Digital as a Key Enabler for Climate Action

The Association of Southeast Asian Nations Perspective

Introduction

As an addition to our global study "The Road to Sustainability: Digital Technologies as a Key Enabler for Climate Action," this **regional chapter** further explores how digital technologies can be leveraged to meet the challenge across the three pillars of climate action (Mitigation, Adaptation & Resilience, Setting Foundations). As one out of six regional deep dives, this chapter is intended to adapt global recommendations to the local context and distinct regional dynamics of the **Association of Southeast Asian Nations (ASEAN).**

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Climate Action in ASEAN – the current state

As the coming years will have the greatest influence on future climate stability, there is little time left to deploy and implement climate protection actions. One key component, though not sufficient on its own, is the reduction of greenhouse gases (mitigation) to meet the Paris Agreement commitments to **limit overall global warming to 1.5°C.**

ASEAN member states have established Nationally Determined Contributions (NDCs) resulting in a 16% GHG emissions increase by 2030 compared to 2010 levels, **falling short of the required 45% reduction for the 1.5°C target.[1]** Many countries in the region have yet to align their strategies with carbon neutrality and net zero goals, creating a significant gap between their commitments and the 1.5°C target.[2]

For instance, Indonesia's NDC goal of a 29% GHG reduction by 2030, and a long-term target of net zero by 2060, 10 years later than the global 2050 goal, necessitates accelerated decarbonization and increased renewable energy adoption.[3] In contrast, **Singapore,** with constraints like limited renewable options and a carbon-intensive economy, is **committed to reaching net zero emissions by 2050** and reducing emissions to around 60 MtCO2e by 2030, employing a whole-of-economy approach through the Singapore Green Plan 2030 to engage all sectors and stakeholders in the transition to a low-carbon future.

The current climate trajectory, under existing policies, predicts increased energy demand, fossil fuel imports, and emissions in the ASEAN region. **Energy demand has surged by over 80% between 2000 and 2019[4] due to rapid economic growth, and** this trend is expected to continue with a threefold increase by 2050 compared to 2020 levels.[5] Fossil fuels currently make up about 80% of the regional energy mix,[6] a reliance that is projected to persist, with oil expected to constitute 47.4% of final energy consumption by 2050, followed by electricity (20.3%), coal (14.5%), and bioenergy (9.2%).[7] Power generation accounted for 40% of CO2 emissions in Southeast Asia in 2020.[8]

The economic impact of climate change is keenly felt across ASEAN member states, with worsening extreme weather events, rising sea levels, and the spread of tropical diseases. **Projections suggest that by 2100, climate change could reduce ASEAN's GDP by 11%[9] and, without mitigation measures, the region could lose 37.4% of its current GDP by 2048, making it the most vulnerable market in Asia.** Notably, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam, which contribute over 90% of ASEAN's total GHG emissions[10] and rely heavily on agriculture and coastal activities, are exceptionally susceptible to climate change impacts.

Case Study

With the increasing threat of climate change amplifying natural disasters, **Google has leveraged AI to address the devastating impacts of flooding, which annually affect over 250 million people and results in around $10 billion in damages.** Google's AI-powered Flood Hub provides hyper-local flood forecasting to 80 nations including ASEAN countries such as Sri Lanka, Myanmar, Thailand, Laos, Vietnam and Cambodia, covering 460 million individuals in total, and delivers advanced warnings up to seven days before potential flood events. By combining data from diverse sources like satellite imagery and weather forecasts, the **technology aims to accurately predicts flood-affected regions and flood severity.** Initially launched in India and Bangladesh, its success has led to a global expansion, now reaching other territories with high flood risks. Through strategic partnerships, Google also ensures that even those without internet access receive these critical flood alerts, emphasizing their commitment to harnessing technology for global safety in the face of climate change.

In light of these climate challenges, there is a recognized need for a sustainable financial framework in the ASEAN region that balances emission reduction, mitigation, and climate adaptation. The **ASEAN Taxonomy for Sustainable Finance,**[11] which assesses the sustainability of economic activities, is a key policy initiative promoting a shift to a low-carbon economy and is aligned with the Paris Agreement and Sustainable Development Goals. However, additional frameworks like carbon pricing,[12] green bonds,[13] blended finance, and public-private partnerships are essential. Indonesia's leadership in thematic bond issuance and carbon pricing serves as a noteworthy example, and the financial sector must further integrate climate action into everyday operations, clarify green taxonomies, and improve access to finance for a more sustainable and resilient ASEAN region.[14]

Climate and digital progress are interconnected global challenges. Digital technology offers innovative and sustainable solutions aligned with climate goals. In the ASEAN region, governments are seen as catalysts for efficient markets in digital climate solutions, but the effectiveness of regional cooperation depends on member states adopting leadership roles rather than just being members. This underscores the importance of individual countries managing their internal affairs to create stable societies, and governments capable of effective regional cooperation.

The ASEAN region is facing escalating climate concerns and needs urgent and collaborative efforts to align with global climate goals for a sustainable future. **Integrating digital solutions can play a crucial role in bridging disparities and driving holistic sustainability.** Standardizing data transfer across the region will enhance communication, enabling efficient sharing of insights and innovations and ultimately boosting the collective capacity to address climate challenges. To make meaningful progress, ASEAN have a clear interest to shift from isolated efforts to unified regional cooperation, this being a prerequisite for success.

Case Study

Ayala Corporation's social enterprise, **Treedom**[15] (in partnership with Globe Telecom), emphasizes transparency and connection in its climate adaptation efforts. By planting over 3.5 million trees in agroforestry systems, it prioritizes coexistence between trees and crops, benefiting local farming communities. The unique approach involves meticulously **photographing and geotagging each tree,** ensuring the health and growth of the saplings. This data is then verified, archived, and shared publicly, reinforcing transparency. Despite the challenges of tracking millions of trees, Treedom's efforts represent a robust commitment to climate adaptation and community engagement.

Climate KPIs ASEAN

Measure	Unit[16]
Climate Indicators	
Expected rise in average surface temperatures in a business-as-usual scenario	3.5
Expected rise in average surface temperatures if all NDCs are achieved	1.0
Activity Indicators	
Absolute emissions per year (MtCO2e)	342.2
GHG per capita (tCO2e)	8.4
Projected emissions in 2050 if all NDCs are achieved (MtCO2e)	1907.0
Renewables in energy mix (%)	25.9%
CO_2 captured in carbon capture schemes (tCO2e)	NA
Average yearly economic damage due to extreme weather (in billion USD)	1.187

The burning issues

Drawing on comprehensive discussions with a diverse range of stakeholders, three paramount issues have been pinpointed that, when addressed collectively, hold the key to propelling sustainable progress and equitability in the ASEAN region.

Bridging the Technological Divide

The challenge of equitable technology distribution looms large. While the world speeds ahead with novel innovations, groups such as low-income communities, rural populations, and other underserved segments have yet to leverage basic digital tools that can transform their lives, resulting in intensifying societal disparities.

Harmonizing Policy for Collective Resilience

ASEAN should consider developing a harmonized regulatory framework while recognizing the economic disparities among its members. This approach ensures both regional alignment in climate policies and consideration of individual nations' needs.

Partnerships for Unified Data Governance

Ensuring interoperability of data policies across jurisdictions will facilitate smoother data flow, necessitating enhanced collaboration between industry and policymakers.

Digital Transformation and Innovation

ASEAN's digital transformation holds significant promise for the region's growth. The ASEAN Digital Integration Index[17] (ADII) identifies digital skills and talent as an area for improvement among six digital integration benchmarks. While the burgeoning digital economy is poised to propel ASEAN's regional integration, it also underscores **a pressing demand for digital professionals with specialized skills.** For instance, Singapore requires a 55% increase[18] in its digital workforce by 2025, while Indonesia needs an additional 600,000[19] digital talents annually until 2030. A Malaysian survey revealed that less than 5% of the private sector believes the current labor market meets their digital talent needs.[20] Moreover, the World Digital Competitiveness Ranking 2022[21] indicates a disparity in digital maturity among ASEAN nations, with four members in the bottom 50% of 63 countries assessed, with only Singapore ranking in the top 20%.

Recognizing the potential of digital technologies to enable climate action, it is estimated that today's digital technologies, if well optimized and applied widely, could reduce up to 20% of total emissions.[22] The positive impact results from their ability to better connect and communicate, thus enabling better **monitoring and tracking** and providing us with software that can **analyze, optimize, and predict,** and supporting us through **augmentation and autonomation.** To fully harness the benefits of digital transformation for climate resilience in ASEAN, there's a pressing need not only to elevate digital skills, talent, and maturity, but also to implement strategic digital initiatives in climate monitoring, infrastructure, and innovation.

From our comprehensive interviews and the synthesis of diverse opinions, three clear priorities have emerged that are instrumental to harnessing the power of digital transformation for climate resilience:

- **Develop an Integrated Digital Climate Monitoring System:[23]**
  By leveraging IoT, satellite imagery, and AI analytics, a centralized platform can provide real-time climate monitoring, offering early warnings for events like typhoons and enabling data-sharing and coordination.

- **Expand Broadband and Cybersecurity:[24]**
  Enhancing broadband in underserved areas ensures universal access to digital climate solutions, while a robust cybersecurity framework protects system integrity.

- **Incentivize Green Tech Hubs:[25]**
  By offering incentives to green tech start-ups, governments can fast-track digital solutions for climate challenges, spurring economic growth in the sustainability sector.

Case Study

Singapore Power (SP) Group's[26] innovative approach to district cooling and smart grid technology is redefining energy management in Singapore and Southeast Asia. As the region's leading district cooling operator, SP Group's Marina Bay network, the world's largest underground system, serves as a central hub, **offering real-time system performance views across various sites.** This integration, coupled with the Computerized Maintenance Management System (CMMS), **ensures high reliability and zero-downtime.** Furthermore, their Green Energy Tech (GET) suite leverages IoT, AI, and digital insights, enabling smarter utilities management. By facilitating data-informed decision-making, SP Group's solutions optimize energy efficiency, reduce emissions, and empower customers with smart solutions to achieve their green targets.

Climate Forward Government

Governments can effectively handle risks and challenges in environmental action by **setting goals** and **creating a flexible framework to achieve them.** Looking at the overarching policy goals, local priorities can, and should, be defined so that practical, holistic plans can be designed and executed.

Local Policy Goals

1. Facilitating Cross-border Data Sharing

While ASEAN has a voluntary digital data governance framework in place,[27] variations exist in how member nations implement cross-border data regimes. Cross-border data sharing not only deepens our understanding of regional climate patterns and challenges but ensures that solutions are data-driven and tailored to specific needs.

2. Encouraging Regional Cooperation and Ownership

Through collaborative initiatives, member states can share best practices, learn from each other's successes and challenges, and develop unified strategies. This not only magnifies the impact of individual efforts but also fosters a sense of shared responsibility and commitment towards a sustainable future.

3. Ensuring Equitable Access to Data and Innovative Technologies

The power of digital technology in climate action is only as strong as its reach. For digital technology to truly amplify our efforts in climate action, it must be a tool in the hands of many, not just a few. Be it in urban skyscrapers or rural landscapes, ensuring everyone has access to data and cutting-edge technologies ensures that all corners of our society can contribute to and benefit from sustainable solutions.

World Bank

The World Bank's commitment to data stewardship reflects a collaborative strategy for global impact. Through the "Digital Development Partnership," the World Bank facilitates collaboration between the public and private sectors, fostering inclusive digital transformation in developing nations. This initiative aids these countries in formulating and implementing digital development strategies across various sectors, including digital governance and the expansion of internet accessibility. Simultaneously, the "Climate Data Warehouse" is at the forefront of building digital infrastructures to enhance transparency in carbon markets. Through projects like the Climate Action Data (CAD) Trust metadata platform and digital MRV systems, the World Bank demonstrates its dedication to innovative solutions, promoting integrity and knowledge-sharing in the global climate landscape.

In the context of Indonesia, the World Bank, in collaboration with the Government of Indonesia (GoI), is actively promoting the Sustainable Landscape Management Program. This program aims to enhance livelihoods, preserve biodiversity, and reduce deforestation and carbon emissions. By combining investment, technical assistance, performance-based payments, and advanced analytics, the initiative particularly focuses on mitigating deforestation and forest degradation.

Digital Tech Policy

In presenting the potential policy measures for achieving these goals, the Digital Sprinters Framework by Google offers a structured approach. This framework defines four primary categories:

Infrastructure, People, Market Environment and Tech Innovation. Each category addresses specific policy aspects that can facilitate sustainable and inclusive economic growth while harnessing the power of digital transformation.

Infrastructure

- **Prioritize national digital infrastructur**e such as National Digital Identification to ensure robust Network Availability and Connectivity for an inclusive digital ecosystem.

- **Bridge the tech maturity gap** by providing digital products and services to communities that are under-served or at risk, ensuring no one is left behind.

- **Enhance infrastructure scalability** to take advantage of synergies and efficiencies from a wider network of involved participants and assets, reaching more individuals and corporations who would benefit from such infrastructure.

People

- **Visibility in data translates to inclusion,** meaning all demographics should be accurately represented in census-level data for informed decision-making by policymakers.

- **Leverage digital platforms to convey** data-driven insights of climate change, emphasizing the interconnectedness of individual, institutional and societal action. Highlight how each person's actions impact the collective, and reciprocally, how collective behaviors influence individual outcomes.

- **Empowering local leadership for capacity building** and initiating localized campaigns. This fosters a deeper understanding of climate change issues within respective communities, thereby bridging the gap between abstract global issues and tangible local impacts.

SP-EDF Partnership on Subsea Cable[28]

The SP Group partnered with French energy company Électricité de France (EDF) Group to codevelop a subsea transmission cable to **import renewable energy from Indonesia to Singapore.** The first stage of the project begins with developing a 1,000 MWp solar photovoltaic plant by a consortium led by EDF's subsidiary, EDF Renewables, to supply renewable energy along the subsea cable. Future plans are in place to expand the interconnection to other clean energy generation sources in Indonesia to improve economies of scale.

Market environment

- **Advocate for a whole-of-economy approach,** recommended as a best practice for Nationally Determined Contributions (NDC) to offer a cohesive and collaborative response with the potential to deliver more impactful and scalable solutions than isolated sectoral initiatives. Within the ASEAN bloc, Singapore sets a precedent and serves as a beacon for its fellow ASEAN nations, exemplifying a path that can be considered for more comprehensive and effective climate action.

- **Adopt an incentive-based approach** to accelerate the just transition by establishing enabling funds or providing incentives (i.e. tax breaks, subsidies, or preferential access to markets). This approach fosters greater collaboration and innovation in addressing climate challenges, potentially offering a more effective solution compared to direct taxation methods like the carbon tax. For example, the Asian Development Bank (ADB) has been at the forefront, promoting its Energy Transition Mechanism[29] in various Southeast Asian nations like the Philippines, with the aim of helping companies such as AC Energy retire coal plants and invest in renewable energy.

- **Promote collaboration between governments, the private sector, and research institutions** to overcome digital gaps for climate adaptation projects in vulnerable or remote areas.[30]

- **Review current national and regional policies** and strengthen cooperation among ministries to ensure they adhere to and promote climate action goals.

- **Prioritize comprehensive data governance policies and bolster cybersecurity measure**s to ensure data protection and responsible use, fostering trust and encouraging the seamless integration of digital innovations across sectors.

Tech Innovation

- **Facilitate connections with industry experts,** host startup-centric events and competitions, and offer comprehensive support to foster tech innovation and growth.

- **Establish and enhance financing mechanisms for climate tech enterprises** through provision of subsidies, grants, and R&D funding, especially for early stage companies in the pre-revenue or pre-product phase.

- **Enhance interoperability of public sector digital platforms** to facilitate seamless integration, improve service delivery, and foster a collaborative ecosystem.

Industry perspectives

Having identified what to do, and how to do it, the next question is where to start. Based on current emission levels and the expertise of interview partners, a special focus on implementing digital technologies leveraging climate action should be placed on the following three key industries: **Energy, Transportation, and Agriculture.**

Industry	Recommendation[31]	Specific action	Priority
Energy	Generation of renewable energy	Implement policies and regulations to promote renewable energy adoption, energy efficiency, and emission reductions (e.g., feed-in tariffs, renewable energy targets, carbon pricing mechanisms)	High
		Invest in renewable energy infrastructure, such as solar, wind, hydroelectric, and geothermal power projects to increase the share of clean energy	Medium
	Smart grid and energy storage	Implement smart grids and energy storage systems to improve integration of intermittent renewable energy sources, enhance grid stability, and ensure efficient energy distribution	Medium
Transportation	Transition to EV	Provision of subsidies, incentives, and charging infrastructure to support electric vehicle adoption	Medium
Agriculture	Sustainable farming techniques	Invest in and develop digital tools such as analytics platforms using real-time data and geospatial analytics to boost production efficiency	High

Conclusion

The importance of a robust digital infrastructure cannot be overstated, as it ensures equitable access, inclusivity, and environmental consideration. **With data-driven insights, both individual and collective actions can be synergized to confront climate change,** weaving global concerns into local narratives. It is encouraging to witness sustainable agricultural practices gaining traction in the ASEAN region, underscoring the need for further innovation and understanding. **The integration of IoT and other advanced technologies presents an enormous potential to revolutionize sectors like agriculture and energy.** However, the true challenge lies not just in adopting the latest technologies, but in molding them to address the specific, tangible needs of communities. Collaborative efforts, incentivized policies, and a holistic approach will undoubtedly steer us towards a more sustainable and digitally enhanced future in ASEAN and the rest of the Asia Pacific region.

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