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Planning Southeast Asia's Decarbonisation Pathways

Insights for Policy-Making

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ISEAS - Yusof Ishak Institute (formerly Institute of Southeast Asian Studies) is an autonomous organisation established in 1968. It is a regional centre dedicated to the study of socio-political, security, and economic trends and developments in Southeast Asia and its wider geostrategic and economic environment.

The Climate Change in Southeast Asia Programme (CCSEAP) was established in 2020 to examine the phenomenon of climate change, its impact, and policy responses across the region. The Programme hopes to cultivate a network of scholars at the forefront of climate change research and build on ISEAS' thought leadership to advance climate discourse and knowledge in Southeast Asia through a series of publications and seminars.

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"There is no doubt that the energy transition will be a massive, and complex undertaking for all of us… that can only be accomplished with strong bureaucratic skills backed by unwavering political commitment."
-Mr Choi Shing Kwok, Director and CEO, ISEAS – Yusof Ishak Institute

"Energy crises are becoming more and more visible with grave social impacts and the potential to counter recent progress in energy transition. This conference gives an opportunity to discuss these challenges."
-Dr Christian Hübner, Head of the Regional Programme Energy Security and Climate Change Asia-Pacific, Konrad Adenaur Stiftung

"If there is one lesson we can draw from the recent geopolitical tensions and economic developments it is this: there is a price to being too dependent on fossil fuels… And the good news is that Southeast Asia is blessed with much renewable energy potential."
-Mr Joseph Teo, Chief Negotiator for Climate Change, Ministry of Sustainability and the Environment, Singapore

"While the strategic, and socio-economic case is clear, shifting to clean energy and ending our reliance on fossil fuels will not be simple. It will require a concerted and sustained policy effort across multiple sectors, alongside strong international dialogue on energy markets, which the UK will continue to prioritise."
-HE Kara Owen, British High Commissioner to Singapore

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1. Preliminary Information

1.1 Acknowledgements

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This outcome report has been developed based on the presentation and inputs from the speakers, moderators, and participants who are experts and experienced professionals in climate policies and energy transition from across ASEAN governments, academia, international and regional organisations, and the business sector.

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1.2 List of Abbreviations

ACE	ASEAN Centre for Energy
ACCEPT	ASEAN Climate Change and Energy Project
AFOLU	Agriculture, Forestry and Other Land Use
APG	ASEAN Power Grid
BAU	Business-As-Usual
BESS	Battery Energy Storage Systems
BTR	Biennial Transparency Reports
BUR	Biennial Update Report
CDM	Clean Development Mechanism
CDRRC	Common but Differentiated Responsibilities and Respective Capabilities
CH4	Methane
CMA	Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
COP	Conference of Parties
CRT	Common Reporting Tables
CTCN	Climate Technology Centre and Network
ERs	Emission Reductions
ETF	Enhanced Transparency Framework
ETS	Emissions Trading Scheme
EVs	Electric Vehicles
FLEGT	Forest Law Enforcement, Governance and Trade
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse Gas
GST	Global Stock Take
GTP	Global Temperature Potential
GW	Gigawatt
GWP	Global Warming Potential
GWp	Gigawatt-peak
IEA	International Energy Agency
INDCs	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
JCM	Joint Crediting Mechanism
KCI	Katowice Committee of Experts on the Impacts of Implementation of Response Measures
LDC	Least Developed Countries

LED	Low Emission Development
LNG	Liquefied Natural Gas
LT-LEDS	Long-term Low Emissions Development Strategy
LTMS-PIP	Lao PDR-Thailand-Malaysia-Singapore Power Integration Project
LULUCF	Land-use, Land-use Change and Forestry
MOI	Means of Implementation
MPGs	Modalities, Procedures and Guidelines for the Transparency Framework for Action and Support Referred to in Article 13 of the Paris Agreement
MRV	Measurement, Reporting and Verification
MtCO2e	Million Tonnes of Carbon Dioxide Equivalent
MW	Megawatt
MWp	Megawatt peak
N2O	Nitrous Oxide
NAMA	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plan
NCs	National Communications
NDC	Nationally Determined Contribution
NDEs	National Designated Entities
NFP	National Focal Points
NID	Narrative Inventory Document
NIR	National Inventory Report
NMAs	Non-Market Approaches
ODA	Official Development Aid
OOF	Other Official Flows
PAWP	Paris Agreement Work Programme (or Paris Rulebook)
PPP	Public-Private Partnership
PSIDs	Pacific and Small Island Developing States
RD&D	Research, Development and Demonstration
REDD+	Reducing Emissions From Deforestation; Reducing Emisions from Forest Degradation; Conservation of Forest Carbon Stocks; Sustainable Management of Forests; and Enhancement of Forest Carbon Stocks (decision 1/cp.16, para. 70)
ROP	Rules of Procedure
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDG	Sustainable Development Goal
SIDs	Small Island Developing States
TEC	Technology Executive Committee
TNAs	Technology Needs Assessments
UNFCCC	United Nations Framework Convention on Climate Change

1.3 Executive Summary

This report is a summary of the engagements during the three-day workshop comprising participants from ASEAN governments, international organizations, academia, and practitioners.

Background

The workshop kicked off with an overview of the global and regional energy trends and climate policies in ASEAN. Participants were presented with geopolitical implications of the war in Ukraine for energy security in the region. It is unavoidable that ASEAN governments will choose a short-term albeit unsustainable pathway to ensure energy security for instance shifting from gas – due to skyrocketing prices driven by the war – to coal, which is still relatively cheap in the region. However, prices of renewable energy are now much more competitive than fossil fuels as an unintended consequence of the war. ASEAN governments have already started to explore strategies to move away from the use of fossil fuels.

ASEAN contributed 8 per cent of the world's total emissions in 2018,[1] and the number is expected to rise in the future due to rapid urbanisation and growth. At the same time, the region is also vulnerable to climate impacts. The ADB forecasted that climate change could slash 11 per cent off the region's total GDP by the end of this century under a business-as-usual scenario. To mitigate climate impacts in the region, ASEAN envisions a regional target to achieve 63.2 per cent share of electricity generation by renewable sources in 2060. Aside from that, various initiatives such as the ASEAN Taxonomy for Sustainable Finance, the ASEAN Green Bond Standards for Capital Market Developers, and the Framework for Circular Economy for the ASEAN Economic Community have served as guiding principles to re-orient the regional bloc to sustainable economic pathways. The regional bloc also attaches great importance to green recovery after the COVID-19 pandemic.

However, existing political sensitivities around fossil fuel prices, taxes and subsidies remain the main obstacles to decarbonisation efforts in the region. It is difficult to reduce subsidies or tax fossil fuels, and at the same time, allocate a substantial amount of capital to invest in renewables. Furthermore, against the backdrop of the war in Ukraine which has driven energy prices up, it is politically challenging to pursue more ambitious climate actions due to the need to ensure undisrupted energy supply and sustain livelihoods.

Decarbonisation Context in ASEAN

To date, eight ASEAN countries have articulated their net-zero commitments: Brunei Darussalam, Cambodia, Laos, Malaysia, Singapore, Vietnam, Indonesia, and Thailand. Although targets vary across countries, these pledges indicate ASEAN countries' commitment in helping the world to decarbonise (Table 1).

All ten ASEAN countries have submitted their Updated Nationally Determined Contributions (NDCs) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2020-2021. Some progress has been made in terms of carbon emissions reduction target setting. Brunei Darussalam, Laos, Malaysia, Myanmar the Philippines, Singapore, and Vietnam increased their unconditional carbon emissions reduction targets. Meanwhile, Cambodia, Laos, Myanmar, Thailand, and Vietnam increased their conditional carbon emissions reduction targets upon receiving international assistance. Interestingly, Malaysia eliminated its conditional target.

But it should be noted that although most ASEAN countries have demonstrated progression on their carbon emissions reduction targets from their previous NDCs, they are still inconsistent with a 1.5°C pathway as envisioned by the Paris Agreement. Thus, greater collaboration is needed for the region to ensure countries can share their experiences, technical-know how, and knowledge to push for more ambitious climate policies moving forward.

Table 1. Summary of NDC and Net-Zero Targets in ASEAN

Country	NDC Submission	Unconditional Target to be Achieved Using Domestic Resources	Conditional Target Upon Receiving International Assistance	Carbon Neutrality/ Net Zero Target
Brunei	2015	Sectoral targets only (no conditionality element)		Net zero by 2050
	2020	Emissions reduction of 20% from 2035 BAU scenario	-	
Cambodia	2017	-	Emissions reduction of 27% from 2030 BAU scenario	Carbon neutrality by 2050
	2020	-	Emissions reduction of 41.7% from 2030 BAU scenario	
Indonesia	2016	Emissions reduction of 29% from 2030 BAU scenario	Emissions reduction of 29% from 2030 BAU scenario	Net zero before or by 2060
	2021	No change	No change	
Laos	2015	-	Implementation of mitigation strategies with estimated emissions reductions	Net zero by 2050
	2021	Emissions reduction of 60% from 2030 BAU scenario	Additional sectoral targets totalling emissions reductions of 45.69 Mt-CO2e/year in 2020-2030	
Malaysia	2015	Carbon intensity reduction of 35% from 2005 levels	Emissions intensity reduction of 45% from 2005 levels	Carbon neutrality by 2050
	2021	Carbon intensity reduction of 45% from 2005 levels	-	
Myanmar	2015	Sectoral targets only		-
	2021	No economy-wide target; sectoral targets adding up to emissions reductions of 244.52 MtCO2e	No economy-wide target; sectoral targets adding up to emissions reductions of 414.75 million MtCO2e (the 2021 NDC did not include economy-wide 2030 emissions under a BAU scenario, but only did so for its electricity sector)	

Table 1. Summary of NDC and Net-Zero Targets in ASEAN *(continued)*

Country	NDC Submission	Unconditional Target to be Achieved Using Domestic Resources	Conditional Target Upon Receiving International Assistance	Carbon Neutrality/ Net Zero Target
Philippines	2015	-	Emissions reduction of 70% from 2000-2030 BAU scenario	-
	2021	Emissions reduction and avoidance of 2.71% from 2020-2030 cumulative BAU scenario	Emissions reduction of 75% from 2020-2030 cumulative BAU scenario	
Singapore	2015	Emissions intensity reduction by 36% from 2005 levels	-	Net zero by 2050
	2020	Peak absolute emissions at 65 MtCO2e	-	
	2022	Peak absolute emissions before 2030 and reach 60 MtCO2e by 2030	-	
Thailand	2016	Emissions reduction of 20% from 2030 BAU scenario	Emissions reduction of 25% from 2030 BAU scenario	Carbon neutrality by 2050 and net zero by 2065
	2020	No change	No change (NDC submitted in 2020) Emissions reduction of 40% from 2030 BAU scenario (Statement at COP26 High Level Segment)	
Viet Nam	2016	Emissions reduction of 8% from 2030 BAU scenario	Emissions reduction of 27% from 2030 BAU scenario	Net zero by 2050
	2020	Emissions reduction of 9% from 2030 BAU scenario	-	

Compiled by ISEAS. Information accurate as of December 2022.

Energy Transition and Climate Change Nexus

According to the World Resources Institute's Climate Watch Historical GHG Emissions, energy generation is the third largest contributor to carbon emissions after land-use change and forestry (LUCF) in the ASEAN region.[2] Meanwhile, across the globe, the transitory switch away from fossil-based energy sources like coal, oil, and natural gas has become technically and economically possible through technological advancements. For instance, according to the United Nations Development Programme's (UNDP's) Human Development Report 2021/2022, prices of large-scale solar photovoltaics decreased by

89 per cent between 2009 and 2019.[3] Similarly, lithium-ion batteries are now 97 per cent cheaper than they were in 1991.

Thus, for the ASEAN region—whose population size will surpass 770 million by 2040 and whose combined economy is projected to be the world's fourth largest single market by 2030, outstripping Japan and the European Union (EU)—a green energy transition is necessary to ensure that future energy demand is met while averting the climate crisis.

At the regional level, political support and appetite for a green energy transition are exceptionally high, thus providing a clear direction for actions. ASEAN has achieved substantial progress in energy efficiency by surpassing its aspirational target of achieving 21 per cent of energy intensity reduction and 13.9 per cent renewable energy share in total primary energy supply in 2018.

The regional bloc is also increasingly becoming more articulate in envisioning its green energy transition. The ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025: Phase II (2021-2025) serves as a guiding document for regional renewable energy targets.[4] The 7th ASEAN Energy Outlook launched in September 2022 lays down some scenarios based on projection modelling to help countries in the region strategically direct their decarbonisation efforts.[5] The Outlook also explores thematic sectors within the framework of energy security that includes technologies for grid integration, utilising fossil fuels during the transition, improving industrial efficiency, enhancing dispatchability of renewable energy, financing energy transition, and managing the safety and social acceptance of civilian nuclear power.

Conclusion

A green energy transition is gaining momentum in the ASEAN region due to technological and economic drivers as well as a growing imperative to improve sustainability. The discussions, sharing of experience, and networking opportunities at this Workshop have enabled the regional governments, scholars, and experts on energy transitions to identify challenges, opportunities, and possible scenarios moving forward.

2. Introduction

COVID-19 has preoccupied governments across the world for the past two years. ASEAN was no exception. With many governments now planning to live with an endemic pandemic, attention has turned to ramping up economic recovery. The window of opportunity for an inclusive and sustainable recovery is now.

Southeast Asia's historical share of GHG emissions has been low but its future share of emissions growth is expected to increase in tandem with projected population and economic development. ASEAN is projected to become the world's 4th largest economy by 2050.[6] Its population is expected to increase from the current 667 million to 770 million by 2040.[7] According to the ASEAN Centre for Energy, the region's energy-related GHG emissions are projected to increase by over 250 per cent between 2020 and 2050 under a baseline scenario. To meet growing electricity demand, the region's power capacity could almost triple from 2020 to 2050 under a baseline scenario.[8] Therefore, Southeast Asia's energy transition plans and the decisions that governments make today will determine its future transition to low carbon economies.

ASEAN has begun to tackle the twin challenges of rising energy demand and the climate crisis. All ASEAN member states (AMS) have submitted their updated Nationally Determined Contributions (NDCs) and four AMS have voluntarily submitted their Long-Term Low Emissions Development Strategies. Majority of NDCs contain renewable energy targets. Wind and solar capacity has steadily increased, reaching 13 GW in 2019.[9] Yet, fossil fuels still account for the majority of growth in energy demand, and observers predict that the 2025 regional target of a renewable share of 23 per cent in total primary energy supply will not be reached at current rates.[10] Radical progress and even higher climate ambition are needed in order for the region to be aligned with 1.5 degrees decarbonisation pathways and to ensure long-term energy security.

The process of energy transition planning can exacerbate existing social inequalities, environmental degradation and geopolitical conflicts. For example, in the absence of effective policy frameworks, biofuels, solar farms and hydropower electricity projects can have an adverse impact on communities and ecosystems. The energy transition process should also consider issues such as quality job creation in new energy sectors, the reskilling and support of existing labour forces in the fossil fuel sector, new sustainable jobs in industries affected by energy transitions,[11] and gender inclusivity.

Therefore, regional and global cooperation is needed on the intersection between long-term energy and climate planning to meet and increase national and regional climate ambitions, avoid carbon lock-ins while addressing potential risks of energy transition such as labour inequities. In this regard, this regional workshop examines how AMS can strengthen their work in the energy-climate nexus, including understanding global energy trends in energy transition, geopolitics of energy transition, emerging RE technologies, RE storage technologies, ensuring a just transition through meaningful civil society engagement, and managing potential risks of transition.

3. Green Energy Transformation Outlook in ASEAN

This section summarizes presentations on green transformation by regional officials from ten ASEAN countries. The presentations highlighted data on emissions, renewable energy generation and energy efficiency of AMS.

Table 2 National Context and Selected Energy Targets of ASEAN Countries

	National Context	Main Energy-related Targets
	•Brunei contributes only 0.017% of global emissions. •Majority of emissions are from industrial power generation (48.1%) and public utility power generation (22%). •Until 2020, Brunei was a net carbon sink.	•Increase share of RE to at least 30% of total generation mix by 2035; •Reduce emissions by at least 10% through better supply and demand management; •Impose a price on carbon emissions.
	•Majority of GHG emissions come from land-use change and agriculture, with the electricity sector accounting for 4% of emissions (2019).[12] •Aims to achieve upper-middle income status by 2030.	•No new coal generation beyond already committed projects by 2050; •Increase the share of solar, biomass and other renewables in generation mix; •Substitution of coal in the industrial and power sector.
	•9th largest country emitter of CO2 (2021),[13] with major drivers including deforestation, peatland megafires, and agriculture. The largest driver is fuel combustion. •However, carbon and energy intensity are falling. •Net energy exporter (coal is its primary export) •High RE technical potential but low utilisation rates.	•Increase total primary energy supply of new renewable energy to 23% in 2025 and 31% in 2050; •Reduce the total primary energy supply of fossil fuels; •Improve energy efficiency measures and shift transportation fuel to renewables; •76% of coal plants to have CCUS capability by 2050.
	•Considered the 22nd most vulnerable country to climate change in the world (2018); •Largest contributors to GHG emissions are the electricity sector, land-use change and agriculture.[14] •Majority of electricity production consists of hydropower, followed by coal.[15]	•New large hydropower (>15MW) to export clean power; •30% renewable share of energy consumption by 2025 (namely biomass, biogas, solar, wind, waste-to-energy); •10% of transport fuel replaced by biofuel by 2025; •Increase energy use efficiency by 10% by 2025.

Table 2 National Context and Selected Energy Targets of ASEAN Countries *(continued)*

	National Context	Main Energy-related Targets
	•Electricity sector is the largest contributor to GHG emissions.[16] •Majority of electricity production consists of coal and gas (2021).[17]	•Increase RE in power mix to 23% in 2022, 31 per cent by 2025 and 40% by 2035; •Increase energy efficiency from 4.3% in 2021 to 8% in 2025.
	•Due to data monitoring limitations, national emissions reporting currently covers only carbon dioxide. •Majority of electricity production consists of hydropower and gas (2021).[18]	•Increase power mix share of solar and wind by 53.5 per cent (conditional) by 2030; •Decrease power mix share of coal by 73.5% (conditional) or 54.4% (unconditional) by 2030.
	•Coal is the largest electricity source, followed by renewable energy. •The share of renewables is still low and mainly comes from hydropower (17%) and geothermal (6%). •RE now contributes around 29% of the power mix, but 43% of energy is still produced by coal.	•Raise the current share of renewables in the power mix from 29% to 35% by 2030 and 50 per cent by 2040; •10% EV penetration rate by 2040.
	•Contributes 0.1% of global emissions, but vulnerable to climate change as a low-lying, island city-state; •GHG emissions are dominated by stationary sources from the electricity and industrial sector. •Main electricity source is natural gas.	•Planned revision in carton tax: $25/t in 2024, $45/t in 2026, $50-80/t in 2030; •At least 2 GWp of solar by 2030 and energy storage deployment of at least 200MW beyond 2025; •Import 4GW of low carbon electricity by 2035 (i.e., 30% of estimated total supply).
	•Heavily reliant on fossil fuels including imported coal; •Over half of electricity generation is from natural gas, while coal (domestic and imported) accounts for 17% (2021).	•Increasing the share of renewable energy to 50% by 2050; •Raising EV implementation by 30% by 2030; •Reaching energy efficiency of over 30% of the total final energy consumption by 2050.
	•One of the ten leading countries in the world in terms of solar and wind investments. •Despite a major boom in renewables in recent years, the share of coal in the energy supply (mainly used for coal-fired power plants) is still large and increasing. • In the power mix, the share of wind reached 5.3% and solar reached 21.2% in 2021.	•Increase share of RE in power mix from 6% t in 2020 to 22% in 2030 and 52% in 2045; •Energy saving target of 5-7% from 2019-2025 and from 8-10% of the total national energy consumption from 2019-2030.

4. Country and Expert Sharing: Common Challenges in the Energy-Climate Nexus

The workshop identified three common challenges:

1) Multi-level governance
(2) Finance
(3) Implementation

4.1 Multi-level Governance

Importance of Coordination between National and Subnational Governments

An absence of alignment in priorities and communication between national and subnational governments can lead to delays in new renewable energy projects at multiple stages of development. In the scoping and siting stages, national governments may lack the required data for decision-making; at later stages, bureaucratic red tape and long processing times can hinder progress. Malaysia cited difficulties in identifying high-potential sites for small hydropower development due to lack of local-level data. Furthermore, since water and land resources are under state jurisdiction, such renewable developments are subject to numerous permit requirements and lengthy approval times.

Importance of Coordination between Different Government Sectors

There was recognition that addressing the energy-climate nexus went beyond the sectors in charge of energy, environment and climate change. Low-carbon development strategies may be increasingly evident in AMS' energy and power plans but more cooperation and communication with other sectors is needed. Progress in renewable energy is tied to land use and natural resource management as well as availability of finance; and further cross-sectoral collaboration may require stronger high-level support or convening power. Brunei for instance acknowledged that renewable developments must be balanced against competing land uses such as reforestation, but uncertainties remain on the priorities of land use mapping authorities and whether climate change priorities have been sufficiently mainstreamed into national development planning.

The Philippines shared that economy-wide emissions reduction targets were based on sectoral targets which were set first when formulating their NDC. In Indonesia, the Ministry of National Development Planning initiated the Low Carbon Development Indonesia (LCDI), a platform to support cross-sectoral integration on low-carbon development and economic growth. However, observers found that the Indonesian Ministry of Environment and Forestry (which acts as the focal point for climate change) retained limited influence over any formal economy-wide strategy to reach net zero.

Balancing between Climate Goals and Existing Legislation

In some cases, climate-energy governance conflicts with longstanding policies and priorities, such as those on attracting foreign direct investment and improving energy security. To reflect newer climate change priorities, governments may need to re-examine existing regulatory environments and how they perpetuate the entrenchment of fossil fuels as the default secure energy source. Greater top-down influence may also be needed to drive change in all sectors. Energy prices remained heavily regulated in Brunei thus resulting in relatively low prices of coal and other fossil fuels and this may hinder electric vehicle penetration by making

them uncompetitive with existing options. There was also an absence of new legislative tools and mechanisms to facilitate renewable energy development in countries such as Laos.

Indonesia has shown climate commitments at the international level, through its G20 announcement of the Grand National Energy Strategy with plans for 100 per cent renewable electricity by 2060 and an operational nuclear power plant by 2049, as well as its NDCs and LT-LEDS. Yet, inconsistencies with other plans and legislation remained. Indonesia's electricity plans indicate that 34 per cent of new power capacity to be added by 2030 (13.8GW) will be from coal-fired power.[19] In addition, the 2020 Omnibus Law drew criticism for weakening environmental protections such as by increasing financial incentives for domestic coal processing,[20] removing limits on the size of mining operations and allowing automatic renewals of mining contracts.[21]

Regulatory Uncertainties

One obstacle often raised by industries is the absence of regulatory certainty or unfavourable regulatory environments for low-carbon projects. Indonesia's low utilisation rate for hydropower despite its high potential may be partly attributed to the removal of feed-in tariffs in 2017. They were replaced by the electricity buy-in tariff or *Biaya Pokok Produksi*, a set price negotiated between the utility sector and government which does not differentiate between electricity sources, thus reducing the profitability of renewables. In addition, although Indonesia was keen on more public-private partnerships (PPP), frequent policy changes deter key players like domestic and foreign independent power producers (IPP) from entering the market. In the Philippines, investments are hindered by the limitations on foreign ownership for green projects, as well as permitting and licensing issues. In Vietnam, if state legislation were to be revised to allow foreign direct investment, an upgrade of its electricity grid could be facilitated.

4.2 Finance

Securing Affordable Finance

The International Renewable Energy Agency (IRENA) estimated that Southeast Asia needs an average annual investment of US$210 billion up to 2050 to achieve a 1.5 degrees Celsius scenario.[22] Such investments should be channelled into renewable energy, energy efficiency and supporting technology and infrastructure. This estimate is over 2.5 times the current planned expenditure by Southeast Asian governments. The gap in transition finance is felt acutely among AMS. As developing economies, most AMS require support from international public and private sources to accelerate energy transition.

The Philippines estimated that investments in the technological shift from coal to renewables alone must increase by at least 20 per cent to achieve the clean energy scenario detailed in its Philippine Energy Plan 2020-2040. Even more investments would be needed to support electricity transmission and distribution projects. Malaysia's efforts to expand rooftop solar power are slowed down by the lack of affordable debt financing in addition to general low awareness and uptake. In Vietnam, which already experiences high public debt, government guarantees for energy projects are decreasing. A potential response is to liberalise competitive service sectors and encourage the entry of new market participants. Despite the Cambodian private sector's growing involvement, the country is actively working to attract more private investors for the energy transition to achieve its targets. One of its initiatives is an NDC tracking database where public users can access information on each of Cambodia's pledged actions under its NDC, its conditionality, stage of implementation and funding sources. The database also provides an overview of funding progress, providing transparency and convenience to potential investors.

While governments have set renewable energy targets, research demonstrates that greater action is needed to attract investments in RE and move away from using old fossil-based regulatory practices, such as implementing major pro-renewable energy governance reform and strengthening the enforcement of regulatory policies and fiscal incentives.[23]

4.3 Implementation

Data and Monitoring

As detailed above by Malaysia, the lack of data can inhibit the planning of renewable energy developments. Conversely,implementing sufficient monitoring into policies, such as reporting requirements for companies, can help push for higher quality energy projects. The Philippines' Energy Resiliency Policy (institutionalised in 2018) requires all energy stakeholders to submit plans for resiliency with updates every three years and incorporate disaster risk reduction programmes into their planning and investments.[24] The Policy is currently being enhanced to follow the Build Better At First Sight principle – in which Environmental Impact Assessments must determine whether projects will be able to withstand climate impacts such as typhoons and sea level rise.

Insufficient data can also result in greater uncertainty in national plans for climate change, which in turn affects climate cooperation at larger scales. Given its high demand for quality carbon credits, Singapore has engaged with all AMS on possible cooperation under Article 6. In October 2022, Singapore signed a Memorandum of Understanding (MoU) with Vietnam to collaborate on energy and carbon credits,[25] and agreed to work towards an Implementation Agreement with Thailand before COP28 in 2023.[26] It has also signed an MoU with Indonesia which includes cooperation on carbon markets.[27]

Despite pursuing partnerships both within and outside the region, Singapore has seen faster progress in agreements with non-ASEAN countries. In August 2022, Singapore signed a MoU with Colombia to collaborate on carbon credits.[28] Singapore and Ghana completed negotiations on their implementation agreement on bilateral transfers of Article 6-aligned carbon credits in November 2022.[29] One obstacle in establishing such collaboration is the limited understanding of how carbon market mechanisms work in general, as well as concern that sales of carbon credits would prevent countries from meeting their own NDC targets.

To ensure Article 6 readiness, partner countries will need a greater awareness of which projects are required to meet their NDCs, and which are additional projects that can contribute to carbon credit sales abroad. This may require extensive tracking of climate and energy-related projects and their respective contributions to emissions reduction.

Absence of Skilled Human Resources

The energy transition will require huge shifts in the traditional energy workforce as coal and other fossil fuels are replaced by renewables. Malaysia raised the concern that the current workforce lacked specific skills and knowledge needed in the renewable energy industry. The public itself is also unaware of the urgency of the energy transition as well as the economic opportunities it offers. Local governments with fossil fuel-dependent workforces can draw lessons from countries such as the UK, where towns with historic coal-mining backgrounds managed to transition to other economic activities. An industrial cluster known as Tees Valley in the Northern part of England which was formerly dominated by steelworks has aspirations to become the world's first net zero industrial cluster by 2040 and achieve long-term affordable decarbonisation through renewables, CCUS, offshore wind services and other projects.[30] Such developments are creating thousands of new quality jobs while protecting existing jobs in the chemicals and

processing industry. These initiatives are partly driven by strong political will at the local level and private sector partnership.

Outdated Grid Infrastucture

While accelerating renewable deployment is crucial for the energy transition, it must be accompanied by major changes in ancillary energy infrastructure, particularly in storage and transmission. Workshop participants discussed how challenges with renewable intermittency and distances between energy producing and consuming regions must be addressed to maximise the potential of newly added renewable capacity, especially for solar and wind energy. Viet Nam's phase of rapid, intense renewable development over the past few years has resulted in a massive growth in renewable capacity. Solar capacity has shot up from 86 MW in 2017 to 4750 MW in 2019 and 16564 MW in 2021.[31] However, existing grid infrastructure has been unable to cope with unprecedented supply spikes, leading to significant curtailments in which energy producers are asked to limit their operations.[32] Viet Nam will temporarily halt new solar projects until 2030 to focus on upgrading the grid to accommodate new power capacities. Large solar power projects will resume after 2030. The grid infrastructure upgrade is one of the crucial bottlenecks for Viet Nam's energy transition. In addition, Viet Nam will need to improve transmission infrastructure for the transfer of energy from central to northern Viet Nam due to mismatches in supply and demand distribution. This case study was identified as a useful lesson for other ASEAN countries planning power capacity additions in solar and wind power. Plans for storage capacity and transmission are crucial in preventing overloaded grids and wasted renewable capacity.

Grid interconnections are also a key challenge for the Philippines, which aims to build a national smart grid and achieve 100 per cent energy access throughout the country — especially due to its archipelagic nature. As discussed above, countries are still facing a large gap in finance for grid and transmission-related projects. It was estimated in the IEA's Net Zero by 2050 Roadmap that grid investments globally must triple by 2030.[33] A workshop participant also pointed out that most grids in the Asia Pacific are covered by public finance, and much more private finance is needed to close the investment gap. In an effort to draw international investments for grid upgrades, Viet Nam is revising laws to allow private sector investments in the grid up to a limited share of 15 per cent. In the past, only the state-owned Vietnam Electricity was allowed to invest in the grid system.

5. Roundtable: Perceptions of Climate Ambition, Decarbonisation, and Power Trade

The roundtable discussion used the Mentimeter software to gauge the perceptions of participants on critical issues related to energy and environmental cooperation in ASEAN.

Perceptions of Climate Ambition

A significant number of participants expressed scepticism or uncertainty regarding the climate ambitions of ASEAN countries. Such perceptions were related to a number of factors, such as the need for more effective cooperation, ineffectiveness in meeting renewable energy targets and lack of awareness. Some respondents argued that the prohibitive costs of technologies such as hydrogen and the continued use of fossil fuels have undermined climate goals. Respondents who held positive perceptions about climate efforts by governments stated that there has been a renewed emphasis by ASEAN on climate change policies in recent years.

Perceptions of Decarbonisation

The deliberations among the participants revealed the lack of a common language to describe decarbonisation. The officials involved in climate change mitigation approached decarbonisation through the measurement of greenhouse gas emissions, while energy officials focused on renewable energy generation. The discussion emphasized the need to speed up the implementation of decarbonisation policies in light of the rapidly deteriorating regional and global environment. However, a number of important challenges to decarbonisation were identified, including financial constraints, lack of research and innovation, and political issues. These challenges are interconnected and have domestic and international dimensions.

Perceptions of Cross-Border Power Trade

Participants opined that ASEAN could play an important role in regional energy trade. The discussion highlighted a number of pathways for ASEAN to enhance energy cooperation, including the development of a common vision, establishment of baseline monitoring and evaluation mechanisms and advocacy for more ambitious NDC targets. The respondents argued that regional political partnerships can play an important role in the success of energy cooperation.

The respondents highlighted a number of challenges to energy cooperation, including political issues, technical challenges, and financial constraints. ASEAN's non-interference policy was seen an obstacle to deeper regional cooperation. To address this issue, the ASEAN Charter will need to be revised through consensus between the member states. At the domestic level, poor coordination among different Ministries can undermine regional energy cooperation. Other obstacles include regional instability, absence of political trust and unreliable grid infrastructure. Cybersecurity was not seen as a major challenge, although research indicates that energy systems will become increasingly vulnerable to cybersecurity in the future.

To overcome these challenges, respondents proposed a number of policy pathways, such as removal of barriers to renewable energy investments, development of a suitable environment for energy trading and increasing the capacity of relevant institutions such as the ASEAN Centre for Energy (ACE). Greater cooperation in exchanging best practices at the regional level can also assist less-developed economies to decarbonise and engage in regional energy trade.

6. Conclusion

Southeast Asia is currently dependent on the utilisation of fossil fuels to drive economic development and meet their UN Sustainable Development Goals including poverty alleviation. Deliberations of the workshop reveal that regional policymakers have envisioned pathways to decarbonisation that are pragmatic and rooted in the region's socio-economic and political realities. These pathways are underpinned by potential growth in wind, solar and hydropower capacities; drafting of national plans on low carbon development and energy efficiency; and drafting of strategies on carbon tax and new technologies such as hydrogen. Decarbonisation pathways are also buoyed by economic imperatives, such as the growing EV industry in Thailand and potential of regional energy trade.

Despite the positive momentum, the proposed pathways by Southeast Asian countries are not ambitious enough to meet the 1.5 °C target. While decarbonisation targets are achievable, they are impeded by a number of challenges in governance, policy, finance, and implementation. Low levels of private sector participation in the energy sector, uncertain regulatory environments and poor-quality grid infrastructure impede energy transition efforts in almost all regional countries. While potential in green hydrogen and battery storage technologies is acknowledged, prohibitive costs, safety concerns, and the lack of governance and legislative frameworks hinder investments and deployment at scale.

Addressing these challenges will require a greater level of coordination at the national levels between two groups of officials – one group based in ministries of energy or development who are responsible for national energy plans and another group based in ministries of environment or climate change task forces who are responsible for drafting and updating their country's long-term low emissions strategies and NDCs.

This workshop has identified common challenges. An exchange of best practices at the regional level can be beneficial towards the development of effective policy interventions. International cooperation will also be instrumental in increasing the availability of green finance, capacity-building of key personnel, and enhancing grid infrastructures.

The workshop facilitated candid exchanges on the performance of ASEAN in driving decarbonisation efforts. Participants referred to ASEAN's potential in driving decarbonisation efforts in Southeast Asia, given its convening capacity, resources, and institutional mechanisms. Yet, there was a high level of pessimism in regard to the actual performance of ASEAN in addressing climate change. ASEAN plays an important role in regional energy cooperation, but its efforts are undermined by political challenges and the lack of finance. While there is great potential in multilateral projects such as the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) and the ASEAN Power Grid, challenges to decarbonisation at the national level, such as poor grid infrastructures, can also undermine regional initiatives.

The workshop highlighted that decarbonisation efforts in Southeast Asia do not occur in a vacuum and is influenced by international issues such as geopolitics, technological developments, and the decisions of the UNFCCC. In developing pathways to low carbon economies, regional countries must factor in great power conflicts, the ground-breaking potentials of hydrogen and artificial intelligence and the impact of energy transition on women and vulnerable communities.

The workshop discussions reinforced the importance of taking multi-faceted approaches and a whole of region approach for the successful implementation of decarbonisation pathways in Southeast Asia.

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8. Annex A: Expert Insights

Presentations and interventions by experts provided valuable insights on global and regional decarbonisation challenges and highlighted the ways by which ASEAN countries can adapt to the global decarbonisation movement and leverage various opportunities.

Global Energy Trends and Overview of ASEAN Energy Transition

Professor Indra Overland: Implications of the War in Ukraine on the Global Energy Transition

- The ongoing war in Ukraine, has undoubtedly pushed European countries to implement economic sanctions on Russia, mainly by reducing or eliminating gas imports. This situation created an impetus to curb fossil fuel dependency on Russia. Countries in the European continent see renewable energy as the only way to adapt to this seemingly long-term geopolitical crisis;
- In the short term, Russia will sell their gas cheaply to countries that do not implement sanctions. Globally, countries might experience a short-term fossil fuel scramble to ensure energy security, mainly shifting from gas – due to high prices—to coal which is still relatively cheap in many parts of the world;
- Nevertheless, beyond the war in Ukraine, renewable energy costs are becoming much more competitive compared to fossil fuels due to technological advancement, thus further incentivising countries to divert from fossil fuels much more permanently.

Mr Beni Suryadi: Southeast Asia's Energy and Climate Outlook

- In ASEAN, one of the most rapidly industrialising regions in the world, there is a perception that the use of fossil fuels is still necessary to ensure energy security;
- The use of coal is still prevalent in the region but as countries are increasingly improving their NDC targets and renewable energy becomes cheaper, coal usage is expected to peak soon;
- According to the ASEAN Energy Outlook 7, over 60 per cent of ASEAN's power could be from renewable energy by 2050. In order to ensure the target is met, ASEAN must phase out coal consumption as early as possible;
- While technological and economic drivers from energy transition are established, energy governance mechanisms have not been developed.

Ms Melinda Martinus: Regional Climate Governance in ASEAN

- ASEAN has a role in organising high-level dialogues on the environment and climate change;
- ASEAN's climate change agenda began to crystallise with the 2009 ASEAN Social-Cultural Community (ASCC) Blueprint, which embedded environmental issues into the regional framework, such as sustainable cities, sustainable consumption and production and sustainable management of biodiversity and natural resources;
- ASEAN also has climate-related initiatives in different sectors, such as the ASEAN Climate Change and Energy Project (ACCEPT) supported by Norway under the ASEAN Centre for Energy, as well as the ASEAN Taxonomy for Sustainable Finance and the ASEAN Green Bonds Standards for capital markets;
- Upcoming joint initiatives indicate further commitment to the mainstreaming of climate change issues, such as the ASEAN Carbon Neutrality Plan and the newly established ASEAN Centre for Climate Change.

Decarbonisation Pathways Elsewhere and Climate Cooperation

Dr Rüya Perincek: Decarbonisation in OECD Countries

In the case of Australia, a national-level green bank was set up:

- The Clean Energy Finance Corporation (CEFC) was set up as an independent statutory authority to facilitate investment into clean energy and boost Australia's low-carbon development.

- The AUD 10 billion provided by the government to the CEFC for investments helped the companies in its portfolio attract new finance from other investors; thus developing debt and equity markets for clean energy investment
- Through diverse financing modalities including project finance, co-financing programmes, corporate loans, climate bonds and equities, the CEFC has supported almost AUD 33 billion in clean energy projects so far

In the case of Denmark, the government established complementary governance and policy for decarbonisation:

- A transparent and independent governance structure helped to manage trade-offs between multiple policy instruments; while consultations with experts, academia and civil society help build public trust.
- Emissions pricing was complemented with regulations such as a ban on new fossil fuel exploration by 2050, public investment in infrastructure and R&D and subsidies which cut costs and boosted private investment. Stakeholder consultation was developed in various sectors with private actors and advisory citizen assemblies

Mr Tom Moody: UK Climate Cooperation with Southeast Asia

- As ASEAN's 11th Dialogue Partner, the UK is committed to climate cooperation in the region;
- Challenges in the region include raising climate ambition, tackling fossil fuel subsidies, closing gaps in investment for renewables and energy efficiency, and implementing a regional energy grid;
- Just Energy Transition Partnerships (JETP), launched at COP26, are a new financing cooperation mechanism aimed at helping coal-dependent countries make a just energy transition;
- JETPs supporting Vietnam and Indonesia are in progress, but challenges include high renewable capital costs, grid upgrades and unfavourable regulatory environments.

Innovation, Digitalisation and Tech in the Energy Transition

Mr Niels de Boer: Current state of research and limitations in renewable energy and decarbonisation technology

- Energy storage systems: (1) Improving storage capacity, (2) Exploring the use of scarce materials like cobalt, (3) Studying real-world applications to electric vehicles and charging, (4) Safe grid integration, (5) testing and certification of technologies for safe deployment, (6) Battery recycling
- Hydrogen and fuel cells: lack of safety standards for the use of hydrogen inhibit research and deployment;
- CCUS and biofuels: tot yet mature enough for market development;
- Renewables integration and digital grids: (1) Scaling of renewables in many different ways, e.g., utility-scale, rooftop solar, microgrids, smart buildings. However, cost remains a limitation; (2)Research on digital grids include grid architecture and interoperability, simulations, prosumer digital grids and multi-energy grids (multiple energy source types) needed.
- Smart building technology: (1) Adding localised energy capture (e.g., solar panels or waste-to-energy) complicates the power system and requires digitalisation, (2) Research ongoing in simulation and optimisation, active and passive technologies (data science) and artificial intelligence, (3) Some projects have achieved zero-energy buildings, positive energy buildings and ultra-low energy high rise buildings.

Mr Vickrem Vijayan: New technologies in the private sector – the case of Sembcorp

- Sembcorp has pursued solar and wind deployment, storage solutions and hydrogen technologies
- On renewable energy deployment: Sembcorp is transitioning to renewable energy. Around 7GW of Sembcorp's 16-17GW portfolio is in renewable energy, including utility-scale projects in India and China
- On storage deployment: (1) Sembcorp is now building a 200Mwh battery storage facility in Singapore to cope with foreseen LNG shortages due to the war in Ukraine. (2) Battery energy storage systems (BESS)

also support Sembcorp's renewable deployment in the UK as it helps manage intermittency of solar and wind.

- on green hydrogen: (1) Hydrogen can be imported from many geographical locations – with potential green hydrogen import projects from Australia, India, Chile and the Middle East. (2) Due to the numerous RE100 companies and data centres with climate goals, as well as Singapore's carbon tax, it can be a good market for hydrogen. (3) The price gap between natural gas and green hydrogen is decreasing due to natural gas hikes in the current energy crisis, which are accelerating green hydrogen development.

Mr Matthew Wittenstein: Regional Interconnections and Smart Grids

- Opportunities in power system connectivity: (1) Economics: access to lower cost resources, potential export revenue, increased economies of scale, (2) Eecurity: Resources diversity, lower reserve margin requirements, (3) Sustainability: Increase access to regions with high renewables potential and enable integration of variable renewable energy (resources smoothing due to the natural variation of RE generation across geographic areas)
- Challenges: (1) Political will, (2) Differing economic situations, high capital costs and concerns on cost sharing (which may require private capital). IEA's Net Zero by 2050 roadmap for the global energy sector estimates that grid investments must triple by 2030, (3) Limited institutional capacity, (4) Ensuring alignment with sustainability and emissions reduction
- Selected potential measures based on the UNESCAP regional roadmap on power system connectivity: (1) Develop a regional master plan, (2) Mobilise investment in cross-border infrastructure, (3) Build trust and political consensus, (4)Develop intergovernmental agreements, (5) Coordinate, harmonise and institutionalise policy and regulatory frameworks, (6) Ensure coherence of connectivity with the SDGs
- Smart grid readiness: (1) Developing countries may need more than *ad hoc* capacity building and information sessions to plan major transformations in their energy systems, which will be needed for both domestic energy transitions and the development of regional interconnections. International partners should be prepared to provide the networks, resources and expertise for conducting in-depth, country-specific studies and assessments. (2) Regional power interconnections and the upgrade and grid improvements go hand in hand. Even before regional markets are established, smart grids can build trust between countries by providing monitoring of grid stability, optimising procedures for line utilisation and providing data for credible impact analyses of integration. (3) However, developing countries may lack the expertise to assess their own energy systems and identify roadmaps towards the development of smart grids. (4) The extensive networks held by organisations like ESCAP can allow them to address countries' specific needs for policy planning tools and expertise by connecting them with the appropriate project.
- An energy official expressed that his country was unsure of where it stands in terms of smart grid readiness. He asked if there was any support for conducting country assessments of smart grid readiness, adding that assessment tools like the NEXSTEP tool for SDG7 roadmaps would be useful. He stressed the importance of helping developing countries understand their current position before they can begin to cooperate regionally on projects like the APG, (6) Mr Wittenstein pointed to the Global Power System Transformation Mechanism (G-PST) consortium under the Green Grids Initiative, which includes members with the ability to conduct smart grid readiness assessments. As the Asia Pacific working group lead for the GGI, ESCAP can connect countries to the G-PST.

Getting the Global Stock Take and Enhanced Transparency Framework to Achieve Energy Transition

Ms Melissa Low: Enhanced Transparency Framework

- State of climate reporting in ASEAN: (ASEAN State of Climate Change Report (ASCCR) (2021) summarises AMS's climate targets and shows that most AMS have economy-wide NDCs, all of which cover energy. It also provides an overview of collective action and allows AMS to see where they stand
- Enhanced Transparency Framework: (1) Parties required to submit Biennial Transparency Reports (BTR) with first submissions due in 2024; (2) The Global Environment Facility (GEF) has been requested to provide support for the preparation of BTRs; (3) The ETF introduces new rules on data to be included (with flexibility for developing countries), reporting guidance and templates; (4) More details on national circumstances, emissions projections to be included.
- Challenges: (1) Enhanced reporting requirements may compound existing reporting challenge for AMS, some of whom have never submitted a Biennial Update Report (BUR) (reports requested by the UNFCCC under the current Measurement, Reporting and Verification (MRV) arrangements). Brunei, Myanmar and the Philippines have not submitted any BURs since 2014. (2) The new reporting guidelines may require recalculations of historical data, familiarisation with IPCC inventory software and additional data previously not required.
- Opportunities: now that the Paris rulebook chapters on th ETF and Article 6 have been developed, countries can develop common MRV procedures for carbon trading. The robust accounting frameworks required for carbon trading will also be useful for the ETF.

Mr Walters Tubua: Role of the Global Stocktake

- Global Stocktake objectives: (1) Under the Paris Agreement, countries are required to report on their progress towards their NDC targets, (2) Country reports as well as inputs from technical bodies, scientists, international organisations and civil society are aggregated in the Global Stocktake to measure global progress and generate key recommendations for countries to table new pledges, (3) Aims for inclusive conversations without naming and blaming, (4) The first Global Stocktake is currently running from 2021-2023 and will repeat every five years.
- The three stages of the Global Stocktake mechanism include: (1) Information collection and preparation: gathering information that fits within the scope but also responds to questions put out by subsidiary chairs and synthesis reports under the technical assessment process; (2) Technical assessment: there will be 3 meetings for the Technical Dialogue. The Joint Contact Group of subsidiary bodies are also meeting to receive feedback on how the Technical Dialogue meetings are conducted, (3) Consideration of outputs: findings are presented at high-level meetings in UAE (COP28). Will report progress on different goals, e.g., finance, peaking emissions.
- Regional dialogues on the Global Stocktake and the Enhanced Transparency Framework are important : (1) Mr Tubua and Ms Melissa Low agreed that having GST dialogues at the regional level before international discussions allows for more open conversations. Countries in the same region have a better mutual understanding, and through such dialogues, they can identify regional challenges and opportunities; (2) This will allow them to form a stronger coordinated voice during conversations at the international GST.

Mr Rex Barrer: Raising Climate Ambition in the UNFCCC Processes (Philippines Case Study)

- Mr Barrer presented research findings from interviews with government officials, negotiators and civil society stakeholders;
- Challenges in climate policy and development: (1) Coordinating multiple government agencies in operationalising key climate plans, (2) Managing priorities in climate action and pandemic recovery, (2) Concerns on limited capacity and resources held by local governments, (3) Expanding meaningful participation

to more key stakeholders, such as the Philippine Commission for Women, (4) Allocation of financial resources and access to alternative sources of funding;
- Enabling conditions for sustainable climate policy: (1) Scientific applications to inform development planning via climate impact assessments, baseline data and MRV, (2) High-level political engagement (avoid targets that contradict climate ambition), (3) Locally-driven multi-stakeholder inter-agency collaboration with emphasis on representing diverse groups, (4) Resource mobilisation using development funds and external climate funds (including non-financial resources such as capacity-building and expertise);
- Recommendations for enhancing UNFCCC processes: (1) NDCs should be used as a tool for mainstreaming low-carbon development, (2) Set a GST agenda with due importance for climate targets aligned with the best available science, (3) Level the playing field for meaningful local multi-sectoral involvement in the GST process.

Ensuring an Equitable Energy Transition

Mr Peter Govindasamy: Understanding the Just Transition

- Energy transitions have a double impact on society: the first-order impact of climate change (rising temperatures, extreme weather etc.) and the second-order impact of climate mitigation measures (economic and social impacts such as job losses, domestic and cross-border trade impacts);
- The Glasgow Climate Pact in 2021 mandated Parties to design Just Transitions strategies to meet mitigation goals;
- Countries must be incentivised to take mitigation actions as well as address their socio-economic impacts by fostering a Just Energy Transition (avoiding disruptive transitions that exacerbate social inequality;
- "Just Energy Transition" has no universally accepted definition, but can be defined by a few aspects: (1) Covers the three pillars of sustainable development: environmental sustainability, economic development and competitiveness, and social considerations; (2) Notions of fairness and inclusiveness; (3) Calls for decent work opportunities and quality jobs; (4) Imperative of not leaving anyone behind; (5) Country-specific and in sync with nationally defined development priorities;
- Impacts of just transitions on jobs: (1) Quantitative: job creation, job substitution and job elimination in the fossil fuel industry, (2) Qualitative: social protections in new jobs, safe working conditions, adequate incomes, sense of dignity, avenues for social dialogue,
- Considerations for a just transition: (1) Based on "national circumstances" as practised by the Paris Agreement, (2) Economic diversification to build resilience to transition shocks, (3) Implement UNFCCC Article 3.5: "promote a supportive and open international economic system" and avoid "unjustifiable discrimination or a disguised restriction on international trade", (4) Stakeholder engagement and coherence in policymaking, both among domestic policymakers and in collaboration with international organisations, (5) Continuous support for workforce capability through re-skilling and up-skilling;
- Role of the Katowice Committee of Experts on the Impacts of the Implementation of Response Measures (KCI): (1) Focus areas include the "just transition of the workforce and the creation of decent work and quality jobs", (2) KCI meetings are conducted twice a year (which Parties can join as observers and provide input) (3) Builds awareness through sharing of best practices, (4) Prepares technical papers, case studies and guidelines on capacity-building, e.g., technical paper on tools for and methods for assessment of impacts of climate response measures, (5) Receives input from experts, practitioners and relevant organisations, (6) Organises workshops.

Professor Lorraine Elliott: The What, Who and How of Making Fair, Sustainable and Equitable Transitions

Why are social justice considerations important in decision-making?

- Justice considerations can help limit social and political resistance to transitions;
- Those who are already vulnerable have fewer opportunities to adapt to local changes or move away from risks;

Professor Elliott introduced three dimensions of social justice and how they apply to a just energy transition (Table 3).

Recommendations on accounting for justice in job creation and green employment

- Address data gaps on jobs created in off-grid and on-grid energy production to improve the understanding of job mixes across subsectors;
- Distributional justice: ensure that policies support workers in fossil fuel sector, decent jobs in new-energy sectors, and job creation in sectors affected by the transition;
- Procedural justice: protect workers from safety hazards and risks from economic turbulence recognising fundamental employment rights and ensuring social dialogue;
- Recognition justice: provide employment opportunities for marginalised groups in the current economy, such as women and unaccounted-for workers with low job and income security.

Table 3. Three Dimensions of Social Justice in Energy Transitions

Definition	Examples	Background
1. Distributive Justice		
Equitable distribution of benefits, harms and burdens related to low-carbon energy production and consumption	•Addressing energy poverty •Decent work for all •Overcoming sectoral/ occupational segregation and disparities	•At least 45 million people in the region still do not have access to reliable and affordable energy •Rural energy solutions such as large hydropower dams can disrupt ecosystems and displace local communities •Reliance on private finance can limit investments in small and distributed renewable energy initiatives (including in urban areas)
2. Procedural Justice		
Full, equal and meaningful participation of all stakeholders and rights-holders in energy-related decisions and processes	•Information disclosure •Employment rights	•Community engagement may not necessarily lead to fairer outcomes if they reinforce existing social and economic inequalities and/or bring extra advantages to those who are already socially or economically privileged
3. Recognition Justice		
Acknowledge forms of exclusion in the energy system and identify and rectify past inequities	•Overcoming high levels of informal and vulnerable employment •Expanding opportunities for marginalised groups	•Southeast Asian women are disproportionately affected by energy poverty due to household roles exposing them to indoor pollution from biomass / firewood cooking

9. Annex B: Workshop Schedule

Monday, 26 September

08.45-09.00	Registration
09.00-09.45	*Welcome Remarks* **Mr Choi Shing Kwok**, Director and CEO, ISEAS-Yusof Ishak Institute **Dr Christian Hübner**, Head, Regional Programme Energy Security and Climate Change Asia-Pacific, Konrad Adenauer Stiftung *by video* *Opening Remarks* **Mr Joseph Teo**, Chief Negotiator for Climate Change, Ministry of Sustainability and the Environment, Singapore **H.E. Kara Owen**, British High Commissioner to Singapore
09.45-10.15	Group photo-taking and break
10.15-12.00	*Session 1: Global Energy Trends and Overview of ASEAN Energy Transition* **Impacts of Geopolitics on Energy and Decarbonisation** **Prof Indra Overland**, Head, Research Group on Climate and Energy, Norwegian Institute of International Affairs **Southeast Asia's Energy and Climate Outlook** **Mr Beni Suryadi**, Manager, Power Fossil Fuel, Alternative Energy and Storage, ASEAN Centre for Energy **Regional Climate Governance in ASEAN** **Ms Melinda Martinus**, Lead Researcher, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institute Moderated Q&A by Dr Mirza Huda, Lead Researcher, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institute
12.00-13.00	Lunch
13.00-14.30	*Session 2: Decarbonisation Pathways Elsewhere: Sucesses and Failures* **Energy Transition in OECD Countries** **Dr Rüya Perincek**, Advisor to the Governing Board, OECD Development Centre **UK Climate Cooperation with Southeast Asia** **Mr Tom Moody**, Regional Director Southeast Asia, Climate and Energy, UK Foreign, Commonwealth and Development Office Moderated Q&A by Dr Prapimphan Chiengkul, Visiting Fellow, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institute
14.30-14.45	Break
14.45-15.45	Working session with country peers to prepare presentation
15.45-16.45	*Session 3: Country Sharing Part 1* Country Presentations: Singapore Indonesia Malaysia Moderated Q&A by Ms Sharon Seah, Senior Fellow and Coordinator, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institute
16.45-17.00	Closing Remarks and Housekeeping
18.30-20.30	Welcome dinner hosted by the British High Commission Venue: Eden Hall, 28 Nassim Road, Singapore 258403

Tuesday, 27 September

09.00-10.30	*Session 4: Country Sharing Part 2* Country Presentations: Cambodia Philippines Thailand Vietnam Moderated by Ms Melinda Martinus, Lead Researcher, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institute
10.30-11.00	Break
11.00-12.00	*Session 5: Country Sharing Part 3* Country Presentations: Brunei Laos Myanmar Moderated Q&A by Ms Aninda Dewayanti, Research Officer, ISEAS-Yusof Ishak Institute
12.00-13.00	Lunch
13.00-14.30	*Session 6: Innovation, Digitalisation and Tech in the Energy Transition* Renewable Energy Options for Southeast Asia **Mr Niels de Boer**, Chief Operating Officer and Senior Programme Director, Energy Research Institute, NTU Role of New Technology in Enhancing Regional Cooperation on Energy **Mr Matthew Wittenstein**, Chief of Section, Energy Connectivity, UNESCAP Battery Storage Innovation **Mr Vickrem Vijayan,** Head, Energy Commercial, Sembcorp Moderated Q&A by Dr Mirza Huda, Lead Researcher, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institute
14.30-15.00	Break
15.00-16.30	*Session 7: Roundtable Discussion Can ASEAN Envision a Regional Energy Transition?* Open sharing by participants and speakers Moderated Q&A by Ms Sharon Seah, Senior Fellow and Coordinator, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institue

Wednesday, 28 September

09.00-10.30	*Session 8: Getting the Global Stock Take and Enhanced Transparency Framework to Achieve Energy Transition* Role of the GST in Transitioning to Low-Carbon Economies **Mr Walters Tubua**, Program Officer, UNFCCC Role of Civil Society in Raising Climate Ambition in the UNFCCC Processes **Mr Rex Barrer**, Lecturer, Ateneo de Manila University Role of the Enhanced Transparency Framework in Energy Transition **Ms Melissa Low**, Research Fellow, NUS Centre for Nature-based Climate Solutions Moderated Q&A by Mr Casey Cronin, Director, Global Intelligence, ClimateWorks Foundation
10.30-11.00	Break
11.00-12.00	*Session 9: Ensuring an Equitable Energy Transition* The What, Who, How of Making a Fair, Sustainable and Equitable Transition **Prof Lorraine Elliott,** Professor Emerita, Coral Bell School of Asia Pacific Affairs, Australian National University Understanding the Work of the Katowice Committee of Experts **Mr Peter Govindasamy**, Senior Director, Climate Change International Team, Ministry of Trade and Industry Singapore Moderated Q&A by Ms Sharon Seah, Senior Fellow and Coordinator, Climate Change in Southeast Asia Programme, ISEAS-Yusof Ishak Institute
12.00-12.30	Lunch, End of Programme
14.30-17.30	Optional site visit to Sembcorp Floating Solar Farm


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