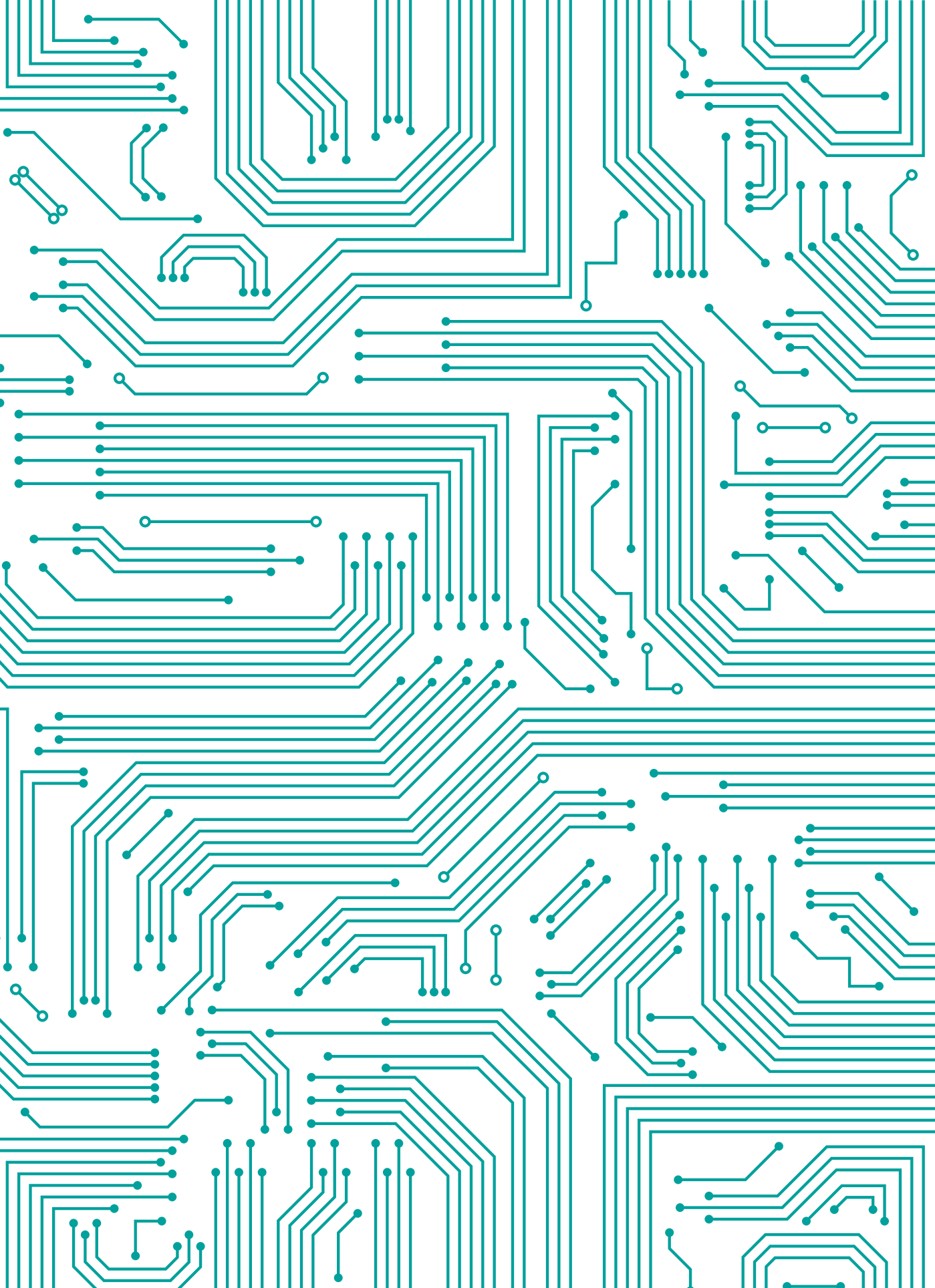
SUMMARY OF ERIA RESEARCH PROJECTS 2024

ERIA
Economic Research Institute
for ASEAN and East Asia



Economic Research Institute for ASEAN and East Asia

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01 Critical Minerals Supply Chain and Economic Analyses

Han Phoumin

Summary

All countries are committed to pursuing pathways to decarbonise emissions by mid-century 2050, as concerns raised by the Intergovernmental Panel on Climate Change highlight the serious consequences of global climate change. The Paris Agreement, a legally binding international treaty on climate change, set an overarching goal to hold 'the increase in the global average temperature to well below 2°C above pre-industrial levels' and to pursue efforts 'to limit the temperature increase to 1.5°C above pre-industrial levels.'

Pursuing net-zero emission pathways will require political commitment to drive policies in all energy-related sectors, transforming business-as-usual energy infrastructure towards clean and sustainable energy systems where clean fuels and renewables will play a crucial role. Scaling up all clean and renewable technologies and production requires a massive amount of rare earth minerals or rare earth elements (REE) as critical inputs. These minerals are essential for producing clean technologies and renewables such as wind turbines, battery storage, batteries in electric vehicles, electrolysers, and smart technologies involved in smart grids and telecommunications. Additionally, REEs are used in the production of warfare weapons.

To meet the net-zero emission scenario, the demand for critical minerals is estimated to grow from 7.1 Mt in 2020 to 42.3 Mt in 2050, representing about a sixfold increase. This surge in demand creates potential energy security concerns in sourcing supply chains, especially since China currently dominates the global supply chain (IEA, 2022).

Presently, China is the leading global player in rare earth elements, with 44 million tons in reserves (about 35% of the global reserve) and an annual mine production of 140,000 tons. The United States, having reopened mining in 2018, gradually increased production to 38,000 tons in 2021, with 1.5 million tons in reserves. Australia ranks third in annual production with 17,000 tons and approximately 4.1 Mt in reserves. Although Viet Nam and Brazil have the second and third largest reserves of rare earth metals with 22 million tons and 21 million tons, respectively, their mine production is amongst the lowest at only 1,000 tons per year each (USGS, 2022).

China's stronghold on the supply chain, accounting for 80-85% of the global supply, underscores the need to develop new sources of rare earths in North America and elsewhere, such as Australia, Viet Nam, and Indonesia. Historically, the U.S. was a major player in the REE market before the 1980s, but production shifted abroad due to growing production elsewhere, environmental pressures at home, and cheaper labour costs.

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China's dominant position has sparked supply concerns. It has previously used REE as political leverage, notably in 2010 when it limited exports to Japan during a territorial dispute, and more recently threatened to cut supply to the United States during the trade war. Recognising the importance of supply chain security, the United States has made several attempts to re-emerge as a major player in the REE supply chain, with renewed focus and substantial investments under the Biden administration.

Countries like Australia, Indonesia, Viet Nam, and India could become new sources in the near future. Australia's resources sector is well-positioned to develop a cost-competitive domestic processing sector that meets environmental, social, and governance considerations, drawing on high labour and environmental standards, reliability as a supplier, and technical expertise. However, these countries need to address barriers such as technical challenges in production, processing, refining, and managing the sustainability of the critical minerals industry.

Governments in Australia, Indonesia, Viet Nam, and India must look into issues that can help de-risk projects at all stages of development to overcome barriers and attract private investment. This can be achieved through project facilitation, providing technical support, and making strategic investments to scale up processing and secure finance and offtake for production. Investing in R&D is also crucial, as demonstrated by China's decades-long investment in this sector.

This study aims to provide a comprehensive analysis of the critical mineral supply chain, from production to refining, and its economic impacts on emerging players in the ASEAN region and beyond. It will also explore how countries like Indonesia, Viet Nam, and Australia can forge stronger relationships with key countries to secure supplies of REE, alongside China. Key external partners such as the United States, Japan, the Republic of Korea, the United Kingdom (UK), India, and European Union (EU) members are crucial for securing offtake contracts for these critical minerals.

Policy Implications

The project is expected to generate knowledge for policy debates and practices concerning the critical mineral supply chain at various levels (national, regional, and firm). It aims to inform policymakers on potential policy changes that can facilitate a swift and just energy transition in the East Asian region. Additionally, it will provide practitioners, both within and outside the East Asian region, with options and practices that can lead to a sustainable critical mineral supply chain.

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02 Masterplan for ASEAN–Japan Next Generation Vehicle Industry Strategy

Alloysius Joko Purwanto

Summary

The market shift towards electric vehicles demonstrates the agility of the automotive industry in ASEAN to adapt. Compared to internal combustion engine (ICE) production, EV manufacturing involves significant differences in production structure and supply chains, material needs, and the treatment of end-of-life products, as well as differing labour requirements in both quantitative and qualitative terms.

Meanwhile, most ASEAN countries have committed to achieving net zero emissions (NZE) by mid-century. This objective not only drives the electrification of transport and mobility in the region but also mandates the automotive sector itself to decarbonise and embrace a circular economy. This means that both EV and ICE vehicle production must implement circularity throughout their supply chains and lifecycle, from cradle to grave.

The ASEAN vehicle industry sectors find themselves at the intersection of various forces, primarily market trends and decarbonisation objectives. The main question the project tries to answer is: How the ASEAN automotive industry strengthen its competitiveness amidst decarbonisation and electrification?

Policy Implications

The objective of this study is to provide a theoretical basis for policies in each ASEAN country to strengthen its competitiveness and develop as a production and export hub for diversified automobile models, considering the global market situation.

Partner Organisation
Monitor Deloitte, University of Indonesia, University of Tokyo

Geographic Scope
ASEAN countries, Japan

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03 ASEAN Alternative Vehicle Technology Portal

Alloysius Joko Purwanto

Summary

This study aims to build an online data portal for ASEAN conventional, new, and alternative road vehicle technologies, with the primary objective of providing comprehensive information on the current state of conventional and alternative vehicle technology development in the ASEAN Member States to the public. An outlook of the future situation of the road vehicle market in ASEAN will also be developed. This data and information will be crucial for policymakers in ASEAN as they develop strategies and policy measures to decarbonise the transport sector.

Policy Implications

This database should also serve to develop road transport models for ASEAN countries, allowing for the forecasting of the dynamics of the road vehicle fleet, the evolution of final energy consumption, and the emissions and air pollution from the road transport sector.

Partner Organisation
University of Indonesia, private consultancies

Geographic Scope
Indonesia, Lao PDR, Malaysia, Thailand, and Viet Nam

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04 Towards an Effective Road Transport Fleet Renewal Strategy for Indonesia

Alloysius Joko Purwanto

Summary

Car ownership rates in Indonesia are projected to continue increasing towards the middle of the century. There were approximately 94 cars per thousand inhabitants in 2020. This rate is expected to rise to 205 cars per thousand inhabitants by 2040, in line with Indonesia's economic development. Additionally, the average lifespan of road vehicles in Indonesia is very high due to the slow rate of fleet renewal, exacerbated by the lack of vehicle scrapping or deregistration policies.

Given this inertia in road vehicle turnover, the current mobility electrification policy being initiated in the country risks being ineffective in reducing carbon emissions and addressing air pollution in urban areas.

The objective of this research is, therefore, to answer the question: 'How can road transport fleet renewal through electrification be effectively implemented in Indonesia?'

Policy Implications

The study will provide policy recommendations to address the following detailed questions:

- How much CO_2 emissions and air pollution need to be reduced from the road transport sector to meet NZE and air quality improvement targets, particularly in urban areas?
- Which 'dirty' vehicles should be targeted for replacement, and which clean (electric) vehicles should be introduced?
- What types of 'clean' vehicles should be introduced to replace the 'dirty' ones?
- What will be the most effective renewal strategy or strategies?
- What will be the costs and benefits for the government, car manufacturers, users, and society as a whole?
- What is the roadmap for implementation? (This can be aligned with the roadmaps from car manufacturing countries such as Japan.)

Partner Organisation
Pustral of the Gadjah Mada University

Geographic Scope
Indonesia

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05 New Players of the Next-generation Automotive Industry (Phase 1): The Case of Next-generation Vehicle Development and Manufacturing

Yasushi Ueki, Alloysius Joko Purwanto

Summary

Automotive industrial policies have traditionally been developed based on the hierarchical pyramid structure consisting of car makers, first-tier suppliers, second-tier suppliers, and lower-tier suppliers. This tiered vertical division of labor in the automotive industry has been governed by car makers, who operate the entire value chains (Gereffi, Humphrey, & Sturgeon, 2005). This traditional industrial organisation has significantly influenced strategies of suppliers, cluster development, and industrial policies (Altenburg, 2006; Sturgeon, Van Biesebroeck, & Gereffi, 2008).

However, vehicle electrification is altering this hierarchical relationship between car makers and their suppliers. The increasing use of electric parts and components (ICs, sensors, and other hardware) and software for vehicles has introduced new types of suppliers, including mega Tier-2 suppliers, which were previously leading suppliers in the ICT industries. Traditionally, Tier-2 suppliers were smaller and less capable than Tier-1 suppliers. Additionally, car makers are now allocating more tasks and budgets to software development, resulting in increased employment and value creation in engineering processes.

The digital transformation in automobiles, enabling CASE (Connected, Autonomous/Automated driving, Shared & Service, Electric) and MaaS (Mobility as a Service), is creating opportunities for firms from other industries to enter automotive businesses. This transformation is changing industry boundaries and leading to industrial convergence (Liu, Shang, Xu, Zhang, Hua, 2023). Innovations like open-source software for autonomous driving, promoted by startups such as Tier IV in Japan, are facilitating these structural changes. In this evolving landscape, next-generation automotive and related businesses are emerging, with firms from different sectors and researchers from private and public research institutes and universities in developing countries developing various types of vehicles (mostly electrified) to enter the market. Understanding the backgrounds and strategies in development, production, procurement, and marketing is crucial for developing countries aiming to promote new vehicle industries. This includes exploring new business opportunities like the eTukTuk in Thailand and eJeepney in the Philippines, which cater to different lifestyles and utilise available renewable energies.

We propose this research project to supplement other projects on automotive suppliers, particularly for developing the Master Plan for the ASEAN-Japan Next Generation Vehicle Industry Strategy

Objectives

1. Map Out New Players: Identify global and East Asian players in next-generation mobility development and production, useful for policy targets in the Master Plan for the ASEAN-Japan Next Generation Vehicle Industry Strategy.
2. Assess Development and Future Potential: Evaluate the current development status and future possibilities of developing a new ASEAN next-generation automotive industrial cluster.

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This study will explore the influences of automotive digital transformation on industrial organisation, industry boundaries, division of labor, and geographical distribution of value creation activities for next-generation vehicle development and production.

Policy Implications

- Integration with Master Plan: This research will fall under the umbrella of the research project for developing the Master Plan for the ASEAN-Japan Next Generation Vehicle Industry Strategy
- Informing Policy Targets: Provide information useful for defining policy target tasks and firms from various industries involved in the next-generation automotive industry.
- Status and Development Analysis: Offer insights into the status and future development of hardware and software developers for next-generation vehicles in East Asia and ASEAN, along with necessary policies based on firm-level strategic behaviors.

06 Global Value Chains in Electric Vehicle and Utilisation of Rare Earth Minerals (REEs)

Dionisius Narjoko

Summary

The global movement towards tighter emission regulations has reignited interest in electric vehicles (EVs), prompting a shift in the automotive industry. This transition has been propelled by technological advancements and regulatory changes, culminating in a global campaign and transition towards EVs. The significance of EVs in vehicle production has risen notably since the mid-2000s, particularly with Tesla's introduction of luxury EVs and its subsequent extraordinary growth.

Consequently, many traditional internal combustion engine vehicle (ICEV) manufacturers have entered the EV market, responding to investor expectations, stringent emissions regulations, and incentives offered in various countries. Notably, manufacturers such as GM, Ford, and Volvo have announced plans to phase out ICEVs and focus on EVs. Additionally, several governments, including those of Norway, the Netherlands, Germany, and India, have proposed or implemented bans on ICEVs, further accelerating the transition to EVs.

The growing importance of EVs has profound implications for global value chains (GVCs) in the automotive industry. The manufacturing processes of battery electric vehicles (BEVs) differ significantly from those of ICEVs. BEV supply chains are typically shorter, with fewer parts and components, primarily consisting of batteries, electric motors, and inverters. Core technologies of traditional cars, such as internal combustion engines and transmission parts, are no longer required, while other components, such as auto bodies and brakes, may require modification. Overall, GVCs for EVs could differ substantially from those for ICEVs.

Moreover, the shift to EVs is driving increased demand for rare earth minerals (REEs), particularly nickel, lithium, cobalt, and graphite, essential for battery production. Forecasted demand for these minerals is expected to increase significantly by 2040, necessitating realignment in mining extraction and industrialisation strategies. However, this process is complex and time-consuming, requiring substantial investment, technology transfer, and skill development to align with new technologies.

Against this backdrop, understanding how traditional automotive supply chains will evolve and their implications is crucial. This research aims to provide insights into factors facilitating the transition to EVs and integrating vehicle production supply chains with REE mining. Specifically, it seeks to examine the impacts of the shift from ICEVs to EVs on global value chains, explore factors for developing GVC models integrating REE mining and manufacturing, and assess policy implications for middle-income countries adapting to changing international production networks in the EV industry.

This research is part of ERIA's FY2024 flagship research projects on 'supply chain resilience on critical minerals and EVs'. Its objectives include examining the impacts of the shift to EVs on global value chains, exploring factors for integrating REE mining into manufacturing, and assessing policy implications for middle-income countries in adapting to changing production networks in the EV industry.

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Policy Implications

This research aims to offer insights for policymakers and industry stakeholders on how countries can formulate their policy directions in response to potential global supply chain restructuring resulting from transformative shifts in the automotive sector. The policy recommendations may also offer insights into the long-term implications if electric vehicles (EVs) become increasingly significant in the future global transportation system.

ASEAN Digital Community: Digital Economy, Start-up Ecosystem, and Innovation

07 GVCs in the Era of Industrial 4.0

Fukunari Kimura, Antoni Estevadeordal, Lurong Chen

Summary

In today's interconnected world, Global Value Chains (GVCs) play a pivotal role in driving economic growth and creating value for businesses worldwide.

The motivation behind this project stems from the recognition that integrating digital technologies into GVCs has the potential to revolutionise business operations, collaboration, and innovation. This research project aims to investigate how digital technologies can empower and enhance global value chains, ultimately contributing to increased efficiency, competitiveness, and sustainability in the global economy.

The study seeks to provide an in-depth understanding of how developing countries can navigate the policy challenges posed by technological advancements and shifting developmental paradigms. It aims to elucidate how Asia can better embrace digital solutions across various sectors, focusing particularly on innovative public policies, private sector strategies, and the role of development cooperation.

The project plans to explore the multifaceted impact of digital transformation on GVCs, with specific research objectives including:

- Analysing the current state of GVCs and identifying key challenges and opportunities for digital transformation.
- Investigating the adoption and implementation of digital technologies in various industries and regions, highlighting best practices and success stories.
- Assessing the economic, social, and environmental impacts of digital empowerment within GVCs.
- Proposing strategies and recommendations for businesses, policymakers, and stakeholders to harness the full potential of digital technologies in GVCs.

Policy Implications

The study's outcomes will illuminate policy suggestions addressing questions such as:

- How technological innovation and digitisation serve as crucial facilitators of success across all industries, fostering the modernisation of the economy and society.
- Strategies for leveraging emerging technologies across sectors and industries effectively.
- Approaches to promoting innovation and collaboration while safeguarding data privacy and security, particularly through the utilisation of big data and cloud computing in key sectors of the economy.

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08 Gender Diversity, Innovation and Productivity in ASEAN Region and India: The Role of Women's Economic Opportunity in Emerging Economies

Wan Seok Chang

Summary

Nowadays, women are largely underrepresented in firms, especially at the top level. Over the last few decades, several local, national, and international programmes have been directed at promoting gender diversity in firms, particularly to increase the number of women in leadership positions. The ASEAN Economic Community (AEC) has emphasised gender equality since its inception. To address the remaining gaps in outcomes between men and women in the region, the AEC has recently increased its focus on supporting women's entrepreneurship within the context of the ASEAN Strategic Action Plan for SME Development 2016–2025. Despite these efforts, progress towards greater gender diversity in firms in the ASEAN region, at all levels, has been slow.

In theory, gender diversity in the composition of firms' human resources can have both positive and negative effects. On the one hand, it could positively contribute to performance by ensuring better support for value creation at all levels of the firm's organisation. This is primarily by expanding the firm's knowledge base (Penrose, 1959) and, thus, its ability to absorb external knowledge and interact with different types of knowledge and competencies (Cohen and Levinthal, 1990; Lundvall, 1992). On the other hand, high levels of diversity in firms could generate disagreements and increase management costs and risks, thereby resulting in lower benefits and performance (Harrison and Klein, 2007). Hence, unbalanced diversity could be detrimental to firms' innovation (Østergaard et al., 2011).

Previous studies that have tended to focus solely on gender diversity at one specific organisational level within firms – often emphasising particular departments or occupational groups such as R&D, top management teams, or corporate boards – could be misleading. When assessing the role of gender diversity, it is crucial to consider different levels of the firm's organisation (i.e. not only top management positions but also the workforce). Therefore, this study will use two comprehensive gender diversity levels of firms' organisation: 1) workforce and 2) ownership. We will then assess the relationship between workforce and ownership gender diversity and firms' performance, considering both innovation inputs and outputs, as well as productivity, in selected ASEAN Member States (AMS) and India.

The objective of this study is to empirically examine the relationship between ownership and workforce diversity, firms' innovation, and productivity, and to provide insights on how gender diversity affects a firm's innovation and productivity at different phases of the innovation process.

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Policy Implications

The results of the study will highlight the value of gender diversity for innovation and create awareness amongst managers and employees that innovation stems from gender diversity at the firm level. Policymakers in the region could develop targeted policies and programmes to encourage and support firms in hiring a more gender-balanced workforce, promoting more female top managers, and fostering a gender-diverse ownership structure.

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09 Digital Twins and Data Governance for Deep Sustainability in Smart Cities

Venkatachalam Anbumozhi

Summary

At the 32nd ASEAN Summit in 2018, the ASEAN Smart Cities Network (ASCN) was established as a collaborative platform where 26 cities from the ten ASEAN Member States work towards the common goal of smart and sustainable urban development. The imperatives of smart cities arose as the region, while striving for economic well-being, grapples with challenges such as rapid urbanisation, environmental degradation, and social disparities. Achieving smart urban sustainability necessitates a comprehensive, integrated approach to urban planning and public action, aligning with the ASEAN Smart Cities Framework (ASCF), the Sustainable Development Goals (SDGs) that address low carbon and circular outcomes, and the UN Habitat's New Urban Agenda of resilience, in the context of mitigating natural disasters and adapting to climate change.

Urban sustainability, as defined by the SDGs, intertwines economic development, social equality, and environmental preservation. Addressing these interconnected aspects calls for integrated public policies through a holistic scheme. However, various governance challenges arise, including multi-level and organisational silos, inadequate data-sharing mechanisms, and issues such as data privacy at the city level.

The progressive uptake of smart city initiatives, which aim to incorporate ICT and other new technologies such as AI to solve various existing challenges and help manage cities in a better way for overall optimisation, is also found to disrupt established models of city governance but at the same time helps solve problems much more efficiently. However, the right policy frameworks, regulations for data acquisition and transfer, and fair competition for global players are neither in place within ASCN nor evolving in a comprehensive way.

While the digital transformation accelerated during the COVID pandemic has started offering an unprecedented window of opportunities to improve the living standards of millions of urban residents, there is no guarantee that the rapid diffusion of new digital technologies will automatically bring sustainability benefits to the citizens. Smart city policies and strategies for data governance need to be implemented and monitored as tools to improve the overall quality of well-being for all residents.

This study will investigate the role of urban data platforms and data governance as essential strategies in addressing the challenges of supporting urban sustainability through integrated public policies. Specifically focusing on the ASCN cities, it will underscore a phased, differentiated, and cost-driven implementation approach, with an initial emphasis on urban data platforms. These platforms, engineered to accumulate, store, process, visualise, and disseminate data related to designated smart cities, have the capability to integrate a variety of historical and real-time data sources. As these platforms evolve, they can assimilate advanced technologies, paving the way for the transition towards a 3D-mapping and AI-driven digital twin model.

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Policy Implications

- Ways to strengthen integrated public policies driven by the Sustainable Development Goals (SDGs), utilising digital urban platforms and data-sharing mechanisms as key tools.
- A regional approach to building urban data platforms, with a strong emphasis on the use of interoperable systems and open-source solutions based on the principles of transparency and collaboration, paving the way for the emergence of a smart city single market in ASEAN.
- Formulate a step-by-step, customised strategy for the implementation of digital twins, starting with the establishment of a robust data governance framework, to align with the diverse stages of development across ASEAN countries.

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10 Benefits and Challenges of Digitalisation in Agriculture and Food System for Enhanced Resilience and Improved Sustainability

Masanori Kozono and Venkatachalam Anbumozhi

Summary

Agriculture and food systems hold a strategic position in the ASEAN economy, serving as a primary source of employment and income for a significant portion of the region's population. More importantly, they contribute significantly to ensuring national, regional, and global food security. However, agriculture and food systems face numerous challenges, including increasing food demand from a growing population, rising malnutrition, adverse impacts of climate change, overexploitation of natural resources, escalating carbon emissions, loss of biodiversity, and food loss and waste.

To overcome these challenges and promote sustainable agriculture and food systems, the utilisation of digital technologies has emerged as a critical tool in recent years. Digital technologies offer innovative solutions to enhance productivity, optimise resource allocation, improve market access, and promote sustainable practices in agriculture and food systems. Several countries in the region are witnessing initiatives leveraging digitalisation in agriculture and food systems. For example, at production sites, precision agriculture technologies such as remote sensing, drones for assessing crop growth and spraying pesticides, and GPS systems contribute to sustainable agriculture by optimising resource use, improving crop yield, and reducing environmental impact. Additionally, farming advisory services based on digital information, which lead to maximising yield through better production practices, are observed in some ASEAN countries. Along the food value chain, digital agriculture trading through digital marketplaces has been rapidly emerging since the COVID-19 pandemic. Digital agriculture trading can streamline marketing and distribution processes, reduce intermediaries, and ensure fair market access for farmers through digital tools and platforms. Generally, the use of these digital technologies in agricultural production and value chains promotes the transition of conventional agriculture and food systems to a more resilient and sustainable form. However, these success stories appear to be limited to some countries in the region. A study conducted by ERIA last year showed that the diffusion of digital agriculture in the ASEAN region is limited, and there is a noticeable gap among countries.

Recognising the importance of digitalisation in agriculture and food systems, in the 'ASEAN Leaders' Declaration on Strengthening Food Security and Nutrition in Response to Crises' adopted at the ASEAN Summit in September 2023, the leaders committed to accelerating digital transformation to increase productivity and resilience in the agri-food system, address challenges of climate change, reduce greenhouse gas emissions, and reduce food loss and waste. In response to the leaders' commitment, at the 45th Meeting of ASEAN Ministers on Agriculture and Forestry (AMAF) held on 4 October 2023, the ERIA President announced that ERIA will launch a new project to promote the utilisation of digital technologies to enhance sustainable agriculture and food systems in ASEAN countries. In the Joint Press Statement of the AMAF meeting, the Ministers expressed their expectation for ERIA's engagement in the digitalisation of the agriculture sector.

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Based on these backgrounds, ERIA will conduct a research project containing some sub-components such as a preliminary assessment study, in-depth country case study and workshops.

Based on this background, this study will be carried out with the following objectives:

- To assess the status of utilisation of digital technologies in agricultural production sites and along the food value chain, focusing on best practices and technologies.
- To identify challenges (e.g. digital infrastructure, connectivity and resources in rural areas, digital literacy, data and cyber security, disparity in diffusion, government initiatives, etc.) and to understand the implications for digitalisation of agriculture.
- To identify and analyse digital policy instruments to strengthen agricultural policies towards enhanced resilience and improved sustainability, with a focus on smallholder farmers.

Policy Implications

- Distinct policy pathways for scaling up applicable digitalisation in the context of smallholder farmers contribute to enhancing the resilience and sustainability of agriculture value chains.
- Elements to be considered for developing the ASEAN Action Plan for promoting digital and information-based agriculture.

Partner Organisation

University, Research Institute or Experts from ASEAN Member States and selected countries beyond ASEAN

Geographic Scope

ASEAN Member States and selected countries beyond ASEAN

Related ERIA Publications

Kozono, M., K. Yamada, and S.M. Diyanah (2023), *Building and Enhancing Sustainable Agriculture and Food Systems in ASEAN: A Preliminary Scoping Study*. ERIA Policy Brief 2023-10. Jakarta: ERIA. Downloadable from: https://www.eria.org/publications/building-and-enhancing-sustainable-agriculture-and-food-systems-in-asean-a-preliminary-scoping-study

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11 Supply Chain Digitalisation Project Phase 5

Daisuke Nakayama

Summary

An initiative to enhance supply chain efficiency and productivity by utilising supply chain data within the ASEAN region. During this period, we will define the architecture of the data-sharing platform, as well as develop other services such as Trade Waltz, Zero Board, Regilia, and others. By collaborating with leading initiatives, we will aim for specific data linkages that target particular industries and perspectives.

Partner Organisation

Toyota Tsusho, DENSO, Thai Summit, FPT, Microsoft Japan, SGTradex, Truedigital

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Human Resource Development

12 Employment Transition in ASEAN and East Asia

Rashesh Shrestha

Summary

ASEAN and East Asian countries are undergoing rapid changes in the structure of employment due to forces of technology and sustainability transition, requiring workers to move from declining sectors to emerging sectors. Such transitions occur naturally and organically over long periods during economic growth. Indeed, a common feature of development is the declining share of employment in agriculture, accompanied by rising shares in manufacturing and services, along with a shift of population from rural to urban areas. However, the pace of economic change is also an important consideration, as faster change allows less time for workers to adjust.

Human capital and economic geography are two important factors that determine how quickly workers can adjust to new economic conditions. Human capital broadly refers to the skills and abilities of workers that can complement existing and future production methods. Economic geography determines the location of economic activities.

All workers are inherently mobile across jobs and locations to a greater or lesser degree. Some transitions require few adjustments for labour – moving from producing rice to producing corn, for example – while others require significant adjustment – moving from being a coal miner to being a solar technician. Other transitions may require relocation, which is also costly from an individual's perspective. During periods of rapid changes in the economy, a faster rate of transition is necessary.

From a theoretical perspective, employment transition takes place when transition benefits exceed transition costs. Transition cost includes retraining cost and relocation cost, whereas transition benefit comprises wage differential and employment probability, which in turn is determined by the number of available jobs. Transition cost and transition benefits have internal dynamics – both costs and benefits fall as more workers transition. Thus, earlier transition can have greater rewards. Transition benefits and costs are also affected by external economic conditions, including product market competition, characteristics of upstream and downstream industries, as well as characteristics of labour market institutions. In a well-functioning labour market, net benefits from transition go to zero as workers move until all benefits from moving are exhausted, and the economy reaches a new equilibrium. However, in many cases, there are policy or institutional barriers to complete or smooth transition, which lowers the productivity of the economy.

For policymakers, it is important to better understand how efficiently the labour market is allowing workers to move to sectors and locations with higher growth potential, and to prioritise reforms that would ensure effective transition. Some policy factors to consider include employment policies, effective education and training institutions, and a robust labour market information system.

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The objective of this project is to better understand the prospects for employment transition in ASEAN and East Asia to provide policy recommendations on how to support workers during periods of rapid economic changes that the region is experiencing. The main research goals are:

1. Provide an estimate of transition costs in ASEAN and East Asian economies by examining the gap between skill demand in emerging sectors and current skill levels.
2. Examine past episodes of employment transition to provide insights into the process and factors affecting the speed of transition.
3. Assess the skill ecosystem that will determine opportunities for workers to retrain and reskill, thereby affecting transition costs.

Policy Implications

This project is expected to provide recommendations on how ASEAN and East Asia can ensure that workers have the best opportunities to transition to the new economic realities. The output will contribute to the ERIA flagship project on human resource development.

Other topics

13 Social Dimensions of GVCs and its Implications for Asian Development

Lurong Chen, Wan Seok Chang

Summary

Global value chains (GVCs) refer to the intricate networks of production and distribution involving multiple countries and firms in the creation of goods and services. Over the past decades, the economic impacts of GVCs have been extensively investigated in the literature, and the corresponding strategies have been well explored in business and political circles.

In recent years, the social dimension of GVCs has garnered increasing attention, focusing on the well-being and rights of individuals, communities, and workers involved in production processes. This heightened awareness is particularly relevant given the growing significance of climate change, human development, energy, and environmental issues on the global sustainable development agenda. Consequently, the social impacts of GVCs can vary across different contexts.

For Asian economies, understanding and addressing these social impacts is crucial for developing policies and practices that promote sustainable and inclusive development within the context of GVCs. Such efforts carry profound implications for Asian regional integration.

This project aims to explore the multifaceted impacts and policy concerns associated with GVCs, including issues such as labour exploitation, job insecurity, technology transfer and skill development, environmental degradation, gender inequality, cultural displacement, market regulation, government behaviour, and corporate social responsibility.

Policy Implications

The outcomes of this project will address the policy concerns mentioned above and shed light on answering questions such as:

- What are/will be the main market tendencies in establishing and enforcing fair standards, rules, and regulations that promote sustainable and responsible business practices within GVCs?
- What will be the economic and business consequences of these concerns in the social dimension of GVCs, particularly from the perspective of Asian regional integration?
- How can Asian economies enhance collaboration amongst governments, businesses, civil society, and international organisations in response to the related social challenges of GVCs to sustain development and regional prosperity?

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14 Economics and Security: Foundations for Comprehensive Regional Security

Dionisius Narjoko

Summary

The countries of the Asia-Pacific region face a critical test of leadership as the side effects of great power competition put the achievements of Asian regionalism at risk. There will always be tensions and risks in the regional and global system, but political decisions by major powers have seen the value of interdependencies become increasingly contested, subject to the logic of zero-sum geopolitical competition. Economic interdependence – secured by consensus efforts and agreed rules – can be a source of mutual benefit and deliver a peace dividend that significantly outweighs the vulnerabilities it is sometimes seen to produce.

Politically, multilateralism diffuses power and preserves strategic space for states to pursue policy options in their interest. Economically, open, contestable, and rules-based markets similarly blunt the ability of countries to use trade and investment ties as tools of coercion against others.

These values underpinned a generation-long effort of Asian regionalism, which was crucial in dramatically raising average living standards across the region and peacefully managing political tensions. They also underpin the vision this research proposes: a new agenda for achieving comprehensive regional security for the Asia-Pacific.

Comprehensive regional security builds upon the long history of comprehensive security, drawing on holistic understandings of security and their interrelationships, and seeing them as achievable only through multilateralism and positive-sum cooperation.

This vision is proposed with a clear-eyed acknowledgement of the hurdles to its realisation. Changing balances of power that undergird the regional order, an increasingly complex set of geopolitical relationships, and existential threats like climate change and pandemics make achieving comprehensive security goals at the national level increasingly challenging. More and more, comprehensive security goals of individual states rely upon the success of cooperative multilateral efforts to minimise the threat of armed conflict, keep markets open, and address environmental, human security, and public health hazards.

These challenges should only galvanise the region in finding new political ways to articulate and progress a renewed regionalism with the goals and principles of comprehensive security at its core. The region begins with an advantage in its pursuit of comprehensive regional security. The ethos of comprehensive security as the basis for national security is already entrenched in the policy frameworks of countries like Japan and deeply informs the policy approaches of Southeast Asian states, as well as the goals of ASEAN's security cooperation initiatives. ASEAN's centrality is the essential starting point for a new regional commitment to comprehensive regional security, by necessity and by virtue of the role it has earned by developing the regional architecture. ASEAN member governments increasingly share a sense of unease, and even alarm, about the effects of great power rivalry on their economic prospects, sovereignty, and diplomatic autonomy.

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All stakeholders stand to benefit from a renewal of Asian regionalism with comprehensive regional security as its guiding objective. Southeast Asia, through its leadership of ASEAN, would be able to consolidate its ability to enmesh great powers in the multilateral institutions that constrain the impact of their rivalry and incentivise cooperation and collective interdependence – something which would yield spillover effects for the major and middle powers across the region such as Japan, South Korea, and Australia. The great powers whose rivalry is causing so much concern throughout the region also have an interest in participating constructively in this effort.

To have practical impact, a framework for comprehensive regional security must be based on multilateralism, economic interdependence, contestable markets that diffuse power, and an emphasis on security cooperation and the primacy of peaceful resolution of differences.

Defining and agreeing upon a set of principles that allow the mutual attainment of comprehensive regional security can set the terms of engagement between all countries and help constrain the exercise of raw political power. These principles need to transcend zero-sum balance of power calculations to effectively blunt the use of economic tools for malign or coercive intentions. This will require open, integrated markets backed by domestic and international rules and institutions that secure open, integrated markets to reduce uncertainty and mitigate risks.

Against this background, this research project aims to explore instruments and frameworks that can harness the potential of institutionally coordinated international economic activities (including those beyond trade) to generate hybrid policy solutions that more optimally balance complex intersecting risks. These are the missing elements towards achieving the vision of comprehensive regional security.

These instruments and frameworks can be developed by carefully analysing how international economic activities encompassing finance, trade, and investment can function as instruments of national security.

Policy Implications

The research is expected to provide ideas on the frameworks, instruments, and institutional settings for countries in the region to adopt national security policies that align with the comprehensive security goals of East and Southeast Asia. This includes suggestions on how ASEAN could deepen and better align its current approach towards the vision of comprehensive regional security.

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15 Formulation of the ASEAN Connectivity Strategic Plan under the ASEAN Community Vision 2045

Intan Murnira Ramli

Summary

Following the in-principle endorsement of the ASEAN Community Vision (ACV) 2045 by the ASEAN Coordinating Council (ACC) and its subsequent notation by the 43rd ASEAN Summit in September 2023, the 11th Meeting of the High-Level Task Force on ASEAN Community's Post-2025 Vision (HLTF-ACV) in October 2023 further agreed that the ACC will coordinate the development of the ACV 2045 ASEAN Connectivity Strategic Plan (ACSP).

The formulation of the ACV 2045 ACSP (the 'Project') aims to undertake a comprehensive review of the implementation of MPAC 2025, analyse global developments and emerging trends related to ASEAN Connectivity, and formulate the ACV 2045 ACSP. To ensure synergies, the formulation of the ACV 2045 ACSP will take into consideration relevant work being undertaken by the three ASEAN Community Pillars (i.e. Political-Security, Economic, and Socio-Cultural) in the conduct of their respective development of ACV 2045 strategic plans, the ASEAN Outlook on the Indo-Pacific, as well as other connectivity-related initiatives at the global, regional, sub-regional, national, and local levels.

Policy Implications

a) The ACV 2045 ACSP will require a comprehensive and pragmatic approach to planning, delivering, monitoring, reviewing, evaluating, and communicating the benefits of ASEAN Connectivity projects and activities. It will strive to achieve a balance between being visionary and being practical, as well as addressing cross-cutting issues, including climate change, gender equality and inclusion, where plausible, and expanding ASEAN's foothold in regional and global fora.
b) The ACV 2045 ACSP will address the lessons learned from the ongoing implementation of MPAC 2025, including the need to be agile and adaptive to changing circumstances and priorities in its work, resource mobilisation, effective coordination, and translation of regional initiatives into national actions.
c) ASEAN Connectivity cuts across multiple sectors across all three ASEAN Community Pillars. Its success depends on getting ownership and support from the various stakeholders at the regional and national levels, including the business community, non-government organisations (NGOs) and other external partners. An inclusive, participatory process is key to ensure that the ACV 2045 ACSP is shared and owned by all relevant stakeholders.

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16 ERIA-UPENN-LEIDEN Project on Global Value Chains of Digital Economy in the Indo-Pacific: Challenges and Opportunities

Anita Prakash, Prof. I.J. Mosquera Valderrama, Prof. Georgios Dimitropoulos

Summary

Digital economy is guiding the business connectivity, market mechanisms, investments, business incubation, and cooperation for Digital Public Infrastructure across borders. In the digital economy ecology, developing economies in the Indo-Pacific require to exchange and cooperate, and synergise their human resource capacities and infrastructure. The cooperation for digital connectivity in the Indo-Pacific must focus on the following overarching question:

This project addresses important challenges before the developing regions of Indo-Pacific, and their preparation for participating in the supply chains of digital economy. The digital economy has arrived rather abruptly for most developing regions, including Asia and Africa, even before these regions could fully participate in the value chains of manufacturing and industries. These economies have a mixed corps of education, innovation, technology and regulatory capacities, and investments in supply chain infrastructure. For example, India has created successful digital public infrastructure for fintech and payments and is home to several unicorns. ASEAN has a thriving start-up eco-system in many member countries and is now working on its Digital Economy Framework. Several countries in Europe have have a thriving digital economy ecology and the EU is forward looking on the rules and governance of digital economy and the AI.

The future of work in developing economies will be determined by the rules of cooperation, and investments in infrastructure and capacities for digital economy. The emerging cooperation with and the role of the G7 and non-G7 countries will be important for the development of services, human capital, regulations for data protection, e-commerce, and taxation – for securing the quality, resilience, and longevity of supply chains of digital economy.

Policy Implications

This research project identifies the conditions under which emerging and developing countries in Indo-Pacific, especially developing Asia, can be better integrated in the Global Value Chains of the digital economy. The papers will Identify the challenges and address the conditions under which digital infrastructure and institutional capacities can be carried out in a plurilateral framework amongst partners in Asia, and between Asia and Europe under the Asia–Europe connectivity plans. It will especially highlight how capacities in India and ASEAN around startups and DPIs can be optimally utilised by its regional partners in Asia and Europe.

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Partner Organisation

ERIA, Leiden University, University of Pennsylvania

Geographic Scope

Asia, Europe, India, ASEAN, Indo-Pacific

Related ERIA Publications

Prakash, A., A.G. Herrerom, B. Czapnik, et al. (2023), *Regional Integration in Indo-Pacific: Connectivity, Cooperation, and New Supply-Chain Linkages.* ERIA Research Project Report 2022-19. Jakarta: ERIA Downloadable from: https://www.eria.org/publications/regional-integration-in-indo-pacific-connectivity-cooperation-and-new-supply-chain-linkages

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17 E-DISC Knowledge Product: Innovation and Entrepreneurship in ASEAN

Giulia Ajmone Marsan

Summary

The ERIA Digital Innovation and Sustainable Economy Centre (E-DISC) is currently working on drafting a white paper that aims to gather deeper insights from the startup ecosystem landscape within the ASEAN region. Collaborating closely with Deloitte, ERIA is spearheading this project to compile a detailed white paper.

Scheduled for delivery by the end of June, Deloitte is expected to provide inputs and a draft report for the white paper to be completed. This draft report will be derived from desk research and interviews conducted with startup leaders across the ASEAN region. Upon receiving the draft report, a thorough assessment will be undertaken to evaluate its coherence and completeness.

Geographic Scope

ASEAN

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Narrowing Development Gaps

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Public Health

18 Industry Development Policy in Healthcare for India and Indonesia, Phase 1

Yoshie Hirose, Manami Uechi

Summary

Since 2020, ERIA has been working on the introduction of the concept of Medical Excellence (MExx), which aims to solve problems in healthcare through multi-sectoral approaches. Another benefit of MExx is the creation of new markets in healthcare that are aligned with the real needs of end users. To drive this, it is expected that the ongoing MExx initiatives will generate policy insights on industry developments and the healthcare system. This research aims to identify priority policy interventions that will lead to active healthcare markets and better healthcare outcomes.

Policy Implications

India
- Outlook of Emerging Hospital Management Sectors:
- Bridging the medical device industry and engineering community
- Priority actions to revolutionize Health Tech in India:

Indonesia
- Workplace healthcare promotion and prevention of chronic non-communicable diseases (NCDs)
- Breast cancer screening in primary healthcare settings
- Education and promotion of oral and dental health

Partner Organisation

Medical Excellence JAPAN

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19 The Potential of the MEXX Model in Facilitating the Healthcare Multisectoral Partnership to Address Non-communicable diseases and Ageing

Manami Uechi

Summary

In the ASEAN region, the leading causes of death are shifting from infectious diseases to non-communicable diseases, and the population is rapidly ageing. Addressing health policy issues such as achieving Universal Health Coverage (UHC), building a robust health system, and developing the healthcare industry is increasingly crucial. These issues are on the ASEAN agenda and should be addressed domestically in each member state. Furthermore, rapid economic growth and social development in ASEAN countries necessitate resilient and sustainable healthcare systems tailored to each country.

ERIA's Healthcare Services Team is exploring the potential of the public–private partnership (PPP) model that Japan has been advocating since 2020. This model, known as the Medical Excellence Project, unites various stakeholders from the healthcare industry, government, academia, and medical institutions to discuss policy approaches and act on healthcare challenges. ERIA envisions more robust collaborations with Medical Excellence JAPAN (MEJ) in each ASEAN Member State in the coming years.

ERIA has been supporting this project in Viet Nam since 2021. In the first phase, three key agendas were identified: cancer, other non-communicable diseases, and ageing, leading to the establishment of Medical Excellence Vietnam (MEV) in 2022. Three MEV–MEJ forums held sequentially in Hanoi in 2023 deepened discussions on specific issues and collaborative projects in these areas. In June 2024, the 4th MEV–MEJ forum was held in Hue, Viet Nam, focusing on the utilisation of ICT and digital transformation in healthcare. Experts from Viet Nam and Japan convened to exchange perspectives and share the latest knowledge about developing and coordinating medical information infrastructure and improving the safety and quality of patient care and healthcare services through IoT.

Policy Implications

We aim to publish a paper to present the potential of the MEXX model and share its effectiveness, particularly with ASEAN countries, to create multisectoral projects that address health sector challenges. This model may also serve as an alternative approach to leverage funding and resources from diverse sources. In Thailand, Age-Tech and Health and Productivity Management are promising areas where pragmatic insights can be delivered. ERIA will also begin collaborative projects in Thailand to address healthcare challenges and opportunities that align with the unique local context.

Partner Organisation

Medical Excellence Japan (MEJ)

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Specific Agenda to Support ASEAN

20 Research on Patent Examination Practice in the Pharmaceutical and Related Fields in the Region of ASEAN Member States (AMS): Phase 2

Toru Furuichi

Summary

The number of patent applications worldwide has been steadily increasing, reaching 3.4 million in 2021. In the pharmaceutical field, the average growth rate in patent applications between 2010 and 2020 was 2.7%. However, this increase in patent applications also imposes a burden on IP offices to examine them efficiently.

Recognising the importance of improving the efficiency of the examination process, there is a need to promote mutual understanding and establish examination guidelines and practices. This not only enhances fairness, transparency, and predictability but also contributes to the overall efficiency of the examination process. However, it's noted that examination guidelines and practices in pharmaceutical-related fields may not be adequately understood and established in ASEAN Member States.

To address this, the AWGIPC (ASEAN Working Group on Intellectual Property Cooperation) and the Japan Patent Office have initiated a project with ERIA related to patent examination practices. This project was launched during the 70th AWGIPC in Singapore in September 2023. The objective is to enhance the examination capacity in each ASEAN Member State and facilitate the development of their own guidelines for patent examinations in the field of Pharmacy.

The project is structured as a 2-year initiative, with Phase 1 focusing on six countries including Indonesia, Lao PDR, Malaysia, the Philippines, Singapore, and Thailand. Phase 2, which is proposed for the second year, will target four additional countries: Brunei Darussalam, Cambodia, Myanmar, and Viet Nam.

Policy Implications

The achievement of this project will be presented in the AWGIPC and the ASEAN–Japan Patent Office heads meeting in FY2025.

Partner Organisation
Institute of Intellectual Property Japan

Geographic Scope
Brunei Darussalam, Cambodia, Myanmar, and Viet Nam for 2nd Phase

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21 Branding Research Project Phase 2 (For Malaysia, Viet Nam, and Brunei)

Toru Furuichi

Summary

Due to the revitalisation of global distribution and the diversification of consumer tastes, the market is inundated with goods and services. Consequently, implementing a branding strategy that leverages intellectual property, such as trademarks and designs, becomes essential. This strategy helps distinguish excellent goods and businesses from others and effectively connects them to investment and industrial development.

Conversely, as the business landscape undergoes significant transformations due to digitalisation (DX), including e-commerce and consumer-to-consumer (C-to-C) business models, it is anticipated that the demand for branding utilising intellectual property will increase in the post-pandemic future.

Given these circumstances, understanding the status and challenges of branding strategies in companies and disseminating successful branding examples will greatly contribute to future economic growth in anticipation of DX. Recognising this, the AWGIPC (ASEAN Working Group on Intellectual Property Cooperation) and the Japan Patent Office have initiated a project through ERIA related to branding strategies to promote the effective utilisation of intellectual property rights. This project was launched during the 70th AWGIPC in Singapore in September 2023.

The entire project is structured to include Preliminary and Phases 1–3. The proposed project, Phase 2, involves Malaysia, Brunei, and Viet Nam. Preliminary activities were conducted in Cambodia, Phase 1 targeted Lao PDR, Indonesia, and Thailand, and Phase 3 will focus on the Philippines, Singapore, and Myanmar.

Policy Implications

The achievements of this project will be presented at the AWGIPC and the ASEAN–Japan Patent Office Heads Meeting in Fiscal Year 2025.

Geographic Scope

Malaysia, Brunei, and Viet Nam
for the 2nd Phase

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Other Topics

22 Preliminary Study for Exploring 'Local Resource-based Food Reserve' Mechanism in ASEAN Member States

Masanori Kozono

Summary

Agriculture and the food system hold a strategic position in the ASEAN economy, serving as a primary source of employment and income for a significant portion of the region's population. Moreover, they contribute significantly to ensuring both national and regional food security in ASEAN. However, agriculture and food systems face unprecedented challenges from increasing food demand due to a growing population, rising malnutrition, adverse impacts of climate change, overexploitation of natural resources, ever-increasing carbon emissions, loss of biodiversity, and food loss and waste. In addition to these long-term challenges, recent external shocks such as the COVID-19 pandemic and escalation of geopolitical tensions have directly and indirectly impacted agriculture and food systems through disruptions in the supply chain of food and agricultural inputs. Specifically, these shocks adversely affected food security, resulting in food price hikes to record levels and shortages of agricultural inputs such as fertiliser.

To address the food insecurity situation in ASEAN, the 44th Meeting of ASEAN Ministers on Agriculture and Forestry (AMAF) held on 25 October 2022 agreed to develop the ASEAN Leaders' Declaration on Strengthening Food Security as one of the Priority Economic Deliverables (PEDs) of Indonesia's 2023 ASEAN Chairmanship. Following this ministerial decision, the Indonesian Government and the ASEAN Secretariat developed the draft of the declaration with support from ERIA in early 2023. Through discussions at a series of official and unofficial meetings amongst ASEAN Member States (AMS), as well as with its dialogue partners and international organisations, the draft was finalised as the 'ASEAN Leaders Declaration on Strengthening Food Security and Nutrition in Response to Crises', which contains the leaders' commitments regarding rapid actions to address food security crises and strengthening preparedness for the long-term resilience and sustainability of agri-food systems. At the ASEAN Summit in September 2023, the declaration was adopted by ASEAN Leaders. In the declaration, exploring the local resource-based food reserve, a new mechanism targeting various commodities rather than just rice was committed, apart from strengthening the existing ASEAN Plus Three Emergency Rice Reserve (APTERR).

Following up on the leaders' commitment to exploring the local resource-based food reserve, the Indonesia Ministry of Agriculture (MOA) requested ERIA to conduct an initial study to provide policy recommendations that contribute to the examination of LRBFR mechanism. The preliminary concept note or discussion paper contains the initial outputs of the study are expected to be reported at the ASEAN Food Security Reserve Board (AFSRB) Meeting, which is one of the ASEAN Sectoral Bodies under AMAF for discussions amongst food security experts from AMS.

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Based on this background, the main objective of this study is to propose the concept containing possible options of elements for LRBFR, with the supporting objectives of this study as follows:

- Assess the existing food reserve mechanism at the regional and national levels.
- Examine the suitable and feasible mechanism for the local resource-based food reserve.
- Identify the related international rules to be considered

Policy Implications

Suggestions on potential mechanisms for the local resource-based food reserve, encompassing commitment methods regarding stockpile, release mechanisms, commodity coverage, and other operational matters.

- Considerations for ensuring alignment with international regulations, such as WTO rules.
- Development of a model mechanism for the local resource-based food reserve, if deemed feasible and appropriate.

Partner Organisation

Ministry of Agriculture of Indonesia, National Research and Innovation Agency of Indonesia

Geographic Scope

ASEAN Member States

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23 ADB-ERIA Project on GSM Modelling for the East Coast Economic Corridor in West Bengal

Anita Prakash, Souknilanh Keola, So Umezaki

Summary

The East Coast Economic Corridor (ECEC) spans over 2500 kilometres from Kolkata to Kanyakumari and is envisioned as a comprehensive and integrated corridor that would promote industrial development, enhance connectivity with trading gateways, and boost economic growth across the region. It aims to leverage the strategic location of the east coast of India, which is rich in natural resources, has skilled workforce, and offers access to international trade routes. The first phase of the ECEC started in the state of Andhra Pradesh with the development of Vizag-Chennai Industrial Corridor (VCIC).

In West Bengal, the ADB team with senior state government officials in April 2022 highlighted the need for updating the Comprehensive Development Plan to capture the economic developments undertaken in the two nodes of Kharagpur–Goaltore–Salboni and Andal–Panagarh and strategize the development of a new node (i.e. Haldia–Tajpur) and select growth centres of the state. This research addresses the Specific focus on ensuring regional and international connectivity in terms of corridor links with Siliguri which acts as an important trijunction transit point between the northeast, the rest of India and with neighbouring countries (Bangladesh, Bhutan and Nepal (via Asian Highway-2 and AH-48).

Policy Implications

ADB India has ongoing project on East Coast Economic Corridor in West Bengal. It has requested ERIA to provide the GSM modeling for bringing out the gains to RGDP through infra and institutional connectivity with Bangladesh, Bhutan, and Nepal, individually as well as all three. Since this work also has strategic importance for the maritime connectivity and new supply chains in the Indian Ocean Rim (IORA) countries, MEA, India will be upscaling the findings of the GSM elements in the regional cooperation platforms such as the BIMSTEC or IORA.

Partner Organisation
ERIA, IDE-JETRO, ADB

Geographic Scope
India, Bhutan, Nepal.
Bangladesh, ASEAN

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24 Gap Analysis/Map the Availability of In Vitro Diagnostics in National Healthcare Systems in Relation to the WHO Model List of Essential In Vitro Diagnostics

Integrated Quality Laboratory Services, World Health Organization, Naofumi Hashimoto, and Antonio Villanueva

Summary

A collaboration between the Economic Research Institute for ASEAN and East Asia (ERIA) and the World Health Organization (WHO), the research will undertake a gap analysis and/or map the availability of in vitro diagnostics in national healthcare systems in relation to the WHO Model List of Essential In Vitro Diagnostics (EDL) to inform the next steps to improve access to such diagnostics in the ASEAN region. Eight countries will be targeted for mapping, selected jointly by ERIA and WHO, in close collaboration with WHO Southeast Asia Regional Office and Western Pacific Regional Office. The specific gap analyses could include elements such as:

(i) how the EDL is utilised in countries, including if national lists of essential in vitro diagnostics are being developed;
(ii) the gap, if any, between recommendations in the EDL and national health coverage;
(iii) causes of eventual gaps; and
(iv) information on the assessment of the value of in vitro diagnostics and the integration of in vitro diagnostics in clinical practice.

Policy Implications

Report on the gap analysis of availability of in vitro diagnostics in targeted ASEAN Member States in relation to recommendations in the EDL, and proposed follow-up actions.

Partner Organisation
World Health Organization

Geographic Scope
Cambodia, Indonesia, Lao PDR, Malaysia, The Philippines, Thailand, Timor-Leste, and Viet Nam

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25 Longitudinal Study of Ageing and Health in the Philippines and Viet Nam

Grace T. Cruz, Vu Cong Nguyen, and Yasuhiko Saito

Summary

Populations are ageing partly because people are living longer. As people live longer, they have started focusing on quality of life. Longevity is considered one of the greatest successes of humanity. But how can it be a success if it means a longer time in ill health or inactivity? Healthy or active years are a quality-of-life indicator. The concept of 'health expectancy' emerged as a summary measure of population health that combines mortality and morbidity. By monitoring changes in health expectancy over time, changes can be evaluated in the population's health structure. More importantly, identifying determinants of health expectancy can help policymakers develop evidence-based policies.

Studies in the Philippines and Viet Nam in 2018 have been published. The survey is the second to compare data from 2018 to 2023. This study will unveil the impact of COVID-19.
The objectives of this study are as follows:

1) Describe the current health status of older adults in the Philippines and Viet Nam.
2) Investigate associated correlates of the current health status of older adults in the Philippines and Viet Nam.
3) Examine changes in health status of older adults using the baseline survey data and previously conducted cross-sectional survey data in the Philippines and Viet Nam.
4) Examine changes in individual health status of older adults using the longitudinal survey data in the Philippines and Viet Nam.
5) Investigate potential determinants of changes in health status of older adults in the Philippines and Viet Nam.
6) Estimate health expectancies by gender, place of residence (urban and rural), and education to examine inequality between subpopulations of older adults in the Philippines and Viet Nam.

Policy Implications

Disability-free life expectancy can be observed by using data from previous surveys, such as the 2007 Philippine Study on Aging and the 2011 Survey on Disability and Profile of Disabilities in Vietnam, and 2018 baseline surveys and trends in health amongst older adults in both countries. Health expectancy is termed as 'disability-free life expectancy' when it is computed using questions on disability. Disability-free life expectancy will be estimated for at least two time points to suggest whether morbidity is being compressed or expanded amongst older adults in the countries. Expansion requires government programmes and policies that will ensure improvement of the health status of older adults in the future. Similarly, a health system should be in place to address the healthcare needs of older people.

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With a follow-up survey in 2023, factors that affect transition amongst possible health states, such as disability free, disability, and death, can be explored. By identifying determinants of health transition, potential measures can be suggested to improve health status of older adults.

Cognitive impairments, dementia, and depression are emerging mental health issues amongst older adults. The quality of life not only of those with such conditions but also of their family members will be extremely low. More needs to be learnt about their health status and quality of life. Frailty, sarcopenia, falls, and sleep patterns are research topics recently developed. With the new longitudinal surveys, what older adults need and the findings should give a better understanding of potential measures to be taken by the governments of both countries.

Partner Organisation

Demographic Research and Development Foundation; Institute of Population, Health and Development; Nihon University

Geographic Scope

The Philippines and Viet Nam

Related ERIA Publications

Cruz, G.T., C.J.P. Cruz and Y. Saito (eds.) (2019), Ageing and Health in the Philipines. Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA).
Downloadable from: https://www.eria.org/publications/ageing-and-health-in-viet-nam/
N.C. Vu, M.T. Tran, L.T. Dang, C.L. Chei, and Y. Saito (eds.) (2020), Ageing and Health in Viet Nam. Jakarta: ERIA and Ha Noi: PHAD.
Downloadable from: https://www.eria.org/publications/ageing-and-health-in-viet-nam/

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Sustainable Economic Development

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Supply Chain of Critical Minerals and Electric Vehicles Ecosystem

26 Vehicle Recycling in Response to the Transformation of the Automobile Industry in ASEAN

Michikazu Kojima, Reo Kawamura, Fusanori Iwasaki

Summary

ERIA published the report titled 'Vehicle Recycling in the ASEAN and Other Asian Countries' in November 2018. The report covered the generation, flows, and treatment of end-of-life vehicles (ELVs), including parts and recyclable waste. While the report identified challenges and issues to be addressed for ELV recycling in this region, the situation has not improved significantly over the past decade.

In addition to the increasing demand for Internal Combustion Engine (ICE) vehicles, the market for electric vehicles (EVs) has rapidly expanded in the ASEAN region. EVs are expected to contribute to the mitigation of environmental issues such as air pollution and climate change. In 2023, ASEAN leaders adopted the ASEAN Leaders' Declaration on Developing a Regional Electric Vehicle Ecosystem, committing to 'develop a regional electric vehicle ecosystem involving all ASEAN Member States that supports the adoption of electric vehicles and the improvement of the electric vehicle industry in ASEAN Member States.' However, there are uncertainties about the recycling technology and its diffusion for end-of-life EVs. Although the production and consumption of EVs are emphasised, concerns about EV recycling remain limited.

The project will identify the challenges and possible measures for ELV recycling in ASEAN, with a focus on EVs, by reviewing academic papers and interviewing engineers, recyclers, and government officials.

Policy Implications

- The status-quo on recycling of ELV for ASEAN
- Challenges on recycling of ELV for ASEAN
- Series of input to 'Master Plan Outline for ASEAN–Japan Co-Creation Initiative for the Next-Generation Automotive Industry'
- Idea about technical guidelines on recycling of ELV for ASEAN
- Recommendations for ASEAN countries on regulation to facilitate recycling of ELV
- Recommendations for Japan to support ASEAN

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Partner Organisation
KPMG AZSA LLC

Geographic Scope
Indonesia, Malaysia, Philippines, Singapore, Thailand, and Viet Nam

Related ERIA Publications

Kojima, M. (eds) (2018), Vehicle Recycling in the ASEAN and other Asian Countries, ERIA Research Project Report 2017 No.16. Jakarta: ERIA.
Downloadable from: https://www.eria.org/publications/vehicle-recycling-in-the-asean-and-other-asian-countries

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Decarbonisation and Carbon Neutrality

27 Developing a Green Finance Framework for Net Zero Emission (ASEAN)

Fauziah Zen

Summary

Under Article 15 of the Paris Agreement, practically all ASEAN Member States (AMS) have committed to achieving net-zero emissions.

Financing the net-zero target is a significant challenge, both during the transition stage and in the net-zero condition. Previous studies by ERIA have found that countries have different conditions in terms of potential, challenges, fiscal capacity, and strategies. These variations result in differing paths and priorities, leading to variations in the stages of policy implementation. In terms of financial instruments developed to finance and influence energy-related behaviour, some AMS have implemented market approaches such as carbon trading mechanisms, as well as public approaches like subsidies, taxes, caps, and quotas. In 2023, ASEAN published the ASEAN Sustainable Finance Taxonomy, Version 2, which serves as a guide for AMS's sustainable finance efforts. Indonesia introduced Version 1.0 of the Indonesian Green Taxonomy in 2022; it is currently undergoing revisions, with Version 2.0 anticipated to be published in the first quarter of 2024. Malaysia issued the Climate Change and Principle-Based Taxonomy (CCPT) in 2021 to guide financial institutions in transacting three types of sustainability categories: climate support, transitioning, and watchlist. Other AMS have also issued national guidance for sustainable finance, including the Singapore-Asia Taxonomy for Sustainable Finance (2023) and the Thailand Taxonomy (2023, now progressing towards Phase 2.0). Other AMS have not yet issued national sustainable finance taxonomies but are expected to publish them soon (e.g. the Philippines in 2024) or have some green initiatives in place.

Transitioning to a green economy in AMS is challenging since about 80% of total energy sources in ASEAN currently come from fossil fuels. The programmes to accelerate the phasing out of coal-fired power plants come with challenges due to their complexities and the involvement of many stakeholders. The Asian Development Bank (ADB) is trying to implement blended finance that mixes concessional and commercial financing to make early retirement of coal plants attractive. However, host countries must bear some financial consequences to finance this transition.

This study aims to review AMS efforts to achieve their decarbonisation goals, identify general lessons useful for other AMS, and examine the specific conditions in each country that present advantages and disadvantages for the transition. Additionally, at the request of the Finance Minister of the Republic of Indonesia, additional research questions are included in Indonesia's report.

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Policy Implications

Identify General Approaches:

Determine strategies that can be advantageous for AMS to finance the green transition:

- Provide Country-Specific Conditions and Improvements:

Assess whether each country has issued its national taxonomy.

- Recommend suitable green finance instruments for each specific country.
- Identify Possible Financing Schemes:

Explore potential financing schemes for the green transition.

- Analyse the fiscal implications of these schemes.

Partner Organisation

PT Sarana Multi Infrastruktur (SMI) of Indonesia, Ministry of Finance of Indonesia,

Geographic Scope

Brunei Darussalaam, Cambodia, Indonesia, Malaysia, Lao PDR, Philippines, Singapore, Thailand, Viet Nam

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28 Case Study on the Development of the Strategies to Reduce Crop Burning in ASEAN Member States

Kentaro Yamada

Summary

Reducing carbon emissions to the atmosphere for mitigating climate change is one of the global and most urgent issues that has been tackled all over the world. Agriculture has been one of the large sources of greenhouse gases, and many activities have been implemented to reduce greenhouse gas emissions. The reduction of greenhouse gases from agriculture-related activities has been proposed as one of the key strategies in 'ASEAN Regional Guidelines for Sustainable Agriculture in ASEAN: Developing Food Security and Food Productivity in ASEAN with Sustainable and Circular Agriculture', which was adopted at the 44th Meeting of the ASEAN Ministers on Agriculture and Forestry in 2022 (ASEAN Secretariat, 2022). Kozono et al. (2023) revealed that the reduction of greenhouse gases from agriculture-related activities is one of the prioritised strategies to implement for enhancing the sustainable agriculture and food system in the ASEAN region, especially required for the longer term.

As one of the major issues for the environmental impact from the agricultural sector, crop burning has been globally recognised. The release of biomass into the air induces greenhouse gas emissions, as well as air pollution which affects human health, and the loss of valuable natural resources provides negative impacts to the economy. Cassou (2018) reported that 40 million kg of biomass dry matter was burnt in the ASEAN region in 2012 and predicted it will slightly increase in 2030.

At the 29th Meeting of the ASEAN Sectoral Working Group on Crops in 2022, the issue of crop burning was discussed amongst ASEAN Member States. A concept note titled 'Incentivising low carbon emission in agriculture through reduction of crop burning in ASEAN: piloting private sector partnership in selected areas and exploring opportunities from the carbon market' was presented with the aim to encourage farmers to reduce crop burning or switch to other climate-friendly practices. Following this discussion and supporting the implementation of the ASEAN Strategy on Carbon Neutrality, the ASEAN Guidelines (or Strategies) on Reducing Crop Burning (hereinafter referred to as 'the Guidelines') are developed as one of the PED of Lao PDR Chairmanship in 2024 (ASEAN Secretariat, 2023). The Guidelines will provide guidance to decrease environmental degradation such as the rising level of air, water, and land pollution, to encourage safe and sustainable alternatives to crop burning, to mitigate greenhouse gas emissions, and to promote sustainable agriculture that is socially, economically, and environmentally viable. This includes encouraging the adoption of alternative techniques such as non-burning agriculture practices, conservation agriculture, no-till farming, and the utilisation of crop residues for developing products with commercial potential (ASEAN Secretariat, 2023).

To support the implementation of the Guidelines, practices for reducing crop burning should be provided. Crop burning has a large range of definitions, and the practices for reducing crop burning are various. For instance, reducing composts of crops and alternating farming styles are ways to reduce crop burning. However, that would depend on the kind of crops and farming styles. It is difficult to cover various types of practices; thus, specific practices in the ASEAN region should be summarised.

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In this study, some practices for reducing crop burning in the ASEAN region will be surveyed, and insights summarised in a report and shared in a workshop. The specific aims of this study will be defined after the first workshop in March for developing the Guidelines, as the focal points for reducing crop burning in the ASEAN region have not yet been revealed.

Policy Implications

- To identify and summarise the practices for reducing crop burning, including induced issues and the countermeasures in the ASEAN region.
- To provide insights for reducing crop burning based on literature and interview surveys.
- To share the knowledge for reducing crop burning with a report and a workshop.
- To report the results or progress in SOM-AMAF+3 and AMAF+3.
- To raise awareness of the importance of reducing crop burning and support the implementation of the Guidelines.

Geographic Scope

Indonesia, Lao PDR, Thailand, and Viet Nam

Related ERIA Publications

ozono, M., K. Yamada, S. M. Diyanah (2023), Building and Enhancing Sustainable Agriculture and Food Systems in ASEAN: A Preliminary Scoping Study. ERIA Policy Brief 2023-10. Jakarta: ERIA. Downloadable from: https://www.eria.org/publications/building-and-enhancing-sustainable-agriculture-and-food-systems-in-asean-a-preliminary-scoping-study

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Specific Agenda to Support ASEAN

29 Extending IDE/ERIA-GSM to Examine Industrial Locations' Impacts on Energy and Environment in ASEAN

Souknilanh Keola, Prof. Toshihide Wada

Summary

The ASEAN SDG Indicators Baseline Report 2020 and The ASEAN online Database for SDG Indicators were launched in October 2020. The economy, social development, and the environment constitute major components of SDG. OECD argues that sustainable developments must be based on the advancement of these three areas at the same time. The three dimensions of sustainable development are interconnected and interdependent. Sustainable development requires a balance between these three dimensions to ensure that economic growth is socially inclusive and environmentally sustainable.

Many tools exist in academics and practices that can be used to predict industrial and economic growth. On the one hand, IDE/ERIA-GSM has been developed at IDE-JETRO and ERIA since 2007 to predict economic growth at sub-national regional levels. On the other hand, various regional and global models are built to estimate the impacts of economic development on energy demand and the environment. Nonetheless two limitations are often observed in these models. Firstly, the dynamics of other aspects of sustainable development are often not considered adequately in each of these models. For example, spatial economic models do not explicitly account for the environment, although certain aspects of social development are indirectly considered through regional disparity and migration. Environmental models generally assume different levels of economic growth without explicit feedback mechanism between the economy, the society and the environment.

The objective of this research are three folds. Firstly, it strives to make an extended and in-death surveys of models across disciplines to identify how different dimensions of sustainable developments are incorporated and implemented. Secondly, it tries to identify some open-source models that may be combined with IDE/ERIA-GSM to examine sustainable developments. Thirdly, it aims to demonstrate how to combine selected models with IDE/ERIA-GSM to examine sustainable developments in ASEAN.

Policy Implications

This project is expected to provide recommendations on how ASEAN and East Asia can achieve industrialisation or economic growth strategies that explicitly consider energy and environment.

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30 Environmental Policies, Green Trade, and FDI

Ha Thi Thanh Doan, Shujiro Urata

Summary

As the need to address environmental issues and achieve sustainable development becomes increasingly urgent, countries are implementing various policies to combat climate change, promote sustainable practices, and protect natural resources. This is evident in the growing inclusion of environmental provisions in free trade agreements and the increasing prevalence of environmental regulations in domestic legislation.

A major challenge in implementing environmental policies is finding a balance between promoting economic growth and protecting the environment. This balance can be difficult to achieve, as environmental regulations can be costly and create compliance barriers for the private sector. Consequently, some firms in countries with stringent regulations may choose to operate in countries with more lenient environmental standards, a phenomenon known as the 'pollution haven effect.' Conversely, overly strict environmental standards targeting specific industries or trading partners can hinder trade and lead to 'green protectionism,' impeding economic growth. In both scenarios, developing countries with lax regulations often suffer more environmentally and economically.

Against this backdrop, this project aims to document the environmental policies of ASEAN countries and their key trading partners and assess their impact on green trade and foreign direct investment (FDI).

This research project has three main objectives. Firstly, we aim to analyse the trends in green trade and FDI amongst ASEAN countries and their key trading partners. Secondly, we will take stock of the trade-related environmental regulations imposed by ASEAN countries and their trading partners through free trade agreements (FTAs) and national legislation. Finally, we will investigate the impact of these environmental regulations on green trade and FDI.

Policy Implications

The research provides policymakers with updated information regarding the landscape of the legal framework on the environment and quantitative evidence of its impact on green trade and FDI. The findings of the research can serve as a valuable resource for policy review on trade and climate change. They will also assist in the harmonisation of environmental standards, the formulation of trade agreements with environmental regulations, and the promotion of trade and FDI in a sustainable manner.

Geographic Scope

ASEAN and ASEAN's key dialogue partners

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31 National Capacity Building for Improvement of Climate Change's Scientific Information using Agricultural Models and Tools

Venkatachalam Anbumozhi

Summary

Lao PDR is expected to be seriously affected by the impacts of climate change. The rural poor, with low incomes and a high dependency on traditional agricultural systems or marginal lands, are particularly vulnerable, especially to flooding and drought. These impacts are induced by observable changes in the climate, including higher than usual intensity rainfall events during the rainy season and extended dry seasons. The related risks include sudden flash floods, landslides, and large-scale land erosion on slopes due to typhoons in the south. These events can be very destructive, not only altering the landscape, fauna, and vegetation but also destroying public infrastructure, property, productive land, agricultural assets, and harvests. The poorest people, who often live in the most fragile environments and are especially reliant on the climate-sensitive agriculture sector, are highly vulnerable to climate change.

The Agricultural Research Centre for Climate Change Resilience and Rural Economy (ARCE) was established on 5 January 2016 and, since 2022, has merged with the Rural Economy Centre to become ARCE. Training will take place here. It operates under the umbrella of the National Agriculture, Forest, and Rural Development Research Institute (NAFRI). As a new centre, ARCE needs to improve human resources related to the techniques and technologies of climate change, such as the development of technical capacity, including 'Agricultural models and other tools for climate change scenarios'. The Ministry of Agriculture and Forests (MAF) recognises the need for an agricultural economy in transition, ensuring that the poor participate in and benefit from the transition process. Increasing the supply of food and generating income from these systems is constrained by low fertility soils, weed competition, production and market risk, including drought and flood. Problems include ineffective value chains and poor market access, inappropriate product quality, lack of infrastructure, extension and policy support, and insufficient agrometeorological information for farmers in rural areas to improve their farming systems.

NAFRI currently lacks sufficient scientific research, so agricultural modelling needs to be developed. Outputs of agricultural models such as AquaCrop (FAO), SWAT (USDA), with help from the Mekong River Commission Secretariat (MRCS), DSSAT (USA), MIKE21, MIKE FLOOD (DHI, Denmark), agro-economic models, and other tools/techniques are important for adapting to climate change and improving human resources.

Currently, ARCE/NAFRI's crop model application is weak due to limited data availability, inappropriate experimental designs for crop modelling, and inadequate knowledge about the capabilities of different models and their suitability for field requirements. The main gap in the uptake and adoption of crop modelling in research is a lack of capacity amongst staff trained in model development and application. Additionally, there is limited understanding of crop model inputs and requirements, a lack of data for model calibration and validation, and a mismatch between the capabilities of crop models and the expectations of what the models can do.

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In this project, we will provide hands-on practical exercises on the use and application of crop models for decision support. It will be a learning-by-doing approach, with lessons learned step by step through a national case study. The site selections will be in the Nam Ngum river basin, and the database from SWAT outputs can support the data input for DSSAT and AquaCrop models.

Policy Implications

- To improve the capacity of human resources for government staff.
- To receive technology from agricultural models and other tools.
- To improve scientific information for the Agro-Meteorology project of FAO (SAMIS).
- To enable researchers to use the outputs of modelling products in their research.

Geographic Scope

Lao PDR

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Other Topics

32 Developing a Sustainable and Inclusive Economic Ecosystem in Nusantara Capital City

Fauziah Zen

Summary

Nusantara is the new capital of Indonesia, regulated by Law No. 3/2022. The first phase of the transfer of central government affairs will begin in 2024, with the entire construction and relocation of the capital expected to be completed by 2045. The vision for Nusantara is to be a 'world city for all,' designed as a symbol of national identity, a sustainable city, and the economic driver of Indonesia's future. Regarding land planning, the Nusantara Area consists of 75% green areas, of which 65% are tropical forests and 10% green cover. The three basic principles of Nusantara's development are as a forest city, a sponge city, and a smart city. It aims to become a model for sustainable cities.

The economic development in Nusantara requires a more detailed implementation framework to integrate the six defined economic clusters, namely Next-Gen Renewables Manufacturing, Integrated Pharmaceuticals Cluster, Sustainable Agri-industry Cluster, Inclusive Eco-tourism and Wellness Cluster, Advanced Chemicals and Derivatives Cluster, and Low Carbon Energy Cluster. These economic clusters will be supported by two enablers: a 21st-century education centre and a smart city, including a financial centre.

Inclusive and equitable economic growth will be promoted by developing Nusantara Capital as an economic superhub, which consists of Nusantara, Samarinda city, and Balikpapan city, two major cities in East Kalimantan. The superhub will be an integral part of efforts for economic transformation in Nusantara Capital and Eastern Kalimantan province. Additionally, selected other regions, especially in Kalimantan, will be engaged as Nusantara city's partners.

A set of regulations for Nusantara's establishment includes stringent guidelines and instructions to ensure the development process adheres to these norms. The regulation has recently been updated, and the revised legal documents will be made public shortly. This study will help establish Nusantara's roadmap for an inclusive, smart, green, and sustainable economic system in the Nusantara superhub. ERIA's strength in contributing to the roadmap lies in the economic expertise and perspective we can provide, as the majority of key people in the Nusantara Capital Authority (NCA) are not economists (urban planners, engineers, and lawyers).

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The study comprises two topics:

- Human capital and migration: To understand migration patterns, drivers of migration, migrants' socioeconomic backgrounds, and the effects of human capital development projects in Indonesia and other relevant nations. Determine future skilled labour needs, gaps in the current workforce, and the educational and vocational systems. Suggest appropriate government involvement to narrow gaps and define cost-effective solutions for upgrading existing workers' skills by learning from the private sector's experience, as well as investigating the prospect of public–private collaborations.
- Regional connectivity: the analysis of connectivity aspects centred in Nusantara Superhub, including its links with other regions in Kalimantan Indonesia and Brunei–Malaysia regions in Kalimantan Island. The roadmap should define the critical connectivity modals required to fulfill this goal and map out the connectivity infrastructure sequences.

Policy Implications

This study is expected to produce a background paper for the roadmaps of human capital development and enhanced connectivity, as well as thematic policy briefs.

Partner Organisation

Nusantara New Capital Authority (NNCA), LPEM FEB UI, ADBI, Singapore Management University (SMU)

Geographic Scope

Indonesia, Brunei Darussalam, Malaysia

Related ERIA Publications

Zen, Fauziah., M. H. Yudhistira (eds.) (2021), *Maritime Highway and Eastern Indonesia Development*. ERIA Research Project Report 2021-24. Jakarta: ERIA
Downloadable from: https://www.eria.org/uploads/media/Research-Project-Report/2021-24-Maritime-Highway-and-Eastern-Indonesia-Development/Maritime-Highway-and-Eastern-Indonesia-Development.pdf

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33 Securing Reverse Supply Chains and Water Utility Pathways for Circular Economy

Venkatachalam Anbumozhi

Summary

The Framework for Circular Economy for the ASEAN Economic Community (AEC) was adopted in 2021, serving as a guide for ASEAN in achieving its long-term goals of a resilient economy, resource efficiency, and sustainable and inclusive growth. The framework has identified five strategic priorities: Standard Harmonisation and Mutual Recognition of Circular Products and Services; Trade Openness and Trade Facilitation in Circular Goods and Services; Enhanced Role of Innovation, Digitalisation, and Emerging/Green Technologies; Competitive Sustainable Finance and Innovative ESG Investments; and Efficient Use of Energy and Other Resources. Building on existing ASEAN initiatives, the framework seeks to explore new opportunities and collaborations with other ASEAN pillars, Dialogue Partners, and the private sector to scale up and accelerate the region's transition to a low-carbon economy.

At the same time, a range of circular economy business models are emerging in ASEAN and East Asia, exploring ways to expand their activities by establishing and scaling up reverse supply chains and reverse logistics. Reverse supply chains generally refer to a set of activities and actors involved in collecting end-of-life goods, recovering residual value through reuse, repair, refurbishment, remanufacturing, and recycling, and redistributing products and materials that can be used again in the economy.

Several studies in electronic, automobile components, and textile manufacturing have provided evidence that companies can maximise returns on investment whilst making progress towards the implementation of circular business practices. A proactive corporate environmental strategy along the supply chain can lead to the development of important organisational capabilities that increase firm competitiveness. Corporate strategy needs to include sustainability aspects for companies to remain competitive. Many brands recognise the general societal trend towards greater circularity. Depending on efficiency, collected waste materials will go to a secondary market, be transformed into other products, or used for other purposes. While processing end-of-life products such as refurbishment, remanufacturing, or recycling near the source of waste may be generally preferable from an environmental sustainability perspective, this may not always be economically feasible. The policy challenge is to strike the right balance between trade in end-of-life products as part of reverse supply chains, which particularly requires efficient and environmentally sound management of end-of-life products. This calls for a detailed examination of the various characteristics of these end-of-life value chains and how they are governed by legal frameworks and corporate decisions.

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While sector-wide reverse supply chain strategies in support of the circular economy are emerging, the role of utilities such as water in the circular economy transition is often not clearly expressed in Circular Economy implementation plans at the ASEAN level. Water, sanitation, and wastewater utilities can become engines for the circular economy as they have an opportunity to view water as a valuable resource that needs to be managed under the threats of water scarcity, increasing energy prices, and nutrient loading. Whilst some progress has been made in the water sector towards transitioning to a circular economy, there remain drawbacks such as an impending regulatory environment and opaque market conditions.

Policy Implications

Opportunities and challenges for governments and business entities to facilitate cross-border reverse supply chains for a resource-efficient and circular economy, with a focus on firm-level cost optimisation and trade facilitation mechanisms.

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34 Blue Food Assessment Indonesia Phase 2

Dionisius Narjoko

Summary

The Deputy Minister for Economic Affairs at the Ministry of National Planning and Development (Badan Perencanaan Pembangunan Nasional, Bappenas) of the Republic of Indonesia, sent an official letter to the President of ERIA dated the 1st of November 2023, inviting ERIA to provide support for the development of the Blue Food Assessment (BFA) for Indonesia.

As stated by the Deputy Minister in her letter, the BFA for Indonesia is broadly defined as a study that assesses the value chains and ecosystem of aquatic food industries in Indonesia. It is one of the further implementations of the Indonesia Blue Economy Roadmap (IBER), which was launched in September 2023.

The Deputy Minister also hopes that the BFA for Indonesia can be regarded as one pilot project under the implementation of the ASEAN Blue Economy Framework, initiated during Indonesia's ASEAN Chairmanship.

The detailed topics covered by the ERIA support are listed below:

- Modelling of maritime GDP and the inclusion of the blue food sector in the maritime GDP model.
- Expansion of IBEI 2024 and the IBEI guideline document.
- Creation of Indonesia Blue Food Indicators 2023 and 2024.
- Standardisation in the blue food sector.
- Comprehensive study of micro fishers in Indonesia, including the prospects for young fishers.
- Analysis of the business development model for the blue food sector and industry.
- Logistics and green shipping industry for blue food development.
- Regulatory review in the blue food sector and industry.
- Women's participation in fishery and aquaculture and equality in blue food benefits.
- Productivity, value creation, and exports of the blue food sector.
- Analysis of championed Indonesia's blue food products or commodities (e.g. seaweed and its manufacturing products, lobsters, tuna, and other major products or commodities).
- Climate and plastic debris factors for sustainable blue food sectoral development.
- Circular economy in the blue food sector and industry.
- Technology and digitalisation in the blue food sector, including the development of digital startups in the blue food sector and potential resource detection.

Partner Organisation

Bappenas, ERIA, Center for Ocean Solution (Stanford University), and MicroSave of Bill and Melinda Gates Foundation.

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35 ASEAN Ecotourism Standard Phase 1

Aladdin Rillo

Summary

This year, one of Laos' Priority Economic Deliverables (PEDs) is the development of ASEAN ecotourism standards. Recognizing the project's scale, the plan involves establishing the standards in 2024, followed by the creation of trainer manuals, a communication toolkit, and training support materials to implement these standards in 2025.

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36 Navigating Challenges on the Path to a Greener Future

Venkatachalam Anbumozhi

Summary

Southeast Asia is one of the world's most vulnerable regions to climate change and is already experiencing severe sustainability challenges, including declining natural capital, unsustainable consumption, and air pollution. Each of these challenges is unique and exhibits characteristics of a wicked problem: dynamic, complex, and involving many stakeholders. ASEAN member states are coordinating efforts to significantly reduce future climate impacts and sustainability risks, which would otherwise threaten past achievements in economic growth and integration in the region. How rapidly growing ASEAN economies choose to meet increasing demands for decarbonisation and dematerialisation, while achieving their sustainable development goals, will have major implications for global efforts as well.

ASEAN policymakers, stakeholders, and development partners will need to consider both vulnerabilities to climate change impacts and the necessity of achieving a greener future in key sectors such as agriculture, electricity, transport, and industry. This includes increasing access to safe and affordable water and energy while meeting sustainable development goals. Full decarbonisation of economic systems in AMS would yield multiple co-benefits for sustainable development, such as arresting environmental degradation, including water use and land contamination. This is possible by 2050 with a rapid increase in renewable energy use in the power sector and the decarbonisation of end-use sectors such as industry and transport through electrification or direct use of renewable energy, as well as significant demand reductions through increased efficiency and improved infrastructure across all end-use sectors.

This paper will demonstrate the impacts that current sustainability initiatives and decarbonisation efforts could have, and the developmental co-benefits AMS can leverage as a result. Decarbonising some sectors, such as agriculture, will be more challenging due to highly fragmented markets. For ASEAN to meet global sustainability targets, specifically net-zero carbon emissions by 2050, decarbonising cities is paramount. This requires cooperation between governments, the private sector, and the cities themselves. Another key challenge to ASEAN's greener and more resilient future includes limited access to financial resources and technology to develop and implement decarbonisation projects. Although global support for AMS has been increasing, insufficient public funds are available to accelerate decarbonisation efforts. Carbon markets could play a vital role in reducing transaction costs and thereby unlocking private investments. This study will offer an analysis of market potentials, the regulatory ecosystem, and potential public-private-community partnership opportunities for early-moving stakeholders. Sectoral bodies of ASEAN can gain a foundational understanding of factors impacting Net Zero strategies and bold actions to accelerate sustainability initiatives.

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37 ASEAN Blue Economy Implementation Plan

Intan Murnira Ramli

Summary

The ASEAN Blue Economy Framework (ABEF), developed with support from ERIA, was adopted by ASEAN leaders at the 43rd ASEAN Summit in Jakarta, Indonesia, in September 2023. Subsequently, the 34th ASEAN Coordinating Council (ACC) Meeting on 4 September 2023 agreed to establish the ASEAN Coordinating Task Force on Blue Economy (ACTF-BE) to oversee the implementation of this framework.

ERIA was recognised during the 42nd ASEAN Summit in Labuan Bajo, Indonesia, on 10–11 May 2023, and the 43rd ASEAN Summit in Jakarta, Indonesia, on 5 September 2023, for its continued support of ASEAN's economic integration and community-building efforts. This support particularly benefited Indonesia's Chairmanship of ASEAN in 2023, including the development of the ASEAN Blue Economy Framework. ERIA also supported flagship events under Indonesia's Chairmanship, which included the ASEAN Blue Economy Forum. Furthermore, the 34th ASEAN Coordinating Council (ACC) Meeting on 4 September 2023 agreed to establish the ASEAN Coordinating Task Force on Blue Economy (ACTF-BE) to oversee the implementation of this framework.

Recognising the cross-cutting nature of this endeavour, and the need for comprehensive research, strategic planning, and technical expertise, the ASEAN Secretary-General on 19 February 2024 invited ERIA to collaborate in the development of the implementation plan. A draft implementation plan is intended to be presented during the first meeting of the ASEAN Coordinating Task Force on Blue Economy, tentatively scheduled for August 2024.

Policy Implications

Given the overarching nature of blue economy issues, the proposed Implementation Plan aims to:

- institutionalise cross-pillar and cross-sectoral cooperation, and
- provide actionable strategies that can be implemented through ASEAN to facilitate cooperation amongst member states and relevant partners on all future regional initiatives related to the blue economy.

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Energy

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Decarbonisation and Carbon Neutrality

38 Management of Asia CCUS Network Phase 4

Shigeru Kimura

Summary

Energy demand in the ASEAN and East Asia region has been increasing due to stable economic growth, and consequently, CO_2 emissions have also been rising significantly because this region largely depends on fossil fuels, especially in the power and transport sectors. In this context, many governments in the region have initiated efforts to increase the adoption of renewable energy sources such as solar/PV. However, these efforts have faced challenges due to the disadvantages of renewables, such as intermittency, seasonality, cost, and lower capacity factors. Therefore, Carbon Capture, Utilisation, and Storage (CCUS) has been highlighted as a key solution to reduce around 90% of CO_2 emissions from fossil fuel combustion in these sectors.

The development and deployment of CCUS in the future will be essential. Consequently, the Asia CCUS Network (ACN) was officially established in 2021 as a platform for CCUS stakeholders, including private and public companies, academia, and financial institutions. As the secretariat of the ACN, ERIA continues to conduct:

- knowledge-sharing conferences,
- capacity-building training sessions, and
- research studies to promote CCUS in the Asia region as a collective activity.

Policy Implications

a. Enhance common and accurate understanding of CCUS.
b. Support signing ceremonies for MOUs between Japanese and Asian organisations concerning CCUS business.
c. Expand CCU to the same extent as CCS.
d. Share knowledge on establishing regulatory frameworks for both national and regional schemes in Asia.
e. Develop appropriate financial mechanisms to support the deployment of CCUS in the Asia region.
f. Initiate the deployment of pilot CCUS projects in the ASEAN region.

Partner Organisation
IEEJ

Geographic Scope
East Asia Summit Countries

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39 Case Studies of LCET (Low Carbon Energy Transition)-CN (Carbon Neutral) Scenario using EAS Energy Outlook Models Updated in 2023-24

Shigeru Kimura

Summary

The production of the EAS Energy Outlook began in 2007, with the first outlook report published in 2008. The purpose of this outlook is to assess the effectiveness of energy-saving and renewable energy targets reported by the 16 EAS countries under the EEC workstream, promoted by EAS-ECTF and EMM. For this, ERIA has formulated a working group consisting of members from 17 EAS countries. The working group members have been updating their energy outlooks independently, with strong support from ERIA, particularly for ASEAN countries. This outlook was updated annually until 2013 and biennially thereafter.

Energy-saving targets contribute to reducing energy consumption, particularly of fossil fuels, while renewable energy targets directly mitigate CO_2 emissions. Consequently, this outlook produces two scenarios: BAU (Business as Usual) and APS (Alternative Policy Scenario), reflecting energy-saving and renewable energy targets to assess their impact on energy saving and CO_2 emissions mitigation. Initially, the energy-saving target was prioritised over CO_2 emissions. However, following COP26, carbon neutrality has become a focus. Therefore, the outlook introduced an additional scenario in 2021 and 2023, named LCET-CN (Low Carbon Energy Transition – Carbon Neutral), reflecting both energy transition and carbon neutrality.

Based on the updated LCET-CN model for 2023-24, ERIA is conducting several case studies to analyse more realistic carbon-neutral pathways, paying particular attention to the cost of zero-emission energy technologies such as hydrogen/fuel ammonia, CCS, and CCU (carbon recycling) in 2024-25.

Policy Implications

a) Present a carbon-neutral pathway for each of the 17 EAS countries.
b) Present the estimated energy costs for both BAU and LCET-CN scenarios.
c) Detail policy and financial support for hydrogen/fuel ammonia and CCUS, including carbon recycling.
d) Outline the policy framework for the hydrogen and CCUS value chain, including carbon recycling, in the EAS/AZEC region.

Partner Organisation
IEEJ

Geographic Scope
East Asia Summit Countries

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40 Investment/Financing Scenarios for All Fuels and Technologies under Carbon Neutrality

Han Phoumin

Summary

The goal of global cleaner energy systems and 'just transitions' can only be achieved if countries are able to accelerate energy transitions in meaningful ways, ensuring energy access, affordability, and security, while also considering environmental sustainability. It should be noted that ASEAN has a different energy landscape compared to North America and Europe in terms of economic development, current energy mix, resource endowment, and cross-country or inter-regional interconnections. Consequently, multiple pathways, involving all technologies and fuels, will need to be adopted to reach the carbon neutrality goal.

ASEAN and East Asia have a high dependency on fossil fuels, with about 80 percent of the energy supply coming from oil, coal, and natural gas. Transitioning away from fossil fuels will take time and involve significant costs related to system transformation and adoption. Thus, the energy system transformation cannot happen overnight. Emission reduction improvements are urgent and necessary to meet the commitments of each respective NDC pledged by all states that are parties to the Conventions of the UNFCCC.

ERIA's technology optimisation analysis for decarbonising ASEAN's energy mix towards carbon neutrality in 2060, produced in collaboration with the Institute of Energy Economics of Japan (IEEJ), suggests that:

i. Energy efficiency improvement and electrification in end-use sectors, combined with low-carbon power supply, are core strategies for decarbonising ASEAN energy systems.
ii. Not only VRE, but also other carbon-free technologies (hydro, geothermal, biomass, nuclear, CO_2-free hydrogen, and CCUS) and negative emission technologies, as well as forest carbon sinks, should contribute to carbon neutrality.
iii. During transition periods, fuel switching from coal to natural gas, deployment of more efficient turbines, and co-firing with hydrogen or ammonia, all play important roles.
iv. While affordable technologies will be deployed in the mid-term, more niche but expensive technologies will be required in the final stage of achieving complete carbon neutrality.
v. For political, economic, and social acceptability, mitigation costs must be reduced through technology innovation, large-scale deployment, and regional/international cooperation.

There are numerous opportunities to reduce emissions in the ASEAN and East Asia region. The transition to carbon neutrality will need to safeguard energy supplies against this backdrop, recognising some countries' limited ability to leap suddenly to renewable energy due to economic constraints and the high costs of decarbonisation. Thus, climate sustainability will need to be considered together with energy security, affordability, and reliability of supply. Various governments and international organisations have established standards and guidelines to ensure that financial flows are consistent with a pathway towards carbon neutrality. However, these tend to focus on green technologies rather than transition technologies and often have limited relevance to the ASEAN region.

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Securing a stable natural gas supply is particularly crucial for the ASEAN region to pursue the goals of energy security and low carbon energy transition. Switching from coal, which is the predominant fuel in power generation in the region, to gas is regarded as a pragmatic short- and mid-term strategy to reduce GHG emissions towards 2030. Delaying the shift to natural gas could also hinder the further penetration of variable renewable energy (VRE). The inherent characteristics of VRE – namely intermittency, low-capacity utilisation ratio, and seasonality (rainy season and dry season) – call for backup systems to balance power demand and supply at the grid level. Since battery technologies are still expensive, the need for the operational flexibility of natural gas will increase in accordance with the growing share of VRE.

Therefore, ASEAN stakeholders, including governments, financial institutions, and the private sector, will need to clearly identify appropriate transition technologies while simultaneously promoting renewables and clean technologies. This study will explore the possibilities for countries to meet carbon neutrality through multiple pathways by investing in and financing all options of fuels and technologies, recognising that not all countries are endowed with renewable resources alone.

Policy Implications

The project is expected to generate knowledge for policy debates and practices related to finance and investment needed to achieve carbon neutrality at various levels (national, regional, and firm). It aims to inform policymakers on potential policy changes that can facilitate a swift and just energy transition in the East Asian region. Additionally, it will provide practitioners, both within and outside the East Asian region, with options and practices that can lead to sustainable investment and financing, helping countries to meet their carbon neutrality goals.

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41 Enhancing Green Digital Finance in Cambodia

Han Phoumin

Summary

Green digital finance aims to improve the financial system's effectiveness in mobilising capital towards a green and inclusive economy aligned with sustainable development goals. Practically, green digital finance is designed to steer financial initiatives by reallocating capital to carbon-neutral assets and unlocking new sources of climate and socially just finance.

Green digital finance has been aggressively promoted in advanced countries and nations embracing low-carbon services and products to meet net-zero emissions. This approach requires financial institutions to integrate mainstream finance with financial technologies (fintech) and sustainable finance. An enabling environment, including supportive policies and a technological ecosystem featuring AI, big data, mobile platforms, distributed ledger technology (DLT) or blockchain, and the Internet of Things (IoT), is crucial for facilitating green digital finance. However, digital technologies also introduce new risks and unintended consequences, including environmental impacts, which can limit their potential to scale sustainable finance. The opportunities and risks of digital finance in enhancing sustainable finance are increasingly recognised globally, including by the G20 Sustainable Finance Study Group and the United Nations. Various countries are exploring emerging practices, policy frameworks, challenges, and opportunities to better leverage digital technologies for financing sustainable and inclusive growth.

In the ASEAN region, the role of sustainable finance was recognised by the ASEAN Finance Ministers' and Central Bank Governors' Meeting (AFMGM) in 2019, leading to a common understanding of sustainable financing essential for attracting and orienting capital towards sustainable investments and away from non-sustainable activities. Consequently, a credible regional sustainable finance taxonomy is needed. As a follow-up, the ASEAN Taxonomy Board (ATB) was established in March 2021 to develop, maintain, and promote the ASEAN Taxonomy for Sustainable Finance (ASEAN Taxonomy). The ASEAN Taxonomy draws on learnings from and intends to be interoperable with the EU Taxonomy and other national taxonomies within ASEAN. These respective taxonomies have been developed prior to and in parallel with the development of ASEAN Taxonomy Version 2. National AMS taxonomies vary in scope and approaches based on different priorities, tolerances, and pathways in their respective jurisdictions but must also reflect the expectations of international investors.

Promoting green digital finance involves banking and non-commercial banking sectors leveraging emerging technologies and digital tools to create new services, products, strategies, and commercial models that comply with the Paris Agreement on Climate Change and sustainable development goals. From the perspective of consumer preferences, demand for ecological or sustainable solutions is expected to increase over the coming years, with products such as organic food, organic clothes, and clean energy. Therefore, the potential of green digital finance is increasingly demanding for countries to shape their financial instruments and develop applications and policies to expand the portfolio of green digital finance investments across all sectors. For the energy sector, financing clean technologies and renewables is key for countries to reduce

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emissions. In this regard, green digital finance could mobilise finance and investment for such sustainable projects. For example, third-party finance and/or green bonds may help solar power businesses address their funding challenges. This means that green digital finance promotes sustainability by efficiently resolving funding issues for businesses, allowing them to allocate more resources to technological innovation.

To support the National Bank of Cambodia (NBC) in introducing Green Digital Finance, the Economic Research Institute for ASEAN and East Asia (ERIA) will sign a Memorandum of Understanding (MoU) with NBC to promote collaboration and strategic cooperation. ERIA will support NBC in identifying appropriate strategies to expand and accelerate the portfolio of ESG and green digital finance in Cambodia.

Policy Implications

The project is expected to generate appropriate suggestions and recommendations for the National Bank of Cambodia to introduce green digital finance into the mainstream financial system of all financial institutions operating in Cambodia.

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42 Integration of Solar PV Electricity for Fishing Boats and Fishing Villages in Indonesia

Alloysius Joko Purwanto

Summary

This project aims to elaborate an optimised integrated solar PV electricity system for fishing boats and fishing villages in Indonesia, specifically in Mamuju and Gorontalo in Sulawesi. The study focuses on establishing a solar photovoltaic-based electricity system in fishing villages to power small fishing boats and the villages themselves. It includes designing electric boat prototypes and conducting a cost–benefit analysis of the entire system. The goal is to develop a business plan that enables the fishing villages to become self-sustaining by procuring electric-powered fishing boats.

Policy Implications

The expected policy recommendations will focus on two main areas. First, the elaboration of a business plan that enables the fishing villages to self-sustain by procuring electric-powered fishing boats. Second, the design of a model or basic framework for an integrated solar PV system-based fishing village that can be implemented in other fishing villages in Indonesia and other ASEAN countries.

Partner Organisation
BRIN (National Research and Innovation Agency) and IIEE (Indonesia Institute for Energy Economics)

Geographic Scope
Indonesia

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43 The Role of Carbon Pricing and Carbon Markets for ASEAN Region's Decarbonisation

Jun Arima

Summary

Based on the Paris Agreement, most ASEAN countries have set their respective carbon neutrality goals and are promoting energy transitions reflecting each country's national circumstances. The Global Stocktake (GST) adopted at COP28 endorsed the energy transition 'in a nationally determined manner, taking into account the Paris Agreement and their different national circumstances, pathways, and approaches.'

Given the dominant share of fossil fuels in the current energy mix, the region urgently needs not only green finance but also transition finance to achieve pragmatic energy transition pathways. However, transition finance is still in its nascent stage in the region, and an enabling policy environment needs to be established, including the provision of public money for blended finance, regulation, and carbon pricing/carbon markets.

The technology optimisation analysis for achieving each country's carbon neutrality goals at the lowest cost suggests that the marginal abatement cost of each country is diverse. Trading carbon credits amongst countries could lower overall abatement costs across the region. For activating the carbon credit market, the existence of domestic carbon constraints (explicit and implicit carbon pricing) within each country is necessary. Countries such as Indonesia and Singapore have already introduced carbon pricing.

While carbon pricing could boost the wider deployment of low/zero emissions technologies, it could also raise energy prices. This could cause economic and social challenges due to the regressive nature of energy costs.

This study explores the current situation regarding the development of carbon pricing/carbon markets in the region and examines the opportunities and challenges associated with the wider application of these instruments. The issues to be addressed include:

- Infrastructure needed for carbon markets (carbon tax, exchanges, financial accounting of carbon credits)
- Possibility of intra-regional emissions trading and intra-regional carbon tax
- Concerns about carbon leakage
- Need to harmonise measures on carbon pricing in the ASEAN region (approaches, methods, national systems, etc.) -> experience/knowledge sharing, best practices

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Policy Implications

This study helps ASEAN countries to recognise the opportunities and challenges related to the wider application of carbon pricing instruments. It addresses issues such as the design of carbon taxes and emissions trading schemes, concerns about carbon leakage, and the potential harmonisation of carbon pricing schemes within the region.

44 AZEC/EAS Hydrogen Master Plan 2024-25

Shigeru Kimura

Summary

Energy demand in the ASEAN and East Asia region has been increasing due to stable economic growth, leading to a significant rise in CO_2 emissions because the region relies heavily on fossil fuels, particularly in the power and transport sectors. In response, many governments in this region have initiated efforts to increase the use of renewable energy sources, such as solar PV. However, the penetration of variable renewable energy has been limited due to its disadvantages, including intermittency, seasonality, cost, and lower capacity factors.

Consequently, hydrogen and fuel ammonia have gained attention as potential renewable energy sources because they can replace fossil fuels in combustion processes without emitting CO_2. To facilitate the future utilisation of hydrogen and fuel ammonia in the AZEC/EAS region, ERIA continues to conduct research studies on both the demand and supply sides of these energy sources in 2024-25.

Policy Implications

a. Develop a common understanding of updated national policies on hydrogen and ammonia.
b. Establish a common understanding of hydrogen standardisation in the EAS/AZEC region.
c. Facilitate information sharing on hydrogen technology development.
d. Discuss issues and challenges related to cross-border hydrogen trade in the Asia region.
e. Ensure a correct understanding of the demand and supply potential for hydrogen and ammonia to establish an appropriate hydrogen master plan, including a roadmap.
f. Increase knowledge sharing amongst EAS hydrogen working group members.

Partner Organisation
IEEJ

Geographic Scope
AZEC/EAS

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45 Carbon Market in ASEAN and East Asia Region

Han Phoumin

Summary

Meeting the carbon neutrality targets by mid-century is a collective effort by all countries committed to the Paris Agreement, implemented through their progressive NDCs to reduce emissions to well below 2 degrees Celsius and aiming to limit the temperature rise to 1.5 degrees Celsius compared to pre-industrial levels, to avoid the unforeseen catastrophic effects of climate change.

The problem of climate change involves a fundamental market failure: those who damage others by emitting greenhouse gases generally do not pay (Nicholas Stern, 2007). The Organisation for Economic Cooperation and Development (OECD) introduced the concept of the Polluter Pays Principle (PPP) in 1972, holding polluters responsible for the pollution they cause. The 'polluter pays' principle is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment (LSE, 2022).

Carbon prices or carbon taxes are generally a price-based mechanism that truly reflects the polluter pays principle, imposing a charge on emitters of greenhouse gases. Carbon prices should reflect the potential social cost caused by future climate change. These prices are expected to force emitters to internalise the cost of pollution through technological innovation or investment in carbon offsetting projects. Alternatively, the carbon price can be calibrated to achieve a certain emissions target, known as a 'quota-based system' or 'cap-and-trade,' where the quota to emit is moved to zero emissions by a specific date, such as net zero by 2050. This is commonly referred to as a 'target consistent' approach. Under both approaches, a financial incentive is created for a polluting entity (such as a factory) to reduce its emissions.

To ensure the carbon market functions effectively, many economists believe that a carbon price should be global and uniform across countries and sectors, so polluters do not simply move operations to so-called 'pollution haven countries,' where a lack of environmental regulation allows them to continue polluting without restrictions. Amongst East Asian countries, Japan implemented carbon taxation in 2021 of 2.89 Japanese yen (2.65 US dollars) per tonne of carbon dioxide (Ministry of Environment, 2019), becoming the first Asian country to implement a carbon tax (Gokhale, 2021). This tax applies to fossil fuels such as petroleum, natural gas, and coal, and is levied in addition to existing taxes on petroleum and coal. The revenue generated from the carbon tax is used to fund renewable energy projects and enhance energy-saving measures (Gokhale, 2021). Singapore, the most advanced economy in ASEAN, implemented a carbon tax in 2019 and established the state-owned CIX Exchange Place (Climate Impact X) to drive carbon credit trading initiatives. In March 2023, Malaysia followed suit with the establishment of the Bursa Carbon Exchange (BCX) and the launch of an auction platform for carbon credits to prove the viability of carbon credit trading.

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In Indonesia, the Presidential Regulation (Perpres) 98/2021 on the Carbon Economic Value, or Nilai Ekonomi Karbon (NEK), is seen as a direct response to the Article 6 Paris Agreement, paving the way for parties to trade carbon to lower emissions. The regulation offers several instruments, including carbon trading, result-based payments, and carbon taxes, which have been delayed twice and are expected to launch in 2025. Amongst all the instruments, carbon trading is a mature mechanism that enables institutions to claim their high-intensive emissions by buying credits from other activities that provide carbon stocks. To strengthen the implementation of carbon trading under Law 4/2023 on the Development and Strengthening of the Financial Sector, the Financial Services Authority (OJK) is tasked with establishing and overseeing carbon trading in the carbon market. The OJK issued regulations on carbon trading through carbon exchanges and officially launched the carbon market on 26 September 2023 (IESR, 2023). Thailand has shown interest in this space and opened a platform for carbon credit trading (FTIX) aimed at providing domestic exporters with the option of purchasing these credits. Other countries in the region are also developing the institutional capacity and necessary conditions for the carbon market at different stages. For example, Viet Nam, the Philippines, Brunei, Cambodia, and Laos have varying levels of readiness regarding establishing a carbon platform and have not made solid commitments in this area.

In this regard, the Economic Research Institute for ASEAN and East Asia (ERIA), as one of the top global and regional think tanks, wishes to facilitate and expedite the implementation of the carbon market in ASEAN by understanding the barriers and necessary conditions to allow the carbon market to freely compete in the open market in ASEAN and open the door for a carbon market hub in the near future. Enriching the studies on carbon market issues in ASEAN and learning from experiences elsewhere, such as the EU Emission Trading System, will help ASEAN transition from a voluntary carbon market to a fully integrated, mandatory carbon market where all emissions-related industries and businesses will participate, with clear rules and regulations to oversee market functioning at the ASEAN level.

Policy Implications

Further, this project aims to inform policy debates and practices for advancing the ASEAN carbon market. The project will provide policy recommendations to address barriers and find ways to build institutional capacity around the carbon market, enabling some countries to catch up with others.

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46 ASEAN Power Grid to Embrace the Integration of New Technologies: Smarter, More Flexible, and More Resilient for Low-carbon Energy Transition

Kei Sudo, Yanfei Li

Summary

The world is witnessing a rapid transformation in the energy sector, driven by the urgent need for climate action and increasing demand for energy security. Concurrently, new technologies in the power sector are offering innovative solutions to meet carbon targets while presenting new challenges to existing infrastructure planning, market institutions, and policies and regulations.

Renewable energy sources like solar and wind are experiencing explosive growth, driven by falling costs, technological advancements, and supportive policies. This shift towards cleaner energy necessitates smarter grids for managing the variability of renewables and integrating distributed energy resources. Artificial intelligence is playing a crucial role in this evolution, empowering smart grids with predictive analytics for demand forecasting, fault detection, and optimised grid operation. Blockchain technology is also emerging as a potential disruptor, enabling secure and transparent peer-to-peer energy trading, while battery storage and other energy storage solutions are becoming increasingly indispensable for balancing supply and demand and enhancing grid resilience. This confluence of innovative technologies is paving the way for a more decentralised, intelligent, and sustainable energy future.

As such, the ASEAN Power Grid (APG), envisioned as a key driver of regional energy security and low-carbon transition, requires modernisation and integration of transformative technologies. The following categories of new technologies can each offer the APG enhanced efficiency and robustness in different aspects and are thus worth studying:

(1) Supply Side Technologies

- Enhanced Grid Management: Smart grid technologies like real-time monitoring, data analytics, and advanced control systems will improve grid stability and enable efficient integration of variable renewable energy (RE) sources like solar and wind. This will be crucial for managing cross-border power flows and optimising dispatch across diverse generation sources.
- Decentralised Cross-border Coordination: Information-sharing platforms and coordinated operation protocols powered by smart grids and advanced algorithms can facilitate seamless real-time communication and collaborative grid management between interconnected ASEAN countries, ideally in a decentralised manner. This will not only enhance operational efficiency and reliability but also foster greater confidence in multilateral cross-border electricity trade.

(2) AI Applications in the Power Sector

- Demand Forecasting and Optimisation: AI-powered demand forecasting can predict electricity consumption patterns across the region, enabling optimal generation planning and resource allocation for cross-border trade. This will minimise energy waste and facilitate efficient utilisation of power grids.
- Predictive Maintenance and Grid Resilience: AI algorithms can analyse data from sensors across the APG to predict potential equipment failures and optimise maintenance schedules. This will enhance

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grid resilience, minimising disruptions and ensuring secure cross-border power flows.

(3) Smart and Efficient Trading

- Secure and Transparent Trading: Blockchain's inherent security and transparency features can transform cross-border electricity trading by enabling direct peer-to-peer transactions between producers and consumers across the APG. This can streamline trade processes, reduce transaction costs, and improve market efficiency.
- Smart Contracts and Distributed Energy Resources (DERs): Blockchain-based smart contracts can automate electricity transactions based on predefined terms, facilitating seamless microgrid and DER integration into the APG. This will open up new avenues for cross-border trade involving smaller, distributed energy sources.

(4) Innovative Energy Storage Technologies

- Cost-Effective Grid Balancing under High Renewables Penetration: Energy storage solutions like batteries and pumped hydro are becoming necessary to store excess renewable power and release it during peak demand periods, smoothing out intermittency and enhancing grid stability for cross-border power flows. Additionally, emerging technologies such as molten salt, compressed air, and PtX-based hydrogen are gaining traction.
- BEV, V2G, and Ancillary Services Market: Battery Electric Vehicles (BEV) and Vehicle-to-Grid (V2G) technologies, along with centralised energy storage facilities, offer innovative and cost-effective ways of managing high variable renewables penetration. Thus, auxiliary markets for ancillary services like frequency regulation and voltage control can emerge within the APG, allowing regional optimisation and utilisation of diverse resources across borders.

Policy Implications

- Estimation of the benefits of introducing new technologies to the APG, such as efficiency improvement, cost savings, emissions reduction, RE integration, system reliability, and energy security enhancement.
- Development of a roadmap for the deployment and integration of emerging new technologies with the ASEAN Power Grid.
- Harmonisation of regulatory frameworks, grid codes, and standards across ASEAN member states to facilitate cross-border power trade, considering the adoption of new technologies.
- Exploration of the proper integration of these new technologies to enable a decentralised or virtually organised electricity market in ASEAN.
- Identification of priority pilot projects demonstrating the viability of specific technologies in different ASEAN contexts.
- Recommendations for addressing energy security concerns related to these advanced technologies, such as grid robustness and reliability, cybersecurity concerns, and data privacy issues.
- Capacity building by international consultants for AMS government officials and technical experts.

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Partner Organisation
ASEAN Centre for Energy and other international consultants (TBC)

Geographic Scope
ASEAN countries

Related ERIA Publications

Noord Pool Consulting (2018), Study on the Formation of the ASEAN Power Grid Transmission System Operator Institution. ERIA Research Project Report 2018-24. Jakarta: ERIA
Downloadable from: https://www.eria.org/research/study-on-the-formation-of-the-asean-power-grid-transmission-system-operator-institution/

Tokyo Electric Power Company Holdings (2018), Study on the Formation of the ASEAN Power Grid Generation and Transmission System Planning Institution. ERIA Research Project Report 2018-25. Jakarta: ERIA
Downloadable from: https://www.eria.org/research/study-on-the-formation-of-the-asean-power-grid-generation-and-transmission-system-planning-institution/

47 Making Carbon Markets and Sustainable Finance Taxonomies Work for Net Zero Economy

Venkatachalam Anbumozhi

Summary

Reducing greenhouse gas (GHG) emissions remains the primary, most effective, and preferred response to climate change. However, decarbonisation alone may prove insufficient to reduce the residual 'hard-to-abate' carbon emissions that may persist in the medium term. All the EAS countries have committed to net-zero targets by 2050, 2060, or 2070 and are devising decarbonisation pathways for key sectors. The ASEAN carbon neutrality map has identified six sectors for priority actions. Once decarbonisation options have been exhausted, carbon capture and storage could play a vital role in neutralising residual emissions; therefore, most scenarios aligned with the Paris Agreement project substantial carbon removal capacities. Estimates from the Smith School of Enterprise and the Environment's 'The State of Carbon Dioxide Removal' report, for example, show that six to ten metric gigatons of CO_2 in annual carbon removal capacity would likely be needed by 2050 for most Paris-aligned net-zero pathways. This capacity could not be delivered quickly, however, so efforts would need to begin as soon as possible to ensure 2050 scenarios are achievable. Some estimates require an additional 0.8 to 2.9 metric gigatons of CO_2 per year of removals capacity by 2030 – three to ten times more than the volumes currently estimated to be on-stream by that date. Given carbon removal's potential importance to achieving net-zero commitments, that segment of carbon markets and trading could become a routine consideration for businesses across sectors. For companies to claim they have reached net zero under the Science Based Targets initiative's Corporate Net-Zero Standard, for example, after they have exhausted decarbonisation actions, they must neutralise any residual emissions. Carbon capture and removal can be especially pertinent for sectors with hard-to-abate emissions – those emissions that are technologically or economically prohibitive to reduce. Closing the removals gap to achieve net zero would require a range of solutions comprising both nature-based solutions (NBS) and technology-based solutions (TBS). NBS remove carbon by restoring, enhancing, or actively managing ecosystems. Because they tend to cost less per metric ton of CO_2 removed than emergent TBS such as CCUS, NBS could offer a more cost-effective path to increasing near-term carbon markets in ASEAN countries which have abundant natural resources. NBS could also play a role in removals over the long term to ensure flexibility and balance in removals capacity. However, TBS generally deliver more 'durable' removals by storing CO_2 permanently with minimal risk of re-release into the atmosphere. And durable solutions are generally preferable to ensure removals efforts remain effective in the long term, so increasing volumes of such solutions would be needed. Accelerating the scale-up of durable TBS and carbon markets would require near-term investment and innovation to reduce their relatively higher cost.

The carbon finance sector and existing climate investment funds covering both NBS and TBS account for an estimated $50 billion, compared with $100 trillion of financial assets under the management of the 500 largest asset managers worldwide. This is due, in part, to the carbon removal and market development under both NBS and TBS being a relatively new topic for investors and the financial sector generally. Nevertheless, sustainable finance frameworks, tools, and standards have recently proliferated at the national and regional levels. The launch of the International Sustainability Standards Board (ISSB), under the International Financial Reporting Standards Foundation (IFRS Foundation), was a pivotal moment for

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sustainability finance. Sustainable finance taxonomy is a shared framework and classification system for defining environmentally sustainable investments. It ensures all stakeholders share an understanding of what sustainable economic activities are. More than 20 sustainable finance taxonomies have now been launched or are at various stages of development worldwide, with ASEAN releasing the updated version in 2023. Embedding carbon removal projects and carbon market derivatives as a core objective of sustainable finance taxonomies offers opportunities for scaling up investments but also faces many unique challenges. This is in part due to carbon removal being a holistic concept that cannot be easily measured and evaluated via a single outcome. This can, therefore, make it difficult to identify and classify individual activities that substantially contribute. Such conceptual challenges are compounded by a relatively immature and fragmented enabling policy environment for voluntary carbon markets in ASEAN and East Asia.

Hence, the objective of the study is to (i) clarify and scale up a range of carbon capture, removal, and storage solutions available for ASEAN+ countries and estimate the associated carbon markets; (ii) examine the combination of NBS and TBS needed to meet the net-zero goals in ASEAN; and (iii) identify the most significant action areas for fully embedding the NBS and TBS-based investments within the ASEAN taxonomy of sustainable finance with respect to evolving architecture, usability, and creating a wider enabling policy environment.

Policy Implications

- Policy pathways for scaling up carbon removal strategies and market development
- Strategies and action plan for improving the ASEAN Taxonomy's usability

48 Module 1: Study on Challenges and Measures to Promote Transition Finance in Asia (ATF SG Operation Module)

Daisuke Kiuchi

Summary

- Transition technologies are critical in achieving carbon neutrality in line with the Paris Agreement. While they play a crucial role, especially in Asia, due to the current energy portfolio, economic environment, and renewable energy endowment, financial institutions (FIs) are struggling to make financial decisions on them due to the unclear market environment. Even though ERIA has published a technology list, there is still less clear guidance on how to best utilise transition technologies compared to green technologies, which are well articulated in many references, such as sustainable finance taxonomy.
- Under the Japanese METI's initiative and sponsorship, the Asia Transition Finance Study Group was organised in 2021 with the mission to discuss specific challenges and potential solutions to overcome them, ensuring a 'Just and Orderly Transition.' ERIA has been one of the Study Group's participants as a Knowledge Contributor since its inception.
- The ATF Study Group has been actively discussing challenges and potential solutions over the past three years. In 2022, the ATF Study Group published its 'Activity Report' and 'Asia Transition Finance Guidelines,' which are practical step-by-step transition finance suitability assessment guidelines for FIs. These publications were well received at the AGGPM in 2022, and the Study Group has been highly rated by its participants. In 2023, it also published the 'Annual Report 2023,' which was also well received at the AGGPM 2023.
- Going forward, however, the Study Group has identified specific issues to address from the 'Annual Report 2023':
  - Remaining issues to operationalise transition finance for FIs: FIs still need to deal with projects without official references; FIs are not familiar with transition technologies and lack concrete data to support de-risking mechanisms for public authorities; Concrete requirements for the guidelines and data are still unclear.
  - Still fluid regulatory environment: Some countries still lack official roadmaps towards NZ/CN; Support from public authorities on the economic viability of transition projects is needed but still limited; To enhance organisational growth and streamline operations, the ATF Study Group has recognised the need for increased structure and principles. As a result, the Secretariat team has been divided into two distinct entities: the FI lead and support team. This module aims to establish a structured approach to the support team's activities across the ATF Study Group's various endeavours.
- By implementing this new framework, the Study Group anticipates improved efficiency and effectiveness in their operations, ultimately leading to enhanced overall performance and success.
- To enable focused operation, ERIA will handle logistics-related topics for the ATF Study Group.

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Policy Implications

- This research activity is expected to identify specific transition finance challenges for FIs, ranging from the definition of transition finance to daily portfolio monitoring.
- Whilst the ATF SG itself is not planning to make a policy recommendation, its activities and discussions will provide various insights on the regulatory environment for sustainable and transition finance.

49 Module 2: Study on Challenges and Measures to Promote Transition Finance in Asia (Content Creation for ERIA for ATF SG Module)

Daisuke Kiuchi

Summary

- Transition technologies are critical in achieving carbon neutrality towards the Paris Agreement. While they play a crucial role, especially in Asia, due to the current energy portfolio, economic environment, and renewable energy endowment, financial institutions (FIs) are struggling to make financial decisions on them due to the obscure market environment. Even though ERIA has published a technology list, there is still less clear guidance on how to best utilise transition technologies compared to green technologies, which are articulated in many references, such as the sustainable finance taxonomy.
- Under the Japanese METI's initiative and sponsorship, the Asia Transition Finance Study Group was organised in 2021 with the mission to discuss specific challenges and potential solutions to overcome them, termed a 'Just and Orderly Transition.' ERIA has been one of the Study Group participants as a Knowledge Contributor since its inception.
- The ATF SG has been actively discussing challenges and potential solutions over the past three years. In 2022, the ATF SG published its 'Activity Report' and 'Asia Transition Finance Guidelines,' which are practical step-by-step transition finance suitability assessment guidelines for FIs. These publications were welcomed at AGGPM in 2022, and the Study Group has been highly rated by its participants. In 2023, it also published the 'Annual Report 2023,' which was also welcomed at AGGPM 2023.

Policy Implications

- This research activity is expected to identify specific transition finance challenges for FIs, ranging from the definition of transition finance to daily portfolio monitoring.
- Whilst the ATF SG itself is not planning to make a policy recommendation, its activities and discussions will deliver various insights on the regulatory environment for sustainable/transition finance.

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50 Module 3: Study on Challenges and Measures to Promote Transition Finance in Asia (ATF SG-related AZE Center Strategy Module)

Daisuke Kiuchi

Summary

- Transition technologies are critical in achieving carbon neutrality towards the Paris Agreement. While they play a crucial role, especially in Asia, due to the current energy portfolio, economic environment, and renewable energy endowment, financial institutions (FIs) are struggling to make financial decisions on them due to the obscure market environment. Even though ERIA has published a technology list, there is still less clear guidance on how to best utilise transition technologies compared to green technologies, which are articulated in many references, such as sustainable finance taxonomy.
- Under the Japanese METI's initiative and sponsorship, the Asia Transition Finance Study Group was organised in 2021 with the mission to discuss specific challenges and potential solutions to overcome them, 'Just and Orderly Transition'. ERIA has been one of the SG participants as a Knowledge Contributor since its inception.
- ERIA established the Center of Energy Transition in Asia (AZE Center) in 2023 with the goal of accelerating the energy transition in Asia. AZE Center aims to achieve this by providing customised content, such as decarbonisation pathways and technology lists, that are specifically tailored to the Asian context. Additionally, AZE Center plans to collaborate with other groups involved in energy transition, including ATF SG. Given AZE Center's expertise as a research organisation, its primary contribution would be as a provider of content that addresses the issues currently not covered and fulfils the unmet needs of ATF SG.
- Moving forward, AZE Center will need to develop a research content strategy and establish a robust governance structure with content advisors. Furthermore, AZE Center should devise a socialisation strategy to ensure that its outputs are accessible and beneficial to a wider range of stakeholders in Asia.
  - > AZE Center strategy to support ATF SG uncovered issues: This part will involve developing a tailored content strategy and implementing a socialisation strategy to promote AZE Center's outputs beyond ATF SG. By doing so, AZE Center aims to increase the reliability and recognition of its content amongst a broader audience.
- In 2024, AZE Center's main objective is to develop a strategy for effective collaboration with ATF SG.

Policy Implications

- This research activity is expected to establish AZE CENTRE's strategy on content and governance.
- Whilst AZE CENTRE itself is not planning to make a policy recommendation, its activities and discussions will deliver various insights on the regulatory environment of energy transition and sustainable/transition finance in Asia.

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Other Topics

51 ASEAN Petroleum Security Agreement (APSA) Improvements on Coordinated Emergency Response Mechanisms for Natural Gas

Han Phoumin

Summary

Oil and gas security issues are escalating globally, primarily due to increasing geopolitical tensions. In March and April 2022, the International Energy Agency (IEA) activated coordinated emergency action to release up to 120 million barrels of oil from its members' emergency stocks, the largest release in history, to address global energy supply instability. This crisis caused oil and gas prices to peak in 2022, impacting the global economy. The ASEAN region was not exempt, with rising fuel prices driving the inflation rate from 3.1% in 2021 to 4.7% in 2022. A disruption in the global oil and gas supply chain poses a long-term risk to ASEAN's economy, as the region heavily relies on oil and gas and is predicted to increasingly depend on imports.

According to the 7th ASEAN Energy Outlook (AEO7), oil and gas supplied up to 56% of regional energy needs in 2020's Total Primary Energy Supply (TPES) and will continue to play a significant role in the energy mix by 2050. ASEAN became a net oil importer before 2005, and imports are projected to increase sevenfold by 2050 compared to 2020 levels. Additionally, without significant new gas resources, the region is projected to become a net importer of natural gas by 2025. The production of both oil and gas has been declining over the past decade. Given the current geopolitical instability and ASEAN's reliance on oil and gas imports, an immediate alternative supply source is crucial to strengthen the energy security of ASEAN Member States (AMS).

AMS has developed a Coordinated Emergency Response Mechanism (CERM) under the ASEAN Petroleum Security Agreement (APSA) to enhance petroleum security. This agreement could also serve as a tool to strengthen regional efforts to secure additional petroleum resources from exporting countries. With more options to maintain energy security, ASEAN countries can better control energy prices, ensuring affordability and promoting economic growth. However, APSA has not been activated since its inception in 2013 and requires adjustments to become operational.

After a ten-year implementation period, APSA expired on 22 March 2023 and is currently in the signatory process by AMS for extension. Prior to APSA's expiry, AMS conducted two official focus group discussions in November 2022 and January 2023, agreeing to extend APSA without adjustments for two years as an interim measure. Relevant stakeholders and ASEAN bodies were tasked with preparing improvements to APSA. This decision aligns with directives from the 40th and 41st ASEAN Summits, which emphasised the need for ASEAN to elevate collaboration to advance new growth engines critical to the region's recovery and long-term resilience from multidimensional crises. These directives included joint efforts to promote energy security. During the 41st ASEAN Ministerial Energy Meeting (AMEM), ASEAN ministers recognised the ongoing collaborative efforts to address volatilities caused by supply chain disruptions in the oil and gas market. They affirmed their commitment to extend the current ASEAN Petroleum Security Agreement (APSA) and anticipated drafting a new APSA agreement in 2024.

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The interim extension is an opportunity for AMS to review the current APSA, identify needed adjustments, and address gaps in its activation. In-depth discussions with all AMS and related stakeholders will be crucial to determine the necessary actions for APSA's future. The APSA task force has identified ten gaps to address, developing studies of the APSA manual and localisation guidelines from AMS that could be used for APSA's actualisation, including the inclusion of natural gas in APSA.

During the interim extension, strategies to address identified gaps, particularly the inclusion of natural gas, will be examined to generate recommendations for improving APSA, reflected in official documents and actual actions. After this interim extension, APSA is expected to be activated with an established working secretariat to enhance regional petroleum security in the future.

Therefore, the objective of this project is to analyse the inclusion of natural gas into APSA and identify the emergency response mechanisms for natural gas within APSA.

Policy Implications

a) Inclusion of natural gas into APSA
b) Development of APSA Protocol on CERM natural gas

52 ASEAN Coal Transition Technologies (ASCOTRECH): Policy, Technology, and Financial Strategies

Han Phoumin

Summary

Following the rapid economic growth in Southeast Asia, growing on average by 4.6% in 2023 and 4.8% in the following year, the growth of energy demand is projected to follow a similar trend. According to the APS scenario of the 7th ASEAN Energy Outlook, energy demand will grow by nearly 30% by 2030 and 170% by 2050 compared to 2020 level. On average, the annual growth rate of energy demand in the region hit 3.4% until the middle of the century.

Within the energy demand mix and against the energy transition agenda, coal will still reach 133 Mtoe in 2050, with the sectoral composition of coal demand shifting towards industry, as coal use will grow by 66% from 2020 to 2050 in the sector. Meanwhile, notwithstanding the eventual downfall of coal use in the electricity sector in the long term (2050 and ahead), it still contributes significantly in the short and medium term at 42% in 2025.

However, the majority of coal-fired power plants, as per 2021 data, are still using less efficient technology (i.e. subcritical), which accounts for 57% of the total generating capacity in Southeast Asia. They are also relatively young – averaging around 14 years – which means that they could be in operation for another 30 years, making it more challenging to curb CO_2 emissions from the power and industrial sectors.

In encouraging coal upgrading towards energy transition through the implementation of clean coal technologies (CCT) and carbon capture utilisation storage (CCS/CCUS), ASEAN Member States face several technological, regulatory, and financial gaps. While there are promising sources of biomass from agricultural waste, biomass co-firing is in early development. Regulatory support is crucial for decarbonisation technologies like carbon capture and storage (CCS), and policies play a critical role in fostering the broader implementation of abatement technologies in ASEAN. Financing poses a key challenge, with acceptable costs ranging from USD 50 to USD 60 per tonne of avoided CO_2. Viable financing options include green bonds and concessional loans, while the carbon market offers cost-effective emission reduction. To tap into these opportunities, government support, direct investments, and comprehensive regulatory frameworks are essential to encourage private investments and de-risk clean coal technologies (CCT) and CCS projects.

Project Objectives

The project's objective is three-fold. It primarily aims to bridge the technological, regulatory, and financial gaps of implementing CCT and its retrofitted technologies, including CCS/CCUS, co-firing technology (biomass, ammonia and hydrogen) and coal upgrading towards energy transition. Therefore, the project is expected to formulate some recommendations to support the deployment of advanced retrofitted CCT, drive the development of supportive policies and draw financial mechanisms for the implementation of the technologies.

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Further, the outputs of the project aim to:

1) Promote the role of CCT and CCUS towards energy transition and low-carbon economy.
2) Facilitate the investment and innovation on CCT in the energy transition era.
3) Enhance AMS awareness and understanding towards the development of advanced CCT as well as public awareness and image of CCT.
4) Advance the development of CCT research, development and innovation.

Policy Implications

Data processing and data standardisation are inseparable in energy modelling. Data collection is also one of the crucial aspects of the modelling flow. Having comprehensive, comparable, and timely energy data will significantly improve insights into the energy outlook and contribute to achieving evidence-based energy policy decisions. In AEO8, energy data submissions are standardised. Bottom-up modelling presents a challenge as it requires a sophisticated and extensive dataset. This approach necessarily has limited sources that provide detailed disaggregation data and relies on the assumption of data standardisation.

Based on the projection results of data processing in AEO8, the findings will potentially suggest the regional energy targets for APAEC post-2025, especially in terms of energy intensity reduction and renewable energy share. The analysis will also present key strategies in each APAEC programme area to reach those new targets. From the optimisation works in this project, the report is also expected to provide several recommendations on how to improve the model for the next AEO or any national outlooks of AMS in the future.

53 Biofuel Market Potential for Regional Cooperation in ASEAN

Tran Dong Phuong

Summary

As ASEAN charts its course towards the next cycle of APAEC, the transport sector emerges as a critical aspect of achieving the current 23% renewable energy (RE) share target of Total Primary Energy Supply (TPES). This report serves as a reference for the region in aiming for a more ambitious decarbonisation goal beyond 2025, while also fulfilling the priority milestones of APAEC Phase II under action plan 5.2: Analyse the potential of biofuel and bioenergy for energy sector decarbonisation. It acts as a beacon for the RE-SSN in crafting a nuanced framework for biofuel cooperation between member states.

The report thoroughly examines regional energy cooperation schemes through policy, trade, and technology lenses. Analysing the gap between biofuel demand driven by Renewable Energy (RE) targets and the expanding economies of ASEAN nations, the report advocates for more ambitious regional goals in biofuel development. It explores diverse blending targets adopted by member states, emphasising their unique approaches. Additionally, the report scrutinises intricate policy frameworks across ASEAN nations, identifying stakeholders influencing biofuel trade, pricing, and financing mechanisms, fostering avenues for regional collaboration. The report also provides an industry overview, analysing production trends, key players, and trade flows within and beyond ASEAN. Unveiling limitations, it addresses competing feedstock uses and trade frictions, proposing innovative regional cooperation models to surmount these challenges.

The research activity will include data collection, desktop study, and technical analysis to support the development of knowledge products, such as the main study report, policy brief, and academic paper, and knowledge exchange events, such as Focus Group Discussions (FGDs), workshops, and meetings. The data collection will utilise ACE's and ERIA's repositories on (1) energy statistics gathered for their respective energy outlook development, (2) relevant national policy documents, (3) presentations of the latest policy presented in past knowledge exchange events, (4) past relevant studies, and (5) other peer-reviewed literature, e.g. academic papers, publications by other research institutions, think tanks, and international organisations. Data collection and desktop research will be verified at the planned knowledge exchange events. Additional interviews and surveys might be considered at the stage of report finalisation to complement the findings.

Partner Organisation

ASEAN Centre for Energy (ACE)

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54 The 4th ASEAN International Conference on Energy and Environment (AICEE)

Tran Dong Phuong

Summary

The ASEAN International Conference on Energy and Environment (AICEE) is an annual flagship conference held by the ASEAN Centre for Energy and its academic partner, in conjunction with the ASEAN Energy Business Forum (AEBF) and the ASEAN Ministers on Energy Meeting (AMEM).

In 2024, the 4th edition of the AICEE will be held in Vientiane, Lao PDR. The National University of Laos has been identified as the academic partner of the conference.

The previous edition, the 3rd AICEE, took the theme of 'Accelerating a Just, Secure and Resilient Energy Transition in ASEAN through Innovation and Interconnectivity'. It received 145 submitted abstracts, with 96 accepted presentations, which were conducted in-person only. Currently, 76 full papers have been submitted and are under review.

The proposal is for ERIA to support ACE in conducting the academic conference, which includes event organisation and 'scholarship' to selected authors.

Policy Implications

In addition to the official proceedings, a white paper could be curated based on the research papers presented and shared during the AICEE. This should summarise insights from the latest research, which can serve as inputs to the APAEC Drafting Committee.

Partner Organisation

ASEAN Centre for Energy (ACE)

55 The 8th ASEAN Energy Outlook (AEO8) Development Support on Optimisation and Modelling

Han Phoumin, Alloysius Joko Purwanto

Summary

The Association of Southeast Asian Nations (ASEAN) comprises 10 Member States (AMS): Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam. Together, they are home to about 679.7 million people, with a combined GDP of USD 3.66 trillion in 2022. The AMS have diverse cultures and vary widely in size, population, development levels, average income, urbanisation, and other factors. As the population rises, the energy demand also continues to increase significantly. In line with that, energy demand in the region is expected to triple by 2050 from the 2020 level under the Baseline Scenario, reaching 1,281.7 Mtoe by 2050. In parallel, ASEAN should accelerate the mission of progressively implementing a regional energy transition.

AMS have solidified their aspirations for regional energy collaboration through the ASEAN Plan of Action for Energy Cooperation (APAEC). This comprises a series of guiding policy documents to support ASEAN in attaining the objectives of the ASEAN Economic Community. The latest version of APAEC covers the period from 2016 to 2025, divided into two five-year phases. The theme for the initial phase, from 2016 to 2020, revolves around 'Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability, and Sustainability for All.' The subsequent phase, from 2021 to 2025, is centred on 'Accelerating Energy Transition and Strengthening Energy Resilience through Greater Innovation and Cooperation.'

Since its establishment, the ASEAN Energy Outlook (AEO) has evolved into a crucial document supporting ASEAN's energy policy and planning. The AEO supports APAEC, offering an overview of the present energy landscape and investigating pathways toward achieving regional (and national) energy objectives and beyond. AEO reports delineate whether and in what manner national and regional objectives in the energy sector – covering aspects such as energy accessibility and affordability, energy efficiency, energy security, and environmental sustainability – can be realised. These reports also outline the necessary policies, measures, and technologies required to facilitate the attainment of these goals.

Notably, the AEO focuses on Programme Area No. 6, Regional Energy Policy and Planning (REPP), under Outcome-based Strategy 1: To enhance the international profile of the ASEAN energy sector, specifically through Action Plan 1.2: Publishing regular regional energy outlooks and strategic reports on thematic issues. The forthcoming 8th ASEAN Energy Outlook (AEO8) is expected for presentation and launch at the 42nd AMEM in Lao PDR in September 2024. AEO8 is timely crucial, because the region is preparing the next cycle of APAEC (towards 2045), and AEO8 will be one of the references in laying out the new pathway and aspirational targets.

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Policy Implications

The expected policy recommendations would be used as a reference for ASEAN to foster more coordinated and impactful coal transition technologies within the ASEAN region.

Policy frameworks:

(i) implement a phased approach to coal transition, considering the varying energy needs, and
(ii) create and strengthen regulations that support the development and integration of coal transition technologies.

Financing mechanisms:

(i) analyse the ASEAN taxonomy for the development of coal transition technologies,
(ii) analyse risks on financing and explore several financing mechanisms to develop coal transition technologies, and
(iii) encourage and facilitate financing options for coal transition technologies.

SUMMARY OF ERIA RESEARCH PROJECTS 2024

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