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Southeast and East Asia

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Foreword

For many Southeast Asians, our upcoming New Year will no doubt be observed soberly and with much self-reflection.

While Southeast Asia as a whole was not as severely affected by the COVID-19 pandemic as other regions around the world in 2020, the region was struck particularly hard in 2021, attributable to both the emergence of more virulent strains of COVID-19 as well as sluggish vaccination rollouts in many countries. Renewed lockdowns, prolonged border closures, and restrictions on economic activity have caused an expected drag on many Southeast Asian economies, who are only now taking tentative steps to reopen.

While many ASEAN policymakers will view the coming year as one of catch-up and re-emergence from the doldrums of the pandemic, it has become increasingly clear to many pundits and policy wonks that 'back to business' is simply not an option anymore. It is in this spirit of building a more resilient, sustainable, and future-ready ASEAN that informs IDEAS' latest annual iteration of the ASEAN Prosperity Initiative Report, which this year includes four chapters written by experts in their fields on a diverse range of topics.

COVID-19 more than anything else laid bare the inequities which plague many ASEAN societies, most notably in the area of food insecurity. The pandemic exacerbated long standing vulnerabilities within the food system, negatively affecting both supply and demand factors. Contrary to the impulse by many countries to achieve self-sufficiency through protectionism, Felippa Ann Amanta and Nisrina Nuraini Nafisah from the Center for Indonesian Policy Studies argue that greater regional integration is the key to strengthening regional food security.

Coinciding with the challenges brought about by the pandemic, ASEAN must also increasingly confront the region's acute vulnerability to climate change, as laid bare in the Sixth Assessment Report (AR6) by the Intergovernmental Panel on Climate Change (IPCC) released in August 2021. As argued by Jukhee Hong of the CARI ASEAN Research and Advocacy, the COVID-19 pandemic presents a unique opportunity for a fundamental reset by ASEAN in aligning policy towards climate mitigation and adaptation in tandem with preserving economic resilience.

Notwithstanding the severe dent posed by the pandemic on ASEAN economies over the past two years, ASEAN is expected to remain one of the fastest growing regions in the world. With this rapid growth will come an increased demand for electricity, thus forcing ASEAN policymakers to confront the so-called energy trilemma facing all modern economies - namely security (accessibility), affordability and environmental sustainability. As argued by Yeo Bee Yin, one solution to the trilemma would be a more integrated electricity system within ASEAN, to be realized through the longstanding ambition of the ASEAN Power Grid. However, as Yeo observes, progress on the ASEAN Power Grid will remain slow without political resolve on the part of Member States.

Finally, the unique circumstances brought about by the pandemic has seen the acceleration of the so-called Fourth Industrial Revolution (4IR) across ASEAN, as lockdowns and social distancing requirements spurred greater adoption of digital technologies by consumers. Dr. Jayant Menon from the ISEAS – Yusof Ishak Institute in Singapore (also IDEAS Senior Fellow) in his paper seeks to understand the potentially inclusive or inequality-

offsetting effects that 4IR technologies can bring to ASEAN, and what sort of national and regional policy choice will be required to adjust to this new normal.

As ASEAN navigates its way out of one of the most difficult periods in the bloc's existence, we hope this year's featured pieces contribute meaningfully to the ongoing discourse on how ASEAN can emerge from this crisis stronger, more resilient, and more prepared for the next - and we breathe deeply as we say this - global crisis.

Tricia Yeoh
CEO of IDEAS

Chapter 1:

ASEAN POWER GRID

Yeo Bee Yin

Background

ASEAN is one of the fastest growing economies in the world currently, and with this has come an increased demand for electricity. With the average growth rate of electricity demand in ASEAN over the past 20 years reaching 6%, ASEAN Member States (AMS) must strategize to meet this future need while balancing the so-called energy trilemma facing all modern economies - namely security (accessibility), affordability and environmental sustainability.

One solution mooted to help resolve the energy trilemma is greater power integration between AMS, to be realized through the so-called ASEAN Power Grid. A more integrated electricity system within ASEAN would help improve energy security (allowing ASEAN Member States to import renewable energy from other fellow ASEAN countries), energy affordability (allowing ASEAN countries to access much cheaper sources of electricity through comparative advantage), and finally environmental impact (with more expensive renewable energy potential can now import renewable energy from other ASEAN countries which have less expensive renewable energy potential). However, despite grand pronouncements and agreements to push for greater intra-ASEAN energy trading, after more than 20 years ASEAN power systems remain unintegrated.

The ASEAN Power Grid

The ASEAN Power Grid (APG) is an initiative to build interconnections to connect the power grids of different AMS and facilitate power trade among them with the ultimate aim of an integrated Southeast Asia power grid system.

The objective of the APG is to enhance energy security, affordability, accessibility and sustainability within the region with a more efficient utilisation of natural energy resources, optimized infrastructure management, energy demand management as well as due consideration for the environment.

The APG initiative first started with ASEAN Vision 2020, which came about after the 1997-1998 Asian Financial Crisis, on 15 December 1997 during the Second ASEAN Informal Summit in Kuala Lumpur, as AMS saw the need to strengthen the ties among themselves with the belief that the key to economic resilience is regional economic integration[1]. AAmong the action plans put forth under ASEAN Vision 2020, AMS agreed to cooperate in developing four sectors of regional infrastructure, one of which was energy.

The APG initiative was later continued under the Master Plan on ASEAN Connectivity 2025 adopted by AMS heads of states on 6 September 2016 with the vision "to achieve a seamlessly and comprehensively connected and integrated ASEAN that will promote competitiveness, inclusiveness, and a greater sense of Community."

Since ASEAN Vision 2020, ASEAN cooperation in energy sector has been guided by the ASEAN Plan of Action for Energy Cooperation (APAEC) blueprint, which includes seven programs - the APG, the Trans-ASEAN gas pipeline (TAGP), coal and clean coal technology, energy efficiency and conservation, renewable energy, regional energy policy and planning, and civilian nuclear energy. APG remains one of the top priorities.

[1] *ASEAN power grid 20 years after: An overview of its progress and achievements, Hazleen Aris and Bo Nørregaard Jørgensen 2020, IOP Conf. Series: Earth and Environmental Science 463 (2020) 012055*

In 2000, the ASEAN Interconnection Masterplan Study (AIMS) working group was created to study the potential and viability of electricity interconnection projects in the ASEAN region, and the associated commercial and regulatory issues. Subsequent reviews are made according to changes in the situation such as economic development, energy demand, technological disruption or environmental considerations.

Usually, the AIMS final report is to be used for the decision making process of APAEC. The first final report of the AIMS (AIMS I) was adopted for the APAEC 2004-2009 series while the AIMS II final report has been used from 2010 until today. AIMS III is currently being drawn up with focus on renewable energy and energy trading.

Table 1 shows the APAEC series since 1999 and the focus of the APG initiative at each period of the series.

Table 1

APAEC Series	APG Focus
APAEC 1999-2004	To establish the policy framework and implementation modalities of the electricity networks under the APG
APAEC 2004-2009	To facilitate the implementation of the ASEAN Interconnection Master Plan (from AIMS I) and to further establish the policy framework
APAEC 2010-2015	To expedite the ASEAN Interconnection Master Plan (from AIMS II) and to harmonise technical standards and operating procedures as well as well regulatory and policy frameworks among AMS
APAEC 2016-2025	**Outcome-based Strategy 1:** To accelerate the progress of APG projects and initiate the expansion of multilateral electricity trading **Outcome-based Strategy 2:** To establish the institutional framework and regulatory capacity as minimum requirements to advance multilateral electricity trading **Outcome-based Strategy 3:** To harmonise the minimum technical requirements to advance multilateral electricity trading **Outcome-based Strategy 4:** To explore integrating renewable energy and other digital development into the APG

The implementation of the APG initiative ultimately comprises of two parts - expanding infrastructure as well as facilitating the power trading between AMS.

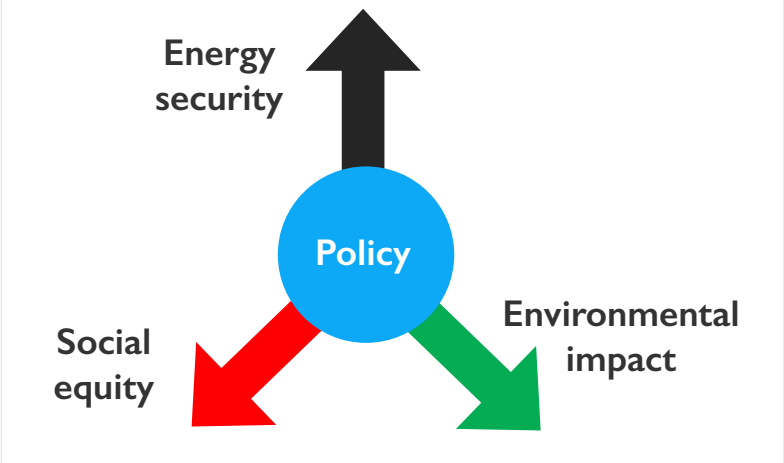
As this paper further delves into this topic, we will see that while there has been some progress made in terms of setting up the infrastructure for grid interconnection, the trading front is still lagging, mostly through bilateral power purchase between neighbouring countries. After more than 20 years since its inception, ASEAN power system remains unintegrated.

Potential benefits of the APG

In the power sector, policy decisions have always been based on the balancing of the so-called energy trilemma – security (accessibility), affordability and environmental sustainability. Namely, how easily and consistently users obtain the electricity, at what price, and the overall environmental impact. Usually, these three considerations are at the opposite ends, therefore it is called energy trilemma (see Figure 1).

For example, coal-generated electricity is still the least costly option for base-load electricity in Malaysia, but concurrently Malaysia needs to import the coal from abroad (meaning less security of source), as well as the fact that it is the dirtiest form of electricity in term of carbon emission per unit of generated electricity (worst environmental impact). Therefore, when planning the nation's electricity generation-mix, Malaysia cannot rely on 100% coal, but a mixture of different sources to achieve a more balanced energy trilemma.

Figure 1: Energy Trilemma



Compared to isolated power grids among ASEAN countries, with each needing to balance its own energy trilemma, power grid interconnections among ASEAN countries will allow for the optimisation of the energy trilemma by exploiting the comparative advantage in the energy trilemma of the trading partners. For example, through interconnection, the isolated areas located near to the neighbouring country's borders will be able to access electricity more cheaply by connecting to a neighbouring country's national grid than its own. Countries with grid interconnection, even without necessarily trading, can play a back-up capacity role for neighbouring countries, enhancing each other's energy security. Or countries with an abundance of green energy can now export said electricity through interconnection to other countries, which would otherwise be cheaper than to generate domestically, striking a better balance on affordability and sustainability.

In addition, the APG will increase AMS resilience towards the three main emerging disruptive forces to the electricity industry and if done well, provide opportunities to further enhance the balance of the AMS energy trilemma. The three disruptive forces are often coined as 3Ds - Digitalisation, Decentralisation and Decarbonisation:

- **Digitalisation** and the availability of Industrial Revolution 4.0 (IR 4.0) technologies such as smart grid, internet of things (IoT), artificial intelligence (AI) and big data, and ongoing adoption of these technologies into the electricity industry, not only in supply but also in demand management. At this moment, our grid system is very rigid and organized in a linear direction -with the grid, the power system and the consumers. There is no room for innovation . But with IR 4.0, there are new technologies that can digitalise the value chain to make it more efficient.

- **Decentralisation** is catalysed by emerging technologies in energy efficiency, solar panels, distributed storage, microgrids, demand response, and peer-to-peer trading, which empower consumers to actively participate in the electricity supply industry instead of being just passive receivers.

- **Decarbonisation** is driven by global commitment to reduce carbon emissions around the world with renewable energy technology getting more competitive and emerging technologies such as electric vehicles, smart charging, heat pumps and so on potentially increasing electricity demand (and hence the electricity industry pie) at a rate like never before seen.

ASEAN is currently one of the fastest growing regions in the world. It is now striving to bring electricity accessibility to the last 45 million people still deprived of electricity today to achieve universal electrification With rapid industrialisation and urbanisation, electricity demand is projected to grow at an average rate of 6% per year, making up to 12% of global demand by 2040. This growing demand is putting pressure on government budgets with the ASEAN region as a whole now on the verge of becoming a net importer of fossil fuel.

To improve energy security in ASEAN, the bloc needs to improve energy efficiency and increase renewable energy (RE), which can be cheaper and easier if ASEAN power systems are more integrated. For example, both Laos and Sarawak have huge potential in providing cheap hydroelectric energy, which can be exported to other ASEAN countries through land interconnections or undersea cables. Instead of importing fossil fuel, which are more carbon intensive, ASEAN countries with less or more expensive RE potential can now import RE from other ASEAN countries through interconnection, which sometimes can be a cheaper option. In addition, as countries leverage on intermittent REs such as solar and wind, grid interconnections will provide better energy security with lower cost in capacity planning.

Although there is great potential in a fully integrated power system in ASEAN, this appears to be a "dream" too far. Next, I'll discuss the progress made so far in terms of infrastructure and trading, and moving forward, what are the practical outcomes we can expect from the APG.

APG Infrastructure

ASEAN has a land area of about 4.5 million square kilometres, which is mostly filled with dense jungles, gigantic mountain ranges and river. Therefore, electricity interconnections between AMS must be planned carefully so that they are not only physically possible but also commercially viable.

APG infrastructure expansion plans under the APAEC series follow recommendations made by the AIMS. It started with AIMS I with interconnection projects identified between 14 combinations of countries/regions (P1 to P14) and later added 2 more under AIMS II (P15 to P16). P1 to P16 are listed below.

P1 Peninsular Malaysia–Singapore
P2 Thailand–Peninsular Malaysia
P3 Sarawak– Peninsular Malaysia
P4 Sumatra–Peninsular Malaysia
P5 Batam–Bintan–Singapore–Johor
P6 Sarawak–West Kalimantan
P7 Philippines–Sabah
P8 Sarawak–Sabah–Brunei
P9 Thailand–Laos
P10 Laos–Vietnam
P11 Thailand–Myanmar
P12 Vietnam–Cambodia
P13 Laos–Cambodia
P14 Thailand–Cambodia
P15 East Sabah – East Kalimantan
P16 Singapore – Sumatera

As of April 2020, a total of 18 APG interconnection projects have been completed with a total capacity flow of 7,645 MW (which is only 3.4% of ASEAN total installed capacity at 222 GW). As well, there are three on-going projects for P1 and P8 with a total capacity flow of 30-100 MW[2]. Figure 2 shows the existing power transmission lines and those under construction/in the planning stage[3].

Figure 2: APG Interconnections Projects. Source: International Energy Agency

[2] *APAEC 2016-2025, ASEAN Center of Energy, adopted in 38th ASEAN Minister of Energy Meeting, 20 November 2020.*
[3] *International Energy Agency, 2020 Regional Focus: Southeast Asia, https://www.iea.org/reports/electricity-market-report-december-2020/2020-regional-focus-southeast-asia*

The existing 18 interconnection projects include the following:

1. 9 interconnection projects are between Thailand and Laos (P9);

2. 2 interconnect projects are between Thailand and Malaysia (P2), Laos and Cambodia (P13) and Laos and Vietnam (P10); and

3. 1 interconnection project is between Peninsular Malaysia to Singapore (P1), Sarawak-West Kalimantan (P6) and Vietnam and Cambodia (P12).

The interconnections between Thailand and Laos make up 70% of the total capacity flow of existing APG interconnections.

Trading

Up until 2018, power trading between AMS has been through bilateral power purchase agreements. Laos in particular with its huge hydroelectric resources has been exporting to its neighbouring countries such as Thailand, Cambodia and Vietnam. In fact, more than 80% of the power traded under the APG involves Laos' hydropower.

As for Malaysia, we have a bilateral power trade arrangement between West Kalimantan and Sarawak. Although Kalimantan is abundant in coal and natural gas, most of the power for remote communities in West Kalimantan is generated from diesel, which is the most expensive form of power generation per unit electricity generated. A 128km 275kV line was commissioned on 31 December 2015 to connect Bengkayang, West Kalimantan and Mambong, Sarawak. This interconnection allows the displacement of between 50MW and 130 MW diesel power in West Kalimantan with electricity from Sarawak, which is cheaper and greener (75% of electricity produced in Sarawak is through hydroelectric).

Multilateral Trading

Multilateral power trading involves the trading of power that involves more than two countries. Malaysia is involved in the APG "pathfinder" project for multilateral trading, referred to as the Laos-Thailand-Malaysia-Singapore Power-Integration-Project (LTMS-PIP). The project aims to demonstrate that multilateral power trading is possible in an ASEAN context and to provide insights into the infrastructure, institutional and policy framework needed for multilateral power trading to happen.

The discussion on the LTMS-PIP started in 2014 with the first multilateral electricity trading agreement - the Energy Purchase and Wheeling Agreement (EPWA), was signed by Laos, Thailand, and Malaysia in 2017. Under this agreement, Laos was to sell up to 100MW of its hydroelectric power to Malaysia, with Thailand serving as a transit (or wheeling) country. Malaysia was to pay for the hydropower from Laos and wheeling charges to Thailand for using their grid to "transport" the power. Phase 1 of LTMS-PIP power trade took place on 1 January 2018 for a period of two year.

During my time as Minister of Energy, Science, Technology, Environment and Climate Change (MESTECC), the

negotiation for Phase 2 of LTMS-PIP started. The considerations for the supplementary agreement at that time were about i. changing power trading from non-firm supply to firm supply; and ii. increasing energy capacity trading from 100MW to 300MW.

With non-firm supply power trading, there was no guaranteed supply from Laos whereas from the demand side, Malaysia would only dispatch the energy from Laos when it was the least cost option in term of system marginal price in the Single Buyer's market. A non-firm supply power trading agreement needed much less commitment from all three parties. as all that was needed was just physical interconnection between Laos, Thailand and Malaysia - whether the real power trading really happened, it didn't matter. A firm-supply power trading arrangement, on the other hand, is a guaranteed power supply-and-demand relationship. It needed guaranteed supply for Laos, service of transit for Thailand, and purchase for Malaysia.

Since LTMS-PIP is a pathfinder project, it would not be meaningful if the Phase 2 of LTMS-PIP continued to be a non-firm supply power trading as the electricity traded would be insignificant. The project would remain a token to APG. However, a firm-supply power trading agreement would require more commitment from all three parties. Thus, the tripartite negotiation would become trickier.

Indeed, the negotiations faced multiple deadlocks as Laos and Thailand would not budge on the energy selling price and wheeling charges respectively. As for Malaysia, our per unit RE generation had become more competitive, meaning we would have to pay slightly higher for RE from Laos than to generate ourselves with solar power under Large-Scale-Solar bidding or through the average cost of generation, but cheaper than the per unit cost of other RE types such as biogas and biomass under a Feed-in-Tariff mechanism.

After the officers presented the options to me and the costs to be incurred to our total system (which would have to be socialized under a incentive-based-regulation (IBR) mechanism), I decided that we would go ahead with the deal. There was no point to call off the ambitious LTMS-PIP to save less than 0.01% to the total system cost (a wrong procurement decision or technical error would affect the cost structure in similar magnitude), in comparison to the the potential benefits that Malaysia can reap from in the future under a more integrated APG.

With that, a Supplementary Agreement to the EPWA was signed by the three countries in the 37th ASEAN Minister of Energy Meeting (AMEM) in September 2019 for a contract period from January 2020 to December 2020, of which the three countries agreed to the power trading of firm-supply of 300MW from Laos to Malaysia via Thailand.

As for connection to the other end, from the end of 2018 onwards, we also proactively engaged with our Singaporean counterpart to consider buying renewable energy (RE) from Malaysia as Singapore with its limited and expensive land will be at comparative disadvantage to generate RE such as solar. Although Singapore has a high reserve margin from power generated from natural gas, we could see that there would be increased demand for RE in the country. This is because many multinational companies have located their regional headquarters in Singapore, and an increasing number of them have committed to certain carbon emission targets or being part of global movement of RE100, in which companies set a target to reach net zero carbon by obtaining 100% of their electricity from RE with a deadline before or latest by 2050.

Singapore can take advantage of LTMS-PIP to buy RE from Malaysia, Thailand or Laos to meet their RE demand while the other parties would be able benefit economically by exporting the electricity. It would be a

triple win - Singapore to obtain RE at lower cost, generating and transiting countries to get additional revenue, and finally to complete LTMS-PIP interconnection (the tripartite agreement mentioned above was essentially only LTM, not LTMS).

That was the reason the MESTECC team started to proactively explore the possibility with their Singapore counterparts for Malaysia to sell RE to Singapore since end-2018. At the beginning, Singapore did not show much interest until after we signed the Phase 2 LTMS-PIP EPWA. The continuous negotiation and discussion eventually bore fruits. By the end of 2021, Singapore entered into a deal with Malaysia for a trial that will see Singapore import 100 MW of electricity from Malaysia for two years, starting from 2021-2022, which experts said would be "useful first step" for Singapore to further move to connecting to the regional power grid[4].

In fact, as anticipated by our team 3 years ago of its future RE demand, on 25 October 2021, the Singapore government also announced that they'll import up to 4 GW of low-carbon RE by 2035. This is a potential export market that if captured fully, will be able to attract RM 6 billion of private investment and create around 50,000 of jobs in Malaysia. Having said that, Malaysia probably will not be able to "eat the whole pie" as given Singapore not so pleasant experience with Malaysia on the water supply issue, they will unlikely make itself over-reliant on us for RE supply.

Nonetheless, since Malaysia is geographically close to Singapore, I expected that we would be able to capture a healthy piece of the pie. Unfortunately, the current Malaysian government suddenly announced that Malaysia will not export RE to Singapore even for the 100 MW electricity export trial (it will only involve conventional power trading). The reasons behind such decision is still unknown at the time of writing.

While this is still a power trading, Singapore has in excess of conventional power hence the future growth in non-RE electricity export from Malaysia to Singapore will not be significant. Malaysia stepping back from competition to Singapore RE import market opens up opportunity for other AMS to export RE to Singapore under APG. I will not be surprised to see Laos to export its abundant hydropower through Thailand and Malaysia under LTMS-PIP some time in the future.

All in all, while there has been encouraging progress made in the LTMS-PIP negotiations in recent years, it is far from achieving a full multilateral and multidirectional trading arrangement. However, there are key lessons that we can take from this experience. To establish a multilateral and multidirectional trading system in ASEAN, it will be necessary to develop the following: i. minimum technical requirements for compatible grid interconnection between trading and transiting countries; ii. a common wheeling charges methodology, iii. a generalised framework for buying and selling and iv. some generalised terms of trade.

The wheeling charges should reflect the full costs to the transmission owner (both fixed and variable), of providing the necessary transmission infrastructure and services, as well as to generate a reasonable return for them. There can be many methodologies to calculate said costs. For example, the LTMS–PIP, wheeling charges are calculated based on the distance of the trade (MW per km), loss charge and balancing charge (both in per MWh) as well as fixed administrative charges.

Trading can be done initially through development of a standardised contract template across any sets of AMS

[4] *Trial to import electricity from Malaysia a 'useful first step' as Singapore prepares to connect with regional grid: Experts, https://www.channelnewsasia.com/news/singapore/singapore-importing-eletricity-malaysia-power-energy-13775308, updated 1 January 2021.*

for collecting trade information such as when and how the trading countries would like to trade.

Moving Forward

After more than 20 years since the APG was first mooted, a fully integrated APG is still in the distant future. **Comparatively, the total capacity flow of all interconnections in APG (7,645 MW) is only 3.4% of ASEAN total installed capacity at 222 GW.** In fact, most physical interconnection projects have been completed later than their targeted operation dates. Not only physical infrastructure, the trading initiatives have moved at an even slower pace. Most of the APG trading done now is bilateral and unidirectional.

The main obstacles that ASEAN needs to overcome to expand AGP include differences in technical aspects such as voltage, frequency and wheeling charges as well as differences in regulations including market structure, mechanisms and power prices. In addition, there are also differences among AMS in terms of economic growth, energy demand and electrification rates, not to mention the absence of institutional and regulatory frameworks. There is also difficulty in getting infrastructure financing to build more transmission lines in high-risk areas, which will slow down APG projects.

In short, after more than 20 years, APG remains a token project in improving ASEAN interconnectivity and integration. Moving forward, APG should expand multilateral electricity trading, according to targets set out in the APAEC 2016-2025, with the ultimate aim of developing a common APG trading platform in the future.

The International Energy Agency (IEA) proposed three models with increasing levels of ambition[5]:

- **Harmonised bilateral trading (near-term)**

    1. Developing a set of common frameworks for entering cross-border bilateral contracts such as minimum harmonised regional grid codes, standardised bilateral contract templates, guidelines of wheeling charges methodology and a regional coordination institution, which would only collect and share information but not be involved in the transactions directly.

    2. Any individual AMS can enter into bilateral trading agreements with any other AMS, regardless of whether they share a border, improving the efficiency and flexibility of bilateral trading in the region, while also laying the groundwork for more formal multilateral trading.

- **Secondary trading model (medium-term)**

    1. Establishing a regional market that exists separately from national markets and system operations, through which domestic power systems clear first, and only gaps and excesses are traded at regional markets.

    2. Building on elements established in (i) and introducing new elements, such as a regional market operator and a central clearing party.

[5] *International Energy Agency, Establishing Multilateral Power Trade in ASEAN, https://www.iea.org/reports/establishing-multilateral-power-trade-in-asean, September 2019.*

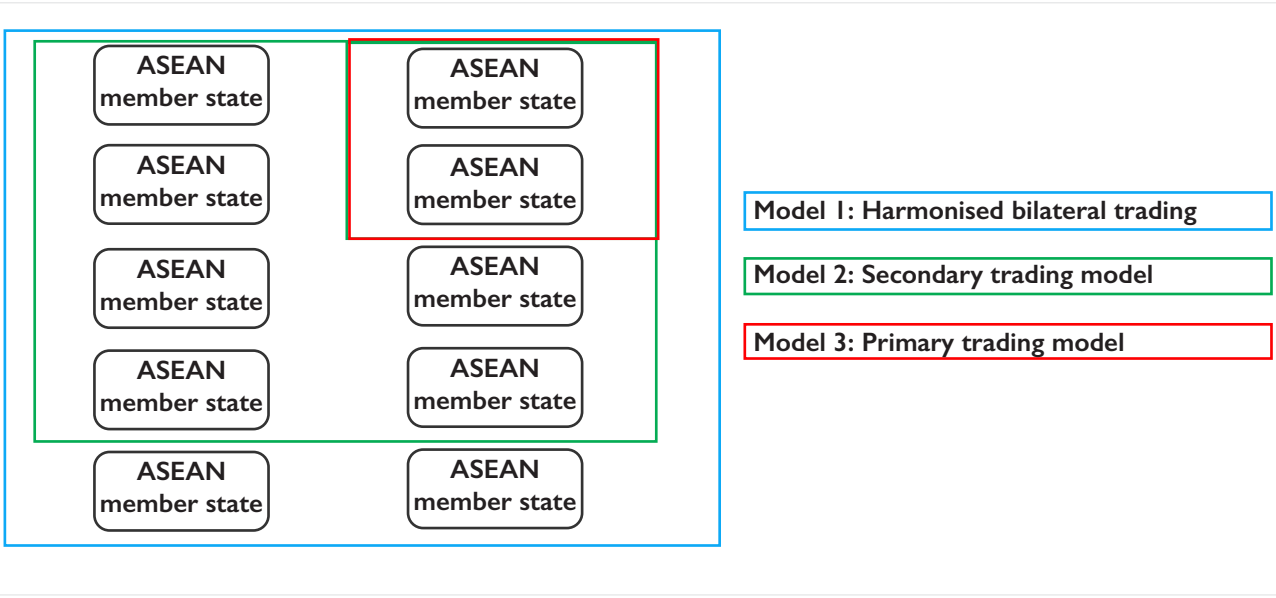
- **Establish a primary trading model (long-term, maybe)**

    1. Establishing a regional market that replaces domestic markets. This will require domestic market restructuring to allow for full reserve and capacity sharing.

    2. If this ever happens, it would probably only be participated by a subset of AMS.

As multilateral trading in APG should be done in stepwise and voluntary fashion, different AMS can choose to participate in different trading models. It is expected that the number of participating AMS will get smaller from model (i) to (iii), with increased level of commitment, as shown in Figure 2. In any case, with modes of participation specified clearly, APG as a whole can move forward more systematically.

Figure 3: A Possible Future for Power Trade in ASEAN. Source: IEA, 2019.



Ending

Based on my experiences and observations directly involved in the negotiations of the LTMS-PIP as well as AMEM, the progress of APG will remain slow without the stronger political will of AMS. In fact, APG did not make it to the agenda in a number of AMEMs, when the highest decision making people from each AMS meet. This just goes to show that APG is not the priority among AMS.

To advance this sort of agenda will require building the necessary and sustainable coalition united by common interests and visions. This coalition would include business associations and multinational corporations interested in meeting net zero carbon emissions, in order to pressure governments to increase renewable energy at the lowest cost possible (as suggested in the abovementioned Singapore case study). Other partners in a possible coalition could include renewable energy developers and independent power producers interested in expanding their market size, as well as utility companies and grid operators interested in the wheeling charges. Ultimately to move forward a public policy it is important to identify the potential winners should such a policy be adopted, make the case for it, and build a sustaining coalition.

It will also be prudent to focus on capability building, whether in terms of regulatory capacity, human resource training, and knowledge sharing. ASEAN being so heterogeneous and energy markets very complex has created very uneven regulatory capacities across borders, which can act as a deterrent to further expansion. A greater uniformity and streamlining of regulations can help facilitate greater inter-ASEAN electricity trade.

The potential benefits of APG mentioned at the beginning of the chapter can only be reaped if APG plays a more significant role in the power systems around ASEAN with increased power trading based on one or more of the abovementioned models suggested by the IEA.

Otherwise, APG will only become a cosmetic ASEAN interconnectivity exercise with insignificant impact to the ASEAN energy trilemma of bringing security, affordability and sustainability to the region.

Chapter 2:

ASEAN Integration toward Food Security: Opportunities and Challenges

Felippa Ann Amanta & Nisrina Nuraini Nafisah

Abstract

ASEAN region faces serious food insecurity with high rates of undernourishment, stunting, and wasting even before the pandemic, but the situation varies significantly between the member states. Singapore and Brunei Darussalam are relatively food secure, while Malaysia, Thailand, Indonesia, Viet Nam, and the Philippines are in moderate food insecurity. Cambodia, Myanmar, and Lao PDR face severe food insecurity, compounded by instability. The Covid-19 pandemic exacerbated the challenge and may have long-lasting consequences of hunger and malnutrition. Regional integration is key to strengthen food security and resilience in the region. The ASEAN Integrated Food Security Framework and its related Strategic Plan of Action, alongside the broader ASEAN Economic Community Blueprint 2025 and ASEAN Trade in Goods Agreement have laid the foundation and targets for integration, but are undermined by AMS' domestic policies that prioritize self-sufficiency through protectionist measures. Deeper regional integration for food security should be pursued through further elimination of tariff, reduction of non-tariff measures, cooperation in rice market integration, improvements of a shared information system, and regulatory harmonisation of food standards.

The Covid-19 global crisis has exacerbated longstanding vulnerabilities in the food system and worsened food security globally, including in the ASEAN region. First and foremost, widespread economic contraction and rising unemployment have reduced household incomes and thus, household's ability to buy food. As a result, poor households experienced increased food insecurity, hunger, and malnutrition. This underlines the unaffordability of food, a problem long before the pandemic. The average share of food expenditure in ASEAN Member States (AMS) ranges from 22% in Singapore, 36% in Indonesia, 41% in both Lao PDR and the Philippines, to 71% in Cambodia which makes low-income households particularly vulnerable to food price increases or income reduction (ASEAN Secretariat, 2016). To make matters worse, disruptions in logistics and supply chain due to mobility restrictions to curb the transmission of the Covid-19 virus hampered food trade and distribution across the region, restricting supply and increasing food prices even further.

As a response to the global disruption, countries tend to turn inward and promote self-sufficiency assuming that it would increase resiliency against future international crises. For example, Indonesia responded by opening large food estates at the cost of deforestation and environmental degradation (Ministry of National Development and Planning Republic of Indonesia, 2021; Maskun et al., 2021). Singapore announced its grand ambition to produce 30% of its nutrition locally by 2030 from currently less than 10% (Lim, 2021). Meanwhile, Malaysia established a National Cabinet Committee on Food Security Policy *(Jawatankuasa Kabinet Mengenai Dasar Sekuriti Makanan Negara)* that will formulate policies to strengthen the domestic agro-food sector and reduce import dependency on several commodities, while introducing Large Scale Smart Paddy Cultivation and increasing rice stockpile quantity from 150,000 metric tonnes to 290,000 metric tonnes (Bernama, 2020; Bernama, 2021).

This chapter will argue that contrary to the impulse of self-sufficiency, regional integration will improve food security and food system resiliency in the ASEAN region. The Covid-19 pandemic provides an opportunity for a food system transformation to prepare ASEAN region for future crises and the ongoing climate crisis that threatens agriculture production and supply chain. This transformation towards healthier, more sustainable and equitable food systems is the agenda of The UN Food Systems Summit and the FAO which refers to the holistic constellation of producing, aggregation, processing, transporting, distribution, and consuming food (FAO, 2018). While this transformation requires multidimensional change, this chapter will focus on regional integration through trade and cooperation as one crucial part of the food systems transformation.

Current Landscape of Food Security in ASEAN

Food security is defined by FAO as "when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." This definition encapsulates the four interrelated dimensions of availability, accessibility (both physical and economic), utility, and stability. This section will discuss the state of food security at a regional, national, and household level.

Based on the four dimensions, ASEAN region has made significant improvements in pre-Covid-19 pandemic times as growth of agriculture production and rising income have increased people's access to food (OECD, 2017). Yet, some challenges remain. At the regional level, more than 9% of the population in Southeast Asia were undernourished in 2019 (Global Nutrition Report, 2020).

The challenge is even greater when accounting for nutritional security, a crucial extension of food security that looks at health and nutritional outcomes that are closely linked to food intake. In 2019, 28% of children under five in the region were stunted, higher than the global stunting rate of 22% (WHO, 2021a). Obesity, mainly caused by the lack of economic access to healthy food, has also alarmingly increased in the last 10-15 years in the ASEAN region (FAO, UNICEF, WFP, & WHO, 2021). These challenges are largely due to unaffordability of healthy diets that can cost up to five times more expensive than energy-sufficient only diets, underscoring the affordability and utility dimensions of food security.

Zooming in, the state of country-level food security varies widely among the ASEAN Member States (Table 1). Singapore and Brunei Darussalam are leading ahead in food security even without significant agriculture sectors, owing to their high-income status, low poverty rates, and open trade system. Meanwhile, Malaysia, Thailand, Philippines, Viet Nam and Indonesia are considered in moderate levels of hunger (Global Hunger Index, 2021). The agriculture sectors in those countries are declining (Figure 1 and Figure 2), raising concerns over their domestic abilities to meet increasing demands of the growing population. Last but not least, Cambodia, Myanmar, and Lao PDR are still experiencing serious levels of hunger (Global Hunger Index, 2021). Myanmar in particular is under conflict and political instability which increases risk of hunger and malnutrition. These trends show that while domestic agriculture production is important, it does not automatically guarantee food security in its full sense of availability, affordability, stability, and utilisation. Food security requires political and economic stability and greater access to diverse food sources, both domestically and internationally.

Table 1. Global Food Security Index among ASEAN Member states

Country	2019		2020		Trend (by rank)
	Rank	Score	Rank	Score	
Singapore	20th	76.4	19th	75.7	+1
Malaysia	44th	67.7	43rd	67.9	+1
Thailand	56th	62.9	51st	64	+5
Viet Nam	61st	60.8	63rd	60.3	-2
Indonesia	60th	60.9	65th	59.5	-5
Myanmar	72nd	56.3	70th	56.6	+2
The Philippines	70th	57.6	73rd	55.7	-3
Cambodia	78th	52.4	81st	51.5	-3
Lao PDR	90th	47.5	90th	46.4	=
Brunei	n/a	n/a	n/a	n/a	n/a

Source: The Economist Intelligence Unit, Global Food Security Index (0 = least favourable, 100 = most favourable). https://foodsecurityindex.eiu.com/

Figure 1: Share of GDP from the Agriculture Sector (%)

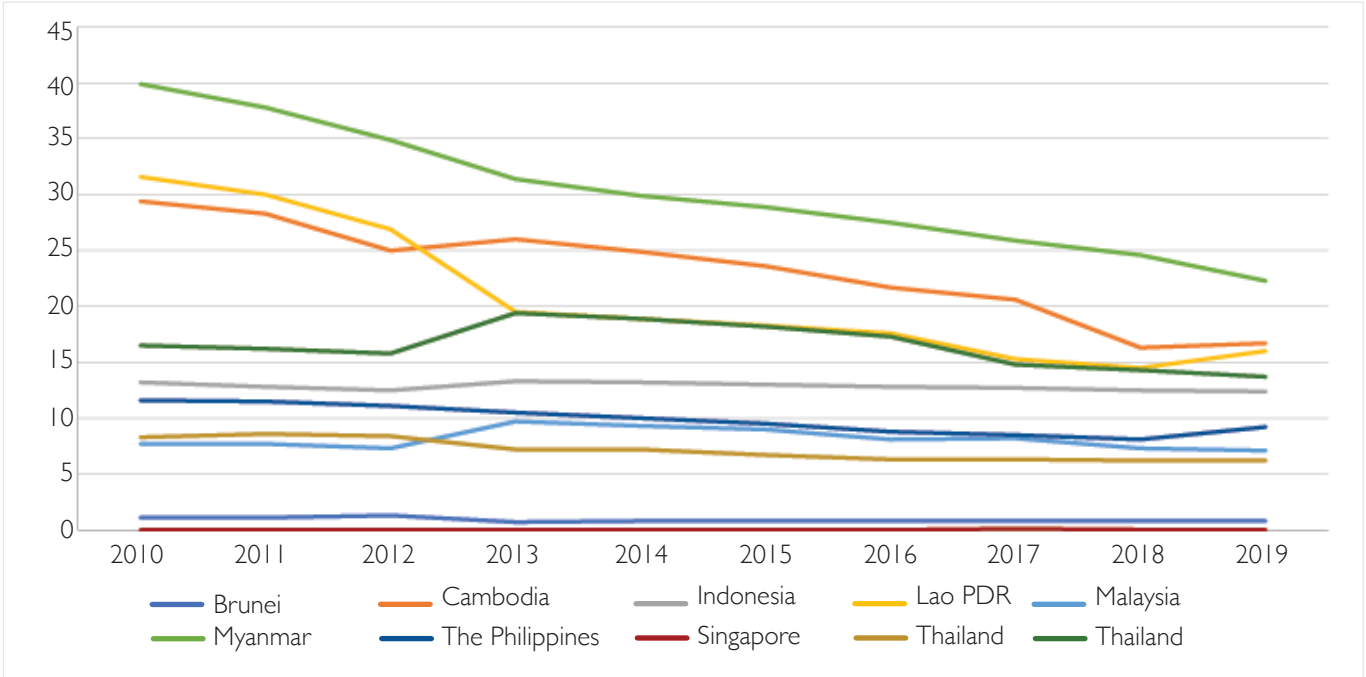
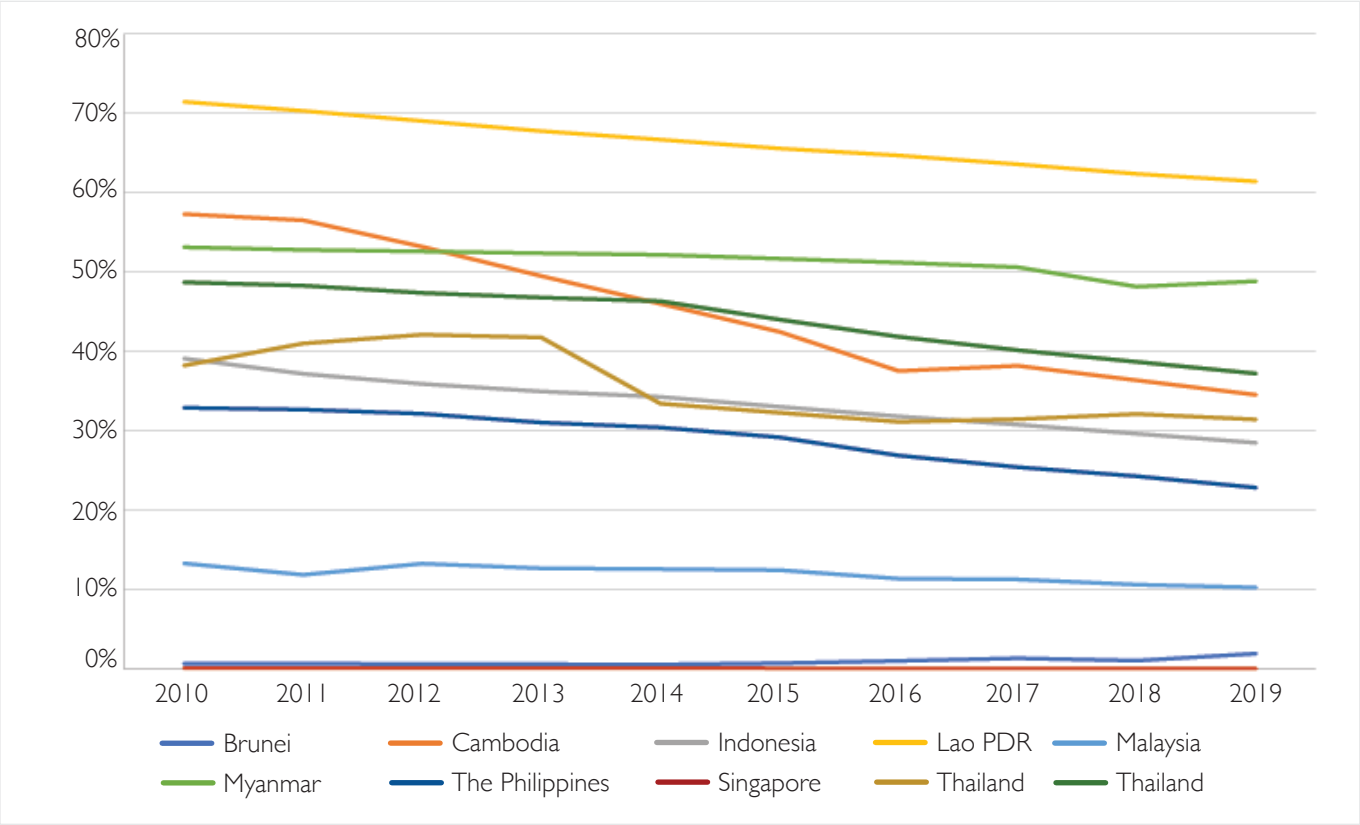


Figure 2: Share of Employment from the Agriculture Sector (% of Total Employment)

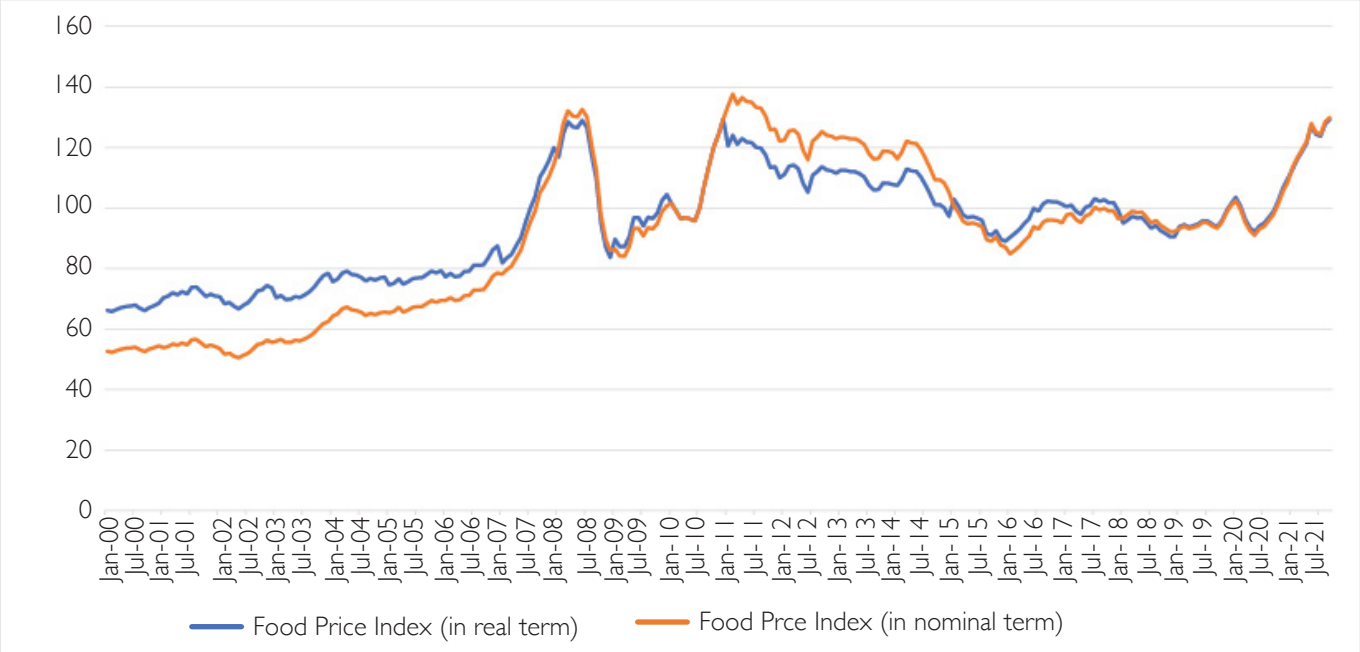


Source: World Bank Data, https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS

During Covid-19, food security in the region worsened due to both supply and demand factors. On the supply side, global food prices as measured by FAO Food Price Index dipped in the early pandemic as demand sharply contracted and supply chain disrupted, but has since rebounded and continued to increase until reaching a 10-year record high (Figure 3). Prices skyrocketed by 33% in September 2021 compared to the same month previous year, driven by rising vegetable oils and wheat prices (FAO, 2021a). This was caused by disruptions in production and distribution throughout the supply chain, such as farmer's reduced access to agriculture input, reduced processing capacity, port congestion, and additional time and costs for cargo handling due to the pandemic (Kim, Kim, & Park, 2020; High Level Panel of Experts [HLPE], 2020). High-value and perishable food items like fruits and vegetables or meats are more sensitive to these disruptions.

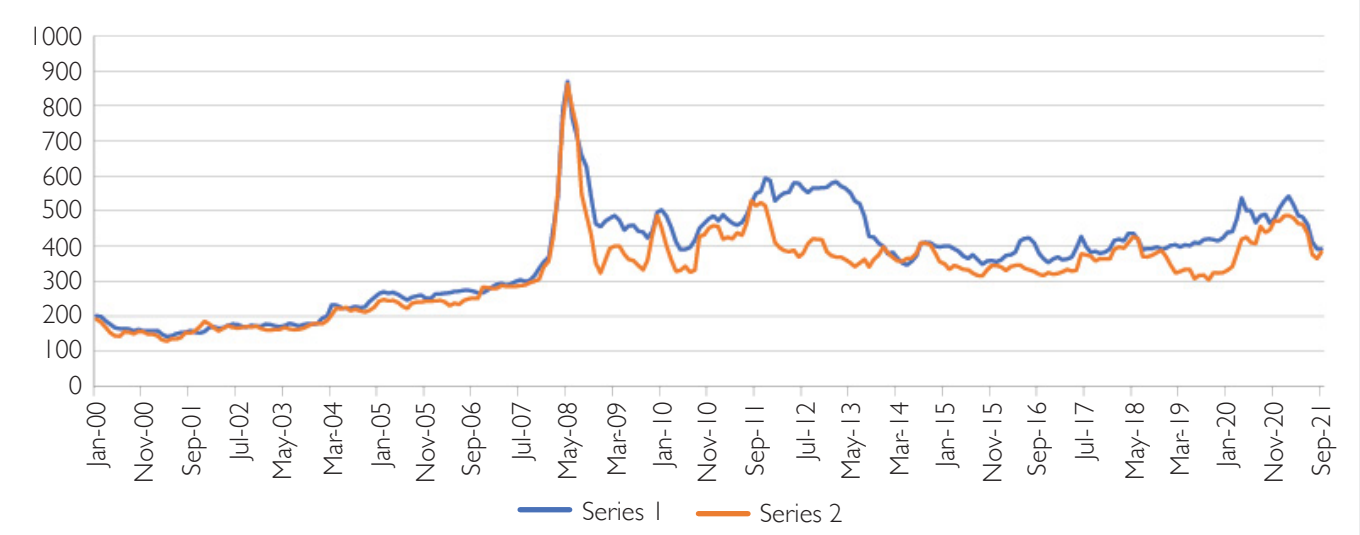
In contrast, prices for rice, a staple food in Southeast Asia, increased by 27% between March 2020 to March 2021, but trended downwards for the rest of 2021 (Figure 4). Early in the pandemic, countries introduced temporary trade restrictions to anticipate food shortages. Most notably, Viet Nam imposed a temporary export quota on rice, which ended in May 2020 (Patunru & Amanta, 2020; International Trade Centre, 2021). The relatively stable rice prices compared to the global food prices can be attributed to the good harvest season in the region.

Figure 3 (Chapter2): FAO Food Price Index in Real and Nominal Terms, 2000-2021



Source: FAO Food Price Index, FAO https://www.fao.org/worldfoodsituation/foodpricesindex/en/
FAO Food Price Index consists of cereal, vegetable oil, dairy, meat, and sugar price indices.

Figure 4 (Chapter2): Rice Prices in Thailand and Viet Nam, 2000-2021 (US$/tonne)



Source: Food Price Monitoring and Analysis, FAO. https://fpma.apps.fao.org/giews/food-prices/tool/public/

On the demand side, reduced household income due to economic contraction and job loss meant that millions were no longer able to afford food, thus increasing food insecurity. Unemployment rate and poverty increased in most AMS during the pandemic, especially in those with high levels of informal employment and significant pre-Covid-19 poverty levels such as Cambodia, Myanmar, Lao PDR, Viet Nam, Indonesia, and the Philippines (ASEAN Secretariat, 2020a). According to available official data, the Philippines and Indonesia experienced the largest increases in unemployment rate, which translated to an additional 5 million and 2.6

million unemployed people respectively (Table 2) (Statistics Indonesia, 2021a; ASEAN Secretariat, 2020a). Poverty rates based on the national poverty line increased from 9.4% in 2019 to 10.2% in 2020 in Indonesia and from 5.6% to 8.4% in Malaysia (Statistics Indonesia, 2021b; Department of Statistics Malaysia, 2021).

Table 2. Unemployment Rate in ASEAN Member States, Before and During Covid-19

Country	Unemployment Rate (%)	
	Before Covid-19 (December 2019-January 2020)	During Covid-19
Brunei	6.8	7.4 (2020 average)
Cambodia	0.13	0.3 (2020 average)
Indonesia	5.28	7.07 (August 2020)
Lao PDR	0.6	1 (2020 average)
Malaysia	3.2	4.8 (December 2020)
Myanmar	0.7	1.79 (2020 average)
Singapore	2.3	3.3 (December 2020)
Thailand	1.07	1.5 (December 2020)
The Philippines	5.3	17.1 (July 2020)
Viet Nam	2.17	2.37 (2020 average)

Sources: Brunei DEPS, Statistics Indonesia, Department of Statistics Malaysia, Myanmar SIS, Philippine Statistic Authority, Ministry of Manpower Singapore, Bank of Thailand, Viet Nam GSO, Trading Economics, ASEAN Secretariat, and the World Bank

The effect of reduced household income on the prevalence of household food insecurity across the AMS is evident. A high-frequency World Bank survey conducted in various months throughout 2020 and 2021 found that percentage of households that ate less due to lack of money increased to a peak of 26% in Cambodia, 41% in Lao PDR, 60% in the Philippines, 33% in Viet Nam, and 38% in Indonesia, with female-headed households and low-income households being most vulnerable (World Bank, 2021).[1] This is an indication of a surge of transitory food insecurity during the pandemic.

For most households, transitory food security can be alleviated alongside economic recovery. However, for the most vulnerable households, the pandemic can affect their food security in the long run and push them further into a state of chronic food insecurity. According to an Integrated Food Security Phase Classification (IPC) report, around 8% of the Philippines' population are in severe chronic food insecurity between 2015-2020 (IPC, 2021). While in Myanmar, 0.7 million (1%) of its population is living in crisis-level to catastrophically acute food insecurity in 2019, which is likely to increase due to the ongoing conflict (FSIN, 2021). Although data on the level of chronic food insecurity is not available for all ASEAN countries, there are indications that some segments of the population in ASEAN are at risk of falling into and remaining in a state of persistent food insecurity after the pandemic.

[1] *The peak percentage of households reporting eating less was collected in different months due to the time difference in survey administration. The data for Cambodia was taken in December 2020, Lao PDR in March 2021, the Philippines and Viet Nam in August 2020, and Indonesia in May 2020. The full result can be accessed: https://www.worldbank.org/en/data/interactive/2020/11/11/covid-19-high-frequency-monitoring-dashboard*

At the regional level, between 2019 and 2020, the number of undernourished people in Southeast Asia is predicted to rise from 46 million to 48.8 million, while prevalence of moderate or food insecurity increased from 16.8% to 18.8% (FAO, UNICEF, WFP, & WHO, 2021). WHO estimates that one in five adults are currently overweight in the region, with Malaysia and Brunei having the highest adult obesity rate of 15.6% and 14.1% among other ASEAN countries (WHO, 2021b). Stunting and wasting are also highly likely to become more prevalent (FAO, IFAD, UNICEF, WFP, & WHO, 2021). The rising food cost and reduction in household incomes due to Covid-19 can make healthy food financially harder to access.

The aforementioned data are only early estimates of the extent of the food insecurity. The actual extent may be more severe during and beyond the pandemic. As countries have to grapple with prolonged pandemic, new variants of the virus, and resurging waves, uncertain economic recovery and supply chain activities may deepen food insecurity, hunger, and malnutrition. Further, nutritional deficiencies in the present may affect long-term nutrition and development of future generations, passing from mothers to children.

ASEAN Regional Integration: Opportunities and Challenges

ASEAN recognizes the importance of cooperation, regional integration, and trade to achieve food security. As a response to the 2008 food crisis, the AMS agreed on ASEAN Integrated Food Security as a pragmatic approach to ensure food security in the region. Against this backdrop, the ASEAN Integrated Food Security (AIFS) Framework and Strategic Plan of Action (SPA FS) was first adopted by the AMS in 2009, and then continually renewed until the latest AIFS Framework and SPA FS 2021-2025.

AIFS Framework is a non-legally binding instrument that provides guidelines and recommendations for regional and national actions to ensure long-term food security and nutrition while improving farmers' livelihood. For the 2021-2025 period, the framework has seven key objectives that are largely carried over from previous iterations, which include ensuring food safety, quality and nutrition, promoting conducive market and trade for agriculture commodities and inputs, as well as operationalizing regional food emergency relief arrangements such as the ASEAN Plus Three Emergency Rice Reserves (APTERR). One significant change from the 2015-2020 framework was the new addition of ensuring food affordability in its objectives. This signals a greater emphasis on affordability on top of availability, especially amidst disruptions caused by emerging challenges such as a global pandemic or disease outbreaks that could increase the cost of food.

The framework comes with a Strategic Plan of Action on Food Security (SPA-FS) that comprises nine specific plans called strategic thrusts to support the framework's implementation. Each strategic thrust comes with output and guiding action programs aimed to create a favorable environment that enables the AMS and relevant stakeholders to cooperate, integrate, and operate in aspects related to trade, food production, and processing.

Related to AIFS' key objective to ensure regional food security by operationalizing regional food emergency relief, the Special ASEAN Plus Three Summit on Covid-19 strongly calls for regional collaboration on the utilisation of APTERR to ensure regional food security (ASEAN Secretariat, 2020b). Although AMS mostly preferred national mechanisms to deal with the risk of food security during the Covid-19 pandemic (Kim, Kim, & Park, 2020), APTERR did release its rice reserves to help ease the burden of several AMS. Throughout 2020 to mid-2021, Myanmar, Lao PDR, the Philippines, and Cambodia received emergency rice assistance through APTERR. The rice assistance that has been contributed by Japan and South Korea through APTERR amounted to 5,675 million tons as of July 2021 (APTERR, 2021). Some of the assistance given were also requested to

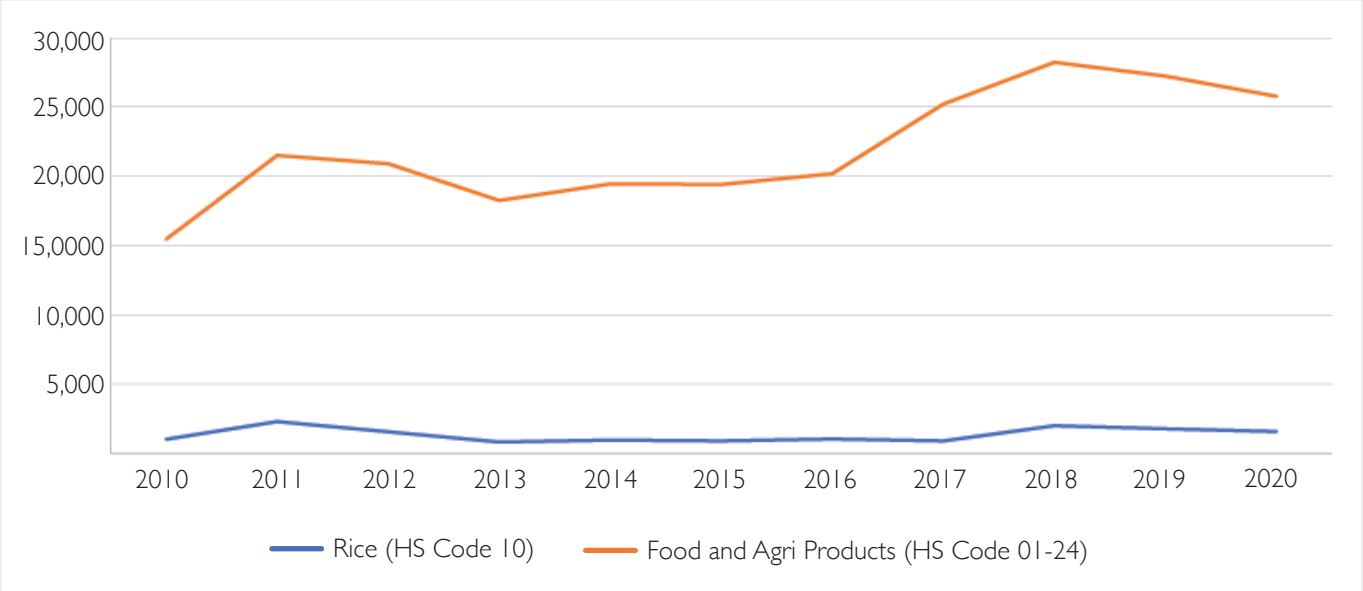
help with natural disasters faced by the Philippines, Myanmar, and Cambodia during the pandemic.

This distribution of APTERR during Covid-19 pandemic is evidence of its potential as a food safety net for the region. However, APTERR still has major limitations. First, it has limited stocks of rice in the reserve that are not sufficient to fulfil ASEAN rice demand during a prolonged crisis. Second, the release of rice reserve stocks is very dependent on the amount of rice that is voluntarily donated by participating member states (Kim, 2018). Therefore, APTERR cannot be relied upon to provide the AMS with food reserves during prolonged crises. Another objective of the AIFS Framework that has been relatively successfully achieved is the promotion of conducive market and trade for agriculture commodities and inputs. The AIFS Framework does not have specific trade provisions, but refers to the ASEAN Trade in Goods Agreement (ATIGA), an extension of the Common Effective Preferential Tariff Scheme for the ASEAN Free Trade Agreement (CEPT-AFTA), which mandates all AMS to lower tariff and non-tariff barriers. This agreement is hoped to accelerate the achievement of an integrated ASEAN Economic Community (AEC) as outlined in the AEC Blueprint 2025.

Under the agreement, the share of tariff lines subject to a 0% tariff rate increased from 69% in 2009 to over 98% in 2018, including in many agriculture products (ERIA, 2021a). The utilisation of ATIGA has increased intra-ASEAN trade by 35% in 2018, with the largest effect seen in agriculture and food industry (ERIA, 2021b). The value of intra-ASEAN food and agriculture (HS Code 01-24) imports almost doubled from US$ 15 billion in 2010 to US$ 26 billion in 2019 (Figure 4) (World Integrated Trade Solutions, 2021).

However, regional integration for rice is more challenging. While rice production capacity differs by country, the ten AMS can collectively fulfill their rice consumption needs if they commit to regional integration (Bello, 2005). In reality, intra-ASEAN trade in rice remains relatively thin, valued at an average of US$ 1.5 billion between 2017 and 2019, no increase from the average of US$ 1.6 billion between 2010-2012 (Figure 5) (World Integrated Trade Solutions, 2021). In all AMS except for Brunei and Singapore, the majority of rice consumption continues to be met by domestic production.

Figure 5: Intra-ASEAN Import Value of Rice and Total Food and Agriculture Products, 2010-2020 (thousand US$)



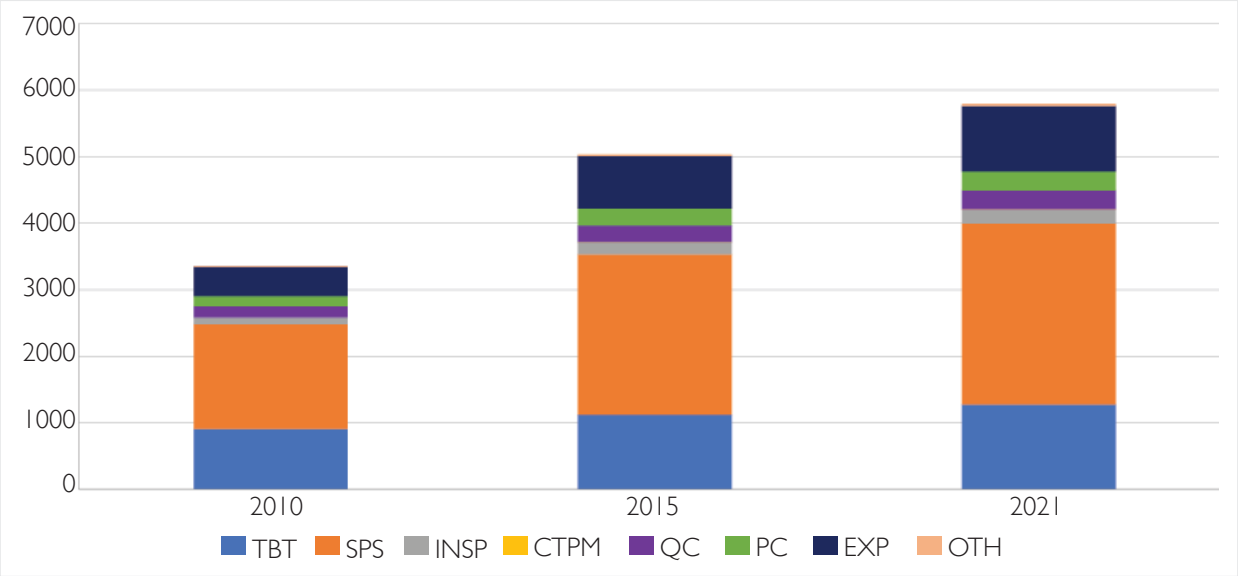
Source: World Bank's World Integrated Trade Solutions. https://wits.worldbank.org/

Rice received special treatment compared to other food and agriculture products. The ATIGA framework allows for Indonesia, Malaysia, and the Philippines to include rice in the highly sensitive list, while Lao PDR, Myanmar, and Viet Nam include rice in the sensitive list, which means it can be liberalized at a later target. Furthermore, Indonesia, Malaysia, and the Philippines have requested a waiver for postponement of the tariff liberalisation as allowed in Article 24 of the ATIGA.[2] Indonesia's rice import is still subject to a quantitative restriction and IDR 450/kg tariff, roughly equivalent to 5% tariff (Patunru & Ilman, 2019). The Philippines, meanwhile, passed its Rice Tariffication Law in 2019 which eliminates quantitative restrictions on rice but imposes a 35% tariff on all rice imports from ASEAN countries (Tobias, 2019; USDA, 2021).

The lag in rice integration undermines the region's food security efforts. Quantitative restrictions on rice imports, compounded by import monopoly by state trading enterprises as in the case of Malaysia's Bernas and Indonesia's Bulog, result in distortion and inefficiencies in the rice market, as well as artificially higher domestic rice prices compared to international prices (Arshad, Arifin, & Tey, 2019). An OECD estimate suggests that rice market integration in ASEAN could reduce the number of households experiencing undernourishment by 5% with large gains in food security in Indonesia and Malaysia (Greenville, 2018). Efforts to address the delay in rice integration, such as through convening a Rice Trade Forum dialogue to discuss potential reduction in rice self-sufficiency targets and amend Article 24, were included as an action plan under the second strategic thrust in the SPA-FS 2021-2025.

Another challenge for regional integration is the prevalence of protectionist non-tariff measures (NTMs) imposed by AMS. ATIGA mandates transparency of NTMs through notification to the ASEAN trade repository, elimination of quantitative restrictions, and elimination of other non-tariff barriers under the Co-ordinating Committee for the Implementation of the ATIGA (CCA). Despite this agreement, the number of NTMs in ASEAN have proliferated in recent years especially in food and agriculture products (Ing, Anandhika, Cadot, & Urata, 2019) (Figure 6). NTMs may carry compliance costs and procedural obstacles such as delays that are burdensome to businesses (Ing, Anandhika, Cadot, & Urata, 2019). These costs are eventually passed on to consumers in the form of higher food prices (Amanta, 2021).

Figure 6: Non-Tariff Measures on Food and Agriculture Products in ASEAN Member States



Source: UNCTAD-TRAINS database, for HS Code 01-24. https://trains.unctad.org/

[2] *Article 24 of the ATIGA refers to the Protocol to Provide Special Consideration for Rice and Sugar*

Elimination of NTMs, especially those that act as trade barriers such as quantitative restrictions, is included in the AEC Blueprint 2025. However, eliminating NTMs is more complicated than tariffs as many NTMs such as sanitary and phytosanitary measures are often necessary to regulate food safety and quality. In this case, regulatory harmonisation is key to minimize the trade cost between countries. A simulation estimates that regulatory overlap, or similarities of regulations, within the ASEAN region can reduce the price effect of NTMs in fruits, vegetables, and grains from 12.5% to 10% (Knebel & Peters, 2019). This harmonisation effort is also included in the AEC Blueprint 2025, but is yet to be included in the 2021-2025 AIFS Framework and SFA-FS.

Domestic measures that undermine food trade are contradictory to ASEAN cooperation efforts among its member states and partners. Cooperation initiatives and agreements established in response to the pandemic such as the ASEAN Comprehensive Recovery Framework (ACRF) adopted during the 37th ASEAN Summit in November 2020, ASEAN-Australia-FAO collaboration project to address threats from animal disease, and the Hanoi Plan of Action on Strengthening ASEAN Economic Cooperation and Supply Chain Connectivity in Response to the Covid-19 Pandemic, encourage closer collaboration and open trade as key to enhance the resiliency of ASEAN's food security during and after Covid-19 (ASEAN Secretariat, 2020c; FAO, 2021b). These guidelines recognized that keeping the markets open for trade and facilitating a safe distribution of agricultural and food products are needed to prevent excessive food price hikes and mitigate the risk of food insecurity.

To facilitate regional coordination in practice, ASEAN needs to strengthen its early warning system and information system to accurately monitor data on food production, planted and harvested area, yield, price, stock, and trade data to be able to make prompt decisions in anticipation of crises. This has been an ongoing effort since 2002 through ASEAN Food Security Information System (AFSIS) which contains a ASEAN Agriculture Commodity Outlook (ACO) and Early Warning Information (EWI) that covers all ASEAN Member States plus People's Republic of China, Japan and Republic of Korea. However, AFSIS relies on official data from each country and suffers from differences of reliability as many countries have inadequate agricultural statistical systems. This undermines the usability of the system for decision-making.

To address the data challenge, the AFSIS Secretariat is implementing an ICT-based agriculture data management system and human capacity building project called National Agri-food Information System (NAIS) with the support of the Government of the Republic of Korea in six AMS, namely Indonesia, Lao PDR, Cambodia, Philippines, Vietnam, and Myanmar. The preliminary pilot project and early phases showed improvements in data collection efficiency, and the project will continue with setting up satellite image processing and utilizing systems (OECD-OPSI, n.d.). This effort will need to be continued and strengthened with commitments from all members to ensure its maintenance and scaling-up.

Conclusion and Policy Implications

The Covid-19 pandemic has worsened food insecurity and increased hunger and malnutrition in the ASEAN region especially in lower-middle income AMS with high poverty rates. It also has possible long-term negative developmental effects for future generations. It has exposed the vulnerabilities of the region's food system and underlined the problem of food affordability, sustainability, and resiliency, which reaffirms the urgency of food policy transformation. This transformation will be necessary for the region to ensure greater food security resilience in the face of future crises including the climate crisis.

Regional efforts through the AIFS Framework and its related SPA-FS, as well as the broader AEC Blueprint 2025 and ATIGA have paved the way for regional integration and have facilitated greater intra-ASEAN food trade that supports food security. However, progress is undermined by domestic self-sufficiency policies by the AMS, such as restrictions on rice imports or increasing number of non-tariff measures on food and agriculture trade.

Efforts to bolster domestic agriculture production and supply chain in a sustainable manner, especially in big agriculture producing countries of Indonesia, Malaysia, Thailand, and the Philippines are important. Yet, domestic production does not necessarily guarantee better food security. Instead, protectionist policies on behalf of self-sufficiency have actually increased the cost and prevented efficient allocation of resources across AMS. Hence, improvements in agriculture production needs to be accompanied with regional integration through greater trade of food and agriculture commodities to ensure affordable food is well-distributed across the AMS. This can be achieved through continuous cooperation to lower tariff and import restrictions especially in rice. Further, elimination of non-tariff barriers and harmonisation of non-tariff measures such as food standards would also facilitate trade in the region and should be included in the next iteration of the AIFS Framework and SPA-FS. Last but not least, improvements in data collection and management as the basis for the AFSIS must be pursued in order to support timely decision-making and cooperation in future crises scenarios.

ASEAN member states also need to strengthen and maintain an exchange of skills, technology and knowledge on the best practices in food security to better anticipate and reduce the risks against future crises. In practice, the exchange should follow a whole-of-government approach that not only involves government agencies concerned in the agriculture and food sectors, but also include agencies in other relevant sectors for food security such as trade, transport, and manpower development. Other stakeholders from the private sectors, development and dialogue partners and NGOs should be involved as they can provide the needed support to enhance national and regional food systems. This multi-stakeholder, multilateral approach is more aligned with the food system paradigm that shapes food security today.

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Chapter 3:

The Acceleration towards a Digital Economy: Distributive and Disruptive Impacts, and Policy Responses

Jayant Menon

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Introduction

One of the oft-cited silver linings of the coronavirus (COVID-19) pandemic is the acceleration towards the Fourth Industrial Revolution (4IR). Lockdowns and other social distancing measures have accelerated the creation and adoption of new technologies that enable work from home and remote learning. Looking forward, firms are already starting to restructure their operations to better adapt to a new normal that will involve less human interaction and be restricted by other risk mitigation regulations (see APEC, 2020).

In this paper, we consider the likely impacts of the COVID-19 induced acceleration towards the 4IR, focusing on its distributional consequences. Although a lot has been written about how the 4IR may worsen existing inequalities between and within countries (see, for instance, UN, 2017), we look more closely to see if there might be offsetting effects that may reduce its negative impacts. The paper aims to contribute to the discussion of the impacts of the 4IR by synthesizing the often neglected, potentially inclusive or inequality-offsetting effects, and examining national and regional policy choices in the short and long run that can assist in the adjustment to a new normal.

We begin with a brief overview of what is meant by the 4IR in Section 2. We then examine the distributional impacts of accelerating the move towards a digital economy, both positive and negative. Section 4 then considers how policy should respond, both in the short run and in the long run, in managing the disruption from technology and demographics. A final section concludes.

The Fourth Industrial Revolution: An Overview

The 4IR is the fusion of technologies across physical, digital and biological realms that will transform our way of life. It builds on the technological advancements of previous industrial revolutions, particularly those of the Third Industrial Revolution (3IR) that produced computers, the Internet and digital technologies. However, the 4IR is unlike other revolutions due to its breadth, depth and speed of change.

Technologies of the 4IR and the interaction between them, offer new ways to create and consume, will transform how we deliver and access public services and open new ways to communicate and govern (see Shwab 2016; 2018).

With the 4IR, new technologies are emerging faster, being adopted more quickly and delivering greater impact. For instance, while landline telephones took more than 75 years to reach 100 million users, mobile phones took less than 15 years. More recently, the internet reached 100 million users in about 6 years, Facebook in about 4 years, WhatsApp in about 3 years, and Instagram in about 2.

Machine learning and big data analytics means the process of discovery and analysis no longer requires human agency. Digital networks allow products and services to scale more quickly. The processing power of computer chips (from the 3IR) has increased by one quadrillion times over the past 50 years and quantum computing has the potential to perform tasks which would not even be possible today.

The consequence of all this is that change in the 4IR will be hard to predict. The technology itself is difficult to map because its growth rate could be exponential, factorial or higher. It is this unpredictability that is making impact assessments difficult, but not impossible.

Equally, it heralds a new brand of 'superstar' economics (Rosen, 1981; Nuesch, 2007). Returns to knowledge and skills are exponential which- if not equally shared- can lead to increasing inequality. This in turn could lead to social exclusion and political instability. The 4IR provides transformative technologies but it will be the job of our social and political institutions to ensure the technologies are used for the benefit of all humankind and not just the few.

The Distributional Impacts of the 4IR

As noted earlier, the impetus that the pandemic has provided in accelerating the move towards a digital economy is often hailed as one of the few positive things to come out of this crisis. Even as lockdowns were lifted, various social distancing measures remained in place, necessitating the use of technology to continue working and learning.

The adoption rate of these technologies has varied across countries, however, and the more developed economies are better able to respond to this need than less developed ones. The level of preparedness of countries is generally negatively correlated to their level of development, and this may widen development gaps if left unaddressed. Southeast Asia, South America and Sub-saharan Africa all score below the world average for digital inclusion (see Kaur et al., 2021). In a cruel twist, there is concern that even this supposed silver lining of the pandemic may end up exacerbating inequality between countries, further increasing the digital divide.

Apart from the digital infrastructure being limited in poor countries, access to what is available can vary by income class within society. The poor in developing countries are less likely to have the means to access this infrastructure, and hence be further marginalised as a result. The 4IR may also lead to a further concentration of the gains from trade in the hands of the few (see, for instance, Bacchetta et al., 2021). Therefore, not only is inequality between countries likely to increase, there could also be a rise in income and wealth disparities within them.

The poor may also be disadvantaged by the fact that the sectors within which they tend to be employed are usually less amenable to the adoption of such technologies. Physical contact may represent a critical aspect of work for low-skilled employees in the manufacturing or construction sectors, for instance. The introduction of social distancing measures may leave them temporarily unemployed, as a result. More generally, the 4IR may also pose a greater threat to their jobs, as automation and robotics take hold initially in the low-skilled, repetitive tasks before progressing to more complex activities.

Apart from these negative impacts, there are several ways in which the 4IR can either reduce inequality or have offsetting effects that can limit its increase. Although a lot of attention has been focused on how the 4IR can exacerbate inequality, there are various countervailing effects that are often overlooked or ignored.

Increasing economic inclusion

The 4IR can be a powerful force for economic inclusion. 4IR technologies will create new ways for citizens to connect, trade with each other, and access services that are currently not available. In Indonesia, Myanmar, the Philippines and Vietnam, less than a third of the population have a bank account. Innovations such as Aadhaar, a digital identification system, is driving financial inclusion and bringing banking services to more than a billion

people in India who had previously been excluded. These financial services enabled by technology allow households to save in secure instruments to enlarge their asset base and escape cycles of poverty and inequality.

Under the 4IR, citizens will gain access to new sources of information, such as high-frequency news and market prices, that can materially affect incomes and welfare. In a now-famous study, Jensen (2007) showed how the adoption of mobile phones by fishermen and wholesalers in South India was associated with a dramatic reduction in price dispersion and the elimination of waste, resulting in increases in consumer and producer welfare. It can also enable new forms of education, such as online courses and virtual classrooms, and new healthcare services, such as telemedicine powered by smartphones linked to diagnostic pills (Menon and Fink, 2018; Xiao and Fan, 2020).

These innovations should result in a reduction in all forms of social and economic inequities and drive a much more inclusive form of economic growth.

Opportunities for Leapfrogging

The opportunities for leapfrogging provided by the 4IR is related to the so-called latecomer's advantage hypothesis[1]. This is where late adopters of technology may be better positioned because they can avoid the mistakes of the past and adapt technologies in a way that benefits them more than early adopters[3]. In certain instances, they are even able to leapfrog early movers, further consolidating their advantage.

Technologies of the 4IR create the opportunity for developing countries to bypass traditional aspects of industrial development. A commonly cited example relates to avoiding costly investments in telephone lines and focusing instead on mobile telephone infrastructure. Apart from the savings in public expenditure that can be directed towards other social goods and services, this type of technology can also be used to access other services such as financial transfers and medical advice, as noted earlier. The technologies of the 4IR can also help find alternative solutions to connecting people in isolated regions where physical infrastructure is costly and/or limited.

Localized renewable energy production, such as solar power coupled with new battery storage technology, could reduce the need for investing in expensive power distribution networks. Drones could help to deliver lightweight high-value goods such as medical supplies to remote regions with poor transport infrastructure. While drones will not remove the need to build roads for the transport of heavy goods and people, they do offer the opportunity to sequence and design transport infrastructure in new ways and to reduce the need for "last-mile" road connectivity. These alternatives can increase economic inclusion for poor and marginalized communities, leading to lower inequality.

1. This was noted as far back as Veblen (1915), although modernized by Gershenkron (1952) as "the advantage of relative backwardness".
2. This assumes that the technology is available for purchase or is easily diffused, which may not be unreasonable given that intellectual property rights are poorly protected or enforced in developing countries.

Enhancing Agriculture

The 4IR has the potential to transform agriculture in poor countries. In the short run, the impact of connecting farmers to the internet has already brought well-documented improvements to farmer productivity, profitability and sustainability. Smartphones give farmers better access to market prices, weather information, and knowledge about soil, seeds and fertiliser. Smartphones may also enable a "sharing economy" to take hold, whereby farmers who cannot afford to buy expensive mechanical equipment can rent it by the hour from other farmers by accessing online sharing sites. In India for instance, Mahindra & Mahindra, an equipment maker, has set up a platform of this type called Trringo.

These enhancements will allow both poverty and inequality to be addressed at its source. It will also reduce the pressure on densely populated urban centres by limiting the amount of rural-urban migration that might occur in the absence of such enhancements improving returns to agriculture.

Supporting Micro and Small and Medium Enterprises (MSMEs)

More than 90 per cent of enterprises in the formal sector within ASEAN are micro and small and medium enterprises (MSMEs). MSMEs have become almost synonymous with the informal sector. These MSMEs, in the formal and the informal sector, account for the overwhelming majority of employment in ASEAN.

MSMEs are often constrained by a lack of access to business and financial services, but blockchain technology has the potential to dramatically increase the security of cross-border financial transactions and logistics even in countries where these services are relatively underdeveloped. Therefore, this technology has the potential to benefit the smallest firms in the poorest regions of ASEAN. The rise of online marketplaces also provides platforms for MSMEs to access markets throughout ASEAN and beyond.

Policy Options in the Short-and Long-run

As noted earlier, one of the major challenges of the 4IR will be the impact on the labour market caused by automation and increasingly advanced robotics and artificial intelligence. Many low-skilled, repetitive jobs are being automated, starting in high wage countries but already spreading quickly to the developing world. With two-thirds of the world's robots already in East Asia, some expect this region to be particularly susceptible to these changes. Although the net impact on jobs and the labour market, in the long run, remains unclear[3], there is little doubt that disruptive technologies will result in significant labour churning and job displacement in the short run (see McKinsey, 2017; Petropoulos, 2021). These adjustment costs and associated negative employment outcomes will affect some countries more than others. Low-skilled, repetitive jobs, such as assembly line workers, are most at risk, and service jobs, such as business process outsourcing, will be increasingly under threat.

As an immediate response, enabling greater mobility of unskilled workers would curtail unemployment in net labour-sending countries and help sustain growth in net labour-receiving ones while also helping counter growing economic inequality within and between these countries.

3. *Far a discussion on how the long run impacts are likely to be net positive, see OECD (2016) and Menon (2019).*

Apart from the challenges posed by the 4IR, ASEAN also has to deal with another long-term factor in the form of divergent demographics. While the newest members of ASEAN have relatively young populations, the rest of ASEAN is ageing rapidly.

For the younger and less developed economies, the biggest challenge lies in adopting policies that will allow them to utilise the demographic window to achieve rapid economic growth, increase per capita incomes, and build up human capital. Central to meeting this challenge is providing productive employment and enhancing the skills of the growing labour force. This is particularly critical considering the negative impact that 4IR technologies can have on industries and jobs in the short run.

Regional cooperation initiatives that promote greater capital and labor mobility can help mitigate many of the negative impacts that demographic and technological trends may have at the domestic level. Ageing countries could get around labour shortages by allowing greater migration or immigration, or continuing to export capital to countries with a youth bulge (Menon and Nakamura, 2009). In the short run, greater capital and labour mobility can help equalise capital-labour ratios and normalise differences in labour and capital productivity to promote more inclusive growth. In the immediate future, greater capital rather than labour mobility may prove to be the easier alternative given continuing border restrictions on people movement during the pandemic. Countries in the region have made considerable progress in removing restrictions to capital flows, whereas liberalising labour flows continues to be fraught with controversy, even before the pandemic hit.

Support for greater labour mobility will have to play a complementary role in overcoming remaining bottlenecks, however. In ASEAN, for instance, harmonisation and streamlining of employment visas have been an important initiative in reducing barriers to labour mobility. ASEAN economies have signed a number of mutual recognition agreements (MRAs) for skilled jobs, but implementation has been stymied by domestic rules and regulations on employment and licensing requirements. Furthermore, these MRAs will have to be more responsive to the rapidly changing skill and labour market conditions as a result of the pandemic and the 4IR.

But removing the barriers to labour mobility will involve more difficult and politically-sensitive policy reforms. Pursuing behind-the-border policy reforms and policy harmonisation has proven the most difficult. But it is in the region's best interest to continue to seek uniformity in regulatory rules that facilitate freer movement of skilled and unskilled labour.

Given these sensitivities, bilateral agreements may end up being more feasible than regional ones. In fact, the India–Singapore Comprehensive Economic Cooperation Agreement (CECA) is one such bilateral deal that has enabled short and long-term employment visas, ranging from 2 months to 3 years, to nationals of both countries. Similar agreements involving other ASEAN countries would be of mutual benefit.

Even at the bilateral level, prospects for increasing labor mobility beyond specific skill categories remain limited. if these agreements cannot promote greater factor mobility, they can assist by promoting trade by limiting the resort to protectionism and by keeping an open trading system for goods and services. As demonstrated by Samuelson's (1948) factor price equalisation theorem, commodity movements and factor movements can serve as close substitutes in achieving similar outcomes. That is, even when the cross-border movement of labour or capital is restricted, trade in goods and services that are produced using these factors is sufficient

to equalise wages and rentals in both countries over time. Therefore, trade liberalisation through regional agreements or other means can serve an important role in achieving the desired outcomes in the adjustment process when increasing factor mobility is difficult or delayed.

While importing skills can help countries catch up and address the challenges posed by the 4IR in the short run, the long-term challenges of 4IR will require a fundamental transformation in systems of education and learning. Governments must pursue education reform and promote lifelong learning. Augmenting cognitive skills such as math's and sciences will be critical for the transition to a more innovative, knowledge-based economy. There will also be a need to strengthen regional education networks and connect innovation incubators in the region. New and innovative approaches to public-private collaboration are also needed, particularly in areas such as research and development.

Conclusion

The COVID-19 pandemic has sped up the move towards a digital economy, as well as other aspects of the 4IR. There are fears that this accelerated transition will result in a rise in inter- and intra-country inequality. Often overlooked are the various ways in which the 4IR can produce offsetting effects, by increasing social, financial and economic inclusion, increasing connectivity, improving agriculture, and supporting MSMEs. To enable this, however, policy changes need to be made.

In the short run, greater factor mobility can help equalise capital-labour ratios and normalise differences in labour and capital productivity to promote more inclusive growth. Greater labour mobility, while politically sensitive, can reduce skills deficits in poorer countries in the short run, and help in preparing the workforce for the 4IR. Given the sensitivities involved, however, bilateral agreements may end up being more feasible than regional ones. The India–Singapore Comprehensive Economic Cooperation Agreement (CECA) provides a useful model that other ASEAN countries could consider, adapting it to suit their specific needs after accounting for differences in skills requirements and demographic trends.

Even if regional or bilateral agreements cannot promote factor mobility, they can help equalise factor prices by increasing commodity trade. That is, even if factors cannot cross borders, increased trade can produce similar results in reducing adjustment costs.

In the longer term, changes in education and learning systems will be necessary, in moving towards an innovative society. This will need to be done while concurrently addressing basic challenges in improving retention rates in secondary schooling, for instance. Overcoming these fundamental challenges is necessary to provide a strong base to build upon in order to exploit the opportunities presented by the 4IR and mitigate its negative impacts, including limiting the rise in inequality.

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Chapter 4:
Greening ASEAN: Pathways and Challenges

Jukhee Hong

Introduction

The COVID-19 pandemic has severely dented ASEAN's economy. The region is however set to regain its economic growth momentum with the Regional Comprehensive Economic Partnership (RCEP) entering into force on 1 January 2022 -- injecting the much-needed boost for recovery.

Yet climate change threatens to undermine the region's future growth and potentially exposes the region to disaster vulnerabilities and negative economic impact. Although all ASEAN member states are parties to the Paris Agreement, their climate action commitments are perceived to be less than ambitious and may miss the mark in achieving the Nationally Determined Contributions (NDCs) targets by 2030 and carbon neutrality by 2050. In fact, it is projected that ASEAN's CO2 emissions per capita is projected to rise 140% between 2015 and 2040.

The paper looks at data and climate projections for ASEAN at the regional level instead of each member state's unique national circumstances and discusses existing regional efforts in ASEAN while highlighting the critical gaps that must be addressed to ensure economic and climate resilience in the region.

Overview

ASEAN is a region richly endowed with biodiversity. 15% of the world's tropical forests, including some of the oldest in the world, are found in ASEAN[1]. It is also home to the global centre of marine biological diversity - the Coral Triangle[2] that covers the coastal waters of Indonesia, Malaysia, Papua New Guinea, and the Philippines. The Coral Triangle has 76% of the world's coral species, making it the highest coral diversity in the world and 30% of the world's coral reefs[3].

ASEAN is also one of the world's robust growth centres. Despite the setback of the COVID-19 pandemic of nearly two years, the growth trajectory of the ASEAN-5[4] is estimated to be robust at 5.8 percent[5] in 2022 and it continues to propel the region towards rapid urbanization. ASEAN's growth is expected to be further boosted by trade growth once the world's largest Free Trade Agreement among 15 countries - the Regional Comprehensive Economic Partnership (RCEP) enters into force in 2022.

Against the backdrop of ASEAN's promising economic growth future, there is an existential crisis of climate change that threatens to undo its growth and long-term sustainability.

1. Ronald C. Estoque et al, *The future of Southeast Asia's forests 2019*
2. *The Coral Triangle Atlas*
3. World Economic Forum The '*Coral Triangle*' *is the largest of its kind, and it's dying, 2018*
4. Indonesia, Malaysia, the Philippines, Vietnam and Thailand
5. International Monetary Fund *World Economic Outlook, Oct 2021*

Code red for humanity!

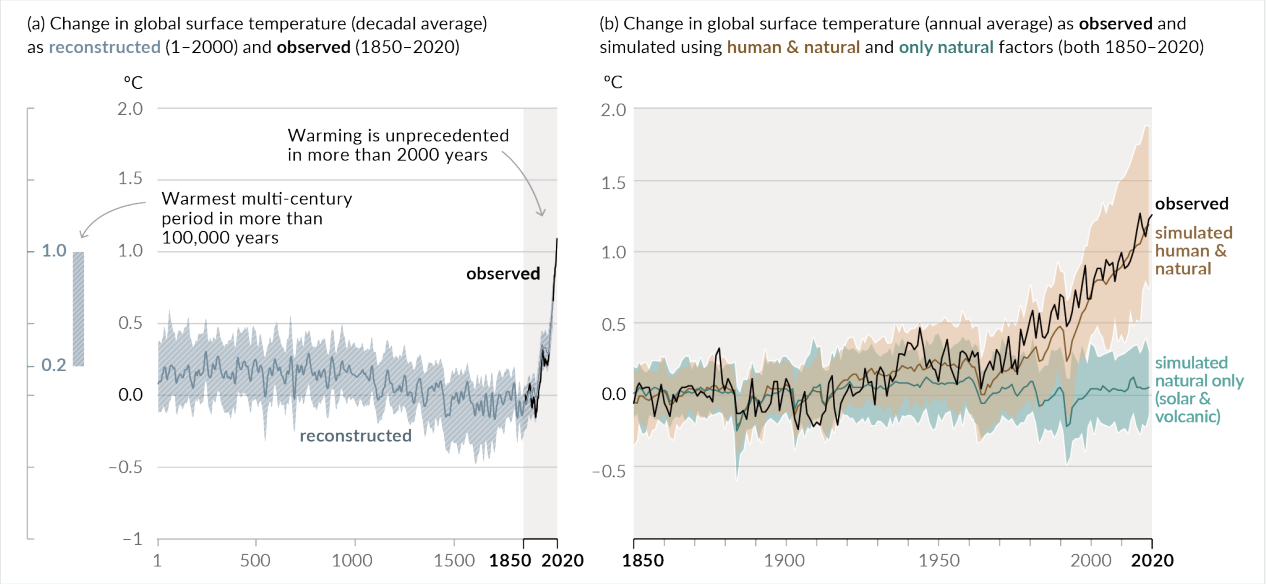
Reports and data based on scientific evidence released in 2021 have provided quantified assessments and projections on the speed, scale, intensity and coverage of human induced global warming as well as the gaps that need to be closed urgently.

(a) Scientific evidence confirms human actions led to rapid and widespread global warming

The first report of the Sixth Assessment Report (AR6) by the Intergovernmental Panel on Climate Change (IPCC) Working Group I released in Aug 2021 confirms that human actions unequivocally caused the fastest global warming in the atmosphere, oceans and land within the span of two thousand years, and every of the last four decades has been successively warmer than any decade that preceded it since 1850[6].

Changes in the atmosphere, ocean, cryosphere and biosphere have occurred, and are widespread and rapid. The report also concluded the unprecedented nature of changes in our climate systems over many centuries or even thousands of years[7] (Figure 1). The observations of the report have led to the United Nations Secretary General Antonio Guterres calling it a "code red for humanity".

Figure 1: Changes in Global Warming temperature relative to 1850-1900



Source: IPCC

(b) Global warming will exceed 1.5°C and 2°C in the 21st century without drastic decarbonisation

Under all emissions scenarios, scientists warn that surface temperatures of the earth's surface will continue to rise at least until around 2050 and unless drastic reductions in carbon dioxide (CO2) and other greenhouse gas emissions are made in the coming decades, global warming will exceed 1.5°C and 2.0°C in the 21st century[8].

6. IPCC *Climate change 2021 The Physical Science Basis p.5* 2021
7. IPCC *Climate change 2021 The Physical Science Basis p.8* 2021
8. IPCC, *Headline Statements from the Summary for Policymakers* 2021

(i) Worsening global climate extremes

In addition to that, global warming has a direct impact on the frequency and intensity of hot extremes, marine heatwaves and heavy precipitation, agricultural and ecological droughts in some regions, the proportion of intense tropical cyclones, as well as reductions in Arctic sea ice, snow cover and permafrost. And it will further worsen the global monsoon precipitation and the severity of wet and dry weather events[9], seriously posing an existential threat for our civilization.

(ii) Climatic impact on Southeast Asia projected to intensify

According to the IPCC report, it is projected that further global warming will lead to multiple changes in climatic impact-drivers (CID) in every region in the world including Southeast Asia. The report projects with high confidence that in the next 20 to 30 years, around 2050, the Southeast Asian region will experience increases in mean temperature, extreme heat, heavy precipitation and pluvial (rain-related) flood. Similarly, coastal related impact drivers will observe increases in sea level, coastal flood and erosion, marine heatwaves, ocean and lake acidification (Figure 2).

Figure 2: Projected Future Changes of Climate Impact Drivers (CID) For Southeast Asia[10 11]

Climatic impact-drivers[12]	FUTURE CHANGES[13]	TREND / ATTRIBUTION
HEAT AND COLD		
Mean air temperature	High confidence of increase	Upward trend without attribution
Extreme heat	High confidence of increase	Upward trend with high confidence of attribution
Cold spell	High confidence of decrease	Downward trend with high confidence of attribution
WET AND DRY		
Mean precipitation	Medium confidence of increase	
River flood	Medium confidence of increase	
Heavy precipitation and pluvial flood	High confidence of increase	Upward trend without attribution
Landslide	Medium confidence of increase	

9. IPCC *Climate change 2021 The Physical Science Basis p.19* 2021

10. *Gutiérrez, J.M., R.G. Jones, G.T. Narisma, L.M. Alves, M. Amjad, I.V. Gorodetskaya, M. Grose, N.A.B. Klutse, S. Krakovska, J. Li, D. Martínez-Castro, L.O. Mearns, S.H. Mernild, T. Ngo-Duc, B. van den Hurk, and J.-H. Yoon, 2021: Atlas. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L.Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K.Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press. Interactive Atlas available from Available from http://interactive-atlas.ipcc.ch/*

11. IPCC *WGI Interactive Atlas: Regional synthesis* 2021

12. *Climatic impact-drivers (CIDs) are defined as physical climate system conditions that affect an element of society or ecosystems. Depending on system tolerance, CIDs and their changes can be detrimental, beneficial, neutral, or a mixture of each across interacting system elements and regions (Reference)*

13. *CID future changes summarized in the regional synthesis refer to a 20–30 year period centred around 2050 and/or consistent with 2°C global warming compared to a similar period within 1960-2014 or 1850-1900. In all cases, the information is representative of average changes over the whole region (Reference).*

WIND		
Tropical cyclone	Medium confidence of increase	Upward trend without attribution
COASTAL		
Relative sea level	High confidence of increase	Upward trend without attribution
Coastal flood	High confidence of increase	
Coastal erosion	High confidence of increase	
Marine heatwave	High confidence of increase	Upward trend without attribution
Ocean and lake acidity	High confidence of increase	
OTHERS		
Atmospheric CO_2 at surface	High confidence of increase	Upward trend without attribution

Source: IPCC 2021

(c) Risk and threats to ASEAN

If unmitigated, these projected future changes will pose adverse risks to the ASEAN region in more ways than one. The urgent need to address climate change, however, is taking a backseat to other priority policy areas such as the digitalisation, economic recovery and trade opening through the entry into force of RCEP in ASEAN.

The region is experiencing a rapid explosion of digital transformation with 40 million new internet users from six ASEAN countries coming online in 2020 due to the pandemic. These countries' collective internet economy is projected to reach a value of US$309 billion by 2025[14]. In September 2021, ASEAN Economic Ministers endorsed a multi-year plan to accelerate ASEAN's economic recovery and digital integration in the **Bandar Seri Begawan Roadmap: An ASEAN Digital Transformation Agenda** as well as adopted the **Work Plan on ASEAN Agreement on E-Commerce**[15].

(i) Disaster vulnerabilities

ASEAN countries face various vulnerabilities due to climate change and disaster stress. Over a period of nearly two decades between 2000 to 2019, Myanmar, the Philippines and Thailand were among the top ten countries most affected by extreme weather[16] (Figure 3). The Philippines had the highest number of people affected by natural hazards, while Myanmar suffered the biggest loss as a share of the GDP at 0.83%[17].

[14] Google, *Temasek, Bain and Company e-Conomy_SEA_2020_Report*, p. 31, 2020
[15] ASEAN *The 53rd Asean Economic Ministers' (AEM) Meeting Press Release*, p. 2.4, September 2021
[16] German Watch *Global Climate Risk Index 2021 Briefing Paper*, p.13, 2021
[17] ASEAN Secretariat, *ASEAN State of Climate Change Report*, p. 36, 202

Figure 3: Long-Term Climate Risk Index (CRI) - Ten Countries Most Affected 2000-2019 (Annual Average)

CRI 2000-2019 *(1999-2018)*	Country	CRI Score	Fatalities	Fatalities per 100 000 per inhabitants	Losses in million US$ ppp	Losses per unit GDP in %	Number of events (2000-2019)
1 *(1)*	Puerto Rico	7.17	149.85	4.12	4149.98	3.66	24
2 *(2)*	Myanmar	10.00	7056.45	14.35	1512.11	0.80	57
3 *(3)*	Haiti	13.67	274.05	2.78	392.54	2.30	80
4 *(4)*	Philippines	18.17	859.35	0.93	3179.12	0.54	317
5 *(14)*	Mozambique	25.83	125.40	0.52	303.03	1.33	35
6 *(20)*	The Bahamas	27.67	5.35	1.56	426.88	3.81	13
7 *(7)*	Bangladesh	28.33	572.50	0.38	1860.44	0.41	185
8 *(5)*	Pakistan	29.00	502.45	0.30	3771.91	0.52	173
9 *(8)*	Thailand	29.83	137.75	0.21	7719.15	0.82	146
10 *(9)*	Nepal	31.33	217.15	0.82	233.06	0.39	191

Source: Germanwatch

ii) Threats to coastal population

At over 670 million people in 2021, ASEAN's combined population is estimated to reach 717 million by 2030[18] and the populations will continue to be concentrated in urban areas and coastal settlements[19]. Cambodia, Indonesia, Myanmar, the Philippines, Thailand and Vietnam all have growing populations in low-elevation coastal areas, with the coastal populations of Vietnam and the Philippines in particular expected to increase:

- Vietnam: 43.1 million (2000) to 80.4 million (2060)
- The Philippines: 13 million (2000) to 34.9 million (2060)

Coastal-related deterioration threatens inhabitants of these areas due to rising sea levels and other coastal related climatic impacts. ASEAN has extensive coastlines with highly concentrated economic activities located at or near them. 77% of ASEAN's population live in coastal areas, contributing over 60% of GDP for some ASEAN member states. It has been estimated that 229 million people in ASEAN live below the high tide line, with 72 million people in Indonesia facing the most risk. In the event of rising sea level, nearly 90% of people in Vietnam will be severely affected[20].

[18] ISEAS, *ASEAN Focus March 2020 – Advancing Climate Resilience in ASEAN*, March 2020.
[19] ISEAS, *ASEAN Focus March 2020 – Advancing Climate Resilience in ASEAN*, March 2020
[20] ASEAN Secretariat, *ASEAN State of Climate Change Report*, p. 38, 2021

(iii) Economic risks

The impact of climate change will not be limited to the physical impacts of climate impact drivers as described above, as climate change has also been projected to cause economic slowdowns. Relative to a 1.5°C scenario, global warming of 2.0°C by the end of the century will see the largest reductions in economic growth for low- and middle-income countries and regions including Southeast Asia[21] . The Asian Development Bank (ADB) estimates that ASEAN could experience damages and losses of over 11% of its GDP by 2100[22] based on a report released in 2015.

ASEAN is the second largest manufacturing hub besides China and forms a part of the global supply chain. The region also produces 28% of the global rice crop and 31% of Asia's rice supply[23]. As the region becomes more integrated with the world's supply chains, the impact of climate change will have an enormous impact on global economic growth.

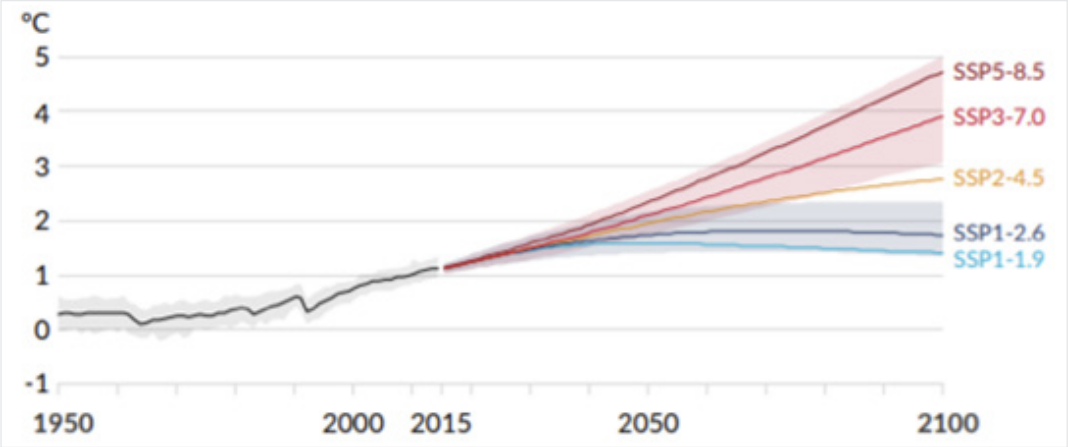
(d) Gaps remain

(i) Very low GHG emissions will limit warming to 1.5°C

With all these vulnerabilities and risks confronting ASEAN and the world, scientists contributing to the IPCC report laid out five Shared Socioeconomic Pathways (SSPs) scenarios of projected socioeconomic global changes up to 2100 with various degrees of GHG emissions ranging from very low to low, intermediate, high and very high.

The modeling suggests that in order to keep global surface temperature within 1.5°C to 2.0°C by the end of the century, it would require our efforts now to reduce greenhouse gas emissions to a very low level (SSP1-1.9) so that net zero emissions can be achieved around 2050[24] (Figure 4).

Figure 4: Global Surface Temperature relative to 1850-1900 In relation to Shared Socioeconomic Pathways (SSPs) Scenarios 2015-2100



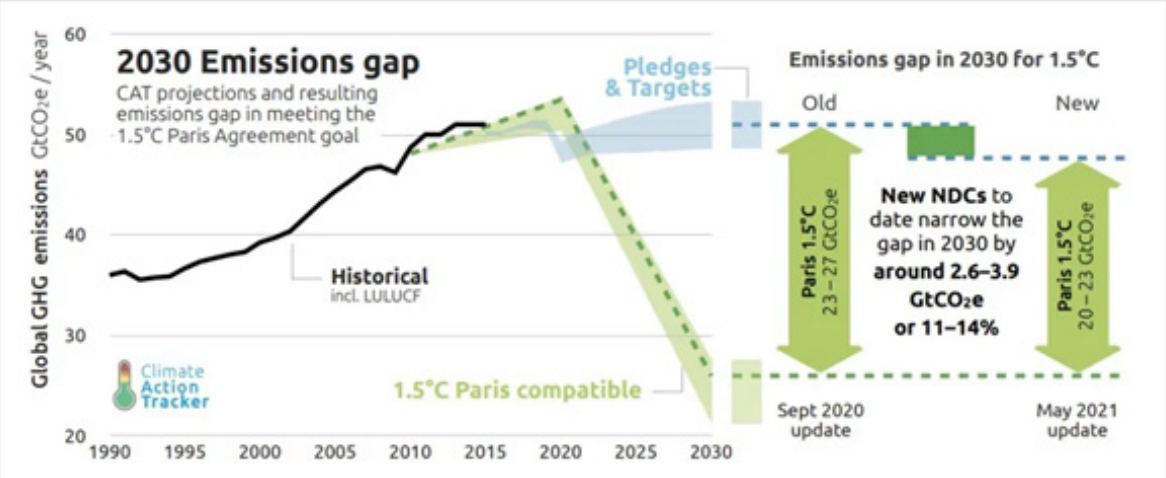
Source: IPCC

21. IPCC, *"Chapter 3 - Impacts of 1.5oC Global Warming on Natural and Human Systems in: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C,"*, p.180, 2018.
22. Asian Development Bank, *Southeast Asia And The Economics Of Global Climate Stabilization*, p. xix, 2015
23. ASEAN Secretariat, *ASEAN State of Climate Change Report*, p. 27, 2021
24. IPCC *Climate change 2021 The Physical Science Basis*, p. 22, Aug 2021

However, huge gaps remain in bringing the warming of the earth to the desired outcome under the ideal scenario of "very low" emissions, even by taking into account the renewed commitments by parties to the Paris Agreement as newly updated emissions pledges made between September 2020 and May 2021 point towards falling short of ambitions.

Climate Action Tracker's analysis revealed that newly updated Nationally Determined Contributions (NDCs) as of May 2021 would likely bring the gap closer to 1.5°C by up to 15% or equivalent to 2.6-3.9 $GtCO_{2e}$[25](Figure 5). Among the countries analysed, the revised NDCs of Indonesia, Singapore and Vietnam joined other countries such as Australia, Brazil, Mexico, New Zealand, Russia, Switzerland as having failed to increase their climate ambition by submitting the same or even less ambitious 2030 targets[26].

Figure 5: Emissions Gap in Meeting 1.5oC Paris Agreement Goal Based on Nationally Determined Contributions As of May 2021



Source: Climate Action Tracker

Although the UN Climate Change's synthesis report in September 2021 shows "a clear trend that greenhouse gas emissions are being reduced over time" with the projected decrease estimated to be by 12% in 2030 relative to 2010, parties to the Paris Agreement need to double down on efforts to decarbonise.

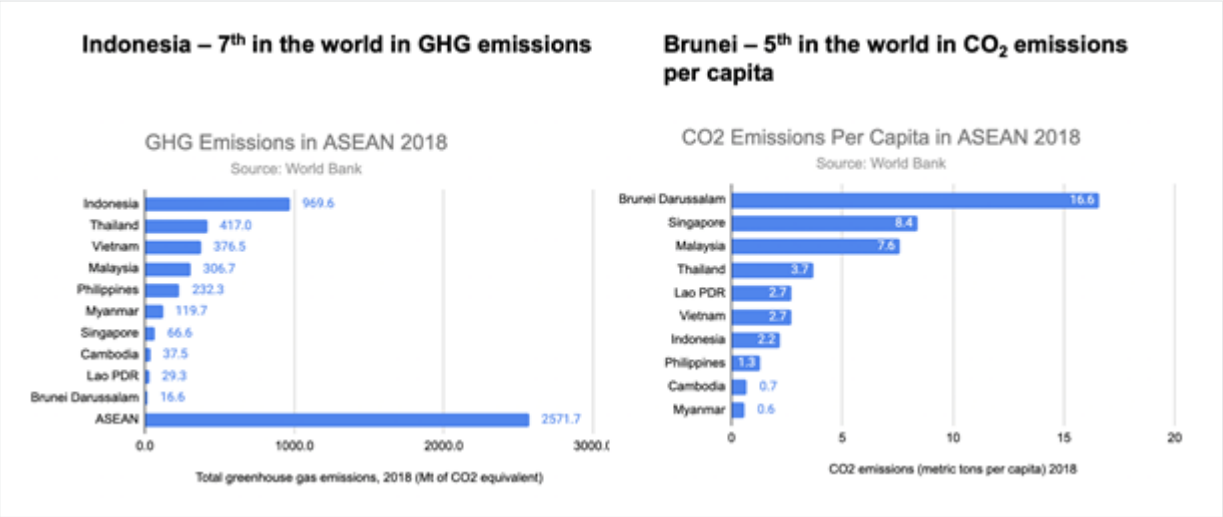
The report, which tabulates the latest NDCs covering 93.1% of global emissions levels in 2019, highlighted a whopping 45% CO_2 emissions reduction by 2030 would be required to keep the 1.5°C goal within reach, and that if the world's CO_2 reduction is at 25% by 2030, we will be looking at a 2.0°C warming by the end of the century[27].

[25.] Climate Action Tracker *Climate Action Tracker Global Update September 2021 p.ii* Sep 2021
[26.] Climate Action Tracker *Climate Action Tracker Global Update September 2021, p.ii* , Sep 2021
[27.] United Nations Climate Change, *Full NDC Synthesis Report: Some Progress, but Still a Big Concern* 2021

ASEAN and climate change

As a region, ASEAN's share of global GHG emissions based on the 2018 data stood at 5.6%[28] with Indonesia being the largest GHG emitter in ASEAN (Figure 7) also ranked seventh in the world due to its size of the economy. However, on a CO2 emissions per capita basis, Brunei is ranked 5th largest emitter in the world followed by Singapore and Malaysia (Figure 7) and ASEAN's GHG emissions are projected to more than double by 2040[29].

Figure 7: GHG Emissions and CO2 Emissions in ASEAN (2018)



Source: World Bank

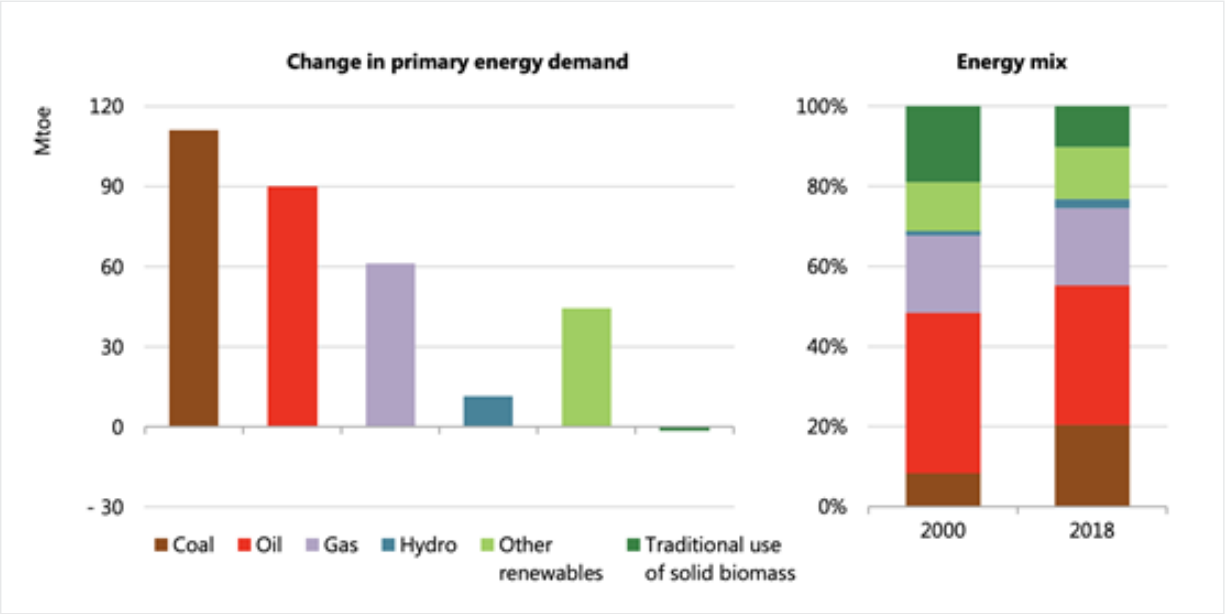
(i) Electricity and transportation biggest GHG emitters in ASEAN

In the past two decades, energy related CO_2 emissions were led by electricity and heat production, the manufacturing industries, and transportation[30]. In fact, the electricity and transport sectors are the two largest emitter sectors and will remain to be so until 2040, with respective share of GHG emissions from energy consumption at about 38% and 25% in 2025, and 42% and 25% in 2040[31].

It should be noted that ASEAN's current energy mix is dominated by fossil fuel. Since 2000, coal has led ASEAN's primary energy demand growth. Oil made up more than a third of ASEAN energy mix followed by coal (20%) and gas (19%)[32] whereas renewable energy contributes less than 20% of ASEAN's energy mix[33] (Figure 8).

28. *World Bank Data, 2021*
29. ASEAN Centre for Energy, *The 6th ASEAN Energy Outlook (2017-2040)*, p.63, 2020
30. ASEAN Secretariat *ASEAN State of Climate Change Report*, p.27, 2021
31. ASEAN Centre for Energy, *The 6th ASEAN Energy Outlook (2017-2040)*, p.22, 2020
32. International Energy Agency, *Southeast Asia Energy Outlook 2019*, p.28, October 2019
33. International Energy Agency, *Southeast Asia Energy Outlook 2019*, p.26, October 2019

Figure 8: Change in Southeast Asia's total primary energy demand and energy mix (2000-2018)



Source: International Energy Agency

(ii) ASEAN's NDC commitments may miss the mark

ASEAN member states have varying degrees of pledges made towards the Paris Agreement goals. In general, Brunei, Malaysia and Singapore have unconditional targets while Indonesia, Lao PDR, the Philippines, Thailand and Vietnam have set both conditional and unconditional targets while Cambodia has only conditional targets. In terms of reducing GHG emissions by 2030, AMS have reduction pledges ranging from less than 5% to 73% (Figure 9).

Based on projections released prior to the NDC updates, these targets are projected to miss the mark as ASEAN member states' GHG emission reduction targets in the NDCs are less than ambitious. According to ASEAN Centre for Energy, under the member states' current policies, ASEAN's NDCs will likely not be achieved. In fact, a BAU scenario previously developed by the ACE in 2017, estimates ASEAN's CO2 emissions per capita is projected to rise 140% between 2015 and 2040.[34]

[34] *I. Overland, H.F. Sagbakken, H.-Y. Chan et al., "The ASEAN climate and energy paradox," p. 2, November 24, 2020.*

Figure 9: Nationally Determined Contribution (NDCs)

	GHG Targets By 2030	Conditionality
Brunei	• 20% reduction relative to BAU (unconditional)	Unconditional only
Cambodia	• 27% GHG reduction compared to BAU, LULUCF contribution of 4.7 MtCO2e/ha/year. 41.7% GHG reduction (of which 59.1% is from FOLU (food and land use sector)) compared to BAU	Conditional only
Indonesia	• 29% (unconditional); 41% (conditional) against BAU	Unconditional + Conditional
Lao PDR	• 60% compared to baseline(unconditional) • Conditional: increase forest cover to 70% of total land area, develop 1 GW of wind and solar capacity, 300 MW of biomass-fired power capacity, and final energy consumption reduction by 10% compared to BAU	*Unconditional + Conditional*
Malaysia	• Reduction in economy-wide carbon intensity (against GDP) of 45% compared to 2005 level.	Unconditional only
Myanmar	• Reduction of GHG emissions & air pollution caused by the transport sector. • 20% electricity saving potential by 2030 of the total forecast electricity consumption.	*Not clearly stated*
Philippines	• GHG emissions reduction and avoidance of 2.71% (unconditional) • 72.29% (conditional) compared against BAU	*Unconditional + Conditional*
Singapore	• Peak emissions at 65 MtCO2e around 2030, 36% reduction in emissions intensity (EI) from 2005 levels	Unconditional only
Thailand	• 20% (unconditional) and up to 25% (conditional) compared to BAU	Unconditional + Conditional
Vietnam	• 9% (unconditional) up to 27% (conditional) GHG reduction compared to BAU	Unconditional + Conditional

Source: UNFCCC NDCs Interim Registry, CARI[35]

35. *Eta Ahmad, CARI, Energy Transition In ASEAN: Gaps, challenges and policy pathways to carbon neutrality, 10 Nov 2021*

Green agenda in ASEAN: Pathways and Challenges

The pathways towards a low carbon economy in ASEAN involve complex reforms that require a fundamental restructuring of the region's industrialisation strategy. However, the dominant narrative in ASEAN Economic Community is strongly focused on trade opening and digital transformation. Unlike the European Green Deal that underpins the EU's industrial strategy that will induce structural changes and transform the Single Market by reallocating resources internally and redistributing wealth[36], ASEAN's regional approach to climate change is less integrated with the economic and finance agenda as the effort to coordinate ASEAN's climate is driven by the Socio-cultural Community rather than the Economic Community Pillar at the ASEAN level. More critically, ASEAN is a heterogeneous region with each member state having its national economic direction and jurisdiction, due to ASEAN's shallow depth of economic integration compared to the EU, making regionally aligned climate actions even more challenging.

Notwithstanding that, ASEAN Chair 2021 Brunei has also dedicated sustainability as one of the three thrusts in its Priority Economic Deliverables (PEDs) where two of the thirteen PEDs are linked to the climate change agenda, namely (a) ASEAN Joint Declaration on Energy Transition and Energy Security as well as (b) developing the Framework for Circular Economy.

Existing key efforts at the ASEAN level are:

(a) ASEAN Climate Vision Towards 2050

In pursuit of the Paris Agreement goals, ASEAN - through the Socio-cultural Pillar of ASEAN Community - has outlined the ASEAN Climate Vision 2050[37] with a focus on meeting the requirements of:

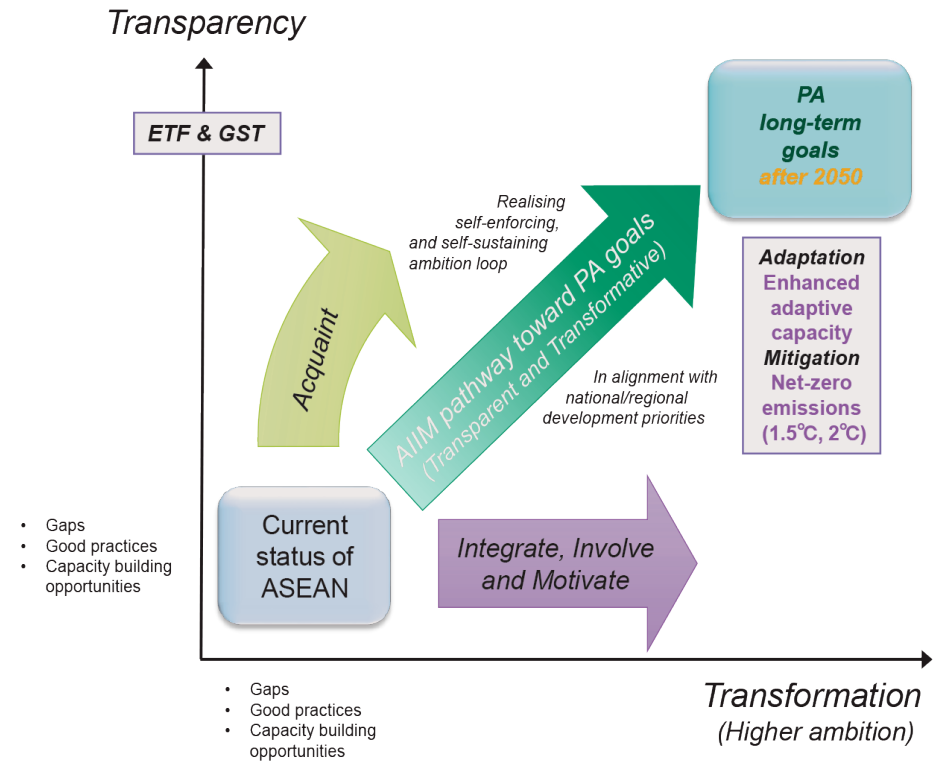
1. reporting under the Enhanced Transparency Framework (ETF) and;

2. limiting global rise of temperature to well below 2.0°C, preferably to 1.5°C, compared to pre-industrial levels,

A recent report released by ASEAN proposed a vision towards 2050 based on two lines of actions, namely to achieve "higher transparency and higher ambition" in the region's transformation (Figure 10). In order to pursue higher ambitions and transparency for the next decade as a goal, ASEAN has identified four sets of adaptation and mitigation measures under the AIIM Framework namely, "Acquaint" which is aimed at transparency; "Integrate"; "Involve"; and "Motivate", which are aimed at transformation to pave the way for ASEAN to achieve net zero by 2050 (Figure 8).

[36] Lee, Makiyama, *"The EU Green Deal and Its Industrial and Political Significance"* 2021
[37] ASEAN Secretariat *ASEAN State of Climate Change Report*, pp.8, 9 2021

Figure 9: ASEAN's Climate Vision Towards 2050 & AIIM Framework



ACQUAINT

- *Enhancement of the knowledge on climate change interventions (adaptation and mitigation actions), assessments on GHG emissions and climate risks, related capacity building, and activities that provide the information necessary to generate new knowledge such as establishing databases, procedures and guidelines, thereby enhancing transparency of actions*
- *ACQUAINT group of actions inspire transformative adaptation and mitigation actions*

INTEGRATE

- *Climate change interventions are interdisciplinary and inter-sectoral, and they also need to be integrated into existing policies, programmes, plans, and procedures*
- *INTEGRATE set of actions highlights all those actions that emphasise such integration, including coordinated actions across ministries, departments, sectors and actors*

INVOLVE

- *Both adaptation and mitigation require multi-stakeholder approaches*
- *Engaging diverse stakeholders, including governments, government institutions, researchers, practitioners, public, private entities, non-governmental agencies at various stages of solution development and implementation, forms an essential aspect of raising the adaptation and mitigation ambition in the ASEAN region*

MOTIVATE

- *Various stakeholders need to be motivated to take appropriate adaptation and mitigation actions through a range of incentives (finance, technology, or others) and policy provisions that can enable stakeholders to act*
- *Capacity building is an essential part of the motivation to act, while it has also been incorporated into the ACQUAINT group due to its close linkage with knowledge and skills*

Source: ASEAN Secretariat

(b) The ASEAN Plan of Action for Energy Cooperation (APAEC) for 2021–2025

ASEAN's regional energy cooperation has entered its second phase. The ASEAN Plan of Action for Energy Cooperation (APAEC) 2021-2025 maps out 7 strategies to enhance energy security and sustainability. The energy choices will still depend on fossil fuels with plans to:

1. develop a **common gas market** for ASEAN by enhancing gas and LNG connectivity and accessibility;

2. optimise the role of **Clean Coal Technology (CCT)** and **Carbon Capture Utilisation and Storage (CCUS)** to accelerate the energy by way of adding to coal capacity from CCT of around 46 GW bringing the total installed capacity to 56 GW by 2040 due to the abundant supply of coal in the region and its affordability[38].

3. To increase renewable energy share in the Total Primary Energy Supply (TPES) to 23% by 2025 in the ASEAN energy mix including increasing the share of renewable energy in installed power capacity to 35% by 2025[39].

4. Promote regional initiatives to enhance human resource capability on nuclear science and technology for power generation in the civilian nuclear energy sector.

(c) ASEAN Comprehensive Recovery Framework (ACRF) 2020

Impacted by the onslaught of the COVID-19 pandemic, ASEAN adopted the ASEAN Comprehensive Recovery Framework (ACRF) at the 37th ASEAN Summit[40] in November 2020. The framework also has one of the five broad strategies focused on "sustainability and resilience" that includes the transition to sustainable energy sources.

(d) ASEAN Economic Community (AEC) Blueprint 2025

The second ten-year blueprint on ASEAN's economic development agenda was released in 2015 as ASEAN announced the formation of the ASEAN Economic Community.

The ASEAN Economic Community (AEC) Blueprint 2025's provision on climate aligned measures are outlined in sections B8 on sustainable economic development and C4 on the energy sector that included the promotion of clean coal technology (CCT).

All these frameworks show that the energy choices of ASEAN are still fossil fuel heavy despite the latest trends that show renewables are the long-term solutions that ASEAN needs.

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[38] ASEAN, ASEAN Plan Of Action For Energy Cooperation (Apaec) 2016-2025 Phase Ii: 2021-2025, p. 24, 2020
[39] ASEAN, ASEAN Plan Of Action For Energy Cooperation (Apaec) 2016-2025 Phase Ii: 2021-2025, p. 6, 2020
[39] ASEAN, *ASEAN Comprehensive Recovery Framework* November 12, 2020.

(e) Challenges

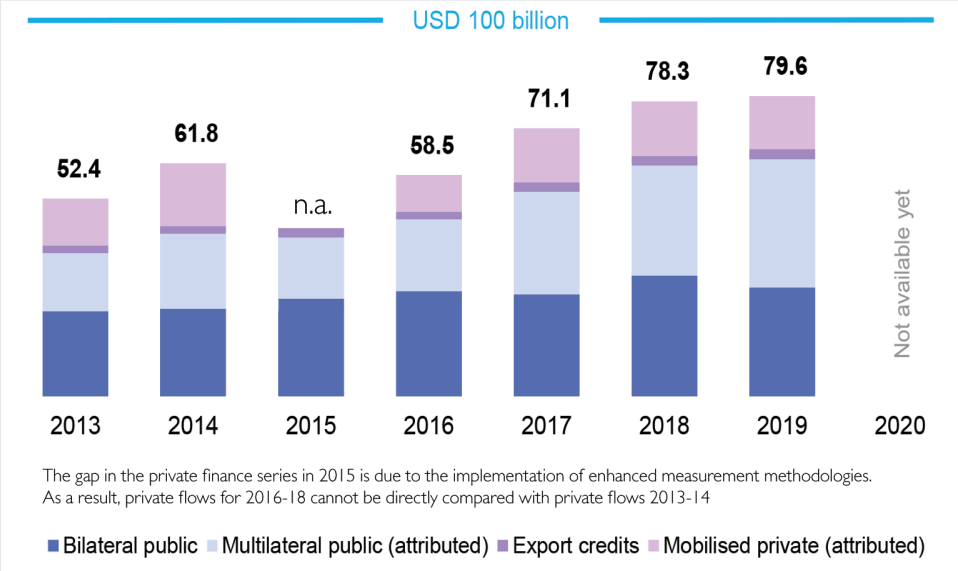
(i) Finance gap

Apart from the technical capacity building that requires technology transfers, the single most crucial gap in ASEAN's climate mitigation and adaptation goals is financial assistance that will make or break the decarbonisation mission, particularly funding pledged by the developed countries to help developing countries. Already, many of ASEAN's NDCs targets are hinged upon the availability of financial assistance and international capacity building assistance.

On the eve of Conference of Parties (COP) 26 in Glasgow, reports on the provision and mobilisation of climate finance recently released have amplified the perception that developed countries have missed the US$100 billion goal in 2020.

The OECD estimates that total climate finance reached US$79.6 billion in 2019 (Figure 11)[41] and estimates and estimates that the US$100 billion will not be reached until 2023[42]. In October 2021, Canada and Germany published a Delivery Plan on the US$100 billion goal, confirmed that the goal was missed and assessed it would be reached in 2023[43].

Figure 11: Climate Finance for developing Countries (US$)



Source: OECD

Similarly, Oxfam International's analysis shows that poorer countries are expected to face up to a shortfall of US$75 billion in climate finance[44]. Despite the US pledging to double its contribution to US$11.4 billion by 2024 and Canada and Germany increasing their finance pledges, the rest of the rich nations (including France, Australia and Japan, Italy, Spain and the Netherlands) have yet to increase their contributions prior to COP26.

41. OECD *Climate Finance Provided and Mobilised by Developed Countries: Aggregate Trends Updated with 2019 Data,* p. 6, September 2021
42. OECD, *"Forward-looking Scenarios of Climate Finance Provided and Mobilised by Developed Countries in 2021-2025 Technical Note"* 25 October 2021
43. Wilkinson, Flasbarth, *"Climate Finance Delivery Plan: Meeting The Us$100 Billion Goal"* 25 October 2021
44. Oxfam International, *Poorer nations expected to face up to $75 billion six-year shortfall in climate finance: Oxfam* 20 September 2021

The failure of the rich countries to deliver their rhetoric is most staggeringly dwarfed when compared with the fiscal recovery packages rolled out due to the pandemic. In 2020, the EU, UK, US, Canada, Australia and Japan combined have spent more than US$15 trillion on COVID-19 fiscal recovery packages which is over 151 times of meeting the climate finance goal of US$100 billion (Figure 12). Not only that, total global military spending rose nearly 20 times more than the climate finance goal since 2019 to just under US$2 trillion[45].

Figure 12: Total Spending On Covid-19 Fiscal Measures (US$ Billion) Of Selected Economies In Relation To US$100 Billion Climate Finance Goal

Country	Total Spending on COVID-19 fiscal measures (US$ billion)	Equivalent to meeting the $billion climate finance goal X times
EU (total)	5,527.40	55
EU (national spending)	4,166.02	42
EU (central fund)	1,361.38	14
Australia	273.89	3
Canada	326.06	3
Japan	2,559.90	23
UK	892.95	9
US	5,838.30	58
EU, UK, US, Canada, Autralia & Japan	15,118.50	151

Source: Oxfam International

Delivering a credible US$100 billion package has a profound impact on the leadership of developed countries and the developing countries' capability to migrate away from fossil fuels dependency that will be otherwise severely hampered.

(ii) Fossil fuel finance

The urgency to gain access to and increase climate finance in order to help poorer nations transition migrate away from fossil fuels cannot be more desperate than the trajectories that all nations must pursue, as highlighted by the International Energy Agency to align with the 1.5°C scenarios[46]. The agency calls for drastic actions such as:

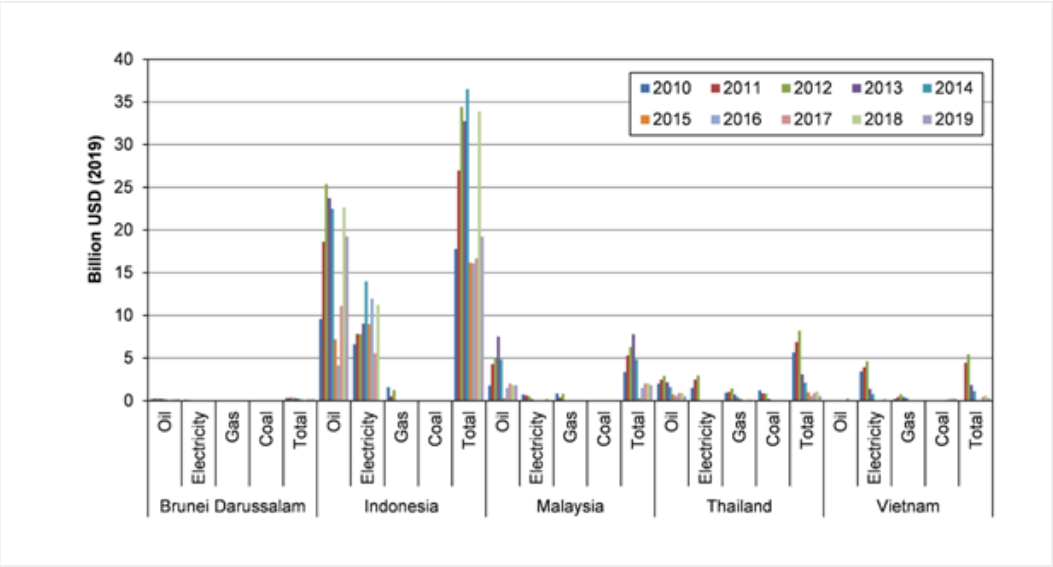
[45] Oxfam International, *Poorer nations expected to face up to $75 billion six-year shortfall in climate finance: Oxfam,* 20 September 2021
[46] International Energy Agency, *Net Zero by 2050: A Roadmap for the Global Energy Sector,* p.20, May 2021

- 2021
    1. No new oil and gas fields and no new coal mines or mine extension
    2. No new unabated coal plants
- By 2025
    1. Ending sales of fossil fuel boilers
- By 2030
    1. Universal energy access
    2. All new buildings are zero-carbon-ready
    3. Phase-out of unabated coal in advanced economies
    4. 60% of global car sales are electric
- By 2035
    1. Net zero emission electricity in advanced economies
    2. No new internal combustion engine car sales
    3. 50% of heavy truck sales are electric
- By 2040
    1. Global electricity is net zero emissions
    2. All unabated coal and oil power plants are phased out
- By 2050
    1. Almost 70% of global electricity is generated from solar PV and wind

Although international climate finance flows to the ASEAN meant for both adaptation and mitigation accounts for US$ 3.2 billion per annum and reaches US$ 6 billion per annum including projects with climate co-benefits (UNFCCC, 2019) counted[47], significant subsidies, though on a declining trend, were still channeled to fossil fuels, especially oil (Figure 13).

[47.] ASEAN, *ASEAN State of Climate Change Report, p.74,* 2021

Figure 13: Fossil Fuel Subsidies in selected ASEAN countries



Source: ASEAN

(iii) Missing links: SMEs's transition

In the context of the climate agenda and trade in ASEAN, micro-, small, and medium-sized enterprises (MSMEs) that make up 97% to 99% of business in ASEAN employing 60% to 80% of workers are ill prepared for the transition to a low carbon economy. As larger companies and corporates, as well as financial institutions are adjusting to the ESG (Environment, Social and Governance) standards, many MSMEs that form part of the supply chains of these firms have yet to be equipped with the necessary preparations to decarbonise. More so when the region is putting great emphasis on the digital transformation induced by the COVID-19 pandemic.

COVID-19: An opportunity for reset

The COVID-19 pandemic has compelled governments around the world to take drastic economic measures. ASEAN had authorised over US$730 billion worth of stimulus spending as of 28 May 2021, about 7.8% of total combined GDP. In addition to that, several ASEAN countries (Cambodia, Indonesia, Lao PDR, Myanmar, the Philippines and Thailand) have also relied on lending from multilateral development banks for a total of US$15.6 billion[48].

A series of reports released by CARI in Jan 2021 found that there were minimal finance flows channeled to climate aligned measures, whether in in stimulus spending, taxation, national budgets, investment and jobs,[49] pointing towards a missed opportunity for green recovery.

Despite the challenges mentioned in this report, there are compelling reasons to accelerate climate actions besides push factors such as risks and vulnerabilities.

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[48] Martinus, *Seah, ASEAN's COVID-19 Recovery Measures: Missing Opportunities for a Green Future, p.2* Yusof Ishak Institute
[49] CARI ASEAN Research and Advocacy, *Policy Brief: Greening ASEAN Series* Jan 2021

(i) Investing in a low carbon future is worth pursuing

The ADB argues that the case for investing in low carbon transition is well justified, based on the following reasons:

- **Eventual climate benefits outweighing initial investments for decarbonisation:** Although substantial initial investment is required for ambitious climate stabilization, such investment will result in greater benefits due to climate change being averted, far outweighing costs associated with global climate solution cooperation.

- **Cost savings from fuel subsidies:** The net costs of low-carbon transition alone are lower as a proportion to GDP than subsidies needed for fossil fuel, without considering the benefits deriving from climate change mitigation cooperation[50].

(ii) Renewables costs undercutting fossil fuels

According to the latest findings, the cost of renewable energies such as solar and wind have plunged 85% since a decade ago and are now undercutting fossil fuels as the cheapest options of energy. The International Renewable Energy Agency (IRENA)'s report shows that 62% of the wind, solar and other renewables in the market in 2020 are cheaper than the cheapest new fossil fuels[51] and an estimated savings of US$156 billion could be beneficial to emerging economies[52].

(iii) Unlocking the US$26 trillion new climate economy potential

The potential of a low carbon economy has not been fully explored. The Coalition of Finance Ministers for Climate Action under the World Bank Group and IMF with 65 member countries including 3 ASEAN countries, namely Indonesia, Malaysia and the Philippines, recognized that the new climate economy could unlock US$26 trillion global investments and create 65 million more jobs through 2030[53] as estimated by the Global Commission on the Economy and Climate[54]. At the sixth ministerial meeting held in Oct 2021 co-chaired by Indonesia Finance Minister Sri Mulyani Indrawati, the Coalition highlighted the critical need to mainstream climate into economic and financial policies and emphasized the critical role of finance ministries in addressing the climate crisis[55].

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50. David A. Raitzer et al, Asian Development Bank. *Southeast Asia And The Economics Of Global Climate Stabilization pp.xv, xxii* 2015
51. World Economic Forum *Renewables were the world's cheapest source of energy in 2020, new report shows* July 2021
52. IRENA, *Majority of New Renewables Undercut Cheapest Fossil Fuel on Cost* June 2021
53. *Coalition of Finance Ministers for Climate Action, 2021*
54. Global Commission on the Economy and Climate *Unlocking The Inclusive Growth Story Of The 21st Century: Accelerating Climate Action In Urgent Times* Aug 2018
55. World Bank, *Sixth Ministerial Meeting of The Coalition of Finance Ministers for Climate Action Press Release* Oct 2021

Conclusion: The way forward

As we take stock of new pledges made at the COP26 just concluded in Glasgow, the global community and ASEAN must waste no time in accelerating policy alignment towards climate mitigation and adaptation in tandem with preserving economic resilience.

First, we must recognise that climate change is an existential threat and drastic actions must be pursued **now** to keep the 1.5oC goal within reach.

Secondly, the COVID-19 pandemic is the best and probably the last opportunity for ASEAN to aim for a fundamental reset as governments continue to stimulate economic recovery from the COIVD-19 pandemic.

Thirdly, carbon reduction and fossil fuel reform are critical in ensuring that we achieve the 45% emissions reduction by 2030. Although ASEAN has laid out regional aspirations to collectively steer the region towards climate resilience, the region will still heavily rely on fossil fuels for its energy supply and these aspirations will have limited impact on GHG emission cuts, especially when each country has its own unique national circumstances and policy priorities to consider. The clarity of incorporating per-capita emissions, climate equity, historical emissions and carbon credit in the overall carbon emissions evaluation in a structured manner is imperative to prevent push back from developing countries due to it being a "touchy subject" among developing countries.

Fourthly, actions speak louder than words. The developed countries must demonstrate credibility and trust by not only delivering pledges made but also by increasing their financial contribution to climate finance, in view of the costly transition needed to achieve net zero goals. Indeed, at the COP26 ASEAN has called for developed countries to not only fulfil the pledges of US$100 billion but also scale up its mobilisation of climate finance from the floor of US$100 billion by considering developing countries' needs before initiating deliberations on setting up of new collative quantified goals . Failing which the credibility of the developing countries would be at stake in commanding other nations to heed the net zero calls.

And **finally,** an effective, inclusive and transparent climate diplomacy that engages both the global north and global south countries is extremely paramount to stem out greenwashing and green-shaming that stand in the way of the road to a climate resilient future for ASEAN and the global community.

[55] ASEAN, ASEAN Joint Statement On Climate Change To The 26th Session Of The Conference Of The Parties To The United Nations Framework Convention On Climate Change (UNFCCC COP26) Nov 2021

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The Institute for Democracy and Economic Affairs (IDEAS) is a nonprofit research institute based in Malaysia dedicated to promoting solutions to public policy challenges. Our vision is :

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