 | ASEAN Ministers on Energy Meeting plus China, Japan, South Korea |
| | AMS | ASEAN Member States |
| | APAEC | ASEAN Plan of Action for Energy Cooperation |
| | APG | ASEAN Power Grid |
| | APGCC | ASEAN Power Grid Consultative Committee |
| | APS | APAEC Target Scenario |
| | APSA | ASEAN Petroleum Security Agreement |
| | APSO | ASEAN Power System Operators |
| | ARNECC | ASEAN Researchers Network on Energy and Climate Change |
| | ASCOPE | ASEAN Council on Petroleum |
| | ASEAN | Association of Southeast Asian Nations |
| | ASEAN+3 | ASEAN plus China, Japan, South Korea |
| | ASEAN GTR | ASEAN Green Transport Rally |
| | ATS | AMS Target Scenario |
| **B** | | |
| | BAS | Baseline Scenario |
| | BECCS | Bio Energy with Carbon Capture and Storage |
| | BIMP-EAGA | Brunei Darussalam-Indonesia-Malaysia-Philippines - East ASEAN Growth Area |
| **C** | | |
| | CASE | Clean, Affordable, and Secure Energy for Southeast Asia |
| | CCS | Carbon Capture and Storage |
| | CCT | Clean Coal Technology |
| | CCUS | Carbon Capture, Utilisation, and Storage |

| | | |
|---|---|---|
| | CEE | Conservation and Energy Efficiency |
| | CEFIA | Cleaner Energy Future Initiative for ASEAN |
| | CEM | Certified Energy Managers |
| | CES | Cryogenic Energy Storage |
| | CETERI | China Energy Technology and Economics Research Institute |
| | CN | Carbon Neutrality |
| | CREEI | China Renewable Energy Engineering Institute |
| | CSM | Common Standard Modules |
| | COP | Conference of the Parties |
| **D** | | |
| | DEDE | Department of Alternative Energy Development and Efficiency of Thailand |
| | DFI | Development Finance Institution |
| | DGE | Directorate General of Electricity of Indonesia |
| | DOE | Department of Energy of the Philippines |
| **E** | | |
| | ECAP | Energy Conservation Workshop under AJEEP |
| | ECCJ | Energy Conservation Center Japan |
| | EDF | Environmental Defense Fund |
| | EE | Energy Efficiency |
| | EE&C | Energy Efficiency & Conservation |
| | EI | Energy Intensity |
| | EMA | Energy Market Authority of Singapore |
| | EMC | Energy Manager Certification |
| | ENPAP | Energy Efficiency Practitioners Association of the Philippines |
| | EPGG | Energy Policy Governing Group |
| | ERIA | Economic Research Institute for ASEAN and East Asia |
| | ETS | Emissions Trading System |
| | EU | European Union |
| | EV | Electric Vehicle |
| | EVCS | EV Charging Station |
| **F** | | |
| | FGD | Focus Group Discussion |
| **G** | | |
| | G-PST | Global Power System Transformation |
| | GCF | Green Climate Fund |
| | GCNEP | Global Centre for Nuclear Energy Partnership India |
| | GDP | Gross Domestic Product |
| | GHG | Greenhouse Gas |
| | GIS | Geographic Information Systems |
| **H** | | |
| | HAPUA | Head of ASEAN Power Utilities/Authorities |
| | HEV | Hybrid Electric Vehicles |
| | HLPD | High Level Policy Dialogue |

**I**

| | |
|---|---|
| IEA | International Energy Agency |
| ICT | Information, Communication and Technology |
| IEEJ | Institute of Energy Economics Japan |
| ITC | Institute of Technology of Cambodia |

**J**

| | |
|---|---|
| JCOAL | Japan Coal Frontier Organization |
| JETRO | Japan External Trade Organization |
| JOGMEC | Japan Organization for Metals and Energy Security |

**K**

| | |
|---|---|
| KEA | Korea Energy Agency |
| KESCO | Korea Electrical Safety Corporation |
| KDB | Korea Development Bank |
| KEEI | Korea Energy Economics Institute |
| KNA | Korea Nuclear Association |

**L**

| | |
|---|---|
| LCBs | Low Carbon Buildings |
| LEAP | Low Emissions Analysis Platform |
| LNG | Liquefied Natural Gas |
| LPG | Liquefied Petroleum Gas |
| LTMS-PIP | Lao PDR, Thailand, Malaysia and Singapore Power Integration Project |

**M**

| | |
|---|---|
| MEMR | Ministry of Energy and Mineral Resources of Indonesia |
| METI | Ministry of Economy, Trade, and Industry of Japan |
| MLP | Methane Leadership Program |
| MoU | Memorandum of Understanding |
| MPP | Energy Modelling and Policy Planning |
| MRI | Mitsubishi Research Institute |
| MTR | Mid-Term Review |

**N**

| | |
|---|---|
| NDC | Nationally Determined Contributions |
| NEC | Nuclear Energy Cooperation |
| NRE | New and Renewable Energy |
| NREL | National Renewable Energy Laboratory |
| NSTDA | National Science and Technology Development Agency |
| NUPI | Norwegian Institute of International Affairs |
| NZE | Net Zero Emission |

**O**

| | |
|---|---|
| OLADE | Organización Latinoamericana de Energía |
| Op-Ed | Opinion Editorial |
| OSRM | Oil Stockpiling Road Map |
| O&G | Oil & Gas |

| | | |
|---|---|---|
| **P** | PEEB-ASEAN | Promoting Energy Efficiency in Building in ASEAN |
| | PLN | Perusahaan Listrik Negara (State Electricity Corporation, Indonesia) |
| | PHEV | Plug-in Hybrid Electric Vehicles |
| **R** | RE | Renewable Energy |
| | REC | Renewable Energy Certificate |
| | RECAP | Renewable Energy Certificate System in BIMP-EAGA Countries |
| | REPP | Regional Energy Policy and Planning |
| **S** | SAEMAS | Sustainable ASEAN Energy Management Certification Scheme |
| | SAREF | Sustainability & Renewable Energy Forum |
| | SEACA | Southeast Asia CCS Accelerator |
| | SEB | Specialised Energy Bodies |
| | SIEW | Singapore International Energy Week |
| | SOE | Senior Official on Energy |
| | SOME | Senior Officials Meeting on Energy |
| | SRE | Sustainable and Renewable Energy |
| | SSN | Sub-sector Networks |
| **T** | TAGP | Trans-ASEAN Gas Pipeline |
| | TNB | Tenaga Nasional Berhad |
| **U** | UNEP | United Nations Environment Programme |
| | UNESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| | UNITEN | Universiti Tenaga Nasional |
| | U.S | United States (of America) |
| | USAID | United States Agency for International Development |
| | USAID SPP | United States Agency for International Development Southeast Asia Smart Power Program |
| | USD | United States Dollar |
| | USTDA | United States Trade and Development Agency |
| | UTM | Universiti Teknologi Malaysia |
| **W** | WG | Working Group |
| **Z** | ZEB | Zero Energy Building |

# Foreword

# Message from the Executive Director

**Dr. Nuki Agya Utama**
Executive Director
ASEAN Centre for Energy

On behalf of the ASEAN Centre for Energy (ACE), I am honoured to present the ACE Annual Report 2023.

First and foremost, we would like to extend our heartfelt gratitude and appreciation to all Senior Officials on Energy (SOE) Leaders, Dialogue Partners (DPs), International Organisations (IOs), Specialised Energy Bodies (SEBs), Sub-Sector Networks (SSNs), and Focal Points for their invaluable contributions and unwavering support in the advancement of ASEAN region energy sector.

In the face of unprecedented global challenges, ACE has remained steadfast in its commitment to illuminate the path towards energy security, affordability, and sustainability for the region. This notable progress is largely credited to the outstanding efforts of our ACE colleagues and partners. Together, we have delivered significant results for key stakeholders, guided by the 7 key strategies of the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II: 2021-2025.

The ACE Annual Report 2023 encompasses ACE's activities and progress throughout the year in fostering energy cooperation and advancement in the ASEAN region. In this annual report, ACE's initiatives are each categorised based on ACE three key roles as a catalyst, knowledge hub, and think tank. This approach aims to showcase ACE's effectiveness in seizing opportunities and navigating challenges throughout the preceding year.

The year 2023 stands out as a remarkable and pivotal time for ACE. For the first time after COVID-19 restrictions, ACE successfully hosted the ASEAN Energy Business Forum 2023 (AEBF 2023) together with the Ministry of Energy and Mineral Resources (MEMR) of the Republic of Indonesia, with the theme of "Accelerating Energy Connectivity to Achieve Sustainable Growth of ASEAN" in conjunction with the 41$^{st}$ ASEAN Ministers on Energy Meeting (AMEM-41).

# Foreword

Parallel to the energy business forum, the 3rd ASEAN International Conference on Energy and Environment (AICEE), ASEAN Green Transport Rally (GTR) 2023, ASEAN Energy Awards (AEA) 2023, 1st Inter-Regional Energy Forum (IREF), and ASEAN Energy Leaders' Golf Tournament took place, drawing participants from across the ASEAN region.

Another milestone accomplished by ACE was the establishment of partnership with United States Agency for International Development Southeast Asia Smart Power Program (USAID SPP) in June 2023, which marks the start of a three-years partnership commitment, aimed at supporting decarbonisation efforts within ASEAN and enhancing the region's power systems. Underpinning the ACE-SPP Partnership is a 3-year, 3 million USD Grant under Contract (GUC) that SPP awarded to ACE effective in May 2023. To harmonise reporting under the GUC with SPP's reporting to USAID, the "Year One Workplan" for this GUC will cover the expanded initial period of 1 May 2023, through 30 September 2024.

Furthermore, ACE in collaboration with various ASEAN oil and gas (O&G) companies, governmental agencies, and international organisations, launched the ASEAN Energy Sector Methane Leadership Program (MLP) under the 4th ASEAN Methane Roundtable Dialogue. The MLP is an 18-month initiative dedicated to improving methane emission management in the ASEAN oil and gas sector. It aligns with the Global Methane Pledge 2030 and emphasises regional collaboration, technology transfer, networking, knowledge sharing, and capacity building among O&G companies, regional and international organisations, and other stakeholders.

In addition to the aforementioned activity, ACE is furthering the integration of energy strategies across the region, offering valuable insights and expertise to ensure that energy policies and programmes align harmoniously with ASEAN's economic advancement and environmental sustainability.

We wish to convey our deepest gratitude for the significant contributions made by the ACE team and our partners, which have greatly contributed to ACE's success in 2023. Your unwavering support has been pivotal in promoting our shared objectives of enhancing energy security, affordability, and sustainability in ASEAN. We also aspire to cultivate opportunities for extended collaborative partnerships, playing a pivotal role in propelling the advancement of the ASEAN energy sector.

# Message from the Chairman

**H.E. Victor Jona**
Cambodia
SOE Leader

In a world marked by challenges and opportunities, the ASEAN Centre for Energy (ACE) has consistently proven itself as a catalyst, knowledge hub, and think tank for the energy sector in the ASEAN region. The dedicated professionals at ACE, who play an essential role in achieving our ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II: 2021-2025 targets, have demonstrated remarkable resilience and resourcefulness, especially in navigating the complexities of economic recovery and sustainable growth. Their unwavering commitment during these challenging times underscores ACE's vital role in shaping the energy landscape and contributing to the sustainable development of the ASEAN community.

As we deepen regional cooperation, ACE continues to prioritise cross-sectoral and cross-pillar coordination within the ASEAN community. The relentless work of ACE remains pivotal in the development and implementation of APAEC, crucial for ensuring energy security and accelerating the region's energy transition. By facilitating collaboration and knowledge-sharing, ACE strengthens the foundation for collective action on shared challenges, positioning the ASEAN region as a global leader in sustainable energy practices.

ACE, through its policy research, networking, and responsiveness to emerging energy issues, continues to assist our understanding of strategic energy developments. Initiatives like capacity-building programs with external partners further enhance our collective knowledge and preparedness. Increased collaboration between ACE's researchers and policymakers from ASEAN Member States (AMS) ensures that policy directions pursued at regional and national levels are supported by evidence and robust analysis. This collaborative approach serves as a testament to the inclusivity and effectiveness of ACE in guiding the region toward a sustainable and resilient energy future.

# Foreword

Reflecting on the progress made in 2023, ACE has affirmed its position as the premier energy centre in the region, leading the ASEAN Energy Sectoral body in post-pandemic recovery. Looking ahead, I am confident that ACE will achieve even more as we maintain our cohesive and collaborative approach. The achievements of ACE are not merely milestones but indicators of a collective commitment to sustainable energy practices and regional prosperity.

The ACE Governing Council, with its critical role in guiding ACE's strategic direction, remains committed to ensuring ACE's continued relevance, responsiveness, and usefulness. As Chair and on behalf of this distinguished Council, I express our renewed firm commitment to guide ACE's work, with the ultimate goal of enhancing energy interconnection in the ASEAN region. Together, we look forward to another year of impactful contributions and shared successes in advancing the energy agenda for the prosperity of our region.

# About ACE

Established on 1 January 1999, the ASEAN Centre for Energy (ACE) is an intergovernmental organisation within the Association of Southeast Asian Nations' (ASEAN) structure that represents the 10 ASEAN Member States' (AMS) interests in the energy sector. ACE supports the implementation of the ASEAN Plan of Action for Energy Cooperation (APAEC), a blueprint for better collaboration towards upgrading energy. The Centre is guided by a Governing Council composed of Senior Officials on Energy from each AMS and a representative from the ASEAN Secretariat as an ex-officio member.

The three key roles of the ACE:

1. As a catalyst to unify and streng then ASEAN energy cooperation and integration by implementing relevant capacity building programmes and projects to assist the AMS develop their energy sector.
2. As the ASEAN energy data centre and knowledge hub to provide a knowledge repository for the AMS.
3. As an ASEAN energy think tank to assist th AMS by identifying and surfacing innovative solutions for ASEAN's energy challenges on policies, legal & regulatory frameworks and technologies.

Keeping the region's energy security, accessability, and sustainability is a fundamental concern of the ASEAN energy sector. Hosted by the Ministry of Energy and Mineral Resources of Indonesia, ACE's office is located in Jakarta, Indonesia. For more information: aseanenergy.org

# 2023 ACE Throughout

**01**
January

**02**
February

4th Government - Private Forum on the Cleaner Energy Future Initiative for ASEAN (CEFIA)

AEO7 Webinar: Redesigning ASEAN Energy Security

**03**
March

**04**
April

ASEAN Energy Efficiency Workshop Series

**05**
May

ASEAN Coal Database and Information System (ACDIS) Workshop

1st SEACA Workshop

ACE-SEDA Coffee Meeting

**06**
June

41st Senior Officials on Energy Meeting (SOME)

4th ASEAN Methane Roundtable Dialogue

ASEAN's High Level Policy Dialogue

ACCEPT II Workshop on Carbon Pricing in ASEAN

**07**
July

41st ASEAN Ministers on Energy Meeting (AMEM)

ASEAN Energy Business Forum (AEBF) 2023

3rd ASEAN International Conference on Energy and Environment

1st Inter-Regional Energy Forum

**08**
August

1st Regional Workshop of Development of Conceptual Framework of Renewable Energy Certificate System (RECAP)

**09**
September

**10**
October

SOME+3 Energy Policy Governing Group (EPGG) Fora 2023

Energy-Climate Nexus Study Tour to Norway

1st Regional Workshop: ASEAN Cool Initiative

ASEAN Power Grid (APG) Meeting Series on ASEAN Power Grid Memorandum of Understanding (MoU) Renewal

2nd SEACA Workshop

**11**
November

JOGMEC Oil Capacity Building 2023

**12**
December

# Activity Highlights

# 1. Activity Highlights

## 1.1. Catalyst

***Objective:*** *To unify and strengthen ASEAN energy cooperation and integration by implementing relevant capacity building programmes and projects to assist the AMS develop their energy sector.*

### 1.1.1. Convening the 2023 ASEAN Specialised Energy Bodies (SEBs) and Sub-sector Networks (SSNs) Official Meetings

Being the secretariat of the APAEC, ACE has crucial role in assisting ASEAN SEB/SSNs in coordination and implementation of the annual milestones of all APAEC programme areas. By doing so, annually ACE has been supporting SEB/SSNs in convening their annual meetings which aim to discuss each programme area's respective progress, challenges, and opportunities, and also to prepare the official reports to Senior Officials Meeting on Energy (SOME) and ASEAN Ministers on Energy Meeting (AMEM). 2023 remarks a pivotal year as this is the first year that all the ASEAN official meetings were back to be held as physical meeting after COVID-19 pandemic. On 3-6 April, Indonesia hosted the **27th EE&C-SSN Meeting and its Associated Meetings** in Tangerang, Indonesia, whereas attended by the EE&C-SSN focal points, partners, and relevant stakeholders to discuss the progress of regional EE&C efforts including the status of energy intensity (EI) reduction target and to further accelerate EE measures in the largest energy-consuming sectors such as transport, industry, and building. On 11-12 April, **14th Nuclear Energy Cooperation (NEC) SSN Meeting and its Associated Meetings** were held in Clark, Pampanga, Philippines in which focal points and relevant stakeholders discussed the status and opportunities of their nuclear energy development for power generation, given the emerging technologies and new developments in the field of nuclear energy. The **30th Renewable Energy (RE) SSN Meeting and its Associated Meetings** were held in Vientiane, Lao PDR on 2-5 May and highlighted the needs for ASEAN to strengthen RE cooperation towards the achievements of its aspirational targets of RE. A week after on 8-11 May, **21st Annual Meeting of the ASEAN Forum on Coal (AFOC) and its Associated Meetings** were held in Kuala Lumpur, Malaysia, whereas the discussion highlighted the role of AFOC to lead CCUS initiatives in ASEAN and coal phase-out under the ASEAN taxonomy. Lastly, **22nd Regional Energy Policy and Planning (REPP) SSN and its Associated Meetings** were held in Singapore on 29-30 May which not only served as sharing platform for the progress of REPP programme area but also as reporting platform for all programme areas of APAEC to collaborate and strengthen the coordination within SEB/SSNs under APAEC. During REPP-SSN Meeting, mid-term review of APAEC Phase II: 2021-2025 was also discussed. In addition to that, in 2023 ACE also attended the HAPUA Council Meeting and ASCOPE Council Meeting to collaborate closely with HAPUA and ASCOPE respectively regarding the progress of APG and TAGP programme areas.

### 1.1.2. Mid Term Review (MTR) of APAEC Phase II: 2021-2025

As part of monitoring and evaluation process of the APAEC Phase II: 2021-2025, during this year, ACE, along with the assistance of ASEAN Secretariat, were supporting REPP-SSN to review existing implementation from the last couple years of the APAEC Phase II. Based on the assessment, APAEC Phase II is on track for completion which reached the score of 4.3 out of 5 for its implementation of the milestones. However, several efforts are still needed to accelerate the achievement of its aspirational targets particularly the Renewable Energy Targets. Moreover, APAEC Phase II MTR also assessed the challenges and identified opportunities for improvement for all outcome-based strategies of each programme area until completion in 2025. Several opportunities are highlighted to be

considered for the next APAEC implementation for example to look into specific energy strategies for targeted sectors such as industry and transport sectors, to align future energy cooperation with the insights from other ASEAN cross sectoral directives (carbon neutrality, circular economy, etc.) and to explore more advanced low carbon energy technologies for ASEAN. Moving forward, the findings and recommendations from APAEC Phase II MTR will be one of main references for the next cycle of APAEC post 2025.

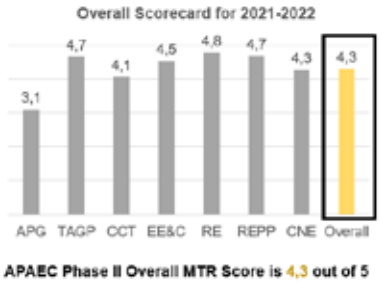



*Figure 1: Mid Term Review (MTR) of APAEC Phase II: 2021-2025*

### 1.1.3. 2nd Workshop of the SAEMAS Working Group under AJEEP Scheme 4

*Figure 2: 2nd Workshop of the SAEMAS Working Group*

On 16 January 2023, ASEAN Centre for Energy (ACE) and Energy Conservation Center Japan (ECCJ) co-organised the 2nd Workshop of the Sustainable ASEAN Energy Management Certification Scheme (SAEMAS) Working Group of the ASEAN-JAPAN Energy Efficiency Partnership (AJEEP) Scheme 4 under the SOME-METI Work Programme 2022-2023, virtually. The Workshop was attended by representatives from six (6) ASEAN Member States (AMS), namely Cambodia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, and Thailand. The key session of the workshop included the AJEEP Scheme 4 Introduction and adoption of Working Group (WG) Term of Reference (TOR), ASEAN Member States (AMS) Country report on Energy Manager Certification (EMC) Programme, and Common Standard Modules (CSM) draft structure which includes lectures, technical training, and energy audit practice.

### 1.1.4. The 2nd FGD of ASEAN Petroleum Security Agreement (APSA)

The 2nd Focus Group Discussion (FGD) on the ASEAN Petroleum Security Agreement (APSA) was hosted virtually by the Ministry of Energy Thailand on 17 January 2023. Participants included representatives from nine ASEAN Member States, namely, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam; ASCOPE; the ASEAN Secretariat; and ACE. The meeting aimed to prepare to report progress and proposed plans during APSA interim extension, which were further reported and discussed during the special Senior Officials Meeting on Energy (SOME) in 2023. Discussions revolved around reviewing recommendations from the 1st FGD, examining APSA's enhancement during its interim extension, and deliberating on future strategies and plans. The meeting underscored the importance of regional collaboration to manage energy volatility and ensure a stable oil and gas supply for the ASEAN region. The way forward involved ongoing dialogue and coordinated efforts among ASEAN countries to reinforce the role of the APSA in regional energy security.

### 1.1.5. Carbon Neutrality Dissemination Seminar under AJEEP Scheme 5

*Figure 3: Carbon Neutrality Dissemination Seminar under AJEEP Scheme 5*

On 2 February 2023, ASEAN Centre for Energy (ACE) and Energy Conservation Center Japan (ECCJ) held Carbon Neutrality Diagnosis Online Seminar of Scheme 5 under the ASEAN Senior Officials Meeting on Energy and Ministry of Economy, Trade, and Industry of Japan (SOME-METI) Work Programme 2022-2023. The seminar

was attended by the representatives from seven (7) ASEAN Member States (AMS), namely Cambodia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, and Thailand. The online seminar was held as a platform for AMS to learn on best practices in achieving carbon neutrality targets from Japan. As the output from the seminar, AJEEP Scheme 5 targets to implement carbon neutrality diagnosis for each of the three (3) factories and buildings, aiming of carbon neutrality project formation.

### 1.1.6. 3rd Workshop of the SAEMAS Working Group under AJEEP Scheme 4

*Figure 4: 3rd Workshop of the SAEMAS Working Group under AJEEP Scheme 4*

On 6 February 2023, ASEAN Centre for Energy (ACE) and Energy Conservation Center Japan (ECCJ) conducted the 3rd Workshop of the SAEMAS Working Group under AJEEP Scheme 4, as a follow up to the 2nd Workshop which was held on 16 January 2023. Eight (8) representatives of ASEAN Member States (AMS) attended the event virtually, including Cambodia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam. Some of the topics discussed at the 3rd SAEMAS Workshop, included updates on the AMS energy manager certification system programmes, ASEAN Energy Manager System (AEMAS), and AJEEP Training of Trainers (TOT). Discussion on the structure of comparative reports and common standard modules (CSM) for SAEMAS were also included among the agendas.

### 1.1.7. The 4th Government – Private Forum on the Cleaner Energy Future Initiative for ASEAN (CEFIA)

*Figure 5: The 4th Government - Private Forum on the Cleaner Energy Future Initiative for ASEAN (CEFIA)*

On 16 February 2023, ASEAN Centre for Energy (ACE) and Mitsubishi Research Institute (MRI) co-organised the 4th Government-Private Forum on the Cleaner Energy Future Initiative for ASEAN (CEFIA). The event was held physically, in Cebu, Philippines, back-to-back with the 17th ASEAN+3 NRE and EE&C Forum. Hosted by Department of Energy (DOE) of Philippines, and supported by Ministry of Economy, Trade and Industry (METI) of Japan, the forum was attended by 76 on-site participants from ASEAN+3 government officials, international organisations, universities, private companies, and 1,810 stream views through DOE Facebook Platform. The 4th CEFIA Forum was convened to share current flagship project progress which includes SteelEcosol, Zero Energy Building (ZEB), RENKEI Control, and Microgrid, also to discuss new flagship project candidate's activities aimed at energy transition towards a decarbonised energy system in the ASEAN region.

### 1.1.8. 17th ASEAN+3 New and Renewable Energy (NRE) and Energy Efficiency & Conservation (EE&C) Forum

The 17th ASEAN+3 NRE and EE&C Forum was held in Cebu, Philippines on 17 February 2023 and hosted by Department of Energy, Philippines. The Forum as chaired by Philippines and co-chaired by China, Japan and Korea and was attended by the representatives of AMS, China, Japan, and Korea, including the representatives from the Energy Conservation Centre Japan (ECCJ), Institute of

Energy Economics, Japan (IEEJ), Korea Energy Agency (KEA), and Korea Energy Economics Institute (KEEI). The Forum consists of three sessions namely Reviews and Directives of past activities, ramping up Renewable Energy and Advancing EE&C through Fuel Switching and Electric Mobility, whereas the participants shared knowledges on each country's updates on RE and EE&C development.

### 1.1.9. AJEEP Post Meeting 2023

*Figure 6: AJEEP Post Meeting 2023*

On 1-2 March 2023, the ASEAN-Japan Energy Efficiency Partnership (AJEEP) Post Meeting under the ASEAN Senior Officials Meeting on Energy and Ministry of Economy, Trade, and Industry of Japan (SOME-METI) Work Programme 2022-2023 was held in Jakarta. The workshop was attended by the representatives from eight (8) ASEAN Member States, namely Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand, and Viet Nam. Also in attendance were the representatives from Energy Conservation Center Japan (ECCJ) and ASEAN Centre for Energy (ACE), as the meeting organisers. The meeting aimed to evaluate the progress of AJEEP Scheme 4 and 5 implementations in 2022-2023 which were considered and agreed upon at the AJEEP Inception Meeting, also to analyse how both schemes are reflected into AMS policy regulatory system, EE&C, and carbon neutrality plan.

### 1.1.10. Launching Webinar: Potential Strategies and Financing Opportunities towards Transition to Decarbonisation Path

Energy Modelling and Policy Planning (MPP) Department hosted a webinar about Potential Strategies and Financing Opportunities towards Transition to Decarbonisation Path on 24 March 2023. The main objective was to present challenges and opportunities of ASEAN Member States (AMS) in transitioning to clean energy and private finance for renewable energy projects. The event had Chen Jing, Director of the International Cooperation Department at CHN Energy, who focused on the vital importance of collaboration in investment, industry, technology, and tenant cooperation within the energy sector. This would significantly accelerate energy transitions in China and AMS. Dr Nuki Agya Utama, Executive Director of ACE, highlighted the need to achieve the AMS Renewable Energy share target by 2025. The report introduction by Dr Ambiyah Abdullah, Imaduddin Abdullah, and Sandy Maulana covered key points like fiscal budget rearrangement and the investment gap in clean energy transition. Imaduddin Abdullah was more focused on the AMS economic recovery, clean energy landscape, and investment needs, addressing challenges, while Sandy Maulana discussed institutional and regulatory issues, limited fiscal space, and project readiness. The presentation concluded with policy recommendations and a proposal for a clean energy technology finance roadmap by Dr Zulfikar Yurnaidi, MPP Manager of ACE.

### 1.1.11. Coordination Workshop for Green Climate Fund (GCF) Programme


*Figure 7: Coordination Workshop for Green Climate Fund (GCF) Programme*

On 31 March 2023, ASEAN Centre for Energy (ACE) and Korea Development Bank (KDB) co-organised an Online Coordination Workshop for Green Climate Fund (GCF) endorsed programme entitled "Supporting Innovative Mechanisms for Industrial Energy Efficiency Financing in Indonesia

with Lessons for Replication in the other ASEAN Member States". The Workshop was attended by representatives from the Ministry of Energy and Mineral Resources, Ministry of Environment, Ministry of Finance, Ministry of Industry of Indonesia, PT. Sarana Multi Infrastruktur (SMI), PT Indonesia Infrastructure Finance (IIF), CIMB Niaga, and UOB Bank.

The GCF programme shall support Indonesia and other ASEAN countries to be ready to drive a low-carbon development pathway with enhanced energy efficiency and conservation performance, addressing three (3) chronic barriers which are all interlinked with a vicious circle of implementation failures of similar precedents, namely financial, regulatory, and technical barriers. The programme proposes a solution package of innovative energy efficiency financing schemes equipped with de-risking mechanisms, a supportive regulatory framework, and technical assistance.

### 1.1.12. ASEAN Energy Efficiency Workshop Series: Tapping the Potential of Energy Efficiency

*Figure 8: ASEAN Energy Efficiency Workshop Series: Tapping the Potential of Energy Efficiency*

On 3 April 2023 morning, the ASEAN Energy Efficiency Workshop: Tapping the Potential of Energy Efficiency was held in Tangerang, Indonesia. Hosted by the Ministry of Energy and Mineral Resources of Indonesia, as part of the 27th Energy Efficiency and Conservation Sub-Sector Network (EE&C-SSN) meeting, the Workshop was attended by 60 on-site participants and livestreamed on Indonesia YouTube Platform. The workshop was physically attended by representatives from Conservation and Energy Efficiency Society (MASKEEI) of Indonesia, Department of Alternative Energy Development and Efficiency (DEDE) of Thailand, ID Pro/Indonesia Data Centre, International Energy Agency (IEA), Ministry of Economy, Trade and Industry (METI) of Japan, Ministry of Energy and Mineral Resources (MEMR) of Indonesia and ASEAN Centre for Energy (ACE).

The Workshop focused on how the region can untap its Energy Efficiency (EE) potential, by spotlight the intensive energy consuming sector in the region (industry) and the future outlook of EE mechanisms, including exploring the need for green data centre and innovative EE financing mechanisms. Some key recommendations from the workshop include exploring digitalisation and utilisation of data analytics to advance energy efficiency in the industry sector, developing a regional benchmarking system for energy-intensive sectors, and seeking collaborative support from all AMS to implement the innovative financing mechanism for EE in the industry.

### 1.1.13. ASEAN Energy Efficiency Workshop in the Transport Sector


*Figure 9: ASEAN Energy Efficiency Workshop in the Transport Sector*

On 3 April 2023, ASEAN Energy Efficiency Workshop in the Transport Sector was held as part 27th EE&C-SSN Associated Meeting in Tangerang, Indonesia. The Meeting was attended by 50 on-site participants from the Asian Federation of Electric Vehicle Association (AFEVA), the Department of Alternative Energy Development and Efficiency of Thailand, the Electric Vehicle Association of Malaysia, the Indonesian Automotive Institute, the International Energy Agency, the Land Transport Authority of Singapore, MASKEEI, the Ministry of Transportation of Indonesia, UNEP, and the ASEAN Centre for Energy.

Hosted by the Ministry of Energy and Mineral Resources of Indonesia, the Workshop served as a dialogue amongst different transport stakeholders, exploring the topics of delivering net zero in the ASEAN transport sector, opportunities,

and challenges in fuel economy standards implementation, and transforming ASEAN into an electric vehicle hub. As outputs of the workshop, several recommendations were concluded, including strengthening cooperation on the development of EVs through standards and innovative technologies, strengthening regional networks within member associations to promote joint ventures/collaboration of business entities, and encouraging the exchange of best practices and other relevant information regarding sustainable transportation industry.

### 1.1.14. ASEAN Energy Efficiency Workshop and Site Visit to Tropical Building


*Figure 10: ASEAN Energy Efficiency Workshop and Site Visit*

Still part of the ASEAN Energy Efficiency Workshop Series in conjunction with the 27th EE&C-SSN Associated Meeting, the Workshop and Site Visit to Tropical Building was held on 4 April 2023 in Tangerang, Indonesia. The event was hosted by the Ministry of Energy and Mineral Resources, Indonesia and participated by 94 participants on-site. Several representatives who attended were from the Architect Association of Indonesia, the Energy Market Authority of Singapore, the Green Building Council Indonesia, the International Energy Agency, the Ministry of Public Works and Housing of Indonesia, PT Angkasa Pura II, and the ASEAN Centre for Energy.

The workshop showcased the best practices, challenges, and opportunities of tropical building from various stakeholders through the Workshop. Then followed with a Site Visit to the past winners from the tropical building category of the ASEAN EE&C Awards. Pahoa Kindergarten School was the first building visited as the school utilises nature-based solutions to achieve energy saving. BSD Green Office Park 9 was the next destination, a building that uses active and passive design, incorporating 10% energy use from installed rooftop solar panel and 30% renewable energy credit.

### 1.1.15. 41st Senior Officials on Energy Meeting (SOME) / 41st ASEAN Ministers on Energy Meeting (AMEM) and its Associated Meetings

SOME and AMEM are the main annual agenda for ACE as it serves as high level platforms to discuss the APAEC progress and future directives of regional energy cooperation. 41st SOME and 41st AMEM (including its Associated Meetings) were organised in Jakarta on 19-20 June and in Bali on 22-25 August respectively, under the Indonesian Chairmanship. Some of the outputs of SOME/AMEM are the "Joint Declaration of the 41st AMEM on Sustainable Energy Security through Interconnectivity and Joint Ministerial Statement of the 41st AMEM" which reflected the achievements and directives for ASEAN energy development. During the SOME/AMEM, ACE as the secretariat of SOME+3/AMEM+3 and SOME-METI, has also assisted AMS officials to organise the dialogues to discuss the progress of SOME+3 EPGG work programme. Additionally, this year also marks the first dialogues of SOME-Asian Development Bank (ADB) and SOME-EU.

### 1.1.16. The 4th ASEAN Methane Roundtable Dialogue

*Figure 11: Beni Suryadi, PFS Manager of ACE, Delivered an Opening Remark on the 4th ASEAN Methane Roundtable Dialogue*

The ASEAN Energy Sector Methane Roundtable has convened three times since October 2021, with the express aim of driving improved

emissions performance by the oil and gas sector in the region. The forum fosters inclusive dialogue among varied stakeholders, sharing actionable insights and effective strategies. This initiative spans over five years, featuring biannual roundtable discussions. Advancing this initiative, the fourth session, scheduled for 26-28 June 2023, is set to be the most impactful one yet. This session is a collaborative effort with ACE and USAID, and alongside oil and gas partners like PETRONAS, PERTAMINA, and PTT. Energy Asia co-hosted this event, which unfolded in three significant segments: a Methane High-level session, a Methane Roundtable, and a Methane Technical Workshop. These sessions aim to:

- Expedite action through proven regional projects with strategic plans extending to 2030.
- Highlight accessible and ground-breaking financial strategies for industry stakeholders, offering incentives for the prompt or advanced implementation of methane mitigation methods.
- Facilitate the exchange of critical technological advancements and expertise among industry experts.

The workshop will also present the latest technological advancements in methane emission reduction and evaluate the efforts of ASEAN member states in mitigating methane emissions, setting the stage for subsequent actions.

### 1.1.17. The Launching of ASEAN Methane Leadership Program


*Figure 12: Leaders from Various Organisations Attended the Launching of ASEAN Energy Sector Methane Leadership Program*

Under the 4th ASEAN Methane Roundtable Dialogue, ACE, in collaboration with various ASEAN oil and gas companies, governmental agencies, and international organisations, launched the ASEAN Energy Sector Methane Leadership Program (MLP) on 26 June 2023. This launch occurred during the Methane High-Level session at the Energy Asia 2023 conference, held at the Kuala Lumpur Convention Centre. Dignitaries such as H.E. Nik Nazmi Nik Ahmad, Minister of Natural Resources, Environment and Climate Change (NRECC), Dr Nuki Agya Utama, ACE Executive Director, Tan Sri Tengku Muhammad Taufik, President and Group Chief Executive Officer of PETRONAS, along with leaders from participating organisations, attended the event.

The MLP is an 18-month initiative dedicated to improving methane emission management in the ASEAN oil and gas sector. It aligns with the Global Methane Pledge 2030 and emphasises regional collaboration, technology transfer, networking, knowledge sharing, and capacity building among O&G companies, regional and international organisations, and other stakeholders. Key partners include the ASEAN Centre of Energy (ACE), ASEAN Council on Petroleum (ASCOPE), Environmental Defense Fund (EDF), Japan Organisation for Metals and Energy Security (JOGMEC), Methane Guiding Principles (MGP), PERTAMINA, PETRONAS, PTTEP, The World Bank, United Nations Environment Programme International Methane Emissions Observatory (UNEP IMEO), United States Agency for International Development (USAID), United States Department of Energy, and United States Trade and Development Agency (USTDA).

### 1.1.18. Brunei Mid-Year Conference and Exhibition 2023

*Figure 13: Brunei Mid-Year Conference and Exhibition 2023*

On 10-11 July 2023, ACE co-organised the Brunei Mid-Year Conference and Exhibition 2023 in Bandar Seri Begawan, Brunei Darussalam, a series of conferences and exhibitions that bring together experts and key players in selected fields which this time is about energy. ACE arranged three sessions namely on Session I (Clean Energy Development for a Just Energy Transition), Session III (Energy Interconnection in Securing Energy Transition), and Fireside Chat on about navigating a secure and just energy transition. The resolution from this event has been submitted and presented to the Brunei Darussalam's Minister.

### 1.1.19. ASEAN's High Level Policy Dialogue (HLPD)

*Figure 14: Participants of the High-Level Policy Dialogue in Bali*

Through ACCEPT II, ACE brought together representatives from ASEAN Member States (AMS), the ASEAN Secretariat and invited panellists from across the region including the International Monetary Fund (IMF), PricewaterhouseCoopers (PwC), and the Asia Clean Energy Partners (ACEP) to this High-Level Policy Dialogue (HLPD) on advocating sustainable energy financing for energy security and climate goals, The policy dialogue aims to address critical challenges and identify innovative solutions for achieving sustainable energy security and meeting climate goals.

Among other events held by ACCEPT II, the High-Level Policy Dialogue was highlighted in the 41st ASEAN Ministers on Energy Meeting (AMEM), hosted by Ministry of Energy and Mines Resources (MEMR) of Indonesia, and looked forward to further activities from ACCEPT to advance the regional energy-climate nexus collaboration.

This occasion was held on 24 July 2023 in Bali and attended by H.E. Kristian Netland, Chargé d'Affaires of the Royal Norwegian Embassy, H.E. Satvinder Singh, Deputy Secretary-General of ASEAN for ASEAN Economic Community, Ir. Wanhar, Director of Electricity Development & Alternate SOE Leader of Indonesia, Litthanoulok Laspho, Director of Power Generation Planning Division & Alternate SOE Leader of Lao PDR, Saiful Adib Abdul Munaff, Senior Director – Operations at the Malaysian Green Technology and Climate Change Corporation, H.E. U Than Zaw, Permanent Secretary of Myanmar's Ministry of Electricity and Energy & SOE Leader of Myanmar, H.E. Felix William B. Fuentebella, Undersecretary for Policy and Planning at the Philippines' Department of Energy & SOE Leader of the Philippines.

### 1.1.20. AJEEP Inception Meeting 2023

*Figure 15: AJEEP Inception Meeting 2023*

The Inception Meeting of ASEAN-JAPAN Energy Efficiency Partnership (AJEEP) Programme was held on 3-4 August 2023, in Ho Chi Minh City, Viet Nam. The meeting was co-organised by ASEAN Centre for Energy (ACE) and Energy Conservation Center Japan (ECCJ), hosted by the Ministry of Industry and Trade of Viet Nam, and supported by DEDE Thailand as the EE&C-SSN Coordinator. Representatives from 10 ASEAN Member States attended the hybrid meeting to discuss the updates and progress on AJEEP Scheme 4, Scheme 5, and Energy Conservation Workshop under AJEEP (ECAP).

Some of key takeaways from the meeting, ACE and ECCJ with EE&C-SSN focus for this fiscal year are to develop the SAEMAS common standard module and advanced modules, implement the

carbon neutrality diagnosis at the selected factory and building, and organised the workshops on the ECAP programme that focus on the development of SAEMAS (ECAP30), EE&C in industry sector (ECAP31), and building sector (ECAP32).

### 1.1.21. ASEAN Energy Business Forum 2023 Media Briefing

*Figure 16: ASEAN Energy Business Forum 2023 Media Briefing*

In 2023, ACE took proactive steps by organising media briefing for the ASEAN Energy Business Forum (AEBF), marking considerable progress for the event. The media briefing was conducted on 27 June 2023 in Jakarta, Indonesia. With Dr Nuki Agya Utama, Executive Director of ACE, and Dr Andy Tirta, Corporate Affairs Manager of ACE & Chair of AEBF 2023 as the speakers, the event invited more than 20 journalists hailing from various reputable outlets such as iNews, Antara, Vietnam News Agency, VOI, and others. This dedicated engagement underscores ACE's commitment to fostering meaningful dialogue and dissemination of crucial energy-related information across the ASEAN region.

### 1.1.22. ASEAN Energy Business Forum (AEBF) 2023

*Figure 17: ASEAN Energy Business Forum (AEBF) 2023*

AEBF 2023 was held in conjunction with the 41st ASEAN Ministers on Energy Meeting (AMEM-41) on 24-25 August 2023 in Bali Nusa Dua Convention Centre (BNDCC), Indonesia. Hosted by Ministry of Energy and Mineral Resources (MEMR) of the Republic of Indonesia, the theme for this year is "Accelerating Energy Connectivity to Achieve Sustainable Growth of ASEAN". The Business Forum took place physically for the first time after COVID-19 restrictions and successfully gathered 1,403 delegates as well as 240 speakers and moderators coming from 5 regions.

There were 14 Memorandum of Understanding (MoUs) signed during the Business Forum witnessed by ASEAN Energy Ministers and in the presence of dialogue partners, underscoring the importance of these collaborations in shaping the region's energy landscape. It emphasised the importance of collaboration and partnership between the representatives from industry, government, and academia to discuss energy and environmental issues.

AEBF 2023 served as a catalyst in fostering triple helix collaboration between government, private, and academe. It is successfully organised by ACE and Dyandra Promosindo as co-organiser.

### 1.1.23. ASEAN Green Transport Rally (GTR) 2023: Towards Net Zero Emissions

*Figure 18: Start and Finish line of the ASEAN Green Transport Rally (GTR) 2023: Towards Net Zero Emissions*

Under the theme "Towards Net Zero Emissions", the ASEAN Centre for Energy (ACE) launched the first ASEAN Green Transport Rally (GTR). Hosted by the Ministry of Energy and Mineral Resources (MEMR) of Indonesia, this rally aims to promote sustainable transportation options and stands as a vivid testament to ASEAN's resolute drive towards net-zero emissions. As an integral part of the ASEAN Energy Business Forum (AEBF) 2023, the rally embarked on its journey from the MEMR office in Jakarta on 20 August 2023 and concluded

in Bali on 24 August 2023, covering an extensive range of approximately 1,250 km.

Eight eco-friendly cars participated in the rally, consisting of biodiesel fuelled vehicles, electric vehicles (EVs), and hybrid electric vehicles (HEV). As part of the journey, there was also Green Transport Talk show on 21 August 2023 in Surabaya, Indonesia. The rally highlighted that compact electric vehicle emitted the lowest emissions which is equivalent to 49 kg $CO_2$, compared to other types of vehicles.

### 1.1.24. The 5th Government - Private Forum on the Cleaner Energy Future Initiative for ASEAN (CEFIA)

*Figure 19: The 5th Government - Private Forum on the Cleaner Energy Future Initiative for ASEAN (CEFIA)*

On 25 August 2023, ASEAN Centre for Energy (ACE) and Boston Consulting Group (BCG) of Japan co-organised the 5th Government-Private Forum on the Cleaner Energy Future Initiative for ASEAN (CEFIA) in Nusa Dua, Bali, Indonesia. The Forum was hosted by the Ministry of Energy and Mineral Resources of Indonesia, as a side-event to the ASEAN Energy Business Forum 2023, supported by Ministry of Economy, Trade and Industry (METI) of Japan. One of the main activities provided at the 5th CEFIA Forum was the formulation of Flagship Projects, in which, a series of projects were formulated and implemented to accelerate the adoption and wide deployment of decarbonising solutions, especially in EE&C and RE. Another activity was a mini–Business Matching Event which was arranged in collaboration with the Japan External Trade Organization (JETRO).

### 1.1.25. The ASEAN Energy Awards 2023

*Figure 20: The ASEAN Energy Awards 2023*

To acknowledge the achievements and contributions of private sectors, individual and youth sector in the region's energy development, ACE conducted the annual or biennial ASEAN Energy Awards in 2023. The 2023 Awards consist of ASEAN Energy Efficient Building Awards, ASEAN Green Building Awards, ASEAN Best Practices for Energy Management in Building and Industry Awards, ASEAN Renewable Energy Project Awards, ASEAN Coalgiga Awards, ASEAN Excellence in Energy Management by Individual, and the 4th ASEAN Energy Youth Awards. There was a total of 113 awardees with the breakdown of the awardees are as follows: 5 awards for Green Building Category, 23 awards for Energy Efficient Building Category, 14 awards for Energy Management in Buildings and Industry Category, 19 awards for Renewable Energy Award, 20 awards for Coal awards, 14 awards for Excellence in Energy Management by Individuals and 18 awards for ASEAN Energy Youth Awards. The awards were presented by the energy ministers and senior officials of the ASEAN Member States during the Awarding Ceremony and Gala Dinner of the ASEAN Energy Business Forum 2023 in Bali, Nusa Dua, Indonesia which also in conjunction with 41st ASEAN Ministers on Energy Meeting and its Associated Meetings.

### 1.1.26. The 3rd ASEAN International Conference on Energy and Environment (AICEE)

*Figure 21: The 3rd ASEAN International Conference on Energy and Environment (AICEE)*

ASEAN Centre for Energy (ACE) hosted the 3rd ASEAN International Conference on Energy and Environment (AICEE) in conjunction with the ASEAN Energy Business Forum (AEBF) 2023 and 41st ASEAN Ministers on Energy Meeting (AMEM). The conference serves to further accelerate the progress towards a sustainable future, enhance collaboration among various sectors, and bridge the gap between academia, policymakers, and businesses. It is a platform for academics, practitioners, and stakeholders to network, exchange ideas, and explore innovative solutions to address the challenges of energy and the environment.

This year AICEE took the theme of "Accelerating a Just, Secure and Resilient Energy Transition in ASEAN through Innovation and Interconnectivity" with six (6) topics to present recent research on energy, climate change, and related issues, especially clean energy transition in the context of energy security and sustainability in ASEAN region, which are: (i) Energy transition and new emerging technologies, (ii) Interconnection: security and accessibility, (iii) Sustainability, Engineering, and Infrastructure, (iv) Carbon pricing and green investment, (v) Energy and digitalisation and (vi) Environment, Policy, and Socioeconomics.

The 3rd AICEE was also co-hosted by Universitas Pendidikan Nasional (UNDIKNAS) Indonesia and Universiti Teknologi Malaysia (UTM), Malaysia. The conference also partnered up with Energy Research Institute of Chulalongkorn University Thailand, National Energy Technology Center, Universiti Tenaga Nasional (UNITEN) Malaysia, Center for $CO_2$ & Flared Gas Utilisation Bandung Institute of Technology, Faculty of Engineering University of Indonesia, Universiti Brunei Darussalam, University of Hawai'i, and ASEAN Climate Change and Energy Project. The 3rd AICEE had received 145 extended abstracts and extended invitations and effectively facilitated the presentation of 96 papers. The committee collected the manuscripts and conduct peer-review among reviewers followed by selection by the IOP editors to be published in the IOP Conference Series: Earth and Environmental Science (Scopus-indexed).

### 1.1.27. 1st Inter-Regional Energy Forum (IREF) as part of AEBF 2023

*Figure 22: All Speakers and Participants of the 1st Inter-Regional Energy Forum (IREF)*

The 1st Inter-Regional Energy Forum (IREF) was organised by the ASEAN Centre for Energy (ACE) in Bali on 25 August 2023, alongside the 41st ASEAN Ministers on Energy Meeting and the ASEAN Energy Business Forum 2023. Themed "Strengthening the Efforts towards the Energy Transition," this event aimed to facilitate dialogue, knowledge sharing, and capacity enhancement regarding energy landscapes within ASEAN and other regions. It was sponsored by the USAID Southeast Asia Smart Power Program.

Participants included representatives from energy intergovernmental organisations, such as ACE, OLADE (Latin America and the Caribbean), AFREC (Africa), and SEC (South Asia). Additionally, international organisations like the IEA, ADB, UN ESCAP, CREEI, ETP, and CASE for Southeast Asia joined in the discussions.

A roundtable discussion moderated by Beni Suryadi focused on regional and ecosystem collaboration. Common challenges included energy accessibility, financing for renewable energy development, and regulatory and institutional capacity. Proposed solutions included capacity building, joint research, and sharing knowledge on

organisational and institutional development. The creation of working groups within regional organisations was recommended to advance collective efforts in energy transition. Participants from international organisations emphasised the significance of knowledge sharing among regions, given shared challenges. They expressed willingness to provide assistance to facilitate collaboration.

### 1.1.28. ASEAN Energy Leaders' Golf Tournament 2023

*Figure 23: ASEAN Energy Leaders' Golf Tournament 2023*

On 26 August 2023, the ASEAN Centre for Energy organised the ASEAN Energy Leaders Golf Tournament 2023, following the intensive 2-days of AEBF 2023 and AMEM-41 activities. Hosted at the prestigious Bali National Golf Club, this event facilitated meaningful engagement and networking opportunities for high-level officials from government and private sectors.

A total of 28 participants, including three ASEAN Energy Ministers, five CEOs, and eight Director Generals, alongside directors and senior managers from private sectors, actively participated. The tournament provided a unique platform for leaders to interact outside the formal settings of the AEBF and AMEM, fostering relationships and collaboration. The event concluded with a networking lunch, providing a relaxed setting for participants to discuss shared interests and potential collaborations.

On the first picture from left to right, H.E. Arifin Tasrif, Minister of Energy & Mineral Resources of Republic of Indonesia, H.E. Pehin Datu Lailaraja Major General (Retired) Dato Paduka Seri Haji Awang Halbi bin Haji Mohd Yussof, Minister at the Prime Minister's Office of Burnei Darussalam, H.E. Phosay Sayasone, Minister of Energy & Mines of Lao PDR, and Dwi Soetjipto, Head of SKK Migas, participated together in this event.

### 1.1.29. ASEAN Energy Business Forum 2023 Press Conference

*Figure 24: ASEAN Energy Business Forum 2023 Press Conference*

In 2023, ACE played a pivotal role in media coverage, amassing over 600 news features. This year, ACE took proactive steps by organising a press conference for the ASEAN Energy Business Forum (AEBF), marking considerable progress for the event. AEBF Press Conference held on 26 August 2023 in Bali, Indonesia, with Dr. Andy Tirta, Corporate Affairs Manager of ACE & Chair of AEBF 2023, and Dadan Kusdiana, Secretary General of the Ministry of Energy and Mineral Resources of the Republic of Indonesia, as the speakers for the Press Conference. The event witnessed a remarkable turnout, with a gathering of over 60 journalists in attendance, generating extensive publication coverage of more than 220 news features across diverse media platforms. This dedicated engagement underscores ACE's commitment to fostering meaningful dialogue and dissemination of crucial energy-related information across the ASEAN region.

### 1.1.30. Integrated Approaches to Scaling Up Electric Mobility


*Figure 25: Integrated Approaches to Scaling Up Electric Mobility*

On 19-22 September 2023, the U.S. Agency for International Development (USAID) Southeast Asia Smart Power Program (SPP), U.S. Department of State's Global Climate Action Partnership (implemented by the U.S. National Renewable Energy Lab [NREL]), and the U.S. Department of Transportation partnered with the ASEAN Secretariat's Land Transport Working Group and the ASEAN Centre for Energy to host the ASEAN-U.S. Workshop: Integrated Approaches to Scaling Up Electric Mobility. The 3,5-day workshop convened 162 participants from ministries of energy, transport, and environment, as well as power sector regulators and utilities from eight ASEAN countries. The workshop featured leading experts from governments, global non-government organisations, and leading private sector players from across ASEAN to speak on e-mobility in the region, including the United Nations Environment Programme, United Nations Development Programme, and Asian Development Bank, among others.

This workshop provided a unique and important forum for stakeholders across the energy and transportation sectors to come together to discuss the opportunities, challenges, and solutions for an equitable transition to low-carbon energy and transportation solutions in ASEAN. For next steps, participants identified the following priorities:

- Regional collaboration on EV supply chain, especially battery manufacturing, recycling, reuse, and other end-of-life management approaches.
- Continued dialogue at the regional level between government bodies and the private sector on topics including vehicle manufacture, interoperable and universal EV charging station (EVCS) development, and clean grid expansion, given each ASEAN country is at a different stage in EV implementation.
- Need for further engagement on cybersecurity issues related to the grid, EVCS, and EVs.
- Conducting life cycle and sustainability assessments for EVs to understand waste.

### 1.1.31. 1st Regional Workshop of Development of Conceptual Framework of Renewable Energy Certificate System (RECAP)

*Figure 26: The 1st Regional Workshop of Development of Conceptual Framework of Renewable Energy Certificate System (RECAP)*

The ASEAN Centre for Energy (ACE) organised the 1st Regional workshop of Development of Conceptual Framework of Renewable Energy Certificate System (RECAP) in Brunei Darussalam-Indonesia-Malaysia-Philippines - East ASEAN Growth Area (BIMP-EAGA) Countries. The workshop was held on 25 September 2023 in conjunction with the 10th BIMP Power and Energy Infrastructure Cluster (PEIC) Meeting, at the Princessa Garden Hotel, Palawan, Philippines. The hybrid workshop was attended by 53 participants from Brunei Darussalam, Indonesia, Malaysia, and the Philippines, including the representatives from ACE.

Hosted by Department of Energy (DOE) Philippines, the one-day workshop concluded that benefit of setting up regional/cross-border REC will trigger cross-border transactions and can drive or stall major infrastructure investment. Additionally, necessity of understanding the local/national REC context prior to engaging further in sub-

regional/regional REC mechanisms such as localisation in each country, transparency/auditable instrument, and communication to stakeholder are necessary.

### 1.1.32. The ASEAN+3 Oil Stock Pilling Road Map 2023

*Figure 27: All Participants from Seven AMS, Japan, Korea, and ACE on the 11th OSRM*

The 11th ASEAN+3 Oil Stockpiling Road Map (OSRM) Workshop, held on 11 October 2023, in Vientiane, Lao PDR, brought together representatives from seven (7) ASEAN Member States (AMS), namely Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, as well as Japan, Korea, and ACE. The event served as a crucial forum for reviewing past OSRM activities and discussing updates in oil and natural gas stockpiling in each country. Key topics included the impact of energy transition on stockpiling policies, the importance of public-private partnerships, and strengthening regional cooperation. The workshop concluded with a forward-looking approach, emphasising the need for continued collaboration among ASEAN+3 countries to enhance energy security and adapt to the evolving energy landscape. The way forward involves developing innovative strategies for future stockpiling activities and maintaining a strong focus on regional resilience and energy stability. In addition, the workshop requested to conduct a standardised data collection on oil stockpiling for each AMS, led by ACE, to facilitate benchmarking process in the identification of regional collaboration opportunities.

### 1.1.33. The 3rd FGD of ASEAN Petroleum Security Agreement (APSA)

*Figure 28: The 3rd FGD of ASEAN Petroleum Security Agreement (APSA)*

The 3rd Focus Group Discussion (FGD) for the ASEAN Petroleum Security Agreement (APSA), held on 11 October 2023, in Vientiane, Lao PDR, included representatives from ten ASEAN Member States. Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, and Thailand attended in person, while the Philippines, Singapore, and Viet Nam participated virtually. The ASEAN Secretariat, ASCOPE Secretariat, and ASEAN Centre for Energy (ACE) were also represented. Discussions cantered on enhancing APSA's effectiveness, policy and infrastructure readiness, the inclusion of natural gas, and strategies for future emergencies. The meeting underscored the importance of regional cooperation and infrastructure development to address energy crises. A consensus was reached on the need to finalise a new APSA agreement by 2024, starting with the development of the Zero draft that accommodates the latest energy trends and requirements.

### 1.1.34. The 6th ASEAN+3 Clean Energy Roundtable Dialogue (CERD)

In 2023, the 6th ASEAN+3 Clean Energy Roundtable Dialogue was held in Haikou, Hainan and was part of the 2023 China-ASEAN Clean Energy Week (CACEW). Aligning with the discussion during CACEW, the 6th CERD was focus on “Decentralised Power System Development and Consumption”. The dialogue highlighted the importance of a diversified energy supply for the region meanwhile to also accelerate the higher renewable energy deployment to achieve the energy transition goals. Throughout the discussion, it was suggested for ASEAN region to continue the knowledge sharing on best practices of

decentralised energy systems as well as on efforts to address the grid connection issue for increased RE penetration.

### 1.1.35. SOME+3 Energy Policy Governing Group (EPGG) Fora 2023

SOME+3 EPGG Fora 2023 were hosted by the Ministry of Energy and Mines, Lao PDR and were organised in Vientiane, Lao PDR on 11-13 October 2023. The fora consist of namely: i) 11th ASEAN+3 Oil Stockpiling Roadmap Workshop, ii) 12th ASEAN+3 Oil Market and Natural Gas Forum and Business Dialogue and iii) 20th ASEAN+3 Energy Security Forum The fora were attended by the representatives of AMS government officials including oil and gas companies, representatives from Ministry of Economy, Trade, and Industry (METI) Japan and Korea Energy Economics Institute and relevant stakeholders. During the fora, several issues were discussed including the updates on national and regional oil stockpiling, oil and gas development and energy security status & updates in each country.

### 1.1.36. ACCEPT II on Singapore International Energy Week (SIEW) 2023

*Figure 29: Beni Suryadi, Project Manager of ACCEPT II, opening the roundtable*

On 27 October 2023, ACE through ACCEPT II, in collaboration with the Energy Studies Institute at the National University of Singapore (ESI@NUS), organised a pivotal roundtable discussion during the Singapore International Energy Week (SIEW) 2023, a prestige annual energy event, hosted by the Energy Market Authority. The roundtable was titled "Financing ASEAN Decarbonisation Roadmap towards Carbon Neutrality" and strategically designed to support ASEAN's journey towards its decarbonisation goals, aligning seamlessly with SIEW 2023's overarching theme, "Energy Transition towards a Net Zero World." This gathering brought together a diverse group of thought leaders, experts, and stakeholders from the energy sector, fostering a collaborative environment for discussing and advancing regional decarbonisation strategies.

### 1.1.37. A Workshop on National Net Zero Modelling – An Energy Sector Roadmap to Net Zero Emissions for Lao PDR


*Figure 30: Group Photo with All Workshop Participants in Lao PDR*

ACCEPT II jointly organised a national net zero modelling workshop with the Ministry of Energy and Mines (MEM) of Lao PDR which is the initial activity of the joint study which has been recognised by the 30th Renewable Energy Sub-Sector Network (RE-SSN) and the 22nd Regional Policy and Planning (REPP-SSN) in 30-31 October 2023. The workshop aims to provide the capacity building in energy modelling and its alignment towards the net zero target through a technical approach that was supported by the Stockholm Environment Institute (SEI) and attended by 30 participants from the government representatives of Lao PDR.

The workshop was divided into two days, underscoring different aspects of consideration for net-zero model. The first day began with opening remarks from Boualom Saysanavong, Chief of Biomass Energy Promotion Division, Department of Energy Efficiency and Promotion, and Beni Suryadi, Project Manager of ACCEPT II. Net zero definition and current energy conditions in ASEAN were delivered during the first day of the workshop. Chitpanya Phamisith from Electricite du Lao also

delivered the power development of Lao PDR and its beginning to support the implementation of cross-border power trade. LEAP Training was conducted on the second day of workshop, which was led by Taylor Binnington, Lead Scientist of SEI. The session included introduction of LEAP software and study case exercises for the energy model.

As the way forward, ACCEPT II will finalise the data collection with MEM as well as model and scenario development with SEI. Afterwards, another workshop in February may be conducted to present the findings and seek feedback and input from Lao PDR governments. Align with the Lao PDR's role as the next ASEAN Chairmanship 2024, the result of the workshop will be launched as the national report of Lao PDR's roadmap toward net zero target at the 42nd ASEAN Ministers on Energy Meeting (AMEM) in 2024.

### 1.1.38. AJEEP Scheme 4: Country Visit to 5 Countries (Indonesia, Malaysia, Singapore, Thailand, Viet Nam)

*Figure 31: AJEEP Scheme 4: Country Visit to 5 Countries (Indonesia, Malaysia, Singapore, Thailand, Viet Nam*

For five days throughout 3-31 October 2023, ACE and ECCJ had conducted country visits to several countries that include Indonesia, Viet Nam, Singapore, Thailand, and Malaysia. These visits aimed to check the details of each country's national energy manager certification system including training facilities, training text and modules, examination, certification standard, renewal conditions, and to understand the discrepancy between SAEMAS Common Standard Module and the National Modules. These visits also acquired the preconditions to enable Mutual Recognition Agreement (MRA) on SAEMAS.

ASEAN Centre for Energy (ACE), together with Energy Conservation Centre of Japan (ECCJ), has been in the process of developing the Sustainable ASEAN Energy Management Certification Scheme (SAEMAS), a regional energy management enhanced scheme that is built from the achievements from AJEEP Training of Trainers, AEMAS, and the national system. This scheme is designed to bolster energy management systems and elevate the professional status of energy managers and practitioners throughout the AMS region.

### 1.1.39. Energy-Climate Nexus Study Tour to Norway

ACE through ACCEPT II has successfully arranged a study tour to Norway (Oslo and Bergen), on 5-11 November 2023, for ASEAN Member States (AMS) representatives from energy and climate institutions. The study tour aims to facilitate dialogue and knowledge sharing between Norwegian stakeholders (government and industries) and AMS on relevant strategies to help reach their net zero target by 2050. Furthermore, it is hoped that the Norwegian stakeholders and AMS representatives could deliver new perspectives on policymaking aimed at enhancing carbon neutrality or net zero in the coming years.

*Figure 32: Participants for the Study Tours in The Norwegian Institute of International Affairs (left); Site Visit to the Northern Lights CCS Project Off the Coast of Norway (right)*

The first part of the tour started in Oslo where the study tour was conducted in the office of the Norwegian Institute of International Affairs (NUPI), ACCEPT II's key partner and co-organiser of the study tour. Participants engaged in dynamic discussions on energy-climate topics with experts and professionals. The following day, the group toured the Klemenstrud Incineration Plant, Norway's largest Waste-to-Energy (WtE) facility, capable of processing 400,000 tonnes of waste annually, and part of the national CCS Longship project.

The second part of the tour continues to Bergen for exploring Norway's climate solution. The net-zero journey in Bergen started by visiting Frøland Hydro Power Plant, the first large power plant in Western Norway when hydropower production started in 1912. AMS representatives were introduced to the operation and maintenance activities in the power plant This was followed by an excursion to the Midtfjellet Windfarm, where participants gained first-hand knowledge of the engineering aspects of wind energy. The second day in Bergen included three site visits. The first was to Equinor, Europe's largest energy supplier, showcasing its commitment to sustainable energy exploration and production. Next was the Northern Lights CCS Project, where the group learned about advancements in carbon capture and storage (CCS) technology, a critical component in mitigating climate change. The final stop was the CCB Energy Park, demonstrating how industrial entities can minimise their carbon footprint in $CO_2$ disposal. Throughout the tour, the emphasis was on the pivotal role of technology in addressing climate change. These technological strides, encountered first-hand by the participants, highlighted the importance of innovative solutions in driving energy transition.

### 1.1.40. Workshop for Energy Conservation (ECAP)

#### 1.1.40.1. ECAP 30 on SAEMAS

*Figure 33: ECAP 30 on SAEMAS*

On 6-10 November 2023, ASEAN Centre for Energy (ACE), together with Energy Conservation Centre of Japan (ECCJ) organised the 30th Workshop for Energy Conservation (ECAP30) to discuss the updates and way forward of several SAEMAS components, including the SAEMAS Common Standard Module, which contains the energy management lecture on electrical and thermal, energy audit, and practical hands-on training, SAEMAS Advanced Modules on Carbon Neutrality, and Introduction of Mutual Recognition Agreement guidelines. The programme also included site-visits to two Japanese factories, the Sumitomo Electric and Dai Nippon Printing. These visits were conducted to learn more about the companies' carbon neutrality technologies and initiatives. The workshop was attended physically by eight (8) ASEAN Member States (AMS), namely Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, and Viet Nam.

#### 1.1.40.2. ECAP 31 on Industry

*Figure 34: ECAP 31 on Industry*

ECAP 31 on Industry was held in Tokyo, Japan on 14-17 November 2023, focusing on the activities to promote decarbonisation and energy efficiency in the industry sector. The activity included two site-visits to Yakult Honsha Co.,Ltd. Central Institute in Kunitachi-City, Tokyo, and Waseda University in Sinjyuku-Ward, Tokyo. ECAP 31 was participated by representatives from 9 AMS, namely Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, and Viet Nam. ASEAN Member States representative gave updates on the updated current/planed policy and measures towards carbon neutrality in their country, including the challenges and efforts towards carbon neutrality (CN), trends in new technologies towards CN, and financial support towards CN.

#### 1.1.40.3. ECAP 32 on Building

*Figure 35: ECAP 32 on Building*

ECAP 32 on Building was held on 11-15 December 2023 in Tokyo, Japan, was the last agenda of ECAP activities in 2023. ECAP 32 under the theme of energy efficiency and conservation in the building sector, focused on the development of regulatory system including building EE&C standards and compliance to the standard, and challenge to promote ZEB as part of AJEEP Scheme 5's efforts to realise carbon neutral (CN) in the building sector. Representatives from seven (7) AMS physically attended ECAP 32, including Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, and Viet Nam. During the ECAP 32 workshop, participants had the opportunity to engage in two site visits that provided practical insights into Japan's approach to energy efficiency and conservation in the building sector. The first site visit at Hareza Tower allowed participants to observe the real-world application of Japan's regulatory systems and standards for energy efficiency. The second site visit focused on retrofitted Zero Energy Buildings (ZEB) in TAISEI CORPORATION's Yokohama Branch.

#### 1.1.41. The 1st Regional Workshop: ASEAN Cool Initiative

*Figure 36: The 1st Regional Workshop: ASEAN Cool Initiative*

On 14-15 November 2023, ASEAN Centre for Energy (ACE) with United Nations Environment Programme United for Efficiency (UNEP-U4E) co-organised the 1st Regional Workshop: ASEAN Cool Initiative, held in Renaissance Hotel, Johor Bahru, Malaysia. Hosted by Energy Commission of Malaysia, the two-day workshop was designed to provide support to ASEAN Member States (AMS) in the journey towards more stringent MEPS levels of Air Conditioners (ACs), namely Phase I: ISO Coefficient of Performance (COP) Standard Formulas (CSPF) Level of 3.7 in 2023, and Phase II: ISO CSPF Level of 6.09 in 2025.

The workshop brought together 7 AMS from Cambodia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, and Viet Nam to share progress on their national Minimum Energy Performance Standards (MEPS) levels, the challenges they face in adopting higher MEPS, and the strategies employed to overcome these barriers. Wrapping up the workshop, ACE and UNEP-U4E provided some recommendations to AMS that there is a need to strive for harmonised regional labels, conduct market assessments, support the market shift for local manufacturers, ensure proper regulatory framework for monitoring and verification activities, and conduct consumers campaigns.

#### 1.1.42. ASEAN Methane Master Class

*Figure 37: Participants, speakers, and organisers of the first Methane Leadership Program (MLP) Masterclass in Johor Bahru, Malaysia*

The 1st Masterclass as part of the ASEAN MLP, aimed at managing methane emissions in the ASEAN Oil and Gas (O&G) industry, was held in Johor Baru, 15-16 November 2023. The event attracted 65 participants from MLP partners and ASEAN O&G companies across Malaysia, Indonesia, Thailand, and Viet Nam. It focused on key training modules from the UNEP programme, covering critical aspects like methane detection, measurement, quantification, and mitigation,

complemented by insights from international agencies and industry experts.

Led by expert trainers from Carbon Limits, the Masterclass delivered foundational modules derived from the UNEP Training programme. In addition to this core curriculum, speakers showcased resources vital for methane management, including EDF's MethaneSAT, JOGMEC's methane testing facility, the Methane Guiding Principles Masterclass, Panametric's Flare.IQ model, UNEP's Oil and Gas Methane Partnership (OGMP 2.0), and the U.S. Department of Commerce Commercial Law Development Program's (CLDP) Methane Handbook. The session also featured SPP's presentation and collaboration with EDF on applying Organisational Change Management principles to Methane Emissions Management. This collaborative effort emphasises knowledge sharing, technology adoption, and fostering a network for effective methane emission control within the ASEAN O&G industry.

### 1.1.43. ASEAN+3 Mitigation Cooperation Programme

ACE has been continuing the cooperation with Korea Energy Agency (KEA) on the ASEAN+3 Mitigation Cooperation Programme as part of SOME+3 EPGG work programme 2023/2024. The Programme in 2023 includes the conduct of ASEAN-Korea Capacity Building Workshop on Energy Efficiency and Conservation in Transport and Industry and 13th Action Plan Working Group (APWG) Meeting of Building Energy Efficiency and Sustainability Initiatives in CLM countries, on 21-22 November 2023, respectively in Seoul, Korea.

### 1.1.44. ASEAN Power Grid (APG) Meeting Series on ASEAN Power Grid Memorandum of Understanding (MoU) Renewal

*Figure 38: Group Photos of the APG Meeting Series Participants*

The ASEAN Power Grid (APG) meeting series, held from the 28 November-1 December 2023, marks a significant stride in the journey towards regional energy integration in Southeast Asia. Organised by the ASEAN Centre for Energy (ACE) and supported by the USAID SPP programme, this series of meetings at the Double Tree Hotel by Hilton in Cikini, Central Jakarta, not only reflected the collaborative spirit of the ASEAN Member States (AMS) but also underscored the region's commitment to sustainable and secure energy. The series was divided into four focused days that consisted of:

- Day 1 – Stakeholders Coordination Meeting, inviting the donors and partners related to the APG projects to disseminate the AIMS III key findings and to discuss the action plan, necessary support, and investment needs for the interconnection projects.
- Day 2 – Focus Group Discussion (FGD) on the APG MoU Renewal with External Partners & APG Roadmap Development. The second day of the meeting aimed to get input and insights from the discussion partners and international organisations for the new APG MoU and to hold a consultative meeting to discuss the APG projects and milestones with partners and AMS delegates.
- Day 3 – Training on Data Sharing. The training in the third day was supported by UNESCAP, aimed to establish agreements on roles, responsibilities, scope of data, procedures,

security classifications, and hosting-entity for data sharing in ASEAN.

- Day 4 – Focus Group Discussion (FGD) on the APG MoU Renewal with Internal ASEAN Bodies, inviting all the delegates from each AMS to discuss the need the APG MoU renewal process and to map each APG-related bodies' role in the APG development process, in line with the Terms of Reference of the bodies, and to map the frameworks to strengthen the interface between APGCC, HAPUA, and AERN.

The meeting series facilitate open discussions between ASEAN bodies and APG-related donors and partners to further discuss the APG MoU renewal process and the way forward to accelerate the progress of APG implementation

# 1.2. Knowledge Hub

***Objective:*** *To provide a knowledge repository and energy data centre for the ASEAN Member States (AMS)*

### 1.2.1. ASEAN-JAPAN Steel Initiative (AJSI) Webinar: Pathways to Carbon Neutrality


*Figure 39: ASEAN-JAPAN Steel Initiative (AJSI) Webinar: Pathways to Carbon Neutrality*

On 14 February 2023, ASEAN Centre for Energy (ACE) co-organised the ASEAN-JAPAN Steel Initiative Webinar: Pathways to Carbon Neutrality, intended for AMS public and private stakeholders of the steel industry. This webinar was an activity under CEFIA (Cleaner Energy Future Initiative for ASEAN) flagship project "SteelEcosol", which aims to provide diagnosis on the energy usage of iron and steel manufacturing plants and recommends optimum energy usage, including through providing list of technologies that reduces energy usage.

The webinar highlighted the importance of carbon neutrality policies in triggering the private sector to achieve energy usage reduction, including Japan's green growth strategy, transition finance, international ISO standards, and the JCM Model Project. In addition, the event also showcased the best technologies available for the steel industry to move towards carbon neutrality, such as Combustion Technology for Hydrogen and Ammonia and Energy-Saving $CO_2$ Absorption Process (ESCAP).

### 1.2.2. AEO7 Webinar: Redesigning ASEAN Energy Security


*Figure 40: AEO7 Webinar: Redesigning ASEAN Energy Security*

On 14 February 2023, ACE held the AEO7 Webinar: Redesigning ASEAN Energy Security aim to share the findings of AEO7 regarding the theme raise. In addition, ACE also launched two complimentary reports to the AEO7 namely the 2022 ASEAN energy insights, sharing energy trends across last year based on the compiled news and Outlooking 2023 elaborate the upcoming energy trends across 2023 and priorities Indonesia's Chairmanship. The webinar featured Dr Ambiyah Abdullah, Silvira Ayu Rosalia, and Rika Safrina as presenters, followed by panel session moderated by Dr Nuki Agya Utama, Dr Kazutomo IRIE, Satya Widya Yudha, Toru MUTA, and Dr Ambiyah Abdullah as panellists, and Dr Zulfikar Yurnaidi to wrap up and close the webinar.

### 1.2.3. JOGMEC Oil Capacity Building 2022

*Figure 41: Group Photo of a Participants for JOGMEC Oil Capacity Building 2022*

ACE and JOGMEC co-organised the oil capacity-building programme, initially planned for 2022, which was carried over and conducted in Tokyo, Japan, from 27 February to 1 March 2023. It was attended by nine representatives from six ASEAN Member States (AMS). The programme

included presentations on oil security and stockpiling from experts and AMS, followed by a discussion and a site visit.

### 1.2.4. The 7th ASEAN Energy Outlook (AEO7) Dissemination to the Institute of Technology of Cambodia (ITC) in Cambodia

On 17 March 2023, ACE organised the 7th ASEAN Energy Outlook (AEO7) Dissemination at the Institute of Technology of Cambodia (ITC) in Phnom Penh. This marked a historic edition where ASEAN assumed full leadership in data gathering, modelling, and dissemination. AEO7, developed in collaboration with national experts, aims to enhance ASEAN's energy sector profile globally. Following the launch during the 40th AMEM, ACE initiated country-specific events to share insights, improve member states' ownership, and explore collaborations. Participants from ITC provided valuable inputs for AEO8. The policy recommendations stress the importance of Renewable Energy (RE) penetration, optimising options, developing storage, and prioritising grid modernisation for stability. In end-use sectors, the focus is on higher energy efficiency, managing demand, pursuing electrification, and promoting bioenergy and solar heating. The overarching theme advocates for a secure and resilient energy transition, necessitating comprehensive assessments of technology and policy options, including considerations of efficiency, resource availability, materials, and end-of-life management.

### 1.2.5. The 7th ASEAN Energy Outlook (AEO7) Dissemination to the Ministry of Energy and Mines of Lao PDR (MEM) in Lao PDR

*Figure 42: The 7th ASEAN Energy Outlook (AEO7) Dissemination to the Ministry of Energy and Mines of Lao PDR (MEM) in Lao PDR*

On 4 May 2023, ACE conducted the 7th ASEAN Energy Outlook (AEO7) Dissemination at the Ministry of Energy and Mines of Lao PDR (MEM) in Vientiane. The meeting aimed to share AEO7 insights, enhance ASEAN ownership, and gather input for the AEO8, scheduled for launch during Lao PDR's ASEAN Chairmanship in 2024. Litthanoulok Laspho, Alternate SOE Leader, Director of Power Generation Planning Division, Department of Energy Policy and Planning of MEM, warmly received ACE's visitations, and discussions with Dr Zulfikar Yurnaidi, MPP Manager of ACE and Dr Ambiyah Abdullah, MPP Senior Researcher of ACE, highlighted AEO's role to APAEC Drafting Committee and the plan for AEO8 as part of Lao PDR's ASEAN Chairmanship Energy Priorities.

### 1.2.6. The 7th ASEAN Energy Outlook (AEO7) Dissemination to the National University of Laos (NUOL) in Lao PDR

*Figure 43: The 7th ASEAN Energy Outlook (AEO7) Dissemination to the National University of Laos (NUOL) in Lao PDR*

On 4 May 2023, ACE conducted the 7th ASEAN Energy Outlook (AEO7) Dissemination at the National University of Laos (NUOL) in Vientiane. The afternoon session at NUOL focused on sharing AEO7 insights with students and faculty members, addressing Lao PDR's Energy Policy, AEO's regional energy cooperation role, and modelling findings by Dr Deuansavanh Phommavongsa, Head of the Administration Division and Lecturer in Mechanical Engineering; Dr Zulfikar Yurnaidi, MPP Manager of ACE; and Dr Ambiyah Abdullah, MPP Senior Researcher of ACE. The event fostered discussions on the energy landscape, governance, and potential research collaboration and concluded with an invitation for student internships at ACE. The feedback collected will contribute to the AEO8 launch during Lao PDR's ASEAN Chairmanship in 2024, aiming to strengthen collaboration with NUOL for the 4th AICEE.

### 1.2.7. ASEAN Coal Database and Information System (ACDIS) Workshop in Malaysia

On 9 May 2023, ACE organised a workshop on the ASEAN Coal Database Information System (ACDIS) in Kuala Lumpur, Malaysia, attended by representatives from the ten ASEAN Member States. Aligned with APAEC Phase II 2021-2025, the workshop focused on the redevelopment of ACDIS to facilitate investment and partnerships in Clean Coal Technology (CCT). ACDIS, initiated by Indonesia in 2011, aims to accelerate the energy transition through a data-driven platform but faces challenges like server inaccessibility and low AMS participation. The stakeholder survey underscores the need for enhanced features, Geographic Information Systems (GIS) mapping, and increased AMS involvement. Best practices from the Philippines, Malaysia, and Thailand are highlighted, emphasising efforts in adopting clean coal technologies. The conclusion outlines a plan for ACDIS redevelopment, integration with AEDS, training, and database maintenance, emphasising full AMS contribution for sustainability.

### 1.2.8. The 7th ASEAN Energy Outlook (AEO7) Dissemination to Universiti Tenaga Nasional (UNITEN) in Malaysia

*Figure 44: The 7th ASEAN Energy Outlook (AEO7) Dissemination to Universiti Tenaga Nasional (UNITEN) in Malaysia*

On 10 May 2023, ACE organised the 7th ASEAN Energy Outlook (AEO7) Dissemination at Universiti Tenaga Nasional (UNITEN) in Putrajaya, Malaysia, aiming to share AEO7 insights and foster discussions on the energy landscape. The hybrid symposium, hosted by UNITEN Business School and Institute of Energy Policy and Research (IEPRe), brought together academics, researchers, scholars, and energy stakeholders to exchange views on ASEAN's energy outlook until 2050. Attendees included postdoctoral researchers, lecturers from UNITEN, and private energy sectors in Malaysia. Dr Siti Indati Mustapa, Deputy Dean of UNITEN Business School, emphasised regional cooperation for clean energy transition. Prof. Dato' Mohd Zamri Yusoff, Deputy Vice-Chancellor of UNITEN, highlighted collaboration potential and UNITEN's role as a national energy university. Dr Norsyahida Mohammad engaged participants with an online quiz before Dr Zulfikar Yurnaidi, MPP Manager of ACE and Rika Safrina, MPP Senior Analyst of ACE presented AEO and its modelling findings. Discussions covered Malaysia's energy sector, hydrogen and nuclear technologies, carbon tax, green jobs, and renewable energy acceleration. Dr Nora Yusma Mohamed Yusop, IEPRe Director, concluded the event with remarks, and potential follow-up research for AEO8 was discussed, followed by a networking session.

### 1.2.9. The Southeast Asia CCS Accelerator (SEACA) Workshop

SEACA initiative, organised by the Global CCS Institute in collaboration with the ASEAN Centre for Energy (ACE), has held two workshops aimed at advancing Carbon Capture and Storage (CCS) in the ASEAN region. These workshops represent a concerted effort to address climate change and reduce emissions in Southeast Asia, a region with significant reliance on fossil fuels. The gatherings brought together a diverse group of stakeholders to develop and discuss strategies for implementing CCS technologies effectively within the region.

#### 1.2.9.1. The 1st SEACA Workshop

*Figure 45: Dr Veerapat Kiatfuengfoo, Deputy Permanent Secretary of Thai Ministry of Energy Thailand, delivered his opening remark for 1st SEACA*

The first SEACA workshop was a pivotal event in the initiative's mission. It convened representatives from Southeast Asian governments, alongside participants from Japan and Australia, project developers, and other key stakeholders. The workshop's primary focus was to develop a framework for CCS regulations, enabling policies, and geological storage resource development in the region. This was in response to the pressing need to address emissions from the heavy reliance on fossil fuels in Southeast Asia. The workshop aimed to lay the groundwork for the accelerated deployment of CCS technologies to mitigate climate change in the region.

#### 1.2.9.2. The 2nd SEACA Workshop


*Figure 46: Dr Nuki Agya Utama, Executive Director of ACE, delivered his opening remark for 2nd SEACA*

The second SEACA workshop continued to advance the conversation on CCS deployment in Southeast Asia. This workshop further delved into the development of policies and regulatory frameworks suitable for CCS implementation across the ASEAN region. It highlighted the need for collaborative efforts in policy development and infrastructure planning, recognising the crucial role of CCS in the region's energy transition and climate change mitigation strategies. This event underscored the commitment of ASEAN member states to integrate CCS into their national agendas, reflecting a growing regional consensus on the importance of this technology.

The SEACA workshops mark significant steps forward in the ASEAN region's journey towards embracing Carbon Capture and Storage (CCS) as a key technology for climate change mitigation and energy transition. These workshops have successfully facilitated a collaborative dialogue among governments, private sector entities, and experts, leading to the development of policies and frameworks that are crucial for the effective deployment of CCS technologies in Southeast Asia. The progress made in these workshops reflects a growing regional commitment to sustainable and innovative solutions for reducing carbon emissions.

### 1.2.10. The 7th ASEAN Energy Outlook (AEO7) Dissemination to Universiti Teknologi Malaysia (UTM) in Malaysia

*Figure 47: The 7th ASEAN Energy Outlook (AEO7) Dissemination to Universiti Teknologi Malaysia (UTM) in Malaysia*

After the recent AEO7 dissemination in Malaysia, ACE continued its outreach at Universiti Teknologi Malaysia (UTM), Johor Bahru, on 30 May 2023. Rika Safrina, MPP Senior Analyst of ACE, presented a study on ASEAN energy investments capacity building strategies as AEO7 revealed a required power sector investment of USD 1,070 billion from 2021 to 2050 under the Baseline

Scenario. Limited public finance in the region calls for a roadmap addressing varying clean energy investment progress among member states. The forum fostered discussions on both public policy and technical aspects of energy modelling and optimisation, potentially leading to further collaboration between ACE and UTM, as outlined in the MoU signed in 2022.

### 1.2.11. The 7th ASEAN Energy Outlook (AEO7) Dissemination to the National University of Singapore (NUS) in Singapore

*Figure 48: The 7th ASEAN Energy Outlook (AEO7) Dissemination to the National University of Singapore (NUS) in Singapore*

On 31 May 2023, Dr Zulfikar Yurnaidi, MPP Manager of ACE, emphasised the significance of enhancing ASEAN academies' understanding of the AEO7 during its dissemination at the National University of Singapore (NUS). Dr Yao Lixia of the Energy Studies Institute expressed gratitude for ACE's knowledge-sharing. The event included insights into Singapore's energy policy, AEO7 findings, and a presentation on ACE's study on ASEAN energy transition investments. The discussions covered energy security, ASEAN's renewable energy targets, and the region's transition challenges. A Q&A session sparked discussions on biofuels, providing valuable feedback for future AEO editions. ACE aims for continued collaboration with NUS.

### 1.2.12. The 7th ASEAN Energy Outlook (AEO7) Dissemination to Nanyang Technological University (NTU) in Singapore

*Figure 49: The 7th ASEAN Energy Outlook (AEO7) Dissemination to Nanyang Technological University (NTU) in Singapore*

On 31 May 2023, the ASEAN Centre for Energy (ACE) conducted the 7th ASEAN Energy Outlook (AEO7) Dissemination at the Energy Research Institute of Nanyang Technological University (ERI@N) in Singapore. This event aimed to disseminate AEO7 findings and share insights from the study on "Investments and Measures for Clean Energy and Power Sector Resilience in ASEAN." Prof. Chan Siew Hwa, Co-Director of ERI@N, welcomed ACE, highlighting NTU's commitment to energy transition. Dr Zulfikar Yurnaidi, MPP Manager of ACE, provided an overview of AEO, emphasising its role in exploring regional pathways. Amira Bilqis, MPP Analyst of ACE, presented AEO7's modelling findings, indicating a tripled energy demand by 2050, while Rika Safrina, MPP Senior Analyst of ACE, discussed ACE's study on energy transition investments, proposing a roadmap for capacity-building programmes. The presentations sparked discussions on policymaking for an investment-friendly energy transition. ACE expressed interest in a potential collaboration with NTU.

### 1.2.13. The 7th ASEAN Energy Outlook (AEO7) Dissemination to the National Science and Technology Development Agency (NSTDA) in Thailand

*Figure 50: The 7th ASEAN Energy Outlook (AEO7) Dissemination to the National Science and Technology Development Agency (NSTDA) in Thailand*

On 8 June 2023, the ASEAN Centre for Energy (ACE) continued its 7th ASEAN Energy Outlook (AEO7) dissemination in Thailand, collaborating with the National Science and Technology Development Agency (NSTDA). Dr Lily Eurwilaichitr from ENTEC, NSTDA, stressed the importance of institutional cooperation. Dr Kampanart, Silva Researcher at ENTEC, NSTDA, presented Thailand's energy policy trends, including carbon neutrality and the Bio-Circular-Green Economy Model. Dr. Zulfikar Yurnaidi, MPP Manager of ACE, introduced AEO, emphasising its role in monitoring ASEAN's energy landscape. Rika Safrina, MPP Senior Analyst of ACE, detailed AEO7 findings, highlighting increased energy demand, fossil fuel dominance, and ASEAN's future as a net importer of natural gas and coal. Rika Safrina also presented ACE's study on regional energy investments, proposing an investment roadmap. Dr Nuwong Chollacoop, Director of ENTEC, NSTDA, facilitated discussions, fostering collaboration between ACE and NSTDA for future studies on ASEAN energy sectors.

### 1.2.14. The 7th ASEAN Energy Outlook (AEO7) Dissemination to Chulalongkorn University in Thailand


*Figure 51: The 7th ASEAN Energy Outlook (AEO7) Dissemination to Chulalongkorn University in Thailand*

On 9 June 2023, ACE held a dissemination event at Chulalongkorn University, Thailand, focusing on the 7th ASEAN Energy Outlook (AEO7) and the study "Attracting Investments for ASEAN Low-Carbon Energy Dissemination." Dr Zulfikar Yurnaidi, MPP Manager of ACE, emphasised AEO7's significance in supporting ASEAN energy policy under APAEC. Assoc. Prof. Kulyos Audomvongseree from Energy Research Institute (ERI) of Chulalongkorn University expressed gratitude for the knowledge exchange. Dr Weerin Wangjiraniran, Researcher of ERI, Chulalongkorn University, discussed Thailand's energy landscape followed by ACE delegation sharing. The dissemination fostered learning exchange on the common use of LEAP as the software tool for modelling for both institutions, concluding with recommendations for future studies and potential collaboration on the improvement of AEO8. In addition, through this visit ERI were invited to be Scientific Committee of the 3rd AICEE in Bali, Indonesia.

### 1.2.15. The 7th ASEAN Energy Outlook (AEO7) Dissemination to King Mongkut's University of Technology Thonburi (KMUTT) in Thailand


*Figure 52: The 7th ASEAN Energy Outlook (AEO7) Dissemination to King Mongkut's University of Technology Thonburi (KMUTT) in Thailand*

On 9 June 2023, the ASEAN Centre for Energy (ACE) continued AEO7 Dissemination at King Mongkut's University of Technology Thonburi (KMUTT) in Bangkok, Thailand. The event aimed to share insights on the energy system in ASEAN and present ACE-related studies on clean energy investments. Dr Bundit Fungtammasan from KMUTT appreciated ACE for organising the event, and Dr Zulfikar Yurnaidi, MPP Manager of ACE, expressed gratitude for KMUTT's warm welcome. Dr Athikom Bangviwat, Head of Energy and Environmental Policy Laboratory (EEPL), KMUTT, presented Thailand's current energy situation followed by ACE delegation presentation. The forum encouraged discussions on the role of energy in ASEAN and potential improvements for AEO8 modelling ACE expressed interest in collaborating with KMUTT for future studies.

### 1.2.16. The 7th ASEAN Energy Outlook (AEO7) Dissemination to Universitas Brunei Darussalam (UBD) in Brunei Darussalam

*Figure 53: The 7th ASEAN Energy Outlook (AEO7) Dissemination to Universitas Brunei Darussalam (UBD) in Brunei Darussalam*

On 12 July 2023, ACE continued the AEO7 Roadshow at Universiti Brunei Darussalam (UBD), building on the success of the MYCE 2023 seminar. Dr. Hj. Abdul Hanif welcomed ACE, appreciating the initiative to share knowledge. Followed by ACE delegation presentations. Policy recommendations for energy transition were discussed, followed by discussion. ACE looks forward to ongoing collaboration with UBD, promoting upcoming events. In addition, through this visit UBD were invited to be Scientific Committee of the 3rd AICEE in Bali, Indonesia.

### 1.2.17. The 47th Indonesia Petroleum Association Convex Participation

The ASEAN Centre for Energy (ACE) participated in the 47th Indonesian Petroleum Association (IPA) Convention & Exhibition (Convex) from 25-27 July 2023. Themed "Enabling Oil & Gas Investment and Energy Transition for Energy Security", the event featured a Plenary Session, Technical Sessions, an Energy Cultural Night, Business Meetings, and an exhibition booth. It gathered various stakeholders like policymakers, energy leaders, and professionals. Key highlights ACE participation during the event included:

#### 1.2.17.1. Plenary Session


*Figure 54: Dr Nuki Agya Utama, Executive Director of ACE, during the plenary session*

Dr Nuki Agya Utama, Executive Director of ACE, discussed the ASEAN energy landscape and its transition with a focus on oil and gas. He emphasised their role in economic growth and energy security, advocating for strategies like developing Liquefied Natural Gas (LNG) facilities, CCUS projects, and a hydrogen economy in ASEAN. He also recommended measures to strengthen energy security during the energy transition, aligning

with Indonesia's strategy to increase natural gas production and implement CCS/CCUS technologies.

#### 1.2.17.2. Special Technical Session

*Figure 55: ACE delegates' presentations at the IPA special technical session*

On the second day of the event, two ACE delegates, Muhammad Shidiq, Senior Research Analyst of ACE and Adhityo Gilang Bhaskoro, Research Analyst of ACE, presented their papers during the technical session. Muhammad Shidiq's presentation focused on hydrogen and CCS policies in ASEAN, addressing economic aspects and the progression of CCS implementation. Adhityo Gilang Bhaskoro presentation covered the dynamics of the oil and gas industry in ASEAN, offering insights into reserves, production, and trade, and emphasised the importance of public-private partnerships, technology innovation, and investor-friendly policies.

#### 1.2.17.3. ACE Booth at the Exhibition

*Figure 56: The report of Oil and Gas Updates 2023 was presented at ACE's booth*

Showcased ACE as the ASEAN think tank and energy hub, promoting the ASEAN Climate Change and Energy Project Phase II (ACCEPT II). It attracted various visitors, including industry professionals and students. A significant presentation was the soft launch of ASEAN Oil and Gas Updates 2023 by Adhityo Gilang Bhaskoro and Silvira Ayu Rosalia, highlighting trends and future outlooks in oil and gas, and noting ASEAN's position as primarily net oil importers. The event served as a platform for extensive discussions on the oil and gas industry's role in the energy transition, emphasising the importance of strategic policies, regional cooperation, and innovative approaches for energy security and sustainable growth in the ASEAN region.

### 1.2.18. ACCEPT II Workshop on Carbon Pricing in ASEAN

*Figure 57: All Participants and Speakers of the Workshop on Carbon Pricing Implementation in ASEAN in Bali*

The ASEAN Centre for Energy (ACE), through the ASEAN Climate Change and Energy Project (ACCEPT) Phase II, has co-organised the "Workshop on Carbon Pricing Implementation in ASEAN" with the Technical Assistance Facility to the Green Team Europe Initiative (TAF-GTEI) with the support from the European Union (EU) as well as the Norwegian Government, and hosted by the Ministry of Energy and Mineral Resources (MEMR) of Indonesia. The workshop conducted from 24-26 July 2023 in Bali, Indonesia. The priority of the event emphasises on fostering dialogue, knowledge sharing, and capacity building.

The outcomes of this workshop were notably presented at the 41st ASEAN Ministers on Energy Meeting (AMEM-41) in Bali, Indonesia, further shaping regional policies and deepening energy-climate knowledge within ASEAN. The workshop's resounding success signifies the unwavering commitment of ASEAN countries in combatting climate change and fostering sustainable development.

The first day of the workshop, participants delved into the concept of carbon pricing, exploring its two forms: carbon tax and Emissions Trading System (ETS). The workshop then brought participants to discuss the progress and implementation of carbon pricing in ASEAN.

Singapore and Indonesia shared their early stage of carbon pricing scheme, while Malaysia emphasised more on their initiative on carbon tax and ETS. Meanwhile, the Philippines, Myanmar, and Lao PDR demonstrated their commitments in transitioning to low-carbon economy and achieving their NDCs.

In depth policy design and training was discussed on the second day. Participants received practical training on the application of Climate Policy Assessment Tool (CPAT) delivered by International Monetary Fund (IMF) to foster effective decision-making in carbon pricing strategies. The tool is also able to explore the multiplier effects of carbon pricing on the domestic economy, including its impact on economic growth, investment attractiveness, energy prices, and job creation. Carbon taxes were highlighted for offering certainty and flexibility in revenue recycling, while comprehensive policy packages and complementary policies were deemed essential for successful carbon pricing implementation.

During the last day, roundtable discussions were conducted to provide a better understanding on carbon pricing as a tool to intertwine energy, economy, and climate, all participants were divided into several small groups and sparked an insightful discussion.

### 1.2.19. ACCEPT II – Call for Proposals – Papers Relevant for Net-Zero Emissions in the Southeast Asian Energy Sector

*Figure 58: Call for Proposals on Papers Relevant for Net-Zero Emissions in the Southeast Asian Energy Sector*

ACCEPT II invited researchers to submit proposals on topics relevant for net-zero emissions in the Southeast Asian energy sector and deal with energy or climate policy, technical analysis, social-economic analysis, theory, simulation and modelling, or advanced deployment. The objective of the project is to support knowledge-building on the energy-climate nexus in the ASEAN region. In August 2023, three proposals have been announced as the winners namely:

1. Inter-region energy trading between ASEAN countries for net zero emission for the power sector, led by Dr Ho Wai Shin from University Teknologi Malaysia (UTM).
2. Quantitative Assessment of Stranded Risk for Coal Power Plants in ASEAN, led by Dr. Reza Fazeli from Australian National University (ANU), Australia.
3. Barrier and Enablers for mobilisation of private capital to achieve ASEAN's NZE target: New cross-sectional evidence from a multi-country survey, led by Prof. Nathan Berg from University of Otago, New Zealand.

### 1.2.20. ACCEPT II on 3rd ASEAN International Conference on Energy and Environment (AICEE)

*Figure 59: All Participants and Speakers of the 3rd AICEE in Bali*

ACCEPT II has contributed to the 3rd ASEAN International Conference on Energy and Environment (AICEE) by submitting 5 papers on the titles of:

- Carbon Border Adjustment Mechanism (CBAM) Implementation on Reducing Emissions in ASEAN Energy Sector.
- How effective the carbon pricing implementation in AMS to reduce regional emissions.
- Review and analysis of readiness, challenges, and potential benefits of power grid

interconnection on energy security and transition pathway in ASEAN

- Economic assessment of Carbon Capture, Utilisation, and Storage (CCUS) in Indonesia insights and strategies for ASEAN's energy transition.
- Utilising unconventional geothermal for AMS: an economic and climate analysis.

The five papers have got accepted among more than 150 submissions and been presented at the 3rd AICEE conference held in Bali on 24 August 2023. The 5 papers afterwards have been submitted to IOP publication by end of November 2023 and currently under review process with reviewer until end of December 2023.

### 1.2.21. ACE Exhibition during Gastech 2023

*Figure 60: ASEAN Centre for Energy showcasing their work at Gastech Exhibition and Conference in Singapore*

ASEAN Centre for Energy (ACE) had the opportunity to have an exhibition at the Gastech Exhibition and Conference in Singapore from 5-8 September 2023. With the central theme of natural gas and hydrogen, ACE presented their work on ASEAN interconnectivity in the power and natural gas sectors and showcased their latest report on hydrogen as the imperative energy transition technology in the region. Besides exhibition, Beni Suryadi, PFS Manager of ACE, also had the privilege to contribute to one of the panel sessions on the impact of the US Inflation Reduction Act on investments in the energy transition efforts in Southeast Asia.

### 1.2.22. ACE at Sustainability & Renewable Energy Forum (SAREF) 3.0

*Figure 61: ACE at Sustainability & Renewable Energy Forum (SAREF) 3.0*

On 6 September 2023, the ASEAN Centre for Energy (ACE) participated in Sustainability & Renewable Energy Forum (SAREF) 3.0. The biennial conference was organised by Sarawak Energy at the Borneo Convention Centre Kuching (BCCK), Sarawak, Malaysia. This event brought together global leaders, experts, and stakeholders, converging to deliberate on crucial matters pertaining to energy and sustainability within the ASEAN region.

ACE was invited as panellist on Plenary Session 2: Regional Energy Transition & Interconnections in ASEAN, which focused on how interconnections equitably address the sharing of renewable energy resources across regions and markets. Dr Nuki Agya Utama, Executive Director of ACE, presented the current state and the role of energy transition in ASEAN Power Grid (APG). Dr Nuki, highlighted the remarkable progress achieved in APG in recent years and the need for significant engagement from ASEAN Member States (AMS) and a more robust political commitment from utilities to implement cross-border interconnections within the region.

*Figure 62: ACE Booth at SAREF 3.0*

At the same event and venue, ACE had the opportunity to have an exhibition at SAREF 3.0 with the theme of Renewable Energy Development and Interconnections on 6-7 September 2023.

Showcasing ACE's current projects and publications to support the transition to a more sustainable energy future in ASEAN, such as the 7th ASEAN Energy Outlook (AEO7) publication and the Development of Conceptual Framework of Renewable Energy Certificate System in BIMP-EAGA Countries (RECAP) Project.

### 1.2.23. Carbon Neutrality Diagnosis Online Seminar (AJEEP Scheme 5)

*Figure 63: Carbon Neutrality Diagnosis Online Seminar (AJEEP Scheme 5)*

On 7 September 2023, ASEAN Centre for Energy (ACE) and Energy Conservation Centre Japan (ECCJ) held the Online Seminar on Carbon Neutrality (CN) Diagnosis of Scheme 5 of ASEAN – Japan Energy Efficiency Partnership (AJEEP) SOME-METI Work Programme 2023 – 2024. The Seminar was attended by representatives from seven (7) ASEAN Member States (AMS), namely, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, and Viet Nam. The seminar aimed to provide a thorough preliminary explanation on the Carbon Neutrality diagnosis guidelines and procedure to support knowledge sharing and capacity building for carbon neutrality and energy efficiency improvements in ASEAN. In fiscal year 2023-2024, onsite CN diagnosis under AJEEP Scheme 5 will be conducted in Nitto Denko Factory of Malaysia and Phra Nang Klao Hospital Building of Thailand.

### 1.2.24. ASEAN Researchers Network on Energy and Climate Change (ARNECC) Paper Talks 2.0 – Net Zero Series

The ASEAN Centre for Energy (ACE) under the ASEAN Energy and Climate Change Project (ACCEPT II), has organised two webinar series entitled 'ARNECC Paper Talks 2.0 – Net Zero Series'. The webinar series aims to promote the ACCEPT II project as well as raise awareness of the journey in achieving net zero target of Southeast Asia to the public. Through the webinar series, it is expected that current energy and climate updates, policies, strategies, and planning of ASEAN can be communicated to the public to increase transparency of completed projects, current projects, and future project proposals.

#### 1.2.24.1. ARNECC Paper Talks 2.0 – Net Zero Series #1: Strategy towards Net-Zero Emission by 2060 from Renewable and Carbon Neutral Energy Perspective


*Figure 64: ARNECC Paper Talks 2.0 – Net Zero Series #1: Strategy towards Net Zero Emission by 2060 from Renewable and Carbon Neutral Energy Perspective*

During the ARNECC Paper Talk 2.0 – Net Zero Series #1 on 26 October 2023, Harun Ardiansyah, University of Illinois Urbana-Champaign, presented a detailed overview of "Strategy towards Net-Zero Emission by 2060 from the Renewable and Carbon Neutral Energy Perspective." The talk covered Indonesia's targets, policy evolution, technological potential, and stressed the significance of policy reinforcement, technological adaptation, and cross-regional partnerships in its journey toward energy transition. The discussion raised vital questions about Indonesia's progress towards Net Zero Emissions, highlighting the importance of incentives, private sector involvement, and considering the social cost of carbon and decentralised energy markets. Indira Pradnyaswari, ACCEPT II Associate Research Analyst of ACE, highlighted the insights shared in the 7th ASEAN Energy Outlook (AEO7), revealing a predominant carbon footprint from the energy, transportation, and agricultural sectors.

**1.2.24.2. ARNECC Paper Talks 2.0 – Net Zero Series #2: Electric Vehicle (EV) and Driving towards Sustainability: Comparison between Electric Vehicles (EVs), Hybrid Electric Vehicles (HEVs), Plug-in Hybrid Electric Vehicles (PHEVs), and Internal Combustion Engine (ICE) Vehicles to Achieve Net Zero Emissions by 2050 from EV**


*Figure 65: Discussion session with Mardika Firliana and Dr Ibham Veza*

The second webinar has invited Dr Ibham Veza from Universiti Teknologi Petronas to deliver his publication titled 'Electric Vehicle (EV) and Driving towards Sustainability: Comparison between EV, HEV, PHEV, and ICE Vehicles to Achieve Net Zero Emissions by 2050 from EV". The webinar explored the environmental and economic implications of various vehicle technologies, including ICE, HEVs, PHEVs, and EVs focussing on the Indonesian market and aiming to achieve net zero emissions by 2050. The study offers valuable insights for policymakers, automotive manufacturers, and consumers, offering a roadmap for transitioning towards more sustainable transportation solutions.

**1.2.25. AEO8 Workshop I 2023 Capacity Building on Technology Roadmap & ICT for Data Analysis - Working Meeting on Scenario & Data**

*Figure 66: AEO8 Workshop I 2023 Capacity Building on Technology Roadmap & ICT for Data Analysis - Working Meeting on Scenario & Data*

ACE hosted the four days of the AEO8 Workshop I in Bogor on 14-17 November 2023, consisting of Capacity Building on Technology Roadmap and ICT for Data Analysis and Working Meeting on Scenario and Data. The event is dedicated for the AEO8 Working Group from each ASEAN Member States. The first two days, ACE invited speakers from Commonwealth Scientific and Industrial Research Organisation (CSIRO); Ministry of Industry, Science, Technology & Innovation of Cambodia; PT Pertamina; and Deloitte aimed to enhance AMS and ACE capabilities on the toolkits and steps-by-steps guidelines to develop a roadmap for energy technologies in the national and regional levels as well as taking advantages of cutting-edge technologies e.g., Big Data, AI, to collect analysis and interpret data to support policymakers in making data-driven decision and adapt to changing energy landscape.

Meanwhile, the working meeting aimed to identify the possible input on the ASEAN energy scenarios, update and verify database. Rika Safrina, MPP Senior Analyst of ACE, outlined AEO7 data and AEO8 development, including plans for exploring Carbon Neutrality. Followed by AMS focal points presented national energy outlooks fostering constructive dialogue to be considered on the scenario. Additional input on regional strategies such as APAEC Phase II and sustainability initiatives e.g., ASEAN Strategy for Carbon Neutrality were discussed. Fruitful discussions and recommendations concluded the kick-off meeting, setting the stage for AEO8 model development. Final day activities focused on scenario discussions, data validation through a data café, and closing remarks from Dr. Zulfikar Yurnaidi, MPP Manager of ACE, emphasising the positive outlook for AEO8 and look forward to country visit to further review the initial results in Q1 2024.

### 1.2.26. JOGMEC Oil Capacity Building 2023

*Figure 67: Participants group photos during welcoming dinner (left) and site visit to Kamisu National LPG Stockpiling Base (right)*

JOGMEC and ACE co-organised the 11th Oil Capacity Building Programme in Japan from 11-13 December 2023, in JOGMEC Training and Research Center. This capacity building programme aims to enhance energy security in ASEAN by sharing knowledge and experience of Japan's oil stockpiling practices from government and private entities.

On the first day, the participants learned stockpiling regulations and practices by the Ministry of Economy, Trade and Industry (METI) of Japan, the Japan Organisation for Metals and Energy Security (JOGMEC), the Petroleum Association of Japan (PAJ), and International Energy Agency (IEA). On the second day, participants from the AMS shared their updates on their stockpiling policies and status. On the last day, the participants went to visit Kamisu National LPG Stockpiling Base to learn more deeply about how the actual stockpiling practice works, including the overall operations, and how the roles of private and government interplay.

### 1.2.27. AJEEP Online Seminar for Carbon Neutrality in Transportation Sector

*Figure 68: AJEEP Online Seminar for Carbon Neutrality in Transportation Sector*

On 19 December 2023, the ASEAN Centre for Energy (ACE) and Energy Efficiency Centre Japan (ECCJ) under the ASEAN-Japan Energy Efficiency Partnership (AJEEP), hosted a virtual seminar on Carbon Neutrality in the Transportation Sector. The objective of this seminar was to equip ASEAN Member States (AMS) with knowledge of decarbonisation management systems and cutting-edge technologies relevant to achieving carbon neutrality in the transportation sector. A key focus was placed on green logistics, identified as an essential concept for ASEAN Member States to embrace and implement to ensure sustainable economic growth alongside efficient and environmentally friendly logistics systems. Additionally, the event facilitated active discourse between participants and Japanese experts, offering a platform for exploring the latest technological advancements in decarbonisation efforts.

# 1.3. Think Tank

***Objective:*** *To assist the ASEAN Member States (AMS) by identifying and surfacing innovative solutions for ASEAN's energy challenges on policies, legal & regulatory frameworks and technologies*

### 1.3.1. AEO7 Webinar: Energy Priorities for ASEAN Economic Development


*Figure 69: AEO7 Webinar: Energy Priorities for ASEAN Economic Development*

ACE conducted AEO7 Webinar on energy priorities for ASEAN Economic Development APAEC Phase II projections, priorities under Indonesia's 2023 ASEAN Chairmanship and the role of women in ASEAN's energy development to celebrate women's month. Members from the MPP team of ACE shared some key figures and topics from the findings of AEO7. Specifically, the key trends of energy demand and supply, and target progress with regards to APAEC regional targets. The webinar gave representatives from AMS to share experience with energy projects as well as the issues that AMS may face in the future. A key spotlight of this webinar was to highlight the need for gender inclusion in policy making and economic consideration during the transition process.

### 1.3.2. Kick off Joint Study on an Energy Sector Roadmap to Net Zero Emission in Lao PDR between ACCEPT and Ministry of Energy and Mines (MEM)

*Figure 70: ACE at the 30th Annual Meeting of the Renewable Energy Sub-Sector Network (RE-SSN) of the ASEAN Energy Cooperation*

ACE, through ACCEPT II, present a proposed study on Lao Net Zero during the 30th Annual Meeting of the Renewable Energy Sub Sector Network (RE-SSN) in Lao PDR, on 4 May 2023. One of ACCEPT II's work plans is to conduct a national energy system modelling for low carbon economy towards net zero. The idea of having the study is model and analyse one of the 10 AMS using energy supply-demand modelling approaches to understand the net zero roadmap of a country. Lao PDR will start the study as the first country in ASEAN, where it is expected that the other countries will be analysed its net zero modelling in the future under ACCEPT II.

The initial introduction of the study was greatly appreciated by Houmpheng Theuambonmy, Deputy Director of Department of Energy Efficiency and Promotion of Lao PDR Ministry of Energy and Mines (MEM), noting that the study planning will greatly be beneficial for Lao PDR since the country is considering to be net zero by 2050 as written in its Nationally Determined Contribution (NDC). The study is expected to give early information on how energy sector plays a role in achieving Lao PDR Net Zero by 2050 and what input or recommendation Lao should do to achieve the Net Zero target. The study is expected to be published and launched during the Lao PDR ASEAN Chairmanship in 2024.

### 1.3.3. ACE-SEDA Coffee Meeting

*Figure 71: ACE-SEDA Coffee Meeting*

ACE conducted a coffee meeting on 12 May 2023, in Malaysia with the Sustainable Energy Development Authority (SEDA). The meeting attended by the two respective parties was joined by representatives from government bodies, private sectors, and other energy organisations. The meeting discussed the importance of sustainable development in ASEAN's rapidly growing region and energy trilemma, with an emphasis on attracting investment for accelerated energy low-carbon transition. From ACE dissemination discussions about the upcoming ASEAN Energy Business Forum in Bali and the AEO7 took place and the findings on energy investment found in AEO7. SEDA also mentioned its role in energy efficiency, green energy and sustainability promotion in Malaysia and point out possible collaborations across other ASEAN states.

### 1.3.4. Webinar - Report Launching of Measures and Investment for Clean Energy and Power Sector Resilience in ASEAN

*Figure 72: Webinar - Report Launching of Measures and Investment for Clean Energy and Power Sector Resilience in ASEAN*

ACE and the Energy Foundation China (EFC) hosted a webinar on 26 June 2023 about the launching of a report on investment for clean energy and power sector resilience in ASEAN. The webinar focuses on providing policy recommendations for AMS to aid in attracting clean energy investment and provide insights about an integrated approach to green fiscal consolidations. The webinar was attended by ACE and EFC as well as subject matter experts from universities and the IEA. The webinar covered topics regarding the difficulties in attaining green energy investment in ASEAN and offered ways to aid facilitating investment in ASEAN. The webinar also highlighted the need for green investment to reach sustainability goals and the underlying issue of risk associated with clean energy projects.

### 1.3.5. IEA EGIB Stakeholder Consultation Workshop

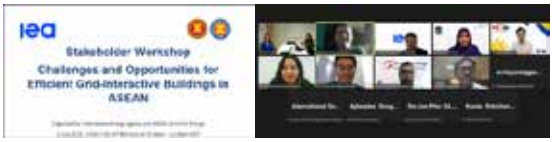



*Figure 73: IEA EGIB Stakeholder Consultation Workshop*

On 31 July 2023, the ASEAN Centre for Energy (ACE) and International Energy Agency (IEA) co-organised online workshop on Challenges and Opportunities for Efficient Grid-Interactive Buildings in ASEAN. The purpose of the online workshop is to convene stakeholders from ASEAN Member States to discuss the preliminary findings of the IEA and ACE study on Efficient Grid-Interactive Buildings (EGIB), which was then officially launched on 2 October 2023, during the IEA Energy Efficiency Training Week in Jakarta, Indonesia.

The study analyses the potential and barriers for EGIBs in the region, offering policy recommendations to foster their development and deployment. The workshop also provided an opportunity for key stakeholders from ASEAN Member States to share their views and feedback on the study, as well as to discuss best practices and lessons learned from EGIBs implementation in the region and beyond. Through interactive sessions and knowledge sharing, the workshop seeks to enhance participants' knowledge and promote the exchange of ideas among stakeholders.

### 1.3.6. ASEAN Cool Initiative Country Call with Malaysia and Singapore

*Figure 74: ASEAN Cool Initiative Country Call with Malaysia and Singapore*

The ASEAN Centre for Energy (ACE) and United Nations Environment Programme United for Efficiency (UNEP-U4E) organised Country Calls on 11 August 2023 with National Environment Agency (NEA) of Singapore and on 14 August 2023 with Suruhanjaya Tenaga, Energy Commission of Malaysia. The online meeting with Malaysian and Singaporean stakeholders aimed to support the implementation of ASEAN Cool Initiative Project at the national level in the development of Minimum Energy Performance Standards (MEPS) for Air Conditioners (AC) and labels for Malaysia and Singapore. The meetings concluded with the key summaries, among other things, the need to considering incentives and free markets to provide higher efficient products, the importance of stakeholder engagement in the process of implementing higher MEPS levels, and ASEAN Cool Initiative Project will help collect data on AC products in the market and technical analysis for the government to support the implementation of MEPS, labels, and incentive.

### 1.3.7. Bilateral Meeting with BIMP-EAGA Countries under RECAP Project

*Figure 75: Bilateral Meeting with BIMP-EAGA Countries under RECAP Project*

Development of Conceptual Framework of Renewable Energy Certificate System in BIMP-EAGA Countries (RECAP) Project is a two-year project funded by BIMP Korean Cooperation Fund (BKCF) and supported by Global Green Growth Initiative (GGGI) as BKCF secretariat, which aims to study the REC market potentials and develop a conceptual framework for a regional REC system in Brunei Darussalam, Indonesia, Malaysia, and the Philippines East ASEAN Growth Area (BIMP-EAGA).

In September and October 2023, the ASEAN Centre for Energy (ACE) convened bilateral meetings with BIMP-EAGA Focal Points and relevant stakeholders, namely, Prime Minister's Office, Brunei Darussalam, Directorate General of Electricity, Ministry of Energy and Mineral Resources (MEMR), Indonesia, Energy Commission of Sabah (ECoS) Malaysia, and Department of Energy of the Philippines (DoE). The foremost objectives of these bilateral meetings are to update stakeholders on the project's trajectory, as well as gather inputs from the key stakeholders on their national Renewable Energy Certificate (REC) priority development and market potential overview.

### 1.3.8. Webinar: Sustainable Finance for Clean Energy in ASEAN

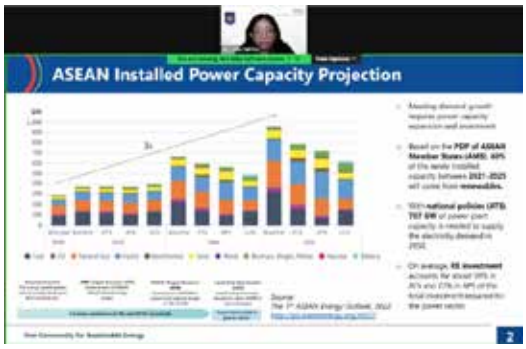



*Figure 76: Webinar: Sustainable Finance for Clean Energy in ASEAN*

ACE along with the IEA and Energy Foundation China hosted a webinar on sustainable finance for clean energy in ASEAN. The webinar featured some speakers from AMS governments, international organisations, private energy firms and financial institutions. The webinar discussed the current conditions of ASEAN energy investment and

the difficulties in infrastructure for green financing. Several government representatives shared their country's experience with clean energy financing. International organisations with experience in green energy financing and private energy firms shared their experience in supporting green investments and ways to help facilitate investments in ASEAN.

### 1.3.9. Energy Reports Launching

This event, scheduled for 1 November 2023, was set to virtually launch two significant reports by the ASEAN Centre for Energy (ACE): 'ASEAN Power Updates 2023' and 'ASEAN Oil and Gas Updates 2023.' These publications, pivotal in addressing the ever-evolving energy sector of AMS in parallel with technological advancements and new energy policies, aim to keep the public informed about the dynamic power system and oil and gas landscape across the ASEAN region.

ASEAN Power Updates 2023,' the second edition in its series, offers a comprehensive overview of the electricity landscape in ASEAN, including the situation of renewable energy (RE). This edition updates the ASEAN power landscape and tracks the implementation of renewables over the past two years. Conversely, 'ASEAN Oil and Gas Updates 2023' provides an in-depth analysis of the oil and natural gas situation in ASEAN, covering a wide range of aspects such as reserves, production, consumption, trade, infrastructure, policy trends, investments, and energy transition initiatives.

Recognising the importance of disseminating this information, ACE, in collaboration with its PFS and MPP departments, organised the event. It featured esteemed professionals, including Mustaba Ari Suryoko from the Directorate of New and Renewable Energy at the Ministry of Mineral and Energy Resources, Indonesia, who commented on the 'ASEAN Power Updates' report. Also, present were Tran Ngoc Lan, Chairman of the Exploration Production Task Force at ASCOPE and Deputy General Manager of the Exploration Division at Petro Vietnam, and Dr Kaho Yu, Head of Energy Research at Verisk Maplecroft, who provided insights on the 'ASEAN Oil and Gas Updates Report.' The virtual event, attended by 130 public participants, reflects ACE's commitment to keeping stakeholders informed and engaged in the ASEAN energy landscape through informative online seminars (webinars).

# Publications

# 2. Publications

**Throughout 2023, The ASEAN Centre for Energy has published:**

| 21 | 13 | 14 | 8 |
|---|---|---|---|
| Reports | Policy Brief | Op-Eds | Blog |

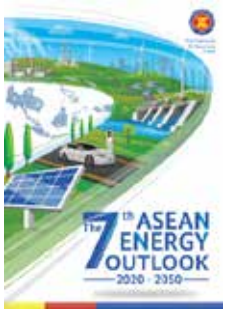
The ASEAN Centre of Energy experienced a significant increase in publication downloads, website visitor, and social media platform. The most downloaded publication of all-time remains the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II: 2021-2025, released in 2020, with 9,552 downloads. Following in rapid succession is the 7th ASEAN Energy Outlook (AEO7), published in 2022, accumulating a total of 9,247 downloads. On the other hand, ACE website visitor has increased significantly compared to 2022, whether in new user, pageviews, sessions, and other components. The increasing in ACE website visitor was also caused by the rising of social media visitors, especially in LinkedIn and Instagram.

## Most Downloaded Publications of All-Time

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

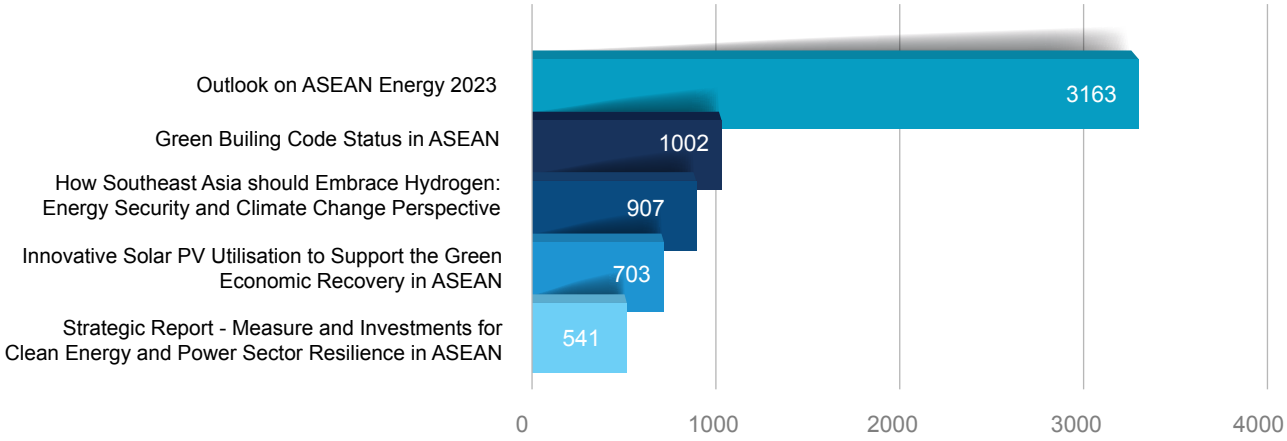
**9,552 downloads**

**The 7th ASEAN Energy Outlook (AEO7)**




**9,247 downloads**

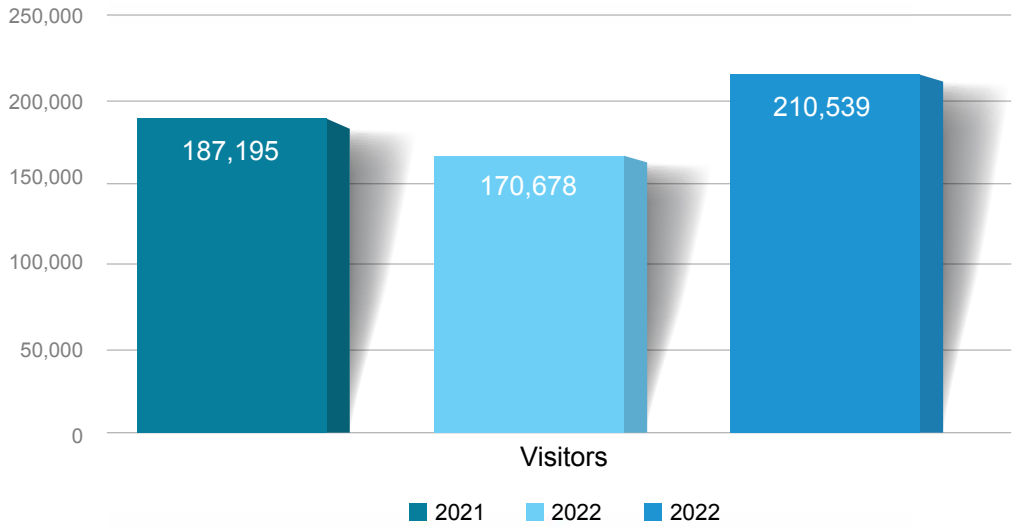
## Most Downloaded Publication in 2023




The most downloaded publication on ACE in 2023 is the Outlook on ASEAN Energy 2023 with the total of 3,163 downloads, followed by Green Building Code Status in ASEAN with 1,002 downloads.

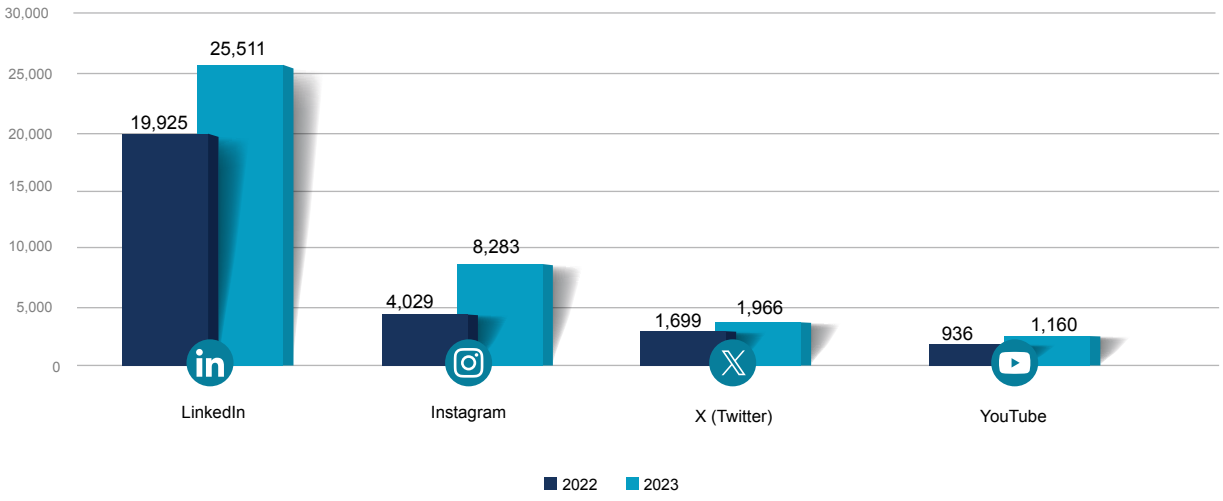
**ACE Website Visitor**

**aseanenergy.org**




In 2023, there has been an increase in the ACE Website sessions, pageviews, users, also new users, compared to 2022, with the total of 210,539 ACE website visitors.

**ACE Social Media**




There has been a significant increase in ACE Social Media visitor in 2023, compared to the previous year. The most visited platform on ACE is LinkedIn with 25,511 visitors throughout 2023, followed with Instagram with 8,283 visitors, also X (Twitter) with 1,966 visitors and YouTube with 1,160 visitors.

# 2.1. ASEAN Power Grid


*Figure 77: ASEAN Power Updates 2023*

### 2.1.1. ASEAN Power Updates 2023

ASEAN Power Updates 2023 is the second edition of the ASEAN Power Updates which aims to present a comprehensive overview of electricity production, including electricity produced from renewable energy sources in ASEAN. This second edition provides an update on the ASEAN power landscape and tracks the use of renewable forms of energy over the past two years. The data were collected from various reliable sources: official reports from the governments, private sectors, and international organisations of the ten member states of the ASEAN. They are available at ACE's internal database: ASEAN Energy Database System (AEDS).


*Figure 78: Smart Grid in ASEAN: Overview and Opportunities to Support the ASEAN Renewable Energy Aspirational Target*

### 2.1.2. Smart Grid in ASEAN: Overview and Opportunities to Support the ASEAN Renewable Energy Aspirational Target

This policy brief focuses on ASEAN's integration of renewable energy via smart grids, emphasising the role of solar and wind energy in achieving RE targets. It outlines existing smart grid roadmaps in ASEAN states, highlighting the focus on essential infrastructure like advanced metering and energy management systems. The brief acknowledges challenges like high investment costs, financial mechanism deficits, and cybersecurity issues. To expedite smart grid implementation, it recommends identifying specific needs, promoting financial incentives, establishing smart grid working groups, advancing research, and developing supportive policies. This strategy aims to streamline ASEAN's transition to smart grid systems.


*Figure 79: 2022 Recap - Electricity Insights*

### 2.1.3. 2022 Recap – Electricity Insights

The energy insight discusses the electricity growth in ASEAN countries in 2022, which faced with disruptions to the global energy supply chain, which will cause fluctuations in energy prices and impact energy security. Nonetheless, AMS countries were able to overcome this crisis by implementing measures to improve their electricity interconnection and support renewable energy investments. Adoption of digital technology was expected to bring significant benefits to the power sector in the region, such as increased reliability and cost savings.

# 2.2. Trans-ASEAN Gas Pipeline


*Figure 80: ASEAN Oil and Gas Updates 2023*

### 2.2.1. ASEAN Oil and Gas Updates 2023

ASEAN Oil and Gas Updates 2023 examines the current state and emerging trends in ASEAN's oil and gas industry. It provides key statistics and analyses the oil and natural gas situation in ASEAN, covering reserves, production, consumption, trade, infrastructure, policy trends, investments, and energy transition initiatives. This edition covers broader topics than those in the 2021 version, with deeper discussions on the field exploration and development activities, the recent status of the trade balance and movement, and investments in infrastructure development. Also included here are descriptions of recent initiatives relating to ASEAN's energy security and energy transition.

Our aim is to equip stakeholders with a high-level overview of the oil and gas industry in ASEAN to navigate its ever-evolving landscape and to point out opportunities for governments to maximise sustainable growth. The data were collected from various reliable sources: official reports from the governments, the private sector, and international organisations. All data are available at ACE's internal database: ASEAN Energy Database System (AEDS).


*Figure 81: 2022 Recap – Fossil Fuel Insights*

### 2.2.2. 2022 Recap – Fossil Fuel Insights

The fossil fuels insight discussed the global energy crunch which resulted in robust demands and tight supplies in fossil fuel sectors. The government and industry started to sense the impact of the geopolitical conflict and geared up to encounter the challenges. However, the year 2022 could be a turning point for ASEAN Member States strategically address energy security with considerations towards green energy. Several policies related to fossil fuel sectors were implemented to ease energy price shocks. The coal, oil, and gas industry also followed the path in the transition into cleaner and more resilient energy.

## 2.3. Coal & Clean Coal Technology


*Figure 82: Biomass Co-Firing in ASEAN: Status and Opportunities to Meeting ASEAN's RE Target*

**2.3.1. Biomass Co-Firing in ASEAN: Status and Opportunities to Meeting ASEAN's RE Target**

This policy brief discusses ASEAN's power sector's reliance on coal and the high $CO_2$ emissions associated with it. It proposes biomass co-firing as a solution for AMS to increase renewable energy share in their energy mix and reduce emissions. Indonesia leads in biomass co-firing with 7.3 GW capacity. However, challenges like the lack of regulations and incentives hinder progress. Recommendations to overcome these include capacity building, standardising biomass specifications, increasing industry collaboration, funding R&D, establishing a biomass database, and supportive policies for effective biomass co-firing implementation in ASEAN.

## 2.4. Energy Efficiency & Conservation

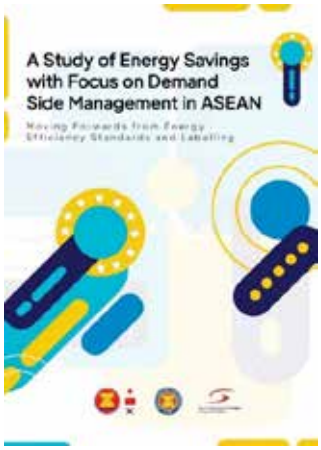



*Figure 83: A Study of Energy Savings with Focus on Demand Side Management in ASEAN*

**2.4.1. A Study of Energy Savings with Focus on Demand Side Management in ASEAN**

This study is part of the 'Energy Savings with Focus on Demand Side Management' project, which is supported by the ASEAN Plus Three Cooperation Fund and intended to provide knowledge sharing and experiences from ASEAN+3 in the pursuit of energy savings. Optimizing energy intensity targets necessitates a gradual shift away from conventional energy sources and heavy industries and a robust focus on enhancing Demand Side Management (DSM), particularly through improved Energy Efficiency (EE). Fostering a conducive enabling environment for DSM, encompassing market mechanisms, regulatory frameworks, information dissemination, fiscal incentives, and advanced technologies and services, will deliver a comprehensive and impactful response to this critical challenge. This study advocates for the integration of Demand Response (DR) as a key component of DSM programme. By leveraging smart forecasting, strategic load shifting, and targeted peak clipping, DR-DSM can effectively manage energy demand peaks, fostering a more adaptable and responsive energy system. This, in turn, paves the way for increased integration of renewable energy sources and facilitates the pursuit of net-zero targets.


*Figure 84: ASEAN-Japan Energy Efficiency Partnership (AJEEP) Scheme 2 Training of Trainers (2016-2022): Achievements and Impacts*

### 2.4.2. ASEAN-Japan Energy Efficiency Partnership (AJEEP) Scheme 2 Training of Trainers (2016-2022): Achievements and Impacts

This Implementation Report, a collaborative effort between the ASEAN Centre for Energy and the Energy Conservation Center of Japan (ECCJ), serves to comprehensively document the achievements of the ASEAN-Japan Energy Efficiency Partnership (AJEEP) Scheme 2 Phase 2 (2016-2022). It is intended to inform stakeholders and policymakers within AMS of the programme's key successes and its transformative impact on the development and implementation of effective energy efficiency and conservation policies and strategies. The program has demonstrably enhanced energy management system capacities and capabilities across AMS by facilitating knowledge transfer and practical training initiatives. This focused approach has empowered AMS to refine their EE&C policies, propelling progress towards the ambitious energy intensity reduction target stipulated under APAEC Phase II (2021-2025). Furthermore, this report presents valuable recommendations and summarized lessons learned, serving as a head start for the development of the Sustainable ASEAN Energy Management Certification Scheme (SAEMAS).


*Figure 85: ASEAN Energy Efficiency and Conservation for the Transportation Sector: Policy Trends and Best Practices*

### 2.4.3. ASEAN Energy Efficiency and Conservation for the Transportation Sector: Policy Trends and Best Practices

The ASEAN Energy Efficiency and Conservation for the Transportation Sector: Policy Trends and Best Practices was developed by the ASEAN Centre for Energy (ACE), with support from the Korea Energy Agency, through the ASEAN+3 Mitigation Cooperation Programme, and guidance from the ASEAN Energy Efficiency and Conservation Sub-sector Network (EE&C-SSN). This report provides valuable insights into the policy trends and best practices for EE&C measures within the transportation sector in the ASEAN region. It also highlights the need for greater policy actions on EE&C in road transportation to ensure that the increase in mobility will not impact the region's energy security, environmental sustainability, and economic prosperity. This report proposes seven key recommendations to strengthen regional cooperation towards greater adoption of energy efficiency measures in the road transportation. These recommendations include enhancing and harmonising fuel economy standards and labelling policies, developing a long-term strategy for biofuel and electric vehicle deployment through a combination of regulations and incentives, which promote policies and infrastructure with mass transit and active mobility.


*Figure 86: Efficient Grid-Interactive Buildings Future of buildings in ASEAN*

### 2.4.4. Efficient Grid-Interactive Buildings Future of Buildings in ASEAN

This report, a collaborative effort between the International Energy Agency's (IEA) Energy Efficiency Division and ACE, sheds light on the transformative potential of grid-interactive buildings amidst global net-zero aspirations. Analysing the interplay of efficiency, digital technologies, and renewable energy integration within the context of ASEAN, it assesses key factors influencing building performance and grid interaction, culminating in tailored policy recommendations. These insights serve as a comprehensive roadmap for ASEAN policymakers to navigate the development of an energy-efficient and grid-interactive built environment, paving the way for a sustainable and cleaner energy future. The report further introduces a novel analytical framework developed by the IEA, providing a robust tool for evaluating the key enablers for widespread adoption of grid-interactive buildings.

### 2.4.5. Cross-sectoral analysis on the implication of ASEAN road transport electrification policies on energy security and climate

Road fleet electrification is one of the key strategies of the ASEAN region in decarbonising the transportation sector. Electric vehicles (EVs) are seen to be more efficient compared to their conventional counterpart. Moreover, reduce pollution and emission which results in negative externalities like respiratory deceases and global warming. This study aims to perform a cross-sectoral analysis of the implication of ASEAN road transport electrification policies on energy security, climate, and societal welfare. Results show that ASEAN could reach 641 million passenger vehicles by 2050, and the implementation of ASEAN countries' EV targets increases the penetration of technologies up to 9% penetration in both private cars and buses, 13% in motorcycles, and 4% in taxicabs. Significant petroleum savings can be expected with the deployment of e-vehicles but would increase end-user electricity demand. As the region could remain highly dependent on fossil-based power generation considering the historical trend in electricity dispatch, it was found that EV deployment could rather result in GHG being emitted than mitigated. However, the technology use could still result in significant pollutants reduction improving urban health and welfare. Thus, social cost savings could be expected with the implementation of ASEAN road transport electrification policies.

This article was published in IOP Conference Series: Earth and Environmental Science, Volume 1199, The 2nd ASEAN International Conference on Energy and Environment, 13/09/2022 – 15/09/2022, Online


*Figure 87: Unlocking the Economic Values of a Centralised Building Energy Database*

### 2.4.6. Unlocking the Economic Values of a Centralised Building Energy Database

This policy brief explores the potential economic value proposition of establishing a centralized building energy data system driven by government initiatives across AMS. Drawing upon best practices from the region, it analyses the economic drivers and benefits that could be unlocked through the collection and disclosure of building energy data. The paper highlights the potential for data-driven innovation, new economic opportunities, and job creation. It advocates for leveraging the existing ASEAN Energy Database System (AEDS) as a centralized platform for secure data collection and analysis, emphasizing strong ownership and collaboration among all 10 AMS. Recognizing the need for capacity building and infrastructure improvements, the brief recommends targeted initiatives to facilitate data sharing and promote engagement with potential users, especially private and

financial institutions. This policy brief argues that by actively utilising AEDS as a regional hub for building energy data, ASEAN can unlock significant economic value and foster a more sustainable built environment.


*Figure 88: Enhancing Strategies for the Sustainability and Deployment of Data Centers in ASEAN*

### 2.4.7. Enhancing Strategies for the Sustainability and Deployment of Data Centers in ASEAN

The policy brief discusses the surge in data centre establishments in ASEAN region, driven by increased digital service demands, amplifying energy consumption, and highlighting the urgency for sustainability and rapid deployment strategies. Challenges faced by these centres encompass regulatory complexities, nascent technologies, and sustainability concerns, necessitating standardised efficiency measures and broader sustainability evaluation indicators across ASEAN countries. To address escalating energy demands spurred by economic growth and digitisation, ASEAN member states must strategically incorporate technologies, policies, and skill development into regional energy efficiency initiatives for a successful transition. The policy brief advocates adopting innovative technologies, such as prefabricated data centres and AI-driven control systems, while emphasising the need for ASEAN-specific sustainability ratings or certifications. Encouraging integration of these technologies with incentives and guidance and fostering collaboration through a regional network and knowledge hubs is essential for ASEAN's collective advancement in data centre development.


*Figure 89: 2022 Recap – Energy Efficiency Insights*

### 2.4.8. 2022 Recap – Energy Efficiency Insights

The energy insights address on the energy efficiency that has been intensified in Southeast Asia through several incentives in 2022. ASEAN countries has installed and operated a range of energy-efficient technologies to optimise the energy used for many energy-using activities, including in the transportation sector as the largest energy consuming sector. Hence, the region turned to join EV revolution as part of their energy efficiency measures. This year has showed government ambitions in realisation of EV targets through policy, which triggered the local industry players to enter EV market.


*Figure 90: 2023 Recap – Mid-Year Energy Insight on Electric Vehicle and Energy Efficiency*

### 2.4.9. 2023 Recap – Mid-Year Energy Insight on Electric Vehicle and Energy Efficiency

From infrastructure gaps to policy intricacies on green mobility, ASEAN countries indicate their efforts towards a more sustainable future. The region made extensive effort in empowering EV manufacturing, including charging station and battery. The government enacted policy on affordable deal by implementing several incentives on EV adoption. Furthermore, the region pushed the potential for technological innovation to increase energy efficiency initiatives as commitment to green energy future.

### 2.4.10. ASEAN Energy Management Accreditation Scheme (AEMAS)

ASEAN Energy Management Accreditation Scheme (AEMAS) was endorsed during the 26th ASEAN Ministers on Energy Meeting (AMEM) in Bangkok in 2008. It has two (2) products, which are Certified Energy Managers (CEM) for individuals and Energy Management Gold Standard (EMGS) for end-users. The current implementing partners are Malaysian Green Technology and Climate Change Corporation (MGTC), Malaysia, and Energy Efficiency Practitioners Association of the Philippines (ENPAP 4.0) from the Philippines. AEMAS has certified around 3,000 CEM over the region. In 2023, it has successfully certified 295 new CEM and 44 renewals. Moreover, 31 new EMGS for end-users.

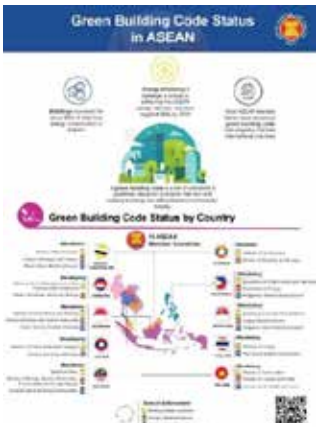



*Figure 91: Green Building Codes Status in ASEAN*

### 2.4.11. Green Building Code Status in ASEAN

The infographic provides a concise overview of the current state of Green Building Codes across ASEAN countries. It delves for insights on the status of adoption, implementation, and evolution of eco-friendly building standards shaping sustainable development in the region.

## 2.5. Renewable Energy

### 2.5.1. Tracking Potential Renewable Energy Jobs in ASEAN

Job creation in renewable is among the most significant social impacts of higher renewable penetration to the energy mix, but it also poses a challenge for countries to adapt to the changing work landscape amidst the energy transition. Hence mapping the distribution and projecting renewable employment in the coming years in ASEAN will be crucial as it would support the policy ramifications, job market, and economy. This research adopted data and scenarios trajectory from the 7th ASEAN Energy Outlook (AEO7) from 2020 up to 2050 with four technologies: Solar PV Utility-Scale, Onshore Wind, Hydropower Dam, and Geothermal. It is limited to three job types: manufacturing, construction, installation, and operation and maintenance. The data was processed using Low Emissions Analysis Platform (LEAP) software. The findings indicate that ASEAN's renewable energy (RE) jobs will reach between 3.9 – 5.5 million, with Viet Nam and Indonesia dominating the share. Meanwhile, job share growth based on the technology is most robust in hydropower and solar. As new plants are established during the early years, job creation will be relatively higher, especially in manufacturing and construction. Further refinement of methodologies and continuous data improvement is vital to allow the better projection of the region's workforce on energy transition and provide opportunities for better coordination, planning, and investment to improve employment outcomes.

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*Figure 92: Integrating 100% renewable energy into electricity systems: A net-zero an analysis for Cambodia, Laos, and Myanmar*

### 2.5.2. Integrating 100% renewable energy into electricity systems: A net-zero analysis for Cambodia, Laos, and Myanmar

The paper, developed collaboratively by ACE through ACCEPT project, NUPI and Institut Teknologi Perusahaan Listrik Negara (PLN) Indonesia, explores how developing countries like Cambodia, Lao PDR, and Myanmar can transition to net zero emissions in their power sectors using renewable energy. By combining the Low Emissions Analysis Platform (LEAP) with the Next Energy Modelling system for Optimisation (NEMO), the study simulates the integration of 100% renewable energy. NEMO, a newer addition to LEAP, allows for long-term simulations considering energy storage, crucial for balancing intermittent renewables. These countries, facing energy poverty and climate vulnerability, can surpass the energy poverty line by 2030-2045 while integrating 100% renewables, primarily hydropower and other non-hydro sources.. The costs for this sustainable path range from 1.1% to 1.8% of GDP in 2020. The approach used here can be replicated in other developing nations to analyse their journey toward 100% renewable energy integration and achieving net zero emissions.


*Figure 93: 2022 Recap – Renewable Energy Insights*

### 2.5.3. 2022 Recap – Renewable Energy Insights

In 2022, ASEAN member states have strengthened their national energy policies to accelerate energy transition and meet emission reduction and renewable energy share targets. Influenced by the spread of renewable energy into other sectors, green economic is in the rise. Solar is still spearheading the growth of renewables in the region along with hydropower, while the focus has been branched to the development of biomass. Considering the financial power of the member states, ASEAN countries have encouraged collaborations and green investments as means to fund future renewable energy projects.


*Figure 94: 2023 Recap – Mid-Year Energy Insight on Renewable Energy and Electricity*

### 2.5.4. 2023 Recap – Mid-Year Energy Insight on Renewable Energy and Electricity

The region put extensive efforts in improving power disruptions and fluctuating tariffs while accelerating the utilisation of renewable and alternative energy. The government geared up with several policy and financial incentives to power up the region. Power interconnection and electricity trade became essential collaboration in the region to boost the effectiveness of the electrical grid. Meanwhile, both government and private industry strived for closer collaboration in assisting the transition of the ASEAN power system to clean energy.

# 2.6. Regional Energy Policy & Planning

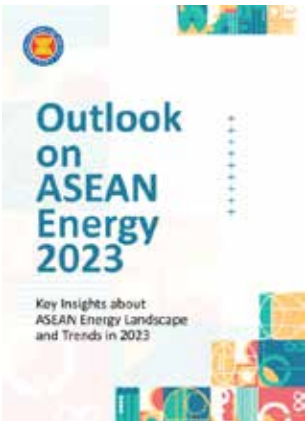



*Figure 95: Outlook on ASEAN Energy 2023*

### 2.6.1. Outlook on ASEAN Energy 2023

The current scenario prompts a re-examination of ASEAN's energy security amidst global crises, emphasising the need to ensure stability in energy supply. Concurrently, assessing ASEAN's global commitments to energy transition becomes pivotal, necessitating a closer look at climate action plans and formulating strategies to garner international public support. Alongside this, diligent tracking of ASEAN's energy targets and policies is imperative, balancing the energy transition with the sustenance of adequate energy provision. As we delve into the priorities for ASEAN energy in 2022-2023, a focus on trailing the achievements and priorities set forth during the ASEAN Chairmanship stands as a guiding beacon for the region's energy trajectory.

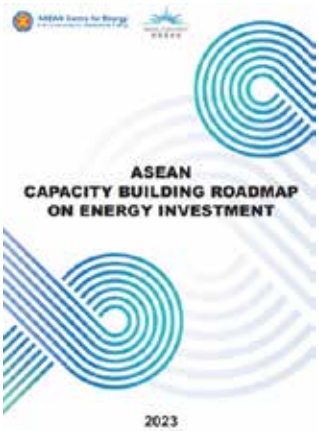



*Figure 96: ASEAN Capacity Building Roadmap on Energy Investment*

### 2.6.2. ASEAN Capacity Building Roadmap on Energy Investment

The report encompasses two crucial aspects: firstly, assessing the advancements and challenges in securing investments and sustainable financing for energy infrastructure and technologies within ASEAN. Secondly, they aim to pinpoint pivotal priority areas and delineate actionable steps to enhance regional capabilities specifically in the realm of clean energy investments. These goals collectively strive to evaluate the current landscape while strategically charting a path forward to bolster ASEAN's capacity and attractiveness in sustainable energy investment ventures. The development of this report was supported by the Energy Foundation China through the project “Measures and Investments for Clean Energy and Power Sector Resilience in ASEAN”. The views expressed herein are those of the authors and do not necessarily represent the views of Energy Foundation China.


*Figure 97: Strategic Report – Measure and Investments for Clean Energy and Power Sector Resilience in ASEAN*

### 2.6.3. Strategic Report – Measure and Investments for Clean Energy and Power Sector Resilience in ASEAN

The study investigates measures and investments for clean energy and power sector resilience in ASEAN. It aims to assess the short-term actions and mobilise longer-term investments in the region to reinforce ASEAN energy security. The research demonstrates the positive role of clean energy and power sector infrastructure in the ASEAN energy transition, including grid infrastructure, energy storage, and digitalisation. It explores more mutually beneficial cooperation opportunities with international stakeholders. Beginning with understanding the current state of each AMS with regards to their achievements of and requirements for clean energy, as well as the ongoing investments and initiatives, a roadmap is formulated for capacity building to address the needs as a national and a region This strategic report also presents best practices, lessons learnt, and policy recommendations to push the clean energy agenda forward for ASEAN. These include strengthening cooperation through the creation of a regional think tank and network for clean energy investments and funding. The development of this report was supported by the Energy

Foundation China through the project "Measures and Investments for Clean Energy and Power Sector Resilience in ASEAN". The views expressed herein are those of the authors and do not necessarily represent the views of Energy Foundation China.

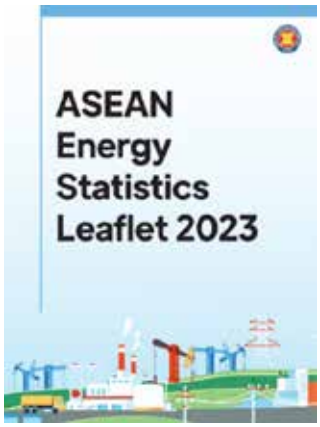



*Figure 98: ASEAN Energy Statistics Leaflet 2023*

### 2.6.4. ASEAN Energy Statistics Leaflet 2023

This report provides comprehensive visualised snapshots of the energy landscape in ASEAN. These include primary energy supply, final energy consumption, electricity, renewable energy, energy-gender, and other energy-related indicators. AESL is one of ACE report series and an integral part of the ASEAN Energy Database System (AEDS). AEDS sets a vision to become the pool of reliable and comprehensive ASEAN energy data and information. As the regional knowledge hub and think tank, ACE curate regional energy data through AEDS to serve as basis for research and policy recommendations to AMS. Data sources of AEDS are the official submission from ASEAN Member States, complemented with reports from government agencies and international organisations. The 2023 AESL is specifically designed to showcase the 2005 – 2021 statistics.

*Figure 99: Green Fiscal Stimulus in Indonesia and Vietnam: A Reality Check of Two Emerging Economies*

### 2.6.5. Green Fiscal Stimulus in Indonesia and Vietnam: A Reality Check of Two Emerging Economies

The COVID-19 pandemic has caused economic and social upheaval across countries. The global economy suffered its biggest slump in four decades while the decades of progress in poverty reduction are now in reverse. However, the pandemic presents a window of opportunity for a greener world. In contrast to fossil fuel, renewable energy showed resilience throughout the pandemic, where the demand and investment in this sector continued to increase. The opportunity for a post-COVID-19 green recovery also comes from billions of government fiscal measures in response to COVID-19. Using the case of two emerging economies, Indonesia and Viet Nam, this paper investigates whether the stimulus plans align with a country's sustainable energy and climate targets. This study finds that despite ambitious country targets for green energy transition, these countries may miss opportunities for a green future due to limited fiscal measures directed to green recovery. The pandemic has exacerbated public fiscal budgets that may further limit the capacity to fund green projects. Amidst the uncertainty and challenges brought by the pandemic, it is critical to balance between promoting economic recovery and achieving sustainable energy and climate targets. To this end, the authors suggest several policy recommendations to achieve these targets amid uncertaianty brought by the COVID-19 pandemic for emerging economies.

This paper was published in Journal Sustainability 2023, 15(3), 2174 and supported by the Energy Foundation China (EFC) through the project "ACE-EFC Joint Studies on COVID-19 Impact on Energy Sector Development and Variable Renewable Energy Smart Microgrid – Electric Vehicle Integration".

### 2.6.6. Social Media Analysis on ASEAN Energy Transition Trends

This study examines how controversies of the energy transition and climate change in the Southeast Asia region were portrayed in public perspectives using big data from the social media platform. This novel data source can then support mapping the emergence and predicting the acceptance of energy transition, which leads to the

following research question, "How can social media inform social controversy and expectations associated with the energy-climate nexus in ASEAN?" As a case study, this paper will be limited to focusing on the ASEAN energy transition and climate change discussion on the Twitter platform between January 2015 and December 2020. This case has been selected for a number of reasons: (i) Climate change is a complex interdisciplinary issue that has gained much global attention recently, (ii) Energy transition is considered an important action by the ASEAN Member States to enhance the regional energy security and sustainability as stated in the ASEAN Plan of Action for Energy Cooperation blueprint, and (iii) Twitter is one of the world's most popular social media platforms. The study relies on two theoretical frameworks as the base for building its research problem: socio-technical transition multi-level perspective and social construction of technology. A multi-quantitative method was performed for data collection and data processing. The data was analysed using descriptive trend analysis, sentiment analysis, and co-word analysis.

This article was published in IOP Conference Series: Earth and Environmental Science, Volume 1199, 2nd ASEAN International Conference on Energy and Environment 13/09/2022 – 15/09/2022 Phnom Penh, Cambodia

*Figure 100: A strategic roadmap for ASEAN to develop hydrogen energy: Economic prospects and carbon emission reduction*

**2.6.7. A strategic roadmap for ASEAN to develop hydrogen energy: Economic prospects and carbon emission reduction.**

The paper, developed collaboratively by the ASEAN Centre for Energy (ACE), the Economic Research Institute for ASEAN and East Asia (ERIA), Hunan University of Technology and Business, and Central South University, offers a comprehensive analysis and a forward-looking strategy for the development of hydrogen energy in the Association of Southeast Asian Nations (ASEAN). This study is significant as it addresses both the economic and environmental aspects of hydrogen energy, which is emerging as a key player in the global shift towards sustainable. Recognising ASEAN's rich fossil fuel reserves and burgeoning renewable energy capabilities, the study outlines a strategic, phased approach for the adoption and development of hydrogen energy. The initial phase focuses on exploiting grey hydrogen energy using existing fossil fuel resources and infrastructure up to 2025. Subsequently, the strategy shifts towards the export of blue hydrogen energy, integrating carbon capture technologies from 2026 to 2030. The ultimate goal post-2030 is to transition to green hydrogen energy, leveraging the declining costs and expanding share of renewable energy sources.

Central to this study is an in-depth economic and environmental assessment using a well-to-wheel (WTW) and Total Cost of Ownership (TCO) analytical model. This model evaluates the feasibility, costs, and carbon emissions of hydrogen energy across ASEAN's power and transportation sectors, alongside its potential for export. The findings indicate that while the short-term economic competitiveness of domestic hydrogen applications may be limited, the long-term outlook appears promising due to the anticipated decrease in renewable energy costs. Moreover, the study emphasises the strategic importance of ASEAN's existing infrastructure, like natural gas pipelines and Liquefied Natural Gas (LNG) plants, which can be repurposed for hydrogen energy, thereby reducing initial developmental costs.

*Figure 101: ASEAN's Energy Transition: How to Attract More Investment in Renewable Energy*

### 2.6.8. ASEAN's Energy Transition: How to Attract More Investment in Renewable Energy

The study examines reasons for the ASEAN region's renewable energy stunted investment through a comparative review of three key factors for attracting investment: renewable energy legislation, energy governance reform, and general conditions for investors. The study assesses business perspectives on renewable energy in any country. It also offers recent development on energy sector in the ASEAN region. Additionally, it identifies challenges and opportunities to accelerate renewable energy investment in Southeast Asia.


*Figure 102: Overcoming Energy Security Challenges in Cambodia through Energy Supply and Demand Measures*

### 2.6.9. Overcoming Energy Security Challenges in Cambodia through Energy Supply and Demand Measures

In Cambodia, various obstacles hinder energy security, stemming from institutional, policy, technical, and societal aspects related to both energy supply and demand. The New Power Development Plan (PDP) and New Energy Efficiency Plan (NEEP) represent efforts to address these concerns, aiming to enhance energy security through comprehensive improvements in supply and demand strategies. To effectively execute these plans, the Cambodian government must supplement them with additional policies, addressing existing barriers such as restructuring electricity tariffs and boosting investments in both supply and demand sectors. Furthermore, establishing a knowledge-sharing platform among stakeholders in the energy sector is essential to streamline coordination and reduce costs. Strengthening regional cooperation, especially in power grid interconnection and potential multilateral electricity trading, stands as a critical step toward fortifying Cambodia's energy security.


*Figure 103: Mobilising Finance to Support ASEAN's Low Carbon Energy Transition: Challenges and Policy*

### 2.6.10. Mobilising Finance to Support ASEAN's Low Carbon Energy Transition: Challenges and Policy Options

ASEAN's power sector necessitates a substantial USD 159 billion investment between 2021 and 2030, with about 75% earmarked for renewable energy (RE). Historically, investments, both public and private, have primarily channelled into hydropower, geothermal, and solar energy, leaving other power generation forms with limited funding. Addressing this requires a focus on bolstering the leverage of public finance and expanding fiscal capacities to attract more private investment. However, significant hurdles persist, including inadequate institutions and regulatory frameworks, insufficient fiscal backing for clean energy, and restricted project pipelines.

To tackle these challenges, specific policy options emerge: implementing regulatory and institutional reforms to enhance planning and execution, reallocating public budgets to enhance leverage, and integrating blended finance models to support early-stage project development and unfamiliar technologies. These measures aim to stimulate the flow of investment into diverse

clean energy sectors, addressing the identified barriers and fostering a more robust and inclusive renewable energy landscape within ASEAN.


*Figure 104: Attracting Clean Energy Investment in ASEAN through Capability Enhancement*

### 2.6.11. Attracting Clean Energy Investment in ASEAN through Capability Enhancement

This policy brief aims to illuminate the current status of capacity building in ASEAN member states (AMS) concerning green investments and funding. It addresses pertinent issues, challenges, ongoing initiatives, and future action plans through strategic approaches. The implementation of new policies focusing on enhancing capacity building in clean energy investments and funding among AMS promises to fortify unity and collaboration, fostering sustainability and a cleaner environment for improved living standards. The proposed establishment of the ASEAN Clean Energy Capacity Building Network stands to leverage AMS in their capacity-building endeavours, fostering solidarity across the region. Additionally, the formulation of Action Plans, integrating Strategic Initiatives (SI), serves as a guideline for strategic implementation approaches in AMS' capacity-building programs, encouraging shared learning among ASEAN members. Furthermore, advocating for more specific and effective policies and regulatory frameworks in clean energy capacity building aims to enhance decision-making and attract investors to participate in clean energy ventures across AMS. Lastly, bridging the gap between developed and developing nations in clean energy investment and finance capacity necessitates collaborative flagship programs and support systems, such as online training modules or webinars, aimed at empowering developing nations with essential knowledge and tools in the clean energy domain.

The development of this report was supported by the Energy Foundation China through the project “Measures and Investments for Clean Energy and Power Sector Resilience in ASEAN”. The views expressed herein are those of the authors and do not necessarily represent the views of Energy Foundation China.


*Figure 105: Integrated Approach to Green Fiscal for ASEAN*

### 2.6.12. Integrated Approach to Green Fiscal for ASEAN

Green fiscal policy stands as a pivotal response to combat global warming, encompassing well-designed tax policies aimed at elevating carbon prices and incorporating non-tax measures like emission trading systems or feebates. Learning from global experiences is imperative for effective green fiscal consolidation, emphasising the need for spending-driven adjustments over revenue-focused ones to stabilise debts, particularly when utilising multiple instruments. Ensuring the efficacy of cooperation between central and local governments demands an integrated approach, supported by apt regulatory frameworks that extend fiscal rules to encompass green consolidation. Establishing the ASEAN Green Fiscal Policy Network (AGFPN) and the ASEAN Data Carbon Pricing Platform (ADCPP) emerges as essential initiatives. These platforms enable ASEAN Member States (AMS) to convene, exchange ideas, and share insights through forums and dialogues, facilitating discussions on green fiscal policies, instruments, models, and challenges. This collective effort aims to advance green fiscal consolidation towards fostering a green economy within their respective states and the wider region.

The development of this report was supported by the Energy Foundation China through the project “Measures and Investments for Clean Energy and Power Sector Resilience in ASEAN”. The views expressed herein are those of the authors and do not necessarily represent the views of Energy Foundation China.


*Figure 106: Accelerating Clean Energy Transition in ASEAN: An Innovative Approach through Blended Finance and Project Preparation Facilities*

### 2.6.13. Accelerating Clean Energy Transition in ASEAN: An Innovative Approach through Blended Finance and Project Preparation Facilities

Renewable energy investments across ASEAN nations face hurdles stemming from inconsistent policies, financial constraints, and a lack of robust project pipelines. Project Preparation Facilities (PPFs) offer promise in overcoming technical, financial, and legal challenges in clean energy project preparation, yet their effectiveness varies and often prioritises later-stage processes, leaving early stages underfunded. Augmenting PPF capabilities with blended financing, including the establishment of a financial intermediary fund, holds potential to lower investment costs and propel early-stage project preparation. A tailored regional programme addressing the unique needs of each ASEAN member state could significantly bolster clean energy investments, especially by focusing on upstream aspects of project preparation. Complemented by targeted initiatives providing support during the enabling phase, this comprehensive approach aims to advance renewable energy projects across the region.


*Figure 107: How Southeast Asia Should Embrace Hydrogen: Energy Security and Climate Change Perspectives*

### 2.6.14. How Southeast Asia Should Embrace Hydrogen: Energy Security and Climate Change Perspectives

The Policy Brief addresses the potential of hydrogen energy in ASEAN countries. It highlights hydrogen's role in enhancing energy security and achieving carbon neutrality. The brief acknowledges the current reliance on fossil fuels in the region and suggests hydrogen as a viable solution to decarbonise various sectors. Challenges, such as high production costs and safety concerns, are discussed. It proposes strategies for developing a hydrogen economy, including market creation, infrastructure development, and research in carbon capture technologies. The brief also examines hydrogen's application in different sectors and the need for ASEAN to embrace this energy alternative for future economic and environmental benefits.

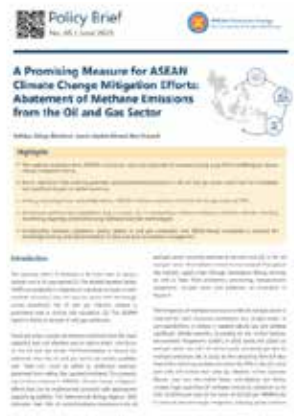



*Figure 108: A Promising Measure for ASEAN Climate Change Mitigation Efforts: Abatement of Methane Emissions from the Oil and Gas Sector*

### 2.6.15. A Promising Measure for ASEAN Climate Change Mitigation Efforts: Abatement of Methane Emissions from the Oil and Gas Sector

The Policy Brief discusses the growing challenge of methane emissions in ASEAN's oil and gas sector and their impact on climate change. It notes that reducing these emissions is crucial due to methane's high global warming potential. The brief highlights that current technologies could reduce ASEAN's oil and gas sector methane emissions by 75%. It emphasises the vital role of government policies and regulations in promoting emission reductions, including monitoring and incentivising methane reduction technologies. Additionally, it stresses the importance of collaboration among regulatory bodies and oil and gas companies for sharing knowledge and best practices in methane management.


*Figure 109: ASEAN Readiness for the Energy Transition: A Baseline Assessment of the Cohesion and Viability of Key ASEAN Energy Planning Documents*

### 2.6.16. ASEAN Readiness for the Energy Transition: A Baseline Assessment of the Cohesion and Viability of Key ASEAN Energy Planning Documents

The policy brief discusses the importance of information sharing on the energy-climate nexus that has the potential to be emphasised in the ASEAN Plan of Action for Energy Cooperation (APAEC) for the period 2026 - 2030 and the 8th ASEAN Energy Outlook (AEO8). It also addresses the importance of defining a low carbon economy for improving common understanding and joint effort to move towards a low carbon economy and net zero emissions in ASEAN. Moreover, the document highlighted the necessity to involve social inclusion and equality to accelerate energy transition in ASEAN.


*Figure 110: Climate Insight on Signs of Hope in 2023 towards a Low Carbon Economy and Net Zero Future*

### 2.6.17. Signs of Hope in 2023 towards a Low Carbon Economy and Net Zero Future

Climate insights is an overview of climate-energy nexus in Southeast Asia. This Q1/2023 Climate Insights highlight ASEAN countries' efforts to promote clean energy as part of a broader global movement towards sustainability. The report highlights ASEAN's commitment and aspiration for net zero with new policies and regulations supporting their energy objectives.


*Figure 111: Climate Insight – Beyond Boundaries: Southeast Asia's Luminous Path towards Sustainable Energy*

### 2.6.18. Beyond Boundaries: Southeast Asia's Luminous Path towards Sustainable Energy

The Q2/2023 Climate Insights highlight ASEAN countries' efforts to tackle environmental issues, support sustainable development, and decrease dependency on fossil fuels. The report showcases the significant initiatives and partnerships propelling the shift towards a greener future in the region. With countries like Indonesia, Cambodia, the Philippines, Thailand, Malaysia and Viet Nam at the forefront, there is a collective commitment to clean energy endeavours backed by international organisations and collaborative ventures.


*Figure 112: Climate Insight – Regional Interconnectivity: A Catalyst for Clean Energy Investments in ASEAN*

### 2.6.19. Regional Interconnectivity: A Catalyst for Clean Energy Investments in ASEAN

The Q3/2023 Climate Insights highlight transformative changes in the region driven by a collective commitment to address climate change and adapt to its impacts. Notably, Singapore is actively seeking alternative sources of green energy, including imports from neighbouring countries such as Indonesia, Thailand, Viet Nam, Lao PDR, and Cambodia. On the other hand, Indonesia, Brunei, Malaysia, and the Philippines are engaging in discussions to establish energy connectivity. These initiatives will serve to promote the transition to clean energy, act as catalysts for clean energy investments, and contribute to a brighter and more sustainable future for the ASEAN Member States

## 2.7. Civilian Nuclear Energy

## 2.8. Annual Report


*Figure 113: ACE Annual Report 2021*

### 2.8.1. ACE Annual Report 2021

ACE Annual Report 2021 covers ACE's accomplishments, activities, and finances throughout 2021. The report highlights the notable achievements that supported the implementation of the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II: 2021-2025 and ACE's organisational development. ACE continues to play a crucial role in the heart of ASEAN energy cooperation despite the COVID-19 outbreak and the challenges it posed to the energy sector.


*Figure 114: ACE Annual Report 2022*

### 2.8.2. ACE Annual Report 2022

ACE Annual Report 2022 covers ACE's accomplishments, activities, and finances throughout 2022. The report highlights the notable achievements that supported the implementation of the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II: 2021-2025 and ACE's organisational development. ACE continues to play a crucial role in the heart of ASEAN energy cooperation.

## 2.9. Op-Eds

***For more details**: http://go.aseanenergy.org/OpEd*

| Title | Authors | Link |
|---|---|---|
| Unearthing the catalyst for ASEAN's energy transition in 2023 | Dr Nuki Agya Utama, Dr Zulfikar Yurnaidi | https://www.thejakartapost.com/opinion/2023/01/07/unearthing-the-catalyst-for-aseans-energy-transition-in-2023.html |
| Tap on commitment from COP27 to support ASEAN renewable energy target | Monika Merdekawati, Septia Buntara Supendi, and Faricha Hidayati | https://www.eco-business.com/opinion/tap-on-commitment-from-cop27-to-support-asean-renewable-energy-target/ |
| Indonesia's leadership in ASEAN's energy transition | Jason Jimmy Amadeus Palenewan, Dr Zulfikar Yurnaidi | https://www.thejakartapost.com/paper/2023/02/08/indonesias-leadership-in-aseans-energy-transition.html. |
| The Future and Challenges of Electromobility in ASEAN | Dr Nuki Agya Utama, Monika Merdekawati, and Dr. Zulfikar Yurnaidi. | https://www.thejakartapost.com/opinion/2023/03/28/the-future-and-challenges-of-electromobility-in-asean.html?utm_campaign=os&utm_source=mobile&utm_medium=android |
| Amplifying ASEAN energy security through regional cooperation | Adhityo Gilang Bhaskoro, Beni Suryadi and Dr Nuki Agya Utama | https://www.thejakartapost.com/paper/2023/04/12/amplifying-asean-energy-security-through-regional-cooperation.html |
| Could it boost renewables in Vietnam? | Dr Nuki Agya Utama, Monika Merdekawati, and Ngoc Huong Giang Vu | https://www.eco-business.com/opinion/local-content-requirements-could-it-boost-renewables-in-Vietnam/ |
| ASEAN-China way forward on energy transition | Amira Bilqis, Imaduddin Abdullah | https://www.phnompenhpost.com/opinion/asean-china-way-forward-energy-transition |
| Strengthening Regional and International Cooperation in Financing Clean Energy in Asean Post-Crisis | Rika Safrina and Hazleen Aris | https://jakartaglobe.id/opinion/strengthening-regional-and-international-cooperation-in-financing-clean-energy-in-asean-postcrisis |
| ASEAN bets on biofuel, but feedstock crunch could void the gamble | Monika Merdekawati, Beni Suryadi, and Jason Jimmy Amadeus Palenewan | https://www.eco-business.com/opinion/asean-bets-on-biofuel-but-feedstock-crunch-could-void-the-gamble/ |
| Strengthening Energy Efficiency Efforts in Residential Sector through the New Energy Efficiency Policy (NEEP) | Ghiffari Aby Malik Nasution, Auliya Febriyanti, Ambiyah Abdullah | https://www.phnompenhpost.com/opinion/strengthening-energy-efficiency-efforts-residential-sector-neep |
| How Grid-Interactive Efficient Buildings Transform the Building Industry, Empower Consumers in ASEAN | Vu Trong Duc Anh and Rio Jon Piter Silitonga | https://www.phnompenhpost.com/opinion/how-grid-interactive-efficient-buildings- |

| | | |
|---|---|---|
| | | transform-building-industry-empower-consumers-asean |
| Energy Can Be a Catalyst for Peace | Dr Nuki Agya Utama, Rika Safrina & Amira Bilqis | https://www.bangkokpost.com/opinion/opinion/2609713/energy-can-be-a-catalyst-for-peace |
| Safeguarding Energy Security in Cambodia for Universal Electricity Access | Auliya Febrianti, Ghiffari Aby Malik Nasution and Ambiyah Abdullah | https://www.phnompenhpost.com/opinion/safeguarding-energy-security-cambodia-universal-electricity-access |
| New Plan Could Benefit ASEAN's EV | Auliya Febrianti and Ambiyah Abdullah | https://www.bangkokpost.com/opinion/opinion/2673343/new-plan-could-benefit-aseans-evs |

# Achievements

# 3. Achievements

## 3.1. Project and Funding

### 3.1.1. Energy Foundation China (EFC)

ACE and The Energy Foundation agreed to continue the phase III collaboration to study carbon trading and energy investment. On 27 September 2023, ACE has received the approval grant from The Energy Foundation with amount of USD 303,200. The project will produce several outcomes, including ASEAN–China Cooperation on the Investment of Energy Transition Workshop and Site Visits as part of the ASEAN Energy Business Forum (AEBF) 2023, as well as ASEAN Energy Investment 2024 Report. The workshop was successfully organised as a side event of the ASEAN Energy Business Forum (AEBF) on 25 August 2023 at Nusa Dua, Bali. By far, the project activities are in the first draft stage and are expected to be disseminated in July 2024.

### 3.1.2. Joint Study on 'The ASEAN Readiness for CCT and CCU Technologies Towards Carbon Neutrality' with J-COAL

ACE has been on the right track in securing the joint project from JCOAL since the sign of agreement in 2022. ACE and JCOAL agreed the collaboration with the total budget of USD 42,000 to work together in providing information, data, and analysis for the AMS for policy development in supporting the implementation of APAEC. The grants will be used to establish strategic report to study 'ASEAN Readiness for CCT and CCU Technologies towards Carbon Neutrality', which under the finalisation stage.

### 3.1.3. EmPower (UNEP and UN Women)

The EmPower team (UN Women and UNEP) also continue its collaborative study to mainstreaming gender in energy sector with the total budget of USD 30,000 for the 2-year project. Within this agreement, ACE also will support the implementation of the project EmPower of Women for Climate Resilient Societies Phase II in Asia Pacific. The Phase II will amplify national results through regional platforms and encourage regional cooperation to drive a just energy transition while reaching a wider range of areas.

### 3.1.4. China Energy Technology and Economics Research Institute (CETERI)

The next phase of ACE-CETERI cooperation recently has been approved to develop the Roadmap for Clean Coal Power Technology Transformation in ASEAN. ACE has received a funding of USD 77,963 to support the joint collaborative research on the clean transformation plan of the coal power plants in the next 10 years, which align with the energy transition in ASEAN. By far, the project activities are still underway for report drafting.

### 3.1.5. Cleaner Energy Future Initiative for ASEAN (CEFIA) Programme

ACE is pleased to announce the continuation of its collaborative efforts to implement the Cleaner Energy Future Initiative for ASEAN (CEFIA) Programme. The CEFIA was launched in 2019 as an initiative to support energy transition and decarbonization of the ASEAN region. With a total budget of 96,724 USD funded by Japanese Ministry of Economy, Trade and Industry (METI) and timeframe spanning 25 July 2023 to 27 March 2024, ACE, alongside Boston Consulting Group G.K. (BCG) as the CEFIA secretariat, will continue supporting the programme's impactful initiatives. Current flagship

projects encompass Zero Energy Building, RENKEI, SteelEcosol, finance, Healthy and Energy Efficient AC System, and Biochar.

### 3.1.6. ASEAN-Japan Energy Efficiency Partnership (AJEEP) Programme

ACE is delighted to announce the continuation of its collaborative efforts with the Energy Conservation Center Japan (ECCJ) under ASEAN Senior Officials Meeting on Energy – Ministry of Trade, Economy, and Industry of Japan (SOME-METI) Work Programme 2023 – 2024. Funded by the METI in a total of JPY 13,799,58, AJEEP targets the establishment of robust energy efficiency and conservation (EE&C) infrastructure across ASEAN, aligning with the "ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II: 2021-2025." Two schemes will advance this mission in 2023 are AJEEP Scheme 4 which aims to establish an ASEAN-wide energy manager qualification system, facilitating improved energy efficiency and contributing to the region's carbon neutrality goals and AJEEP Scheme 5 which focused on disseminating and promoting advanced technologies and systems, this scheme targets the industrial, transportation, and commercial building sectors.

### 3.1.7. ASEAN Cool Initiative Project (UNEP-U4E)

In 2023, the ASEAN Centre for Energy (ACE) secured a USD 100,000 Small Scale Funding Agreement (SSFA) from the United for Efficiency (U4E) under the ASEAN Cool Initiative Project which lasts until November 2024. The project aims to provide support for ASEAN Member States (AMS) in adopting and implementing regional/national roadmaps on Minimum Energy Performance Standards (MEPS) for Air Conditioners (ACs), whilst deploying low-Global Warming Potential (GWP) refrigerants. The outputs of the project include two activities at the regional level to accelerate the regional roadmap on energy efficient AC and at the national level to support development of MEPS and labels for Malaysia and Singapore.

### 3.1.8. Low Carbon Building Transition Programme (IKI)

In 2023, ACE has made another milestone in accelerating the low carbon building transition in Asia by securing agreement on the Low-Carbon Building Transition (ALCBT) programme in 5 Asian countries (Cambodia, India, Indonesia, Thailand, and Viet Nam). The 5 years-programme is funded by the International Climate Fund (IKI) and the Federal Ministry for Economic Affairs and Climate Action (BMKW), Germany, also supported by GGGI as consortium lead. ACE will manage a budget of EUR 3,433,236 to promote Low Carbon Buildings (LCBs), facilitate development and use of Energy Performance Contract (EPC) and On-Bill Financing Model to promote LC Building, and knowledge sharing and capacity enhancement on sustainable building across ASEAN member countries.

### 3.1.9. Promoting Energy Efficiency in Building in ASEAN (PEEB-ASEAN) Programme (AFD)

In December 2023, the Agence Française de Développement (AFD) just confirmed the acceptance of ACE's proposal on Promoting Energy Efficiency in Building in ASEAN (PEEB-ASEAN) Programme with a budget of USD 2,800,000. The PEEB-ASEAN programme aims to support the transition of the building sector towards better energy and environmental performance and better resilience to the effects of climate change. The beneficiaries of this 4 year-project are the 10 ASEAN Member States (AMS).

The objectives of the project include the Enhancement of Enabling Activities for Building Energy Efficiency and Building Energy Efficiency Investment and Scaling-Up. Each component comprises a number of complementary activities

designed to strengthen building EE and green regulations, to promote effective enabling activities for EE and green buildings in ASEAN member states (AMS), and to provide technical and financial assistance to public and private project owners to achieve ambitious EE and green performance targets.

### 3.1.10. Feasibility Study of Indonesia-Malaysia Cross-border Interconnection Funded by United States Trade & Development Agency (USTDA)

*Figure 115: The 1st Proposal Preparation Meeting between PLN, USTDA, ACE, Delphos, Stantec, USAID SPP, and DGE on 25 January 2023*

Refer to the directive from the 40th ASEAN Ministers on Energy Meeting (AMEM), dated 15 September 2022, held in Cambodia, stated that the Following - Up of AIMS III including facilitating pre-feasibility and detailed feasibility studies for APG project implementation, ACE has already engaged with the support of broader U.S. government programmes and Development Partners to conduct feasibility study for two (2) of the possible 18 identified cross-border interconnections in ASEAN resulted in AIMS III. The two (2) projects involving the possible power trading between Indonesia and Malaysia through Sumatra and Borneo islands.

The project development has reached a successful milestone as the grant proposal was approved by the USTDA leadership.

The announcement of grant approval was made during the two leaders, President Biden and President Widodo elevated U.S.-Indonesia ties to a Comprehensive Strategic Partnership in November 2023. The commencement of the project is expected to be in early Q1 2024. The feasibility study will be conducted under the grant funded by the United States Trade & Development Agency (USTDA), the total project value is USD 2,387,082.

The feasibility study will focus on scaling up investments in the cross-border transmission facility between Sumatra – Peninsular Malaysia and Kalimantan – Sabah, supporting the development and implementation of policies for cross-border power trading between Indonesia – Malaysia. The Feasibility Study will determine the technical, financial, and economic feasibility and the preliminary environmental impact assessment of the project.

ACE as project initiator and coordinator, has engaged with the U.S Firms, Delphos International Ltd and Stantec, to develop the project proposal along with the guidance from government of Indonesia through Directorate General of Electricity (DGE) and advisory from the United States Agency for International Development (USAID). ACE also has already secured the full support from the Indonesia and Malaysia' utilities through the establishment of the Memorandum of Understanding with PT. PLN (Persero), Tenaga Nasional Berhad (TNB) and Sabah Electricity Sdn Bhd (SESB) for the development of Feasibility Study for Cross-border Interconnection between Indonesia – Malaysia which was signed at the 41st ASEAN Ministers on Energy Meeting (AMEM-41) in Bali, 25 August 2023.

### 3.1.11. ACE Signed Partnership with USAID SPP to Drive Clean Energy Transition


*Figure 116: Grand Under Contract Signing Ceremony of USAID SPP*

ACE and SPP engaged in a formal Grant Under Contract (GUC) signing event during the 41st Senior Officials Meeting on Energy (SOME-41) held on 22 June 2023, in Jakarta, Indonesia. This signing ceremony played a vital role in the context of the 14th SOME-US meeting and was attended by prominent

stakeholders from both ASEAN and the United States. Among the witnesses to the signing between ACE and SPP were leaders from the 10 ASEAN Member States (AMS), representatives from the ASEAN Secretariat, the US Mission to ASEAN, and the USAID Regional Development Mission for Asia (RDMA).

Dr Nuki Agya Utama, ACE's Executive Director, signed a three-year partnership grant alongside John Bruce Wells, Chief of Party at USAID Southeast Asia's Smart Power Program (SPP). The signing was witnessed by notable individuals, including Kanchana Wanichkorn, Director of ASEAN Sectoral Development at the ASEAN Secretariat; Jisman Hutajulu, Director General of Electricity at the Ministry of Energy and Mineral Resources and Indonesia's Senior Official on Energy (SOE); Kate Rebholz, US ASEAN Chargé d'Affaires; and Steve Olive, Mission Director at USAID RDMA.

This momentous signing ceremony marks a three-year partnership commitment between ACE and SPP, aimed at supporting decarbonisation efforts within ASEAN and enhancing the region's power systems. The partnership's goals include increasing regional energy trade and accelerating the adoption of low-carbon energy technologies to strengthen the region.

The ACE-SPP Partnership provides an ongoing framework through which ACE and SPP can collaborate in the design and implementation that advances the APAEC Phase 2: 2021-2025. The main results of the project will be the achievement of key strategies of APAEC Phase 2: 2021-2025 Programme Areas.

Underpinning the ACE-SPP Partnership is a 3-year, $3 million Grant under Contract (GUC) that SPP awarded to ACE effective 1 May 2023. To harmonise reporting under the GUC with SPP's reporting to USAID, the "Year One Workplan" for this GUC will cover the expanded initial period of 1 May 2023, through 30 September 2024.

This first year of GUC operation is based on the foundation of team building, presence, and collaboration. A dedicated PMU is established to carry out the implementation of the project. ACE is responsible for introducing the ACE-SPP Project and its accomplishments to the ASEAN key stakeholders (AMEM, SOME, SEBs/SSNs) with detailed work plans as below.


*Figure 117: 1st Year Work Plan of ACE under USAID SPP Project*

Seventy-eight (78) key activities are identified based on the discussion between ACE and SPP Technical Teams on 22-24 May 2023, and 15 August 2023, in Jakarta, Indonesia as the outcome of Annual Work Plan 2023. These activities would support the achievement of APAEC Phase 2: 2021-2025 in four (4) Programme Areas, namely APG, EE&C, RE and REPP. These 78 Key Activities have different Deliverables, mainly are technical reports from the studies, workshops, and their activity reports. Detailed deliverables are presented below.

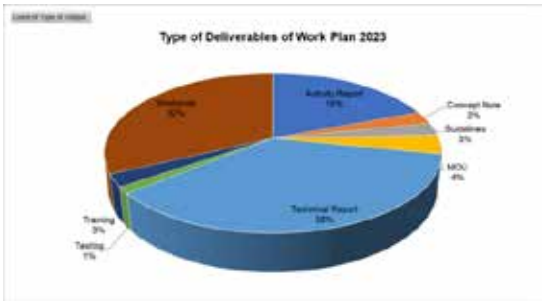



*Figure 118: Shares of Type of Deliverables of Work Plan 2023*

All the activities will be delivered from 1 May 2023 to 30 September 2024. Below is the profile of each quarter's activities (progressed and completed).

| Activity /Deliverables | Q3 2023 | Q4 2023 | Q1 2024 | Q2 2024 | Q3 2024 |
|---|---|---|---|---|---|
| Activity Report | 1 | 4 | 2 | 4 | 6 |
| Concept Note | | 1 | 1 | 1 | |
| Guidelines | | | 1 | 1 | 1 |
| MOU | | | 1 | 2 | 1 |
| Technical Report | 2 | 9 | 14 | 19 | 12 |
| Testing | | 1 | | | |
| Training | | | | 2 | 1 |
| Workshop | 4 | 3 | 8 | 13 | 8 |
| Total | 7 | 18 | 27 | 42 | 29 |

*Figure 119: ACE Deliverables under USAID SPP Project*

### 3.1.12. ASEAN Climate Change and Energy Project (ACCEPT II)

The ongoing ASEAN Climate Change and Energy Project (ACCEPT) II is taking a remarkable step in 2023. Since its inception in November 2022, ACCEPT II has been instrumental in supporting the implementation of the APAEC Programme Area No. 6, on Regional Energy Policy and Planning. This is achieved through the Outcome Based Strategy (OBS) 6, emphasising information sharing on the energy-climate nexus.

During the 41st ASEAN Ministers on Energy Meeting (AMEM-41), held in Bali on 24 August 2023, ACCEPT II's contributions were prominently featured. Two key events highlighted at this meeting were the High-Level Policy Dialogue on 'Sustainable Energy Financing and the Mobilisation of Energy Investment to Ensure Energy Security and Achieve the Nationally Determined Contributions in ASEAN' and the Regional Workshop on Carbon Pricing Implementation in ASEAN. These activities were recognised for their role in enhancing ASEAN's capacities towards a low-carbon energy system and a net-zero future.

The meeting also highlighted the anticipation of future projects and activities from ACCEPT II, aimed at further advancing regional energy-climate nexus collaboration. This includes the Energy-Climate Nexus Study Tour to Norway, which was conducted on 5-11 November au2023.

Looking ahead, ACCEPT II is set to continue its support for the ASEAN Member States. Its focus will remain on advancing knowledge, building capacity, and strengthening regional structures and collaborations in the energy-climate nexus, both at national and regional levels.

### 3.1.13. Peer-Learning Facilitation Support for Southeast Asia's Global Power System Transformation (G-PST) Activities

The core team of Global Power System Transformation (G-PST) Consortium, including the Energy Systems Integration Group (ESIG), Imperial College London, Council of Scientific and Industrial Research (CSIR), Fraunhofer Cluster of Excellence for Integrated Energy Systems, National Renewable Energy Laboratory (NREL), Latin American Energy Organisation (OLADE), Institute of Electrical and Electronics Engineers (IEEE), Electric Power Research Institute (EPRI), Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Danish Technical University (DTU), and the ASEAN Centre for Energy (ACE), is leading the consortium and actively engaged with power system operators in all region for accelerating the transition to advanced low emission power system.

The G-PST Consortium is partnering with several emerging economy and developing country system operators from Africa, Asia, Latin America, and Eastern Europe who will also guide the G-PST Consortium vision and collaborate with the G-PST Consortium to advance power system transformation with a focus on technical collaboration, peer learning and exchange, and workforce development to support local power system transformation priorities.

One of the main activities under G-PST Consortium is to facilitate a knowledge sharing platform in the form of community practice for the system operators. These could include virtual or in-person regional knowledge-sharing roundtables, which usually consist of technical presentations from participants inside or outside the region.

Following the success of the first Southeast Asia's Community of Practice (CoP) with the topic of "Learning from Viet Nam's Experience on High Fluctuations of Variable Renewable Energy in Grid System" that was held on November 2022, attracted more than 220 participants to join into the lively discussion among system operators, the ASEAN Centre for Energy (ACE) in collaboration with the G-PST Consortium Secretariat, NREL is planning to conduct a series of Community of Practice for Southeast Asia's System Operators in 2024.

The purpose of this project is to conduct a series of Community of Practice for the Southeast Asia power system operators, to facilitate a participants-driven activity for knowledge and hands on experiences sharing in the pursuit of accelerating the transformation to low emission power system. The outcomes of the discussion will be collected and gathered in a written report, whitepapers, or other sharing platform.

ACE has received the subcontract/awards from the NREL, as G-PST secretariat to support all activity for possible 5 years with total value of the project is USD 500,000. ACE has engaged with the G-PST secretariat, NREL, to develop the concept of the project and allocated the required resource, in parallel ACE also has received the support from the Head of ASEAN Power Utilities/Authorities (HAPUA) to seek guidance and endorsement of the project and to engage with the ASEAN Power System Operators (APSO) to discuss the potential topics of the peer-learning activities.

## 3.2. Memorandum of Understanding

### 3.2.1. MoU with KNA for Nuclear Power and Clean Energy Strategic Partnership

*Figure 120: The Signing MoU between ACE and KNA*

The ASEAN Centre for Energy (ACE) and Korea Nuclear Association (KNA) are pleased to announce the signing of a Memorandum of Understanding (MoU) at the ASEAN Centre for Energy's headquarter in Jakarta, Indonesia. The signing ceremony marked the beginning of a strategic partnership aimed at enhancing human resource capacity development for nuclear power generation and clean energy utilisation in ASEAN, in line with the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase 2: 2021-2025.

The ceremony was attended by the leaders from both ACE and KNA, including Jonghun Tae, the President of the Korea Nuclear Association (KNA), and Dr Nuki Agya Utama, the Executive Director of ACE. In his opening remarks, Jonghun expressed KNA's eagerness to expand its operations to ASEAN and recognised ACE as the perfect partner for this undertaking. Meanwhile, Dr Nuki reiterated the importance of enhancing partnership, noting the projected ASEAN's energy demand would grow 3-4 times by 2050, according to the 7$^{th}$ ASEAN Energy Outlook, and welcomed KNA and Korean Government's timely assistance.

Both sides acknowledged the challenges of achieving sustainable energy development and energy security and agreed that there are no single pathways to meet ASEAN energy needs. Hence, they recognised the importance of nuclear energy to enable the efforts towards achieving sustainable future.

In conclusion, the signing of MoU between ACE and KNA is a significant milestone in fostering a strategic partnership in nuclear energy utilisation between the two sides. It is a signal to their commitment to a sustainable energy future for ASEAN and their recognition of the importance of collaboration and partnership in achieving this goal.

### 3.2.2. MoU with the United Nations Environment Programme (UNEP) - Global ESCO Network

The ASEAN Centre for Energy (ACE) and the United Nations Environment Programme (UNEP), with the invaluable participation of the Global ESCO Network, are pleased to announce the signing of a Memorandum of Understanding (MoU) in May 2023. This MoU signifies the unwavering commitment of both organisations to deepen their collaboration and achieve shared goals in advancing energy efficiency

through Energy Service Companies (ESCOs) and Energy Performance Contracting (EPCs), particularly in the context of the ASEAN Plan of Action for Energy Cooperation (APAEC) and through the involvement of the Global ESCO Network. The MoU outlines key areas of collaboration including supporting APAEC implementation in formulating impactful national and regional energy efficiency policies and Joint knowledge sharing and capacity building on ESCO development and deployment in ASEAN.

### 3.2.3. MoU with Multiple Partners on AMEM-41 and AEBF 2023

*Figure 121: ACE's MoU Signing Ceremony with Multiple Partners, witnessed by ASEAN Ministers*

On 25 August 2023, in Bali, the ASEAN Centre for Energy (ACE) played a pivotal role in the signing of a significant Memorandum of Understanding (MoU) concerning cross-border interconnections. This event took place alongside the 41st ASEAN Ministers on Energy Meeting (AMEM-41), coinciding with the ASEAN Energy Business Forum (AEBF) 2023. The ceremony was witnessed by the ASEAN Ministers, underscoring the importance of these collaborations in advancing the region's energy landscape. The following MoUs have been established:

#### 3.2.3.1. ACE-Indonesia-Malaysia Cross-Border Power Interconnections

The MoU represents a joint commitment from four principal entities: PT PLN (Persero), led by President Director Darmawan Prasodjo; Tenaga Nasional Berhad (TNB), with President and Chief Executive Officer Dato' Indera Ir. Baharin Bin Din at the helm; Sabah Electricity Sdn Bhd (SESB), represented by Chief Executive Officer Ir. Ts. Mohd Yaakob Jaafar; and ACE, under the guidance of Executive Director Dr Nuki Agya Utama. This progressive initiative stems from the ASEAN Interconnection Masterplan Study (AIMS) III Phases 1 and 2. Developed through collaborative efforts between ACE and the Heads of ASEAN Power Utilities/Authorities (HAPUA), the study provides a roadmap for essential transmission infrastructure. This infrastructure is key to facilitating multilateral power trade within ASEAN and seamlessly integrating renewable energy into the ASEAN Power Grid.

At the heart of this initiative are 18 potential cross-border lines identified by AIMS III, which could support up to 33 GW of electricity interconnections. Building on these insights, ACE is leading efforts to realise these plans through Feasibility Studies focused on the Operationalisation of Cross-Border Interconnections in Southeast Asia. A significant aspect of these studies is the integration of renewable energy, in line with the objectives of AIMS III. Moreover, this agreement lays the groundwork for harnessing the region's abundant renewable energy resources. It aims to ensure equitable distribution of surplus capacity and to drive economic development, energy resilience, and security across ASEAN nations.

#### 3.2.3.2. ACE, Southeast Asia Energy Transition Partnership (ETP), and Clean, Affordable and Secure Energy for Southeast Asia (CASE)

A landmark MoU was signed between ACE, ETP, and CASE to bolster the ASEAN Power Grid (APG). This agreement focuses on enhancing cross-border electricity trade and integrating renewable energy sources, as outlined in APAEC Phase II. It includes the implementation of the APG Advancement Programme, emphasising multilateral power trading and renewable energy integration. This marks a considerable stride in advancing regional energy integration and meeting ASEAN's growing energy needs and renewable targets.

#### 3.2.3.3. ACE and Asian Development Bank (ADB)

ACE and ADB have signed MoU to collaborate on developing clean energy and energy efficiency projects, regional power market and multilateral power trade arrangements, and regional power interconnections within ASEAN.

#### 3.2.3.4. ACE and Japan International Cooperation Agency (JICA)

ACE and JICA are working together to expedite decarbonisation and promote sustainable development within the ASEAN region.

#### 3.2.3.5. ACE and Waseda University

ACE and Waseda University have established a partnership to promote research, educational activities, and knowledge exchanges. The signing ceremony was on 25 August 2023 in Bali during the ASEAN Energy Business Forum (AEBF) 2023.

#### 3.2.3.6. ACE and Universiti Tenaga Nasional (UNITEN)

On 25 August 2023, ACE and Universiti Tenaga Nasional (UNITEN) Malaysia signed a memorandum of understanding in Bali during the ASEAN Energy Business Forum (AEBF) 2023. In conjunction with AEBF, UNITEN also served as the academic partner of the 3rd ASEAN International Conference on Energy and Environment (AICEE). Moreover, collaboration includes fostering academic, research, and industry in energy sectors based on mutual benefit.

#### 3.2.3.7. ACE and Universitas Pendidikan Nasional (UNDIKNAS)

ACE has reached mutual understanding with Universitas Pendidikan Nasional (UNDIKNAS) Indonesia to reinforce research and training efforts. The signing ceremony was attended by Ida Nyoman Basmantara, Head of International Office, as the representative from UNDIKNAS, and Dr Zulfikar Yurnaidi, MPP Manager of ACE in the presence of Dr Nuki Agya Utama, the Executive Director of ACE.

#### 3.2.3.8. ASEAN-China Clean Energy Cooperation Centre (ACCECC) Affairs Managing Agency

ACE and ACCECC Affairs Managing Agency signed an MoU, aiming to enhance clean energy collaboration between ASEAN and China, focusing on joint research, knowledge sharing, and cooperative initiatives.

#### 3.2.3.9. ACE and Energy Foundation China (EFC)

ACE has partnered with EFC to expedite energy transition and ensure energy security in the ASEAN region. The collaboration encompasses joint research, policy development, and technology adoption.

#### 3.2.3.10. ACE and National Solar Exchange

ACE and National Solar Exchange are embarking on a collaborative project to develop a functional demonstration of a regional energy investment platform, contributing to the goals of APAEC.

#### 3.2.3.11. ACE and Japan External Trade Organization (JETRO)

ACE and JETRO are enhancing collaboration to propel energy transition in ASEAN countries, advancing efforts towards net-zero emissions.

#### 3.2.3.12. ACE and Korea Developmet Bank (KDB)

ACE and KDB are closely collaborating on the "Supporting Innovative Mechanisms for Industrial Energy Efficiency Financing in Indonesia with Lessons for Replication in the other ASEAN Member States" programme.

#### 3.2.3.13. ACE and United Nations Office for Project Services (UNOPS) and Deutsche Gesselchaft für Internationale Zusammenarbeit GmbH (GIZ)

ACE is entering into a strategic partnership with the United Nations Office for Project Services (UNOPS) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH under the Southeast Asia Energy Transition Partnership

(ETP), aimed at accelerating energy transition in the region.

### 3.2.4. MoU with KESCO

*Figure 122: Memorandum of Understanding with KESCO*

ACE partnered up with Korea Electrical Safety Corporation (KESCO) for a three-year collaboration to enhance electrical safety and energy cooperation in the region. It was signed by the President of KESCO, Jihyun Park and the Executive Director of ACE, Dr Nuki Agya Utama. The MOU contains various collaborative activities, including Official Development Assistance programmes, information exchange, joint research, and awareness-raising efforts.

### 3.2.5. MoU with Huawei


*Figure 123: Memorandum of Understanding with Huawei*

ACE signed MoU with Huawei on 12 December 2023 at the ASEAN Headquarters in Jakarta, Indonesia. The signing ceremony focuses on implementing seven programme areas outlined in the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II: 2021-2025, including exploring a pioneering pilot project on establishing a Data Centre as well as capacity buildings and event supports.

### 3.2.6. MoU with GCNEP

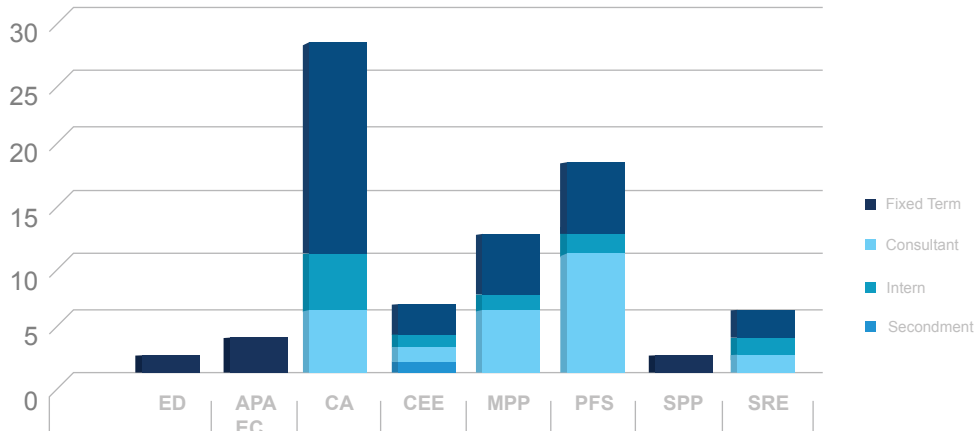
*Figure 124: Memorandum of Understanding with GCNEP*

The ASEAN Centre for Energy (ACE) and the Global Centre for Nuclear Energy Partnership (GCNEP) signed a five-year Memorandum of Understanding (MoU) at ASEAN Headquarters in Jakarta, on 15 December 2023. The signing ceremony at the ASEAN Headquarters in Jakarta was significant, with Dr Nuki Agya Utama of ACE and H.E. Jayant N. Khobragade, Ambassador of India to ASEAN, leading the agreement, focuses on Civilian Nuclear Energy under the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II. High-level participation included H.E. Satvinder Singh, Deputy Secretary-General of ASEAN Economic Community that highlighted the peaceful uses of nuclear energy and technologies developed by India's Department of Atomic Energy in the field of agriculture, health, other industrial applications, which could be of interest to the ASEAN. It aims to enhance nuclear energy regulatory and technical capacities, increase public understanding, and promote regional collaboration in ASEAN. The MoU aligns with ASEAN-India cooperative goals on civilian nuclear and clean energy, aiming to ensure future energy security. Activities will include joint research, lectures, and workshops on advanced nuclear systems, safety, and applications.

# People at ACE

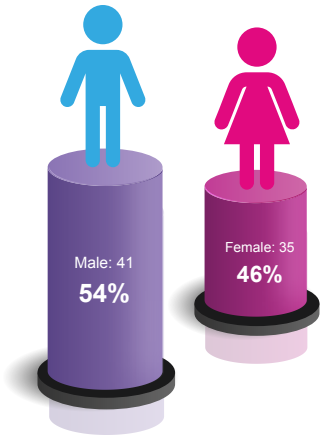
The ASEAN Centre for Energy has increased their workforce throughout 2023, with a total of **76 employees**, consisting of 54 full-time staffs and 22 interns. The gender breakdown of the employees are 46% female and 51% male.

## Staff Dashboard

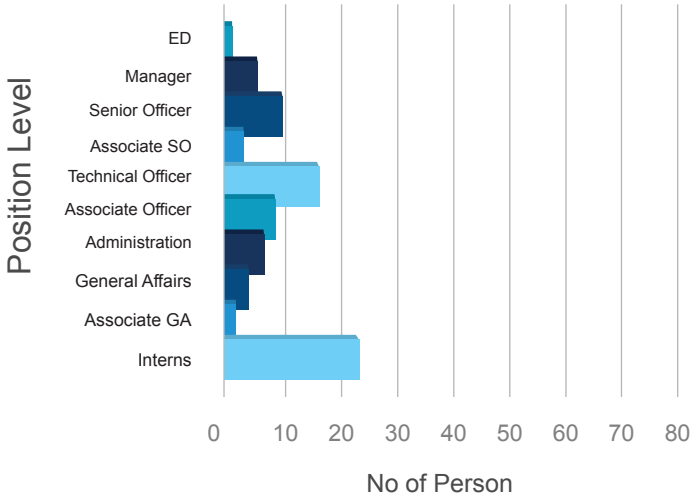



| | ED | APAEC | CA | CEE | MPP | PFS | SPP | SRE |
|---|---|---|---|---|---|---|---|---|
| Fixed Term | 1 | 1 | 18 | 3 | 7 | 7 | 1 | 2 |
| Consultant | | | 5 | 1 | 1 | 2 | | 2 |
| Intern | | | 5 | 1 | 5 | 10 | | 1 |
| Secondment | | | | 1 | | | | |

## Gender Proportion




## Staff Level




## Management and Staff

| Executive Director | |
|---|---|
| Dr Nuki Agya Utama | |

| Corporate Affairs Department | |
|---|---|
| Dr Andy Tirta | Manager of Corporate Affairs |
| Emilia Syadriah | Senior Officer of Human Resources and Administration |
| Gita Destiana | Human Resource Officer |
| Syahira Narizta Syahputri | Business Development Officer |
| Rinda Rufaidah | Communications Officer |
| Bayu Surya Prayogie | Associate Graphic Designer Officer |
| Hartina Hiromi Satyanegara | ICT Officer |
| Irfan Nasrullah | ICT Officer |
| Endang Triani Widyastuti | Administration and Finance Senior Advisor |
| Muhamad Harmein Armia | Senior Officer of Administration and Finance |
| Cut Sarah Mutia | Administration and Finance Officer |
| Mutia Asriyani | Treasury Officer |
| Zharen Febriza | Accounting Officer |
| Freya Murti Pramudita | Administration and Finance Officer |
| Dwiky Syarief Samapta Mufti | Administration and Finance Officer |
| Adiskiya Rinintasari | General Affairs and Procurement Officer |
| Arfidyaninggar Septia Rinda | Secretary of Executive Director |
| Arisakti Prihatwono | Associate Legal Officer |

| ASEAN Plan of Action for Energy Cooperation (APAEC) Department | |
|---|---|
| Christopher G Zamora | Senior Manager of APAEC |
| Rizky Aditya Putra | Senior Officer of APAEC |
| Dynta Trishana Munardy | APAEC Officer |

| Energy Modelling and Policy Planning (MPP) Department | |
|---|---|
| Dr Zulfikar Yurnaidi | Manager of MPP |
| Dr Ambiyah Abdullah | Senior Officer of MPP |
| Rika Safrina | Senior Officer of MPP |
| Muhammad Shidiq | Senior Officer of MPP |
| Silvira Ayu Rosalia | Energy Statistician and Data Visualisation Officer |
| Amira Bilqis | MPP Officer |
| Michael Petalio | MPP Modeler |
| Indira Pradnyaswari | Associate MPP Officer |

| Power, Fossil Fuel, Alternative Energy and Storage (PFS) Department | |
|---|---|
| Beni Suryadi | Manager of PFS |
| Phat Pumchawsaun | Program Manager of USAID Smart Power Program |
| Prihastya Wiratama | Project Manager of ASEAN Power Interconnection |
| Aldilla Noor Rakhiemah | PFS Senior Officer |
| Nadhilah Shani | PFS Senior Officer |
| Suwanto | PFS Senior Officer |
| Adhityo Gilang Bhaskoro | PFS Officer |
| Akbar Dwi Wahyono | PFS Officer |
| Chaedar Indra Pramana | PFS Officer |
| Marcel Nicky Arianto | Associate PFS Officer |

| Sustainable and Renewable Energy (SRE) Department | |
|---|---|
| Monika Merdekawati | SRE Officer |
| Muhammad Ilham Rizaldi | SRE Officer |
| I Dewa Made Raditya Margenta | SRE Officer |
| Zahrah Zafira | Associate SRE Officer |
| Veronica Ayu Pangestika | Associate SRE Officer |

| Energy Efficiency and Conservation (CEE) Department | |
|---|---|
| Septia Buntara Supendi | Acting Manager of CEE |
| Rio Jon Piter Silitonga | CEE Officer |
| Shania Esmeralda Manaloe | CEE Officer |
| Mardika Firlina | Associate CEE Officer |
| Tetsuya Nomoto | Secondment of CEE |

| Supporting Staff | |
|---|---|
| Agus Suprianto | General Affairs Officer |
| Slamet | Associate General Affairs Officer |
| Deni Pratama | Associate General Affairs Officer |
| Haris Munanda | Driver |
| Supri Yatno Putro | Driver |

# Financial Statement

# Financial Statement

**STATEMENTS OF FINANCIAL POSITION**
**FOR THE YEAR ENDED 31 DECEMBER 2023**
(Expressed in United States Dollars, unless otherwise stated)

| **Assets** | **2023** | **2022** |
|---|---|---|
| Current Assets | | |
| Cash and cash equivalent | 1,852,200.31 | 1,902,276.04 |
| Prepaid Expenses | - | 10,652.21 |
| Account Receivable | - | - |
| Other Receivable | 75,729.15 | 164,409.40 |
| Other Current Assets | 158,028.12 | 104,303.87 |
| Total Current Assets | 2,085,957.58 | 2,181,641.52 |
| Non-Current Asset | | |
| Fixed Asset – Net | 102,888.22 | 55,485.98 |
| Intangible Asset - Net | 12,741.15 | 4,361.53 |
| Deposit of Endowment Fund (ASEAN Secretariat) | 2,322,713.74 | 2,277,808.40 |
| Total Non-Current Asset | 2,438,343.1 | 2,337,655.91 |
| **Total Assets** | **4,524,300.69** | **4,519,297.43** |
| **Liabilities and Net Asset** | | |
| Liabilities | | |
| Other Current Liabilities | 240,730.44 | 106,134.44 |
| Total Liabilities | 240,730.44 | 106,134.44 |
| Net Asset | | |
| General Fund | 720,393.80 | 828,015.40 |
| Project Fund | 1,240,462.71 | 1,307,339.19 |
| Principal of Endowment Fund | 2,322,713.74 | 2,277,808.40 |
| Total Net Asset | 4,283,570.25 | 4,413,162.99 |
| Total Liabilities and Net Asset | **4,524,300.69** | **4,519,297.43** |

**STATEMENT OF CHANGES IN NET ASSET**
**FOR THE YEAR ENDED 31 DECEMBER 2023**
(Expressed in United States Dollars, unless otherwise stated)

| **General Fund** | **2023** | **2022** |
|---|---|---|
| Sources of General Fund | | |
| 80% from interest of Endowment Fund | 27,639.52 | 545.08 |
| Other Income | 105,862.52 | 59,218.74 |
| Income from Dialogue Partner and International Organization | 1,021,756.46 | 586,875.12 |
| Other Income from AEBF Profit Sharing | 75,729.16 | - |
| Other Income from AEBF 2022 Sponsors | - | 69,000.00 |
| Other Income from CSPF | - | 44,777.56 |
| Total Sources of General Fund | 1,230,987.66 | 760,416.50 |
| Total Expenditures | (1,338,609.26) | (967,168.99) |
| **Net Increase (Decrease) of General Fund** | **(107,621.60)** | **(206,752.49)** |
| | | |
| **Project Fund** | | |
| Sources of Project Fund | 3,032,295.20 | 1,503,472.49 |
| Project Fund Expenditures | (3,099,171.68) | (1,844,819.35) |
| **Net Increase (Decrease) of Project Fund** | **(66,876.48)** | **(341,346.86)** |
| | | |
| **Endowment Fund** | | |
| Interest of Endowment Fund | 34,549.40 | 681.35 |
| Return Endowment Fund | 11,898.00 | - |
| Transfer to General Fund | (1,542.06) | - |
| **Net Decrease of Endowment Fund** | **44,905.34** | **681.35** |
| **Increase (Decrease) in Net Asset** | **(129,592.74)** | **(547,418.00)** |
| Available Net Asset, Beginning | 4,413,162.99 | 4,960,580.99 |
| **Available Net Asset, Ending** | **4,283,570.25** | **4,413,162.99** |

# ANNUAL REPORT 2023

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