



Southeast Asia's
Green Economy 2021 Report:
Opportunities on the
Road to Net Zero

BAIN & COMPANY 

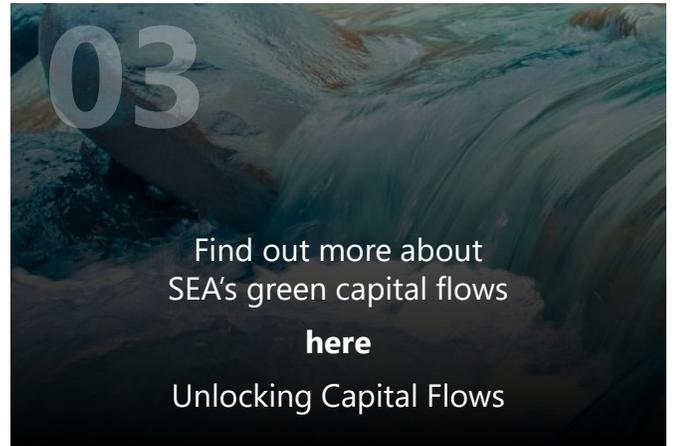
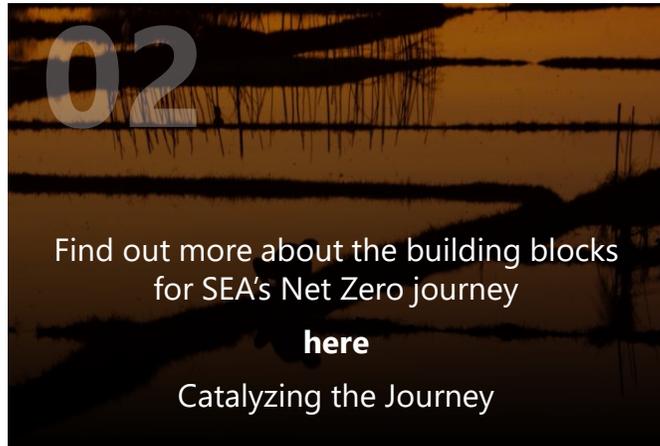
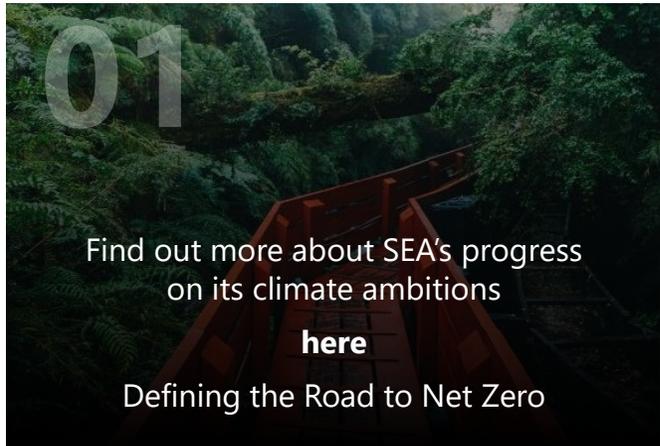
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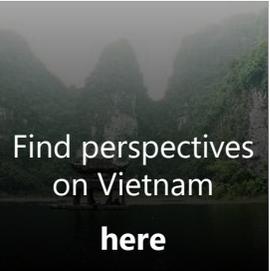
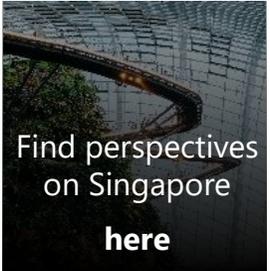
Main report



Deep-dive sections



Country insights



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Reference

The information included in this report should be sourced as “Bain, Microsoft, and Temasek, Southeast Asia’s Green Economy 2021 Report: Opportunities on the Road to Net Zero.”

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The “Southeast Asia’s (SEA) Green Economy 2021 Report: Opportunities on the Road to Net Zero” is jointly produced by a collaboration between Bain & Company, Microsoft, and Temasek. Contributing authors are as follows:

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Acknowledgements

We would like to thank the team who has worked tirelessly to develop this report:

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The insights and content of this report also benefited from the wisdom of >60 leading industry experts across SEA and beyond. The richness and clarity of thought in this report would not have been possible without the thoughtful leadership from these individuals. To all who answered our call, wrote a thoughtful email, or filled out our survey – we owe you our deepest thanks.

Prologue

Last year, we set out on a mission to estimate the value of building SEA's sustainability ecosystem, with the aim of shifting the discourse on sustainability from problem to opportunity. In doing so, we discovered ~\$1 trillion in opportunities for SEA by 2030, providing the first dollar-value estimate of the region's green economy. We also identified clear, high impact areas for businesses and investors to capitalize on while driving forward the sustainability agenda.

This year, we dive deeper into an integral theme of sustainability, one that is considered among the greater challenges humanity has been tasked with solving in modern history – climate action and the race to Net Zero.

Through this report, we highlight the burning platform for immediate and accelerated climate action, as the window to achieve Paris goals narrows. We provide an objective assessment of SEA's progress against climate ambitions and plan, highlight the Net Zero imperatives for SEA along with the commercial opportunities it brings, and map out the landscape of green capital flows in the region. Finally, we suggest tangible individual and collective actions that can make the vision of a sustainable SEA a reality at scale.

Though our focus is on Net Zero, it is important to recognize that climate action cannot be undertaken in isolation. We must consider the interrelationships with the other planetary boundaries of freshwater use, ozone depletion, biosphere integrity, land system change, biogeochemical flows, atmospheric aerosol pollution, ocean acidification, and the release of novel chemicals. We must also do our best to ensure a just climate transition – paradoxically, those who are most impacted by climate

change are also most at risk of being left behind (e.g., coastal and Indigenous communities) as countries transition to low-carbon economies. For a developing region like SEA, climate justice and climate action must go hand in hand.

With complex interconnections unlike any other systemic undertaking in our economic history, charting a strategic path to realize value from the low-carbon economy requires a highly nuanced and holistic approach. We must become Net Zero while also preserving biodiversity, saving our fresh water, and improving the livelihoods of rural communities.

That said, the Net Zero imperative offers significant opportunities to those who dare to push the boundaries of convention. It presents avenues for diverse business segments to create commercial leverage while leading the climate transition. As this report finds, realizing this will require nontraditional thinking and an unprecedented scale of collaboration and co-innovation.

We hope this report begins to paint the picture of both the imperative for climate action as well as the opportunities it brings. Finally, we hope to inspire tangible actions from all sets of stakeholders – business leaders, investors, government officials, or simply the concerned citizen.

Foreword by Bain & Company



Satish Shankar

Regional Managing Partner,
Bain & Company, Asia-Pacific

Climate action is the imperative of this decade. The recent Intergovernmental Panel on Climate Change (IPCC) report reinforced the urgency for action and highlighted the undeniable human element driving the climate emergency. This transition to a low-carbon reality is the largest-scale transformation Bain has helped our clients embark on in our nearly 50-year history. We embrace the challenge.

There is growing recognition of SEA's pivotal role in the global fight against climate change. The region holds some of the most valuable natural capital in our forests, mangroves, and peatlands. Rich in natural resources, such as rice and rubber, SEA is the start of many supply chains – making the decarbonization of SEA a nonnegotiable for multinational corporations (MNCs), who must reimagine their supply chains to achieve Net Zero.

While our potential is vast, SEA risks being left behind if we do not act now. Robust sustainability measurement and reporting is becoming the global mandate and SEA businesses and suppliers, many of whom are small-medium sized enterprises (SMEs), face a real threat if they are unable to keep up. SEA also faces twin challenges of needing to increase economic growth while decarbonizing societies. Thus far, we have not moved fast enough – as this report finds, our latest NDCs¹ are not 1.5°C pathway-aligned, leaving a gap of ~3-4 Gt in 2030. Meanwhile, climate risk to the region is increasing, with real impact on future GDP.²

The imperative to act is undeniable, and the time to leap is now – not only because of the risk that inaction could pose, but also because climate action represents significant opportunities. In SEA, we estimated that ~\$1 trillion economic

opportunities³ could be generated through the green economy, with new growth areas contributing ~6-8% to our region's GDP by 2030.

To capture this opportunity, SEA businesses must lead, not follow. Despite macro factors not within control, corporates must identify the optimal strategic space where they can play an active commercial role while advancing SEA's climate ambitions. This will require unconventional thought and ecosystem-wide collaboration. At Bain, we are helping clients to develop sustainability strategies that are intertwined with their core business ambitions, with tangible actions that lead to results. We observe significant value from embracing sustainability: sustainable brands enjoy a 3x increase in customer loyalty and a 4x increase in household penetration, and employees are 50x more likely to be happy working for purpose-driven companies. We understand the benefits of this firsthand – sustainability is embedded in our DNA. As a company, we have been carbon neutral since 2012 and aim to achieve Net Zero by 2030.

At Bain, we firmly believe that bold steps define the future. We recently launched [Further™](#) – Bain's integrated suite of environmental, social, and governance (ESG) capabilities that brings the full force of our talent, expertise, and energy to create a more sustainable, equitable, and inclusive world. We invite you to join us as we push the boundaries along the road to Net Zero journey and go **Further**, together.

Notes: 1. Nationally determined contributions; 2. Gross domestic product; 3. From new growth areas and efficiency gains, with majority of opportunities having decarbonization impact

Foreword by Microsoft



Sandy Gupta

COO, Vice President of Sales,
Marketing, and Operations,
Microsoft Asia-Pacific

The scientific consensus is clear: the world confronts an urgent carbon problem. The carbon in our atmosphere has created a blanket of gas that traps heat and is changing the world's climate. If we don't curb emissions, and temperatures continue to climb, science tells us that the results will be catastrophic.

At some level, every industry is undergoing sustainable digital transformation. From 5G, cloud computing, and internet of things (IoT) and data – technology has accelerated and transformed the innovation agenda for companies. From digital supply chains that improve business processes and reduce carbon footprints to IoT sensors streaming real-time telemetry for predictive analytics, there is no shortage of examples of how technology can enable ambitious sustainability outcomes. And this is further transformed by start-ups and digital natives who are using artificial intelligence and data to create solutions that are disrupting industries.

That is one of the reasons we are investing in the [SEA Clean Energy Facility](#) (SEACEF) to accelerate deployment of large-scale, innovative, high-impact clean energy projects and businesses in critical SEA markets.

We see businesses in manufacturing unlocking new data-driven insights to cut carbon across their operations and supply chains; retail tracking the carbon footprint of products from farm to fork, field to fiber to consumer, and everything in between to reduce their emissions and deliver purpose-driven products to customers.

The opportunity is here and what this report underlines is the urgent need for public policy, capital investments, technology, partnerships, and demand for a Net Zero future to come together so SEA can push ahead with achieving a sustainable future.

We have a responsibility to protect our most finite resource – the planet. Without immediate and drastic action today, adapting to these impacts in the future will be more difficult and costly.

And Microsoft is doing our part to accelerate the world's transformation to a Net Zero future with Clean Energy Startups and Ecosystem and through our [Climate Innovation Fund](#), committing \$1 billion of capital to invest in meaningful, measurable climate solutions, particularly where the capital need for climate solutions is not being met; supporting technologies that are relevant to Microsoft's core business and that of our customers; and ensuring developing economies and underserved communities benefit from climate solutions. That, and we have been carbon neutral since 2012, but that's not stopping us from committing to being [carbon negative](#) by 2030, and by 2050, will remove from the environment all the carbon the company has emitted either directly or by electrical consumption since it was founded in 1975.

We are one year into a decades-long strategy and while we have made some early progress, we know that one company or organization alone cannot meet the world's climate challenges.

It is our role as leaders, working together as a coalition to bring in our strengths, assets, resources to build a region that is more resilient, equitable, greener, and sustainable for everyone. This is purpose driven technology, where the mission is to collaborate for the greater, common good.

Foreword by Temasek

TEMASEK



Steve Howard
Chief Sustainability Officer,
Temasek

The urgency for climate action has never been greater. The recent IPCC report suggests that we are at imminent risk of breaching the 1.5°C threshold. We are making progress, but we need to urgently step up our efforts in large-scale reductions in emissions to limit warming to 1.5°C.

We cannot afford to wait. If warming continues unabated, global temperatures could rise by 3.2°C by 2050. In this scenario, the global economy stands to lose close to 20%¹ of its GDP compared to a world without climate change by the mid-century. The most impacted regions, in the same scenario, include emerging Asia, with SEA countries projected to lose up to 37%¹ of their GDP. Many view the climate emergency and transition toward a low-carbon economy as the challenge of our generation; we see also the significant value and opportunities it brings. Temasek seeks to catalyze and invest in solutions to these key global challenges.

In SEA, we are seeing promising investible areas emerge, especially across energy and agri-food, as highlighted in this report. Valuing our region's natural capital as a carbon sink and preserving our biodiversity is also critical. To that end, we have established Mandai Nature Fund, in partnership with Mandai Park Holdings, to help wildlife, nature and communities thrive in Asia. Our joint venture with DBS, SGX and Standard Chartered - Climate Impact X - offers a global marketplace for high-quality carbon credits to increase capital flows to nature-based solutions such as reforestation and regenerative agriculture.

Shifts in investor sentiments promise to unlock green capital flow to accelerate the transition. 57% of investors now integrate sustainability in their investing thesis, up from 52% in 2019. Multiple forces are at play, from stakeholder pressures to an emerging recognition of the opportunity. Green fundraising has been on an upward trajectory, with ~150% annual growth in green debt issued since 2016. Capital deployment into green assets by PE/VC funds have also increased by ~50% annually since 2016.

While both green fundraising and capital deployment is picking up in the region, we have a long way to go. Building up the region's sustainable infrastructure in areas such as renewables, electric vehicles and waste management will require some \$2 trillion in investments over the next decade. By contrast, this report finds that only ~\$9 billion has been deployed to green businesses and assets in 2020.

At Temasek, sustainability is central to what we do. We have committed to halve our portfolio carbon emissions by 2030 and to be Net Zero by 2050. We actively seek sustainable solutions from plant-based foods, to alternative energy sources to bring about a sustainable future. The road to Net Zero will not be easy, but it offers significant opportunities for collaboration between private, public, and philanthropic sectors to unlock SEA's full potential.

This report offers an important update on the opportunities for investors, companies, and governments to collaborate and accelerate the transition to a greener economy in the region. I hope that it will provide useful insights and help catalyze further action for our collective sustainable future.

Notes: 1. Swiss Re Institute –
The economics of climate
change: no action not an option
(Apr 2021)

Key takeaways

As the global narrative on climate change shifts from challenges to action, there is growing recognition of the importance of SEA as a critical part of the Net Zero puzzle.

SEA is the start of many supply routes and is home to some of the world's most valuable natural capital sources: ~25% of global investible pantropic forest carbon stock, 19-46% of blue carbon stock, and ~97% of tropical peatland carbon sinks.

SEA investors' mindsets are shifting, and green capital is beginning to flow, but there is a long way to go.

The region needs ~\$2 trillion in infrastructure investments over the next decade for a sustainable transition. In 2020, only ~\$9 billion capital was deployed into green businesses and assets.

SEA has mobilized in the past year, with landmark national announcements and growth in corporate action, but pathways to results remain unclear.

Only 2 SEA countries have Net Zero commitments, robust climate plans are sparse, and carbon prices remain low (~\$4-5 per tCO₂e). The region faces a ~3-4Gt gap to 1.5°C-aligned emissions levels in 2030 based on latest NDCs. While MNCs, government-linked enterprises, regional corporates, and family-run businesses lead the way, SMEs face resource constraints to make the shift.

The playbook to accelerate SEA's path to Net Zero must account for regional nuances and include individual and collective action at an ecosystem level.

All sets of stakeholders – businesses, investors, communities, and governments – are required. Key ingredients for SEA's collective action plan include ecosystem-wide co-innovation, collective transition support leveraging blended financing and public-private partnerships, and regional/cross-border collaboration. Those who lead the charge stand to gain \$1 trillion in economic opportunities by 2030.

We know what needs to be done: ~90% of SEA's emissions are addressable through the energy transition, valuing nature, and the agri-food transformation.

Opportunities exist as we decarbonize SEA's heaviest emitting sectors. Scaling the voluntary carbon markets and leveraging data and digital innovation can further accelerate our Net Zero journey.

Summary by the numbers

Global momentum is growing



+1.5°C

by early 2030s

global warming vs. pre-industrial levels to be exceeded by early **2030s**, according to the latest IPCC report



\$3 trillion

planned green investments

\$3 trillion planned green investments by the world's largest economies and **\$121 trillion** in AUM¹ of investors and funds who have signed the PRI²



27%

SBTi³ companies

SBTi companies make up **27%** of global market capitalization in 2021 vs. **11%** in 2019

The imperative for SEA is clear...



15

climate crises in SEA

15 of 24 climate-linked crises that IFRC⁴ responded to in Asia-Pacific in 2020 occurred in SEA – the most impacted globally. **4** of the 10 countries that were most affected by climate-related disasters from 1999 to 2018 are in SEA, according to Germanwatch's Climate Risk Index (CRI)



17-37%

GDP impact due to climate change

17-37% GDP loss expected for SEA by 2050 (**2.7-4.2%** by 2030) in **2.0-3.2°C** global warming scenarios – the worst globally. At the same time, SEA has heavy economic dependency on resource- and carbon-intensive industries, which represent **>45%** regional economy today⁵



100%

loss of SEA's peatlands by 2030

100% of peatlands and **50%** of forest cover expected to be lost by 2030 and 2050 respectively, at present rates of deforestation and land use conversion

...and there is a lot more to be done



~3-4 Gt

gap to 1.5°C-aligned emissions in 2030

We are not on track and the path to action is not clear: latest NDCs leave a **~2.7-3.7Gt** emissions gap to 1.5°C-aligned levels in 2030, closing the gap from previous NDCs by **11-18%** vs. **68%** for Colombia, **9%** for China, **64%** for the EU, and **71%** for the US



<\$9 billion

deployed to the green economy in 2020

A global arms race is emerging to build the industries of the future, led by the US, Europe, and China. SEA needs **\$2 trillion** in investments over the next decade for a sustainable transition, yet only **<\$9 billion** capital was deployed in green assets in 2020



2

SEA countries with Net Zero commitments

Only **2** countries have Net Zero commitments and **2** have announced or implemented a carbon tax, with prices at **\$4-5** per tCO₂e vs. **~\$20** global average and **\$50-\$100** needed for 1.5°C pathway by 2030. SEA SBTi companies represent **4%** market capitalization vs. **27%** for global

Summary by the numbers

SEA has clear opportunities to accelerate its Net Zero journey



~90%

of SEA emissions from 3 sectors

A small number of sectors are the problem and the opportunity: bold action to accelerate energy transition, value nature, and transform agri-food system can address **~90%** of SEA's emissions and deliver emissions reduction for the wider world



46%

of emissions from energy

46% of SEA's emissions come from energy, presenting opportunity for SEA to leapfrog and pivot to cleaner energy sources: energy efficiency, renewables adoption, grid modernization, and electrification are immediate opportunities while emerging CCUS¹ and hydrogen hold future promise



~25%

of global investible forest carbon

SEA holds some of the world's most valuable natural capital, but this is at risk, with LUCF² accounting for **27%** of SEA emissions. Action today can save **~25%** of the world's investible pantropic forest carbon stock, **19%–46%** of blue carbon, and **~97%** of tropical peatland carbon sinks



15%

of emissions from agriculture

Agriculture forms **~10%** of the region's GDP but is also the source of **15%** of emissions: opportunities exist to empower smallholder farmers with sustainable practices and innovations, as well as build out the region as a global center for ag-tech such as alternative-protein

Key actors are beginning to move



>85%

SEA businesses are family-run

Family businesses, who represent **>85%** of SEA businesses valued at **>\$1 billion**, are moving fast to scale the transition, while SMEs, who make up **~40%** of GDP, face resource constraints in making the shift



78%

MNCs require suppliers to be sustainable

78% of MNCs will remove suppliers that endanger their Net Zero transition by 2025, with SEA being an essential focus: **92%** of rubber, **22%** of semiconductor exports, and many other resource routes including textiles and palm start in the region



57%

SEA investors expect sustainability

Shifts in investor sentiments promise to unlock green capital flow to accelerate the transition: **57%** of investors now integrate sustainability in their investment thesis while **19%** identify as impact investors in 2021 (vs. **52%** and **0%** respectively in 2019)



\$2 trillion

investment required

There is a big need to address, which presents significant opportunity: **\$2 trillion** investments in infrastructure over the next decade is required to enable's SEA sustainable transition

3 key ingredients

to drive collective action at an ecosystem level to achieve a sustainable SEA

1. Ecosystem co-innovation
2. Collective transition support
3. Regional collaboration

~\$1 trillion economic opportunities

Everyone – businesses, investors, governments, and communities – has a role to play. For businesses who lead the action on our path to achieving a green economy, up to **~\$1 trillion** economic opportunities are on the table by 2030

Will you join us on this journey?

Executive summary

This is a moment of transition

A new narrative has emerged around climate action and global actors are responding. SEA is gaining importance as a critical piece of the global Net Zero solution. There is renewed recognition of the untapped potential of SEA's natural capital as carbon sinks, and MNCs who have committed to Net Zero recognize they cannot deliver their climate goals without supporting change in SEA across their local supply chains. Put simply, the world cannot achieve Net Zero without SEA coming along on the journey.

SEA faces additional risks itself. It is one of the regions most at-risk to climate shocks and stands to lose much of future GDP (3-4% negative impact by 2030, translating to ~\$130-\$200 billion in 2.0-3.2°C global warming scenarios) unless it takes decisive and timely action. The region needs to take three steps to accelerate its Net Zero journey:

- 1) Define its road to Net Zero**
- 2) Catalyze the journey and outcomes together**
- 3) Unlock capital and investments**

Our Net Zero plan must be crystalized

Dialogue has changed with Covid-19. Concerns about regional interdependency and resilience have come to the fore, together with greater climate awareness. SEA nations have made notable landmark moves in the past year— Singapore launched its National Green Plan, Indonesia announced a 2060 Net Zero commitment, and the ASEAN Taxonomy Board began work on a regional sustainable finance taxonomy, to name a few.

The region's businesses are also mobilizing. Regional champions, government-linked corporations, and MNCs are all coming to the table, driven by internal values, self-interest and external pressures. Family-owned businesses, who make up >85% of SEA businesses valued at >\$1 billion, are poised to play a pivotal role in accelerating the transition and new investment.

Yet SEA is not on track. The region's latest climate NDC commitments improve on 2015's reduction targets by only ~0.5–0.6 GtCO₂e by 2030, leaving an estimated gap of ~3 GtCO₂e (conditional) to ~4 GtCO₂e (unconditional), to achieving promised emissions reductions in line with Paris Agreement's 1.5°C goals.

Yes, allowances must be made. SEA has been hard hit by Covid-19: the region's GDP growth was 7.8% pt. lower than forecasted in 2020. Many SEA businesses remain in survival mode, with little extra resources available to focus on sustainability. SMEs, who form ~40% of the region's economy and ~75% of the workforce, are hard hit.

As a resource-rich, developing region, SEA faces unique issues for change. Critically, SEA needs to balance the climate transition with socioeconomic needs and a reliance on fossil fuels for energy security. However, we also have significant opportunities: a vast amount of valuable natural capital and potential renewable energy sources, corporate structures that can move fast and effectively scale sustainability, and a growing appetite for co-innovation and collaboration across sectors and organization types. All this is needed to address SEA's sustainability challenges.

Challenges aside, SEA needs to take climate action now and define the right pathway that accounts for its own constraints, point of departure, and human needs.

Executive summary

The road to Net Zero presents clear opportunities for SEA

Together, the energy transition, valuing nature, and transforming our agri-food system could address up to **~90% of the region's emissions** while unlocking new economic opportunities and industries of tomorrow.

Energy transition:

Reshaping the region's ecosystem from resource extraction to electrification is one of the largest challenges SEA has ever faced. Immediate opportunities lean toward driving energy efficiency and renewables (e.g., solar, wind), scaled by grid modernization and electrification, and on the horizon, rethinking transport, emerging carbon capture technologies and hydrogen innovations.

Valuing nature:

Nature is one of SEA's largest and most undervalued resources; the global movement to "better price" nature offers a material opportunity for SEA investors and businesses enabled by tech and financial innovation to scale protection of SEA's vast resources to realize potential as global carbon sinks and biodiversity banks.

Agri-food transformation:

Agriculture is the other backbone of SEA's economy but is also a source of significant emissions and other environmental impacts. Opportunities exist to empower smallholder farmers with sustainable practices and innovations that also improve productivity, as well as build out the region as a global center for food tech, e.g., alternative-protein.

We see two critical enablers to accelerate our journey:

Scaling the region's voluntary carbon markets will accelerate SEA's decarbonization by pricing carbon while incentivizing the protection of our natural capital and contributing socioeconomic benefits to the region. SEA holds immense potential, particularly in nature-based solutions. By 2030, ~\$10 billion in revenue opportunities could be realized across the value chain.

The growing "green data revolution" is also a major catalyst for scaling climate impact. Thematic changes such as the democratization of data, advanced predictive models, and growing cross-sector co-innovation are enabling us to push boundaries at a pace we never imagined possible. There are green shoots in digital innovation taking place in SEA, with the development of Singapore's digital twin for climate resilience modelling and geospatial mapping of SEA forests for better conservation as prime examples.

Executive summary

Unlocking capital flows

SEA investors increasingly see sustainability as an opportunity vs. a risk: 57% of investors now integrate sustainability in their investing thesis while 19% identify as impact investors in 2021 (vs. 52% and 0% respectively in 2019). Multiple forces are at play, from investor pressures to recognition of this opportunity.

Mindsets are in turn starting to generate results. Green fundraising has been on a strong upward trajectory, with 40-150% growth per annum (p.a.) across debt issuances, IPO¹, PE/VC² fundraising, and sustainable public funds AUM³.

What is crystal clear is there is significant headroom to invest more. ~\$2 trillion in investments over the next decade is required to build out SEA's infrastructure for a sustainable transition. Governments cannot do this alone – ADB⁴ estimates ~40% of infrastructure investments need to come from the private sector.

Yet, despite high liquidity, many barriers limit flows today: inconsistent government policies, an immature ecosystem leading to high transaction costs and evolving standards, and conservative mindsets. Action is needed for change.

Notes: 1. Initial public offerings;
2. Private equity/venture capital;
3. Assets under management;
4. Asian Development Bank;
5. Majority of opportunities have decarbonization impact

Leading by doing

Achieving Net Zero as a region demands individual action by businesses, investors, governments, and communities, as well as collective action at an ecosystem level.

Businesses must identify the strategic white space where they can advance SEA's climate transition while driving commercial value and innovation that is aligned to their core business strategy.

Investors can further unlock green and transition capital flows in the region through catalytic financial instruments to de-risk investments and novel sustainability or transition-linked products to lower barriers to financing, while **governments** need to demonstrate regulatory leadership to create investible environments for sustainable assets.

The scale of the Net Zero challenge is significant in economic, investment, nature, and human terms – SEA must find the path forward that meets the conditions of its realities. We know where attention is needed, and where the opportunities lie. Regional actors now need to come together to develop a robust Net Zero plan that accounts for regional nuances and the distinct needs of diverse SEA nation-states.

Three ingredients are crucial for collective action:

- 1) Ecosystem-wide co-innovation:** accelerate commercialization of low-carbon tech that suits SEA's needs, such as agri-tech and carbon capture; increase sharing of data/tools/standards through value chain-wide alliances; and mobilize public and private capital to conserve and restore SEA's natural carbon sinks
- 2) Collective transition support, leveraging public-private partnerships and blended financing:** improve access to capital and build capabilities of SMEs/smallholders, mitigate impact of stranded assets for hard-to-abate sectors, and upskill and retrain SEA's workforce for the green economy
- 3) Regional collaboration:** develop a holistic SEA Net Zero transition plan, establish a cross-border carbon trading system, and reassess energy security by exploring a regional grid to more efficiently connect demand to supply

For businesses who lead the action, more than \$1 trillion⁵ in economic opportunities are on the table. SEA is at a pivotal transition point, and the decision is yours – will you join us on this journey?

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Introduction

2021: Year of
Transition and
Climate Action

Moving from “challenges”
to “solutions”

A new global narrative emerges – Net Zero takes center stage

Global recognition that the Net Zero window is closing, and greater collective action is needed



“ Unless there are **immediate, rapid and large-scale reductions** in greenhouse gas emissions, limiting warming to close to 1.5°C or **even 2°C will be beyond reach**

IPCC (August 2021)



“ 2021 should be a **turning point for our planet** and to accelerate efforts to cut greenhouse gas emissions

G7 Summit (June 2021)



“ 2021 must be the year for climate action – **‘The make it or break it year’**

UN Secretary-General,
António Guterres (April 2021)



“ The **United States is not waiting**, the costs of delay are too great, and our nation is resolved to act now

US White House (April 2021)

Closing window

To limit global warming to 1.5°C above the pre-industrial period, 45% reduction in annual emissions is required by 2030¹

We are off track

Global warming is expected to exceed 1.5°C by the early 2030s, according to the latest IPCC report (we are at ~1.1°C² today, with 2020 being the third warmest year on record). Further, emissions are on pace to increase by 4.8% in 2021 – the largest increase since the great financial crisis

Not enough scale

Long lead time for solutions to take effect; for example, though renewables prices are falling quickly now, solar energy took ~20 years to reach ~10% of global installed capacity

All hope pinned on COP26

In November, nations will come together to review commitments and strengthen ambitions for the first time since the 2015 Paris Agreement. Initial talks indicate progress and alignment may not be enough, with international transfers of offsets and mitigation outcomes (Article 6) remaining at the center of dispute

Notes: 1. From 2010 baseline;
2. Based on the latest IPCC assessment. This is 10 years earlier than IPCC's 2018 projections in the SR1.5

Sources: [WMO](#); [Reuters](#); [White House Briefing Room](#); [IEA 2021 Global Energy Review](#); [UNFCCC](#); [New Climate Institute](#); [BBC](#); [Global Data](#); [IPCC 2021](#); [CNA](#)

The scales have tipped – key actors are responding

The narrative is shifting from problem to solution and action

Non-exhaustive

~2.5x

Growth in mentions of **climate action** relative to **climate change**

~52% 2016-2021¹ growth in media mentions of "climate action" vs. ~21% for "climate change"

“ We see **climate action** as fundamental to alleviating poverty and boosting prosperity



“ The United States must advance a credible strategy for robust and continued **climate action**

BROOKINGS

“ **Climate action** is at the heart of the European Green Deal



“ As governments recognize the importance of **climate action**... industries are left with little choice but to change

Bloomberg

Notes: 1. 2021 annualized based on YTD July run rate; 2. ~\$1.2 trillion from EU's green deal and ~\$2 trillion in proposed infrastructure and clean energy spending by the US; 3. Principles for responsible investment; 4. Market capitalization data as of Jan 2021, covering 1,040 companies that were part of the SBTi in October 2020; 5. Science Based Targets initiative

Sources: Factiva; [European Commission](#); [White House Briefing Room](#); UN PRI; WFE, Euromonitor; [SBTi](#); [World Bank](#); [Brookings Institute](#); [European Union](#)

Global economies

\$3 trillion+ since 2020

Planned infrastructure and clean energy investments by economies representing ~45% of global GDP²

Investors and shareholders

~\$121 trillion as of 2021 vs. ~\$86 trillion in 2019

AUM of institutional investors and PE firms that are UN PRI³ signatories

Corporations

~27% as of 2021 vs. ~11% in 2019

Global market capitalization⁴ represented by SBTi⁵ companies

Growing recognition of the risks of climate change to SEA...

Risks require immediate action



15

of 24 climate-linked crises in Asia-Pacific (vs. 18 in 2019) that IFRC responded to in 2020 were in SEA – **its busiest region globally**¹

17-37%

negative GDP impact in 2050, and 2.7-4.2% by 2030, due to climate events in 2°C-3.2°C scenarios² – the most impacted region globally

5.4%

growth in electricity demand in 2021 forecasted – the fastest growing region in the world (3% average)⁴

96%

of Bangkok's land may be submerged by a "ten-year flood" in 2030³

Notes: 1. More than 31 million people have been affected in the region; 2. Relative to a scenario without climate change (0°C). SEA's loss is particularly severe, with world GDP expected to lose 11-18% in 2050 in the same scenarios; 3. A "ten-year flood" has a 10% annual chance of occurring; 4. Demand for electricity in all other regions is forecasted to grow at ~1-4%

Sources: [Swiss Re Institute](#); [Greenpeace](#); [Reuters](#); [IFRC](#); [International Energy Agency](#); [UN](#); [Eastpring](#); [Koh et al.](#); [WEForum](#)

...and increasing significance of SEA in global climate action

Growing importance of SEA to global actors

As one of the **fastest-growing regional economies**, it is important that SEA develops in a **sustainable manner**

~4%

expected GDP growth rate annually over the next decade (third only to India and China)

SEA's **natural capital holds the highest global potential as a decarbonization lever**

25%
19-46%

of global financially viable, investible carbon stock in pantropic terrestrial forests

of global blue carbon storage potential (4.8 GtCO₂e)

The world cannot reach Net Zero without addressing its **supply chains, many of which start in SEA**

92%

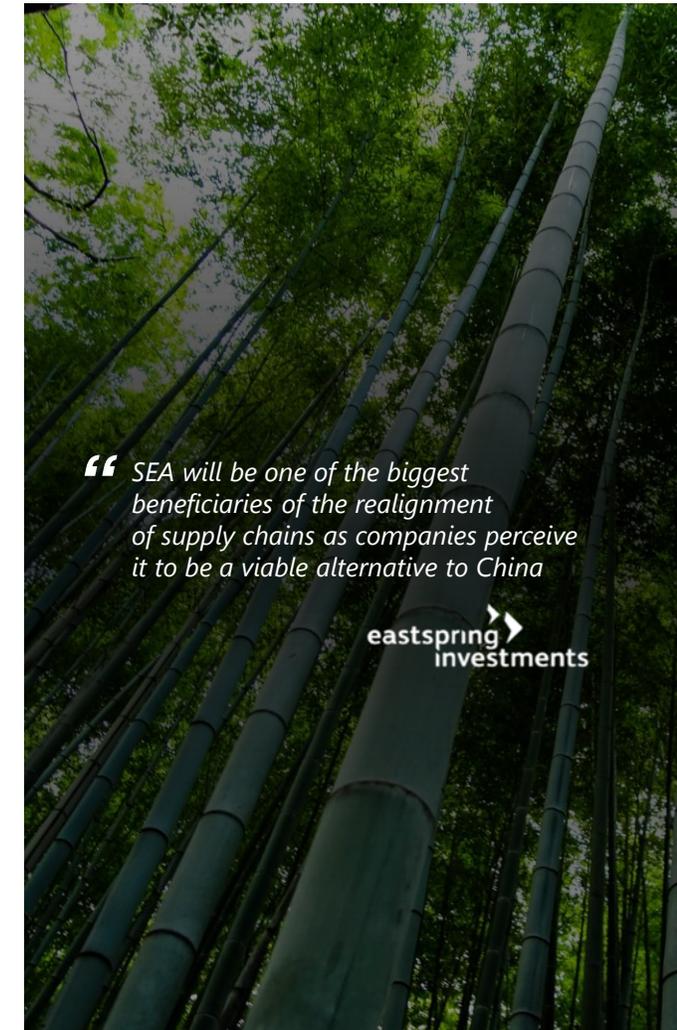
of global natural rubber exports¹

22%

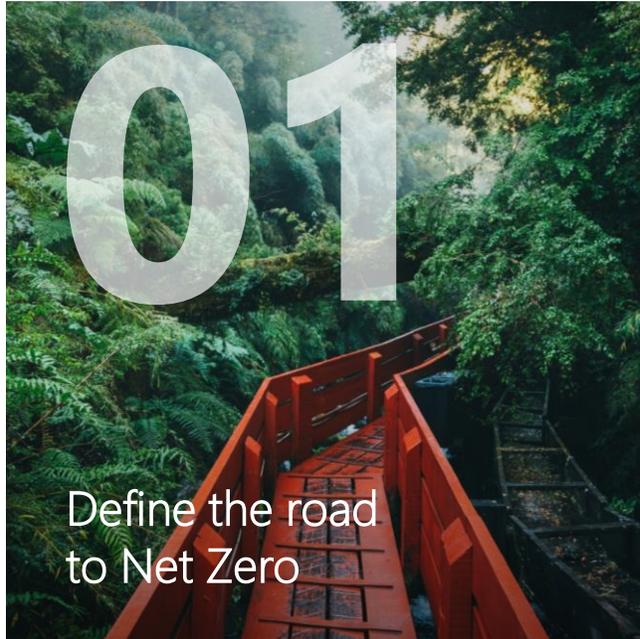
of global semiconductor exports²

Notes: 1. 2020 value of SEA exports for natural rubber and similar gum (HS 4001); 2. 2020 value of SEA exports for diodes, transistors and similar semiconductors (HS 8541)

Sources: [Swiss Re Institute](#); [Greenpeace](#); [Reuters](#); [IFRC](#); [International Energy Agency](#); [UN](#); [Eastpring](#); [Koh et al.](#); [WEForum](#)



Three steps to accelerate SEA's Net Zero journey



Climate ambitions have begun to form in SEA but **more needs to be done to achieve Net Zero**



Opportunities exist along SEA's Net Zero journey, with the voluntary carbon markets and data/digital innovations as key accelerants



Investors' mindsets are shifting, but it is critical to remove structural barriers that exist today to address the significant need for capital

A lush green forest with a wooden walkway and a stream. The walkway is made of reddish-brown wood and has a railing. The stream is in the foreground, and the forest is dense with various types of trees and plants. The background is slightly hazy, suggesting a misty or rainy day.

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Defining the Road to Net Zero

Regional action and awareness are building, yet pathways and results remain on the horizon

▶ Curious to find out more?
Read the deep dive here

Covid-19 has brought issues of regional risk and resilience into sharp focus and spurred climate awareness

In the wake of Covid-19, we have witnessed a shift in discourse in SEA:

Heightened awareness of supply chain disruptions and food security risks

Covid-19 has reinforced the need to develop a more resilient, **localized supply chain**, **improve food security**, and reduce the region's reliance on global trade flows.

For example, **Singapore launched its "30 by 30" plan** for local farms to produce 30% of nutritional needs by 2030 with tech-enabled urban and sustainable farming systems, which will also reduce emissions footprint.

Increased need for resilient government green recovery budgets

Covid-19 has highlighted the need to **move away from the BAU¹ approach** governments have taken in the past in response to external shocks such as climate events.

As part of SEA's Comprehensive Recovery Framework, a core priority is to advance **toward a more sustainable and resilient future**, including the transition to **sustainable energy** and **green infrastructure**.

Change in individual behavior and consumption habits

Covid-19 lockdowns have changed the way individuals live and work (e.g., video calls and work from home instead of traveling) and if sustained, could **potentially abate ~15% of all transportation emissions**.

The pandemic has also **accelerated the shift to digital** as a consumption platform over the past year while also **shifting consumers toward "conscious consumption"** with **~54% of SEA consumers** indicating they will be **more environmentally conscious** in the future.

Notes: 1. Business-as-usual

Sources: [CNA](#); [LSE](#); [Singapore Food Authority](#); [ASEAN](#); [Bain](#)
2020 SEA Digital Consumer
[Survey](#); One Earth

SEA has made progress in the past year but **more still needs to be done**



Landmark moves by SEA nations

There has been a wave of landmark announcements by SEA governments in the past year, including 2 Net Zero commitments (Laos, Indonesia) and 4 national green plans (e.g., Singapore's Green Plan 2030, Thailand's Bio-Circular-Green Economy model) to accelerate the transition toward Net Zero

Steps forward in regional collaboration

In 2021, the ASEAN Taxonomy Board was set up to develop a regional, sustainable finance and transition taxonomies framework, and Phase II of the ASEAN Plan of Action for Energy Cooperation was launched

Corporations in the region leading the way

Corporations across the spectrum are taking concrete actions to accelerate sustainability within and beyond their own organization's boundaries (e.g., working with suppliers and customers to drive their sustainability agenda). Family-led businesses have also awoken to the importance of sustainability and resiliency in the wake of Covid-19 and are well-positioned to lead the charge in the region

NDCs and renewables targets lag global peers

SEA nations are behind global peers in Net Zero commitments (20% of SEA nations vs. 28% of the world), renewables supply targets (~23-29%² in SEA vs. ~40% in the US by 2040), and NDCs (latest SEA NDCs closed the gap from previous by 11-18% vs. 68% for Colombia and 64% for EU). The region still has ~3-4 GtCO₂e¹ emissions gap in 2030 to achieve the 1.5°C pathway

Lack of robust plans to achieve Net Zero targets

Most SEA countries do not have all the elements of an effective Net Zero plan (e.g., Net Zero committed to law, absolute 2030 emissions targets, full sector coverage), leaving more to be done to enhance the scope and clarity of their commitment

SMEs lacking in support and resources to make the shift

Exacerbated by Covid-19, SMEs, who form ~40% of GDP and employ ~75% of the workforce, lack financial and human resources and sustainability capabilities to keep up with the rapidly evolving sustainability standards (e.g., access to green financing)



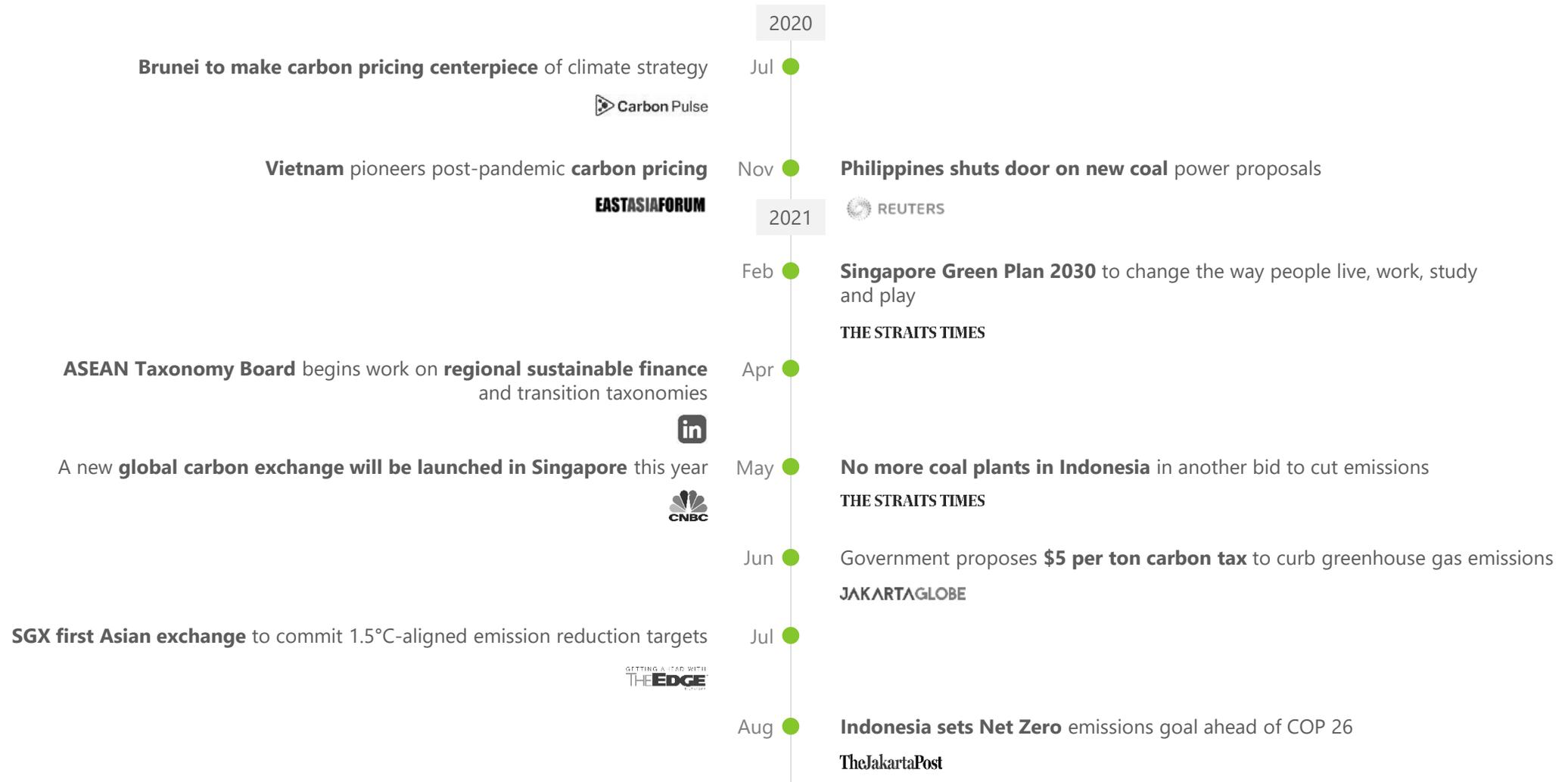
Notes: 1. Bain analysis based on latest country NDCs; 2. Based on ASEAN Centre for Energy's ASEAN (Phase II: 2021 – 2025) target scenario or progressive scenarios respectively

Sources: EIA; Reuters

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ROAD TO NET ZERO

SEA countries have made **landmark announcements and moves** in the past year alone



Sources: Bloomberg; Jakarta Post; Straits Times; Straits Times (2); Reuters; East Asia Forum; Carbon Pulse; CNBC; LinkedIn; Jakarta Globe ID; Reuters (2); The Edge

01

ROAD TO NET ZERO

National ambitions are beginning to form across the region

Only 2 countries have committed to Net Zero Singapore is the only country whose unconditional emissions are expected to fall between now and 2030 2 countries have implemented or announced a carbon tax, while 4 are considering carbon pricing

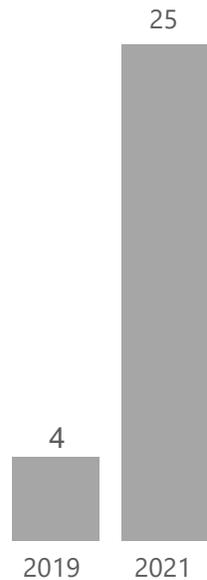
Notes: 1. "Emissions targets" refers to target reduction by 2030 from BAU unless stated otherwise; 2. Unconditional reduction not dependent on external support. Conditional targets dependent on sufficient international support; 3. Myanmar's NDC largely addresses only energy and LUCF, which make up ~65% of their emissions today; 4. Implied change estimated as percentage difference of calculated absolute emissions level in 2030 based on targets from 2018 levels; 5. Emissions trading scheme; 6. Refers to installed capacity, not to be confused with power supply/generation; 7. Unconditional target for non-hydropower renewables; 8. Based on 2 Gwp solar capacity target by 2030 as % of estimated total power capacity of ~13.8 GW; 9. Based on ASEAN Centre for Energy's ASEAN target scenario (Phase II: 2021 – 2025)

Sources: Reuters; Mongabay; CNA; Greenplan; Power-technology; The Edge; JTC; Eco-business; Global Data; icap; Business Inquirer; Bangkok Post; IEA; Export.gov; Platform 2020 redesign; Nupi; UNFCCC; All NDCs; UOB; ASEAN Energy

| |  Brunei |  Cambodia |  Indonesia |  Laos |  Malaysia |  Myanmar |  Philippines |  Singapore |  Thailand |  Vietnam |
|--|--|--|---|--|--|---|---|---|--|---|
| Net Zero | | | 2060 | 2050 | | | | | | |
| 2030 emissions targets¹ | | | | | Emissions intensity of GDP relative to BAU | Absolute emissions target (select sectors) | | Absolute emissions target (economy-wide) | | |
| Unconditional ² | -20% | | -29% | -60% | -45% | 600 MtCO ₂ e ³ | -3% | 65 MtCO ₂ e | -20% | -8% |
| Conditional | | -42% | -41% | -67% | | 400 MtCO ₂ e ³ | -75% | | -25% | -25% |
| <i>Implied change in absolute emissions (from 2018 levels)⁴</i> | | | | | Regional (unconditional) target of ~26% by 2030 | | | | | |
| Unconditional | +39% | | +19% | +9% | +84% | +158% | +50% | -3% | +3% | +99% |
| Conditional | | +31% | -1% | -11% | | +85% | -62% | | -3% | +62% |
| Carbon pricing | Carbon pricing to be implemented by 2025 | | Carbon tax (\$5/tCO ₂ e) announced, ETS ⁵ under consideration | | | | Carbon tax and ETS under consideration | Carbon tax (~\$4/tCO ₂ e) implemented | ETS under consideration | ETS legalized – to take effect by Jan 2022 |
| Renewables installed capacity target⁶ | ~30% by 2035 | ~25% by 2030 | ~48% by 2030 | ~30% (consumption) by 2025 | ~40% by 2035 | ~11% by 2030 ⁷ (non-hydro) | ~38% by 2035 | ~15% by 2030 ⁸ | ~30% by 2030 | ~32% by 2030 |
| | | | | | Regional target of ~33% by 2025 ⁹ (from ~24% in 2018) | | | | | |
| Nature | Increase forest reserves from 41% to 55% by 2035 | Increase forest cover to 60% of total area by 2030 | Protect 5.8 million ha of forests and 1.9 million ha of peatlands by 2030 | Increase forest cover to 70% of total area (conditional) by 2030 | Protect >20% of terrestrial and 10% of coastal areas by 2025 | Reduce deforestation by 25% by 2030 (50% conditional) | Eliminate net loss in forests, mangrove, seagrass, coral cover by 2028 | Plant 1 million more trees and add 130 ha of new parks by 2030 | Increase forest cover to 55% of total area by 2037 | Increase forest cover to 42% of total area by 2030 |

Increasing commitments and taking tangible action to drive sustainability forward

SEA SBTi signatories



Regional Champions

Increasing recognition of sustainability risks and opportunities

Improved business operations to **achieve efficiencies from sustainability**

“(In 2020, CDL)¹ achieved 44% reduction in carbon emissions intensity against 2007 levels... over \$30 million in energy savings from energy efficient retrofitting and initiatives across all its commercial buildings



Sustainability initiatives to capitalize on **lower costs of capital**

“(The \$255 million sustainability-linked loan has) a mechanism to **adjust to lower interest rates based on Indorama’s ESG² score** (with maturity in 2025)



Government-linked Enterprises

Investments and partnerships to develop holistic infrastructure and drive ecosystem change

TEMASEK

Established \$600 million decarbonization fund in partnership with BlackRock



Acquisitions of renewable companies such as Amplus and SOLS Energy to boost clean energy portfolio



Targeting Net Zero by 2060 and increased transparency through partnership with CDP Global



Accelerating electric vehicles adoption in partnership with Foxconn

MNCs

Collaboration with **suppliers and customers** to decarbonize supply chains

78%

Will remove suppliers that endanger their Net Zero transition by 2025³

30%

Have offered **preferential pricing** to sustainable suppliers³



Targeting Net Zero by 2039 for entire supply chain (~90% of palm oil suppliers in SEA)



Requires 100% RSPO⁴-certified palm oil by 2023 from suppliers (>90% in SEA)



Requires supplier certification for environmental management (~44% in SEA)

...and with customers and ecosystem drive forward sustainability agenda



Developing digital environmental solutions and established AI for Earth and \$1 billion climate innovation fund

Notes: 1. City Developments Limited; 2. Environmental, social, and governance; 3. According to survey with 400 of the world’s largest MNCs, conducted by Standard Chartered in Mar 2021; 4. Roundtable on Sustainable Palm Oil

Sources: The Global Economy; SC; SCMP; Reuters; Energy Voice; PTBA; IEEFA; Unilever suppliers; Nestlé suppliers; Samsung suppliers; Indorama; Climate Bonds; Petronas; Global Data; CDL; Company websites; Industry interviews

Family-run businesses are poised to play a pivotal role in SEA's transition

> 85% of SEA businesses valued at >\$1 billion **are family-run**¹

Family businesses have multiple strategic advantages in shifting to sustainability:

- 

Shorter chain of command
allows for more nimble decision-making and transformations
- 

Majority family ownership
results in reduced external pressures to manage for short-term profitability
- 

Generational mindset
enforces an inherent sense of stewardship in building longevity and resilience for intergenerational transfer

“**Founder and family-led businesses hold the key to a dramatic change** (for sustainability in ASEAN)

VP Sales & Marketing, Global Tech Co

“**Family businesses have unique advantages** that may enable them to bring more **immediate impact** (in sustainability)

Managing Director, Government Investor Co

“**As a family business, longevity is the key common theme, be that in commerce, sustainability, or people management**

General Manager, Family Conglomerate Co

Examples of family businesses leading the charge



Targeting **group-wide Net Zero** by **2030** (scope 3 by 2050) **through** renewables (100% by 2030), energy efficiency, low-carbon products and nature-based solutions



KUOK GROUP

Introduced innovative **circularity** practices and **energy efficiency** assets and installed **renewable energy** in group subsidiaries (Shangri-La Group, Kerry Logistics, etc.)



Developed Singapore's **first carbon neutral building** and **eco-mall** by focusing on energy efficiency and carbon offsetting

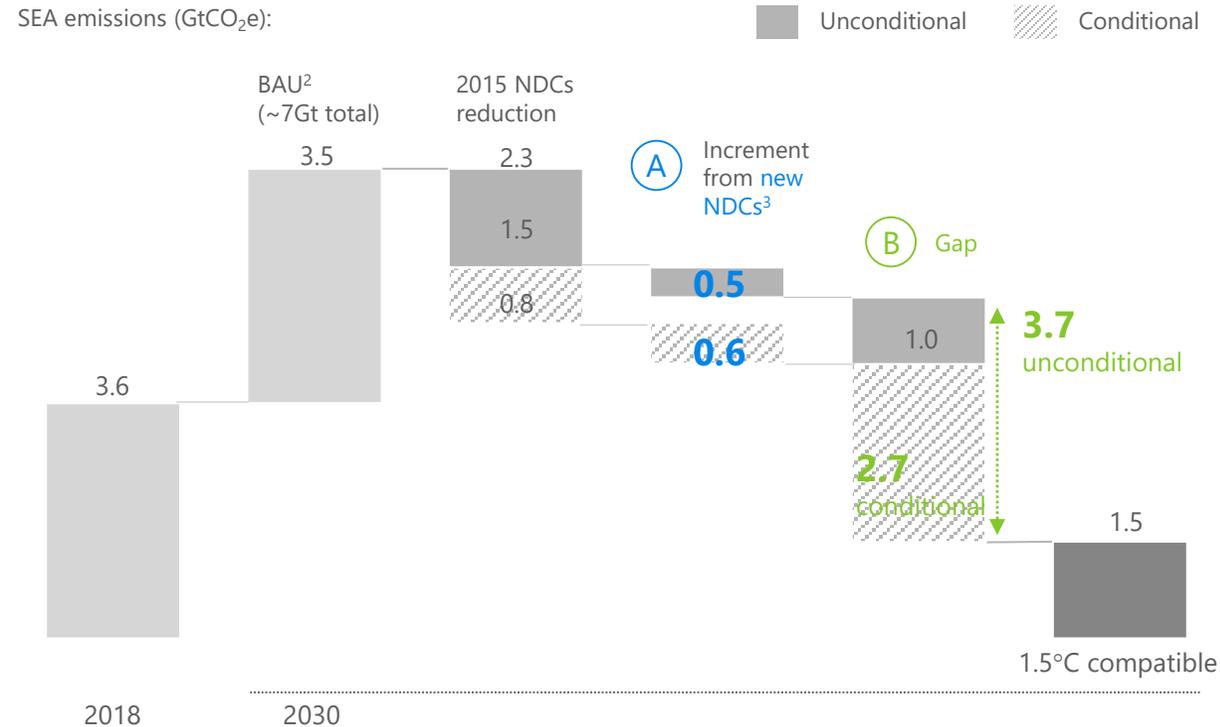
Notes: 1. Family-run businesses have more than half of their shares controlled by (more than 1) members of the same family

Sources: [Brunswick Group](#); [UNESCAP \(CP Group\)](#); [Hong Leong](#); [Company websites](#); [Institute for Family Business](#); industry interviews

However, SEA is not on track, and there is a lot of work to do

Based on latest NDCs

SEA expected gap to 1.5°C compatible emissions levels in 2030¹

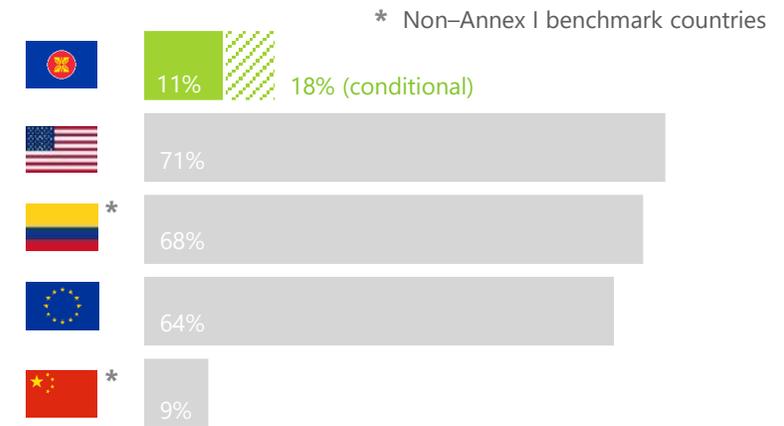


(A) SEA's latest NDCs predict a **marginal improvement of 0.5–0.6 GtCO₂e** from previous, which leaves projected emissions levels at **>4-5GtCO₂e in 2030**

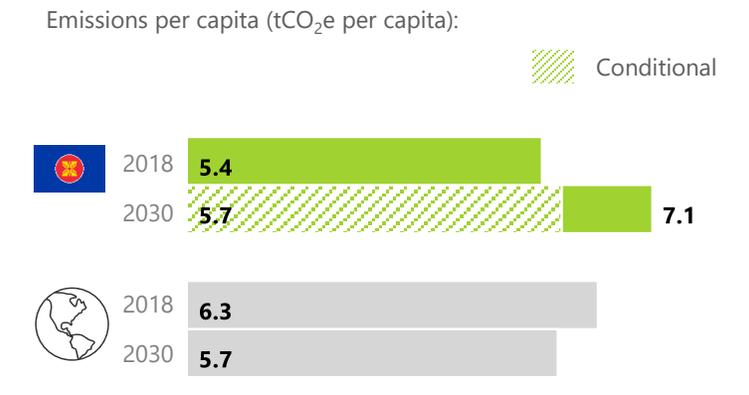
(B) ~2.7–3.7 GtCO₂e gap to 1.5°C pathway compatible scenario remains in 2030

Notes: 1. 1.5°C compatible emissions levels based on IPCC's estimate that annual emissions will need to fall by 45% from 2010 levels by 2030; 2. BAUs emissions taken from country NDCs where available; 3. Myanmar's latest NDC had a significant contribution to the increment from new NDCs, as they did not provide previous mitigation targets in the old NDCs. Myanmar's BAU only accounts for selected sector emissions, which contribute to ~65% of total emissions today. Laos' BAU emissions used in place of their old NDCs as targets provided in old NDCs were not comparable; Sources: IPCC; Country NDCs; Euromonitor; Economist; Intelligence Unit; Bain analysis

2030 emissions gap closed by latest NDCs (from 2015 NDCs)

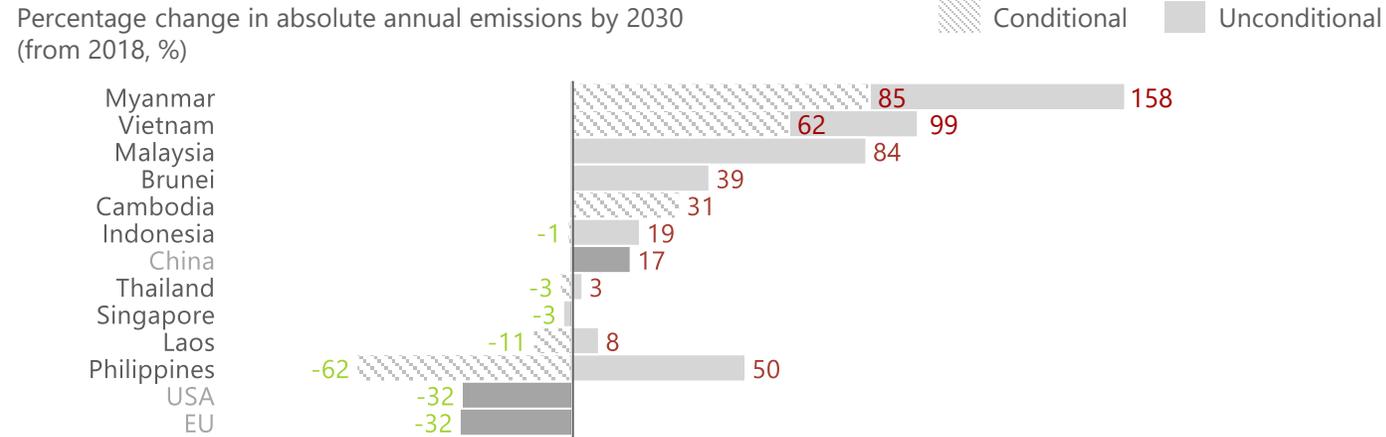


SEA emissions per capita is set to overtake global average by 2030



Compared with global benchmarks, SEA's climate ambitions appear modest

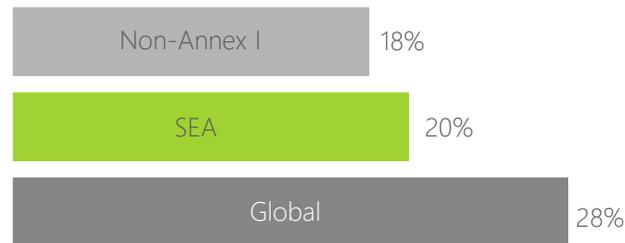
Most of SEA's latest NDC targets lead to an increase in annual emissions by 2030 in absolute terms



Notes: 1. Non-Annex I countries as categorized by UNFCCC, and Net Zero commitments do not consider targets under discussion; 2. SEA carbon price range based on carbon tax implemented or considered in Singapore (SG) and Indonesia (ID), European Union (EU), and United States (US), based on 2021 ETS prices from International Carbon Action Partnership (ICAP) as of June 2021. China prices based on debut price of National ETS in July 2021; 3. Emissions trading scheme; 4. Climate policy agenda of President Biden omits any mention of carbon pricing

SEA Net Zero commitments are in line with non-Annex I countries, but trail global average

Countries with Net Zero commitments,¹ percentage (%)



Prices of EU ETS are in line with Paris goals (high enough to trigger fuel switching)

Regional carbon pricing is still insufficient

Price per tCO₂e²

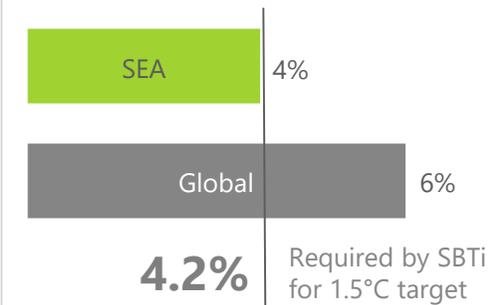
| | | |
|--|--------------|---|
| | \$4 - \$5 | 2 SEA countries have set or proposed a tax |
| | > \$7 | China national ETS ³ |
| | > \$18 | California Cap-and-Trade ⁴ |
| | > \$60 | EU ETS |
| | \$50 - \$100 | Range required by 2030 to be Paris 1.5°C compatible |

SEA corporates have been less ambitious relative to global peers

SBTi signatories as percentage of total market cap (%)



Average annual emissions reductions of SBTi companies since start year, percentage (%)



Scope 3 emissions footprints remain a challenge to measure and address globally, even among leading companies. There is urgent need for binding carbon-accounting and reporting standards

Sources: Bain analysis; IPCC; CAT; ECIU; Ember; Reuters; Reuters (2); SBTi

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ROAD TO NET ZERO

The plan for Net Zero must be crystallized – few SEA countries have all the elements of a robust plan

Unlike global benchmarks, most SEA countries **have not materially improved ambitions**, nor **set Net Zero targets**

SEA countries can strengthen their commitments by setting **absolute targets** and having **full sector coverage**

Elements of an effective Net Zero plan¹

Lacking  Leading

Global benchmarks

Annex I Non-Annex I

| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Brunei | Cambodia | Indonesia | Laos | Malaysia | Myanmar | Philippines | Singapore | Thailand | Vietnam | EU | USA | Colombia | China ² | Best-in-class |
| Improved ambition | Material | Slight | No | NA ³ | Slight | Material | Slight | No | No | No | Material | Material | Material | Slight | Material |
| Net Zero target year | No | No | 2060 | 2050 | No | No | No | No | No | No | 2050 | 2050 | 2050 | 2060 | Achieved |
| Legal status (Net Zero) | NA | NA | Policy Document | Policy Document | NA | NA | NA | NA | NA | NA | In Law | Policy Document | Policy Document | Policy Document | In Law |
| 2030 reduction target type | Relative | Relative | Relative | Relative | Intensity | Absolute | Relative | Absolute | Relative | Relative | Absolute | Absolute | Absolute | Intensity | Absolute |
| Coverage (sector and gases) | Partial | Partial | Partial | Partial | Complete | Incomplete | Partial | Complete | Partial | Partial | Complete | Complete | Partial | Partial | Complete |
| Conditionality | Unconditional | Conditional | Both | Unconditional | Unconditional | Both | Conditional | Unconditional | Both | Both | Unconditional | Unconditional | Unconditional | Unconditional | Unconditional |
| Intl. aviation and shipping ⁴ | Not specified | Not specified | Not specified | Not specified | Not specified | Not specified | Not specified | Not specified | Not specified | Not specified | Partial | Not specified | Not specified | Not specified | Full coverage |
| Use of removals outside borders | Limited | Not specified | Not specified | Intend to use | No | Not specified | Limited | No | Limited | Not specified | No | No | Intend to use | Not specified | No |
| Removal transparency | Partial | Not specified | Not specified | Not specified | Not specified | Partial | Not specified | Partial | Not specified | Partial | Partial | Partial | Partial | Not specified | Full |
| Review process (Net Zero) | NA | NA | Non-legally binding | Non-legally binding | NA | NA | NA | NA | NA | NA | Legally binding | Not specified | Not specified | Not specified | Legally binding |
| Pathway and measures | Limited | Quantified | Limited | Quantified | Limited | Quantified | Limited | Quantified | Limited | Limited | Limited ⁵ | Limited | Quantified | Not specified | Quantified |
| Consideration of fairness ⁶ | Included | Included | Included | Included | Included | Included | Included | Included | Included | Included | Included | Included | Included | Not included | Included |

Notes: 1. Elements adapted from Climate Action Tracker's Net Zero evaluation methodology and IPCC guidelines. None of the countries listed had separate reduction and removal targets; 2. China categorization based on latest NDC proposal at 2020 Climate Ambition Submit – latest NDC has yet to be officially submitted; 3. Not applicable as Laos' previous NDC targets not comparable with latest targets; 4. Intl. aviation and shipping refers to accounting of all emissions from intl. bunkers (beyond Carbon Offsetting and Reduction Scheme for International Aviation [CORSIA] and International Marine Organization [IMO]); 5. EU's ambitious "Fit for 55" package and plan has been proposed, but not yet submitted; 6. Based on whether latest NDCs include explanation on why targets are fair

Sources: IPCC; ECIU; Country NDCs; CAT; Bain analysis

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ROAD TO NET ZERO

SEA faces **specific challenges** for change...

SEA-specific nuances present multiple **challenges**



Reliance **on natural resource extraction** such as fossil fuels and forestry for livelihood of communities and workforce



Need **to balance transition with socioeconomic growth** while protecting jobs and livelihoods, with regional GDP forecasted to grow by 5.5% in 2021



Significant risk of **stranded assets** – for example, ~\$60 billion¹ in stranded value from coal assets in Indonesia, Vietnam, and the Philippines, which make up ~75%² of SEA's coal-power capacity



Diverse regional populations and socioeconomic needs as a loose federation of countries with uneven pattern of development across the region, unlike the EU



Challenge in **measuring carbon footprint** due to longer and more complex supply chains (small, geographically siloed suppliers such as smallholder farms)

Notes: 1. Estimated by CarbonTracker in 2018, using a cost-optimized asset-level methodology and scenario analysis which phases out coal power in a manner compatible with the temperature goal in the Paris Agreement;

2. Based on International Energy Agency (IEA) data for 2019

Sources: [Brunswick Group](#); [Carbon Tracker](#); [IEA](#); Industry interviews

...that are exacerbated by Covid-19

Covid-19 has further diverted focus from sustainability to survival



Significant **strain on the economic environment:**
SEA GDP growth in 2020 was 7.8% pt. lower than forecast due to Covid-19 lockdowns and disruptions



Many **businesses, especially SMEs, are focused on staying afloat:**
SMEs (~75% of total employment and ~40% of total GDP in SEA), who were resource-constrained to begin with, have been worst hit by Covid-19 and are fighting for survival

“ Because of Covid-19, many SMEs are struggling to stay open. In the near-term post-Covid-19 world, SMEs are still likely to prioritize recouping profits over their sustainability ambitions.

SEA Country SME Council Leader

“ (SEA) businesses are fighting their own existential issues. With cash flow suffering from Covid-19, survival is the first order of business - sustainability is not top of mind.

Managing Director,
SEA investment group

01

ROAD TO NET ZERO

There is no reason for inaction – there is **significant upside** for SEA if we get it right

Curious to find out more?
Read the deep dive here

Significant **opportunities** present in SEA...



High potential value in **protecting SEA's natural capital** such as forests, peatlands, and mangroves



Abundant renewable energy resources such as geothermal, solar, and offshore wind – opportunity to scale capacity of low-carbon energy amid falling prices



Significant **infrastructure still to be developed**, especially in less developed countries (~\$2 trillion investment need over the next decade for the region's sustainable transition)



Streamlined/top-down corporate structures position family-run businesses to play a pivotal role in SEA's sustainability transition



A generational shift is changing consumption habits, with the younger population being more cognizant of sustainability imperatives



Opportunity to **accelerate R&D¹ and innovation** with increasing entrepreneurial spirit, willingness for cross-sector collaboration and capital interest in green opportunities

Establish SEA as a **global leader** in supplying **high-quality carbon credits** to help accelerate decarbonization, preserve SEA's natural capital and generate socioeconomic co-benefits (e.g., cleaner air and water quality)

Accelerate the transition by **removing regulatory hurdles, collaborating regionally, and leveraging decreasing costs** to scale capacity and establish new baseload energy source

Leapfrog to development of sustainable infrastructure and practices with green construction, electrification, modern grids, etc.

Accelerate adoption of **sustainability initiatives** by leveraging the inherent strategic advantages that SEA businesses possess

Leverage shift to **"conscious consumption"** to catalyze change in purchasing habits as early movers have the potential to reap rewards

Propel SEA to the **forefront of sustainability innovation** to accelerate the region's Net Zero transition and build position on a global stage (e.g., as an alternative-protein hub)

...that are **ripe for action**

All actors in SEA need to come together to **capitalize on SEA's distinct advantages to drive the shift to a green economy**

Notes: 1. Research and development

Sources: Industry interviews; Bain analysis

02

Catalyzing the Journey

Energy transition, valuing nature, and a sustainable agri-food system

▶ Curious to find out more?
Read the deep dive here

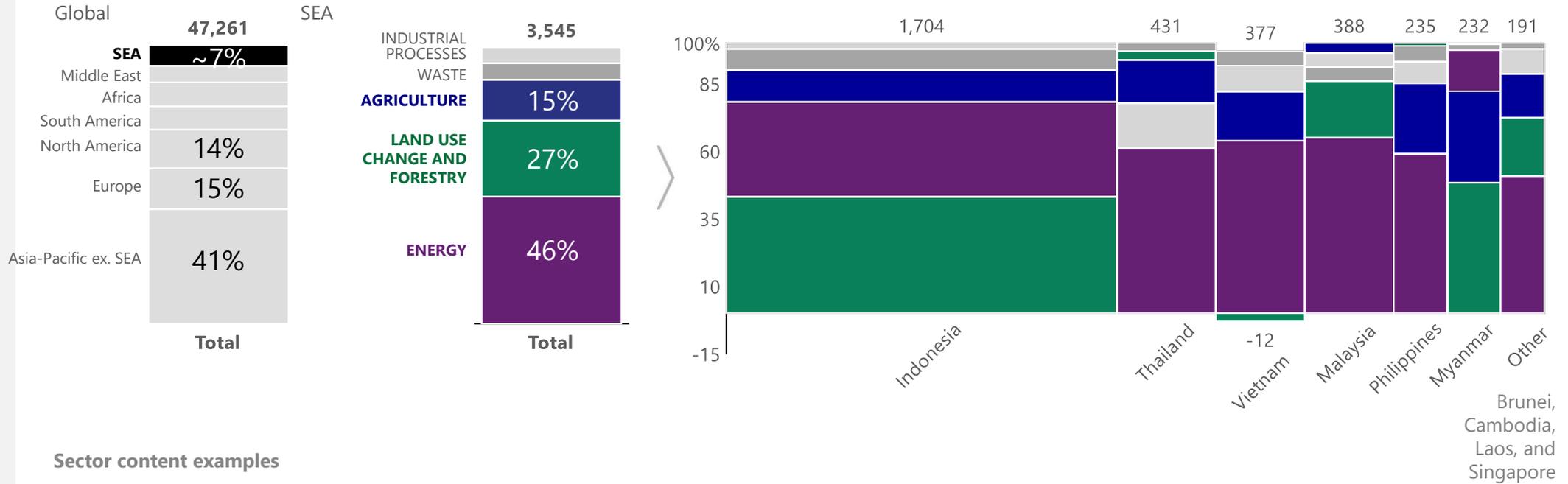
02

CATALYZE THE JOURNEY

Energy, land use change and forestry, and agriculture are the biggest emitting sectors in SEA

Three sectors contribute to ~90% of SEA emissions

2018 carbon emission volume (MtCO₂e)



Sector content examples

Energy: Emissions from energy generation and consumption across all industries, e.g., transport and heating in manufacturing/ industrial/agriculture processes

Waste: Direct emissions from landfills, wastewater treatment, sewage, etc.

Land use change and forestry: Emissions and removal of carbon from human-induced land use e.g., urbanization, deforestation

Industrial processes: Non-energy-related emissions such as release of embodied carbon in cement

Agriculture: Emissions from enteric fermentation from livestock, fertilizer application, manure management, etc.

Notes: Sectors based on IPCC definitions
Sources: Climate Watch

02

CATALYZE THE JOURNEY

Building blocks on SEA's Net Zero journey

Decarbonize



Energy transition

Address growing energy security and demand through cleaner sources



Valuing nature

Assign value to and protect the region's natural capital as carbon sinks and biodiversity banks



Agri-food system transformation

Empower smallholders to adopt sustainability while building out SEA as the alternative-protein hub



Others: Waste and industry emissions management

Leverage enablers



Voluntary carbon markets

Compensate for hard-to-abate emissions, scale decarbonization solutions by pricing carbon, and protect SEA's natural capital while leveraging its potential to serve global need and contributing to the region's socioeconomic development



Data and digital

Catalyze innovation and scale sustainability impact through the "green data revolution"

02

CATALYZE THE JOURNEY

DECARBONIZE

ENERGY TRANSITION

Energy transition: SEA must transition to cleaner energy sources while maintaining energy security

Fossil fuels are the **largest source** of SEA's **energy emissions** and are projected to **remain dominant** despite national and regional renewable energy targets

Non-exhaustive

108% Projected growth in SEA energy demand by 2040 (from 2017)¹

77% Projected energy supply from fossil fuels in 2040¹

Only **3** SEA countries above the global average in energy transition readiness²

Key imperatives for SEA:

Reduce Energy efficiency

Low-hanging fruit with mature tech (e.g., district cooling, smart energy management), but minimal regulatory incentives limit adoption

Substitute Clean energy and fuel switching

Favorable physical environment for renewables but need to solve for intermittency issues and develop more conducive legal and regulatory frameworks to attract investment.

Abundance of biomass feedstock for use in modern biofuels

Scale Grid modernization and electrification

Improvements in regional grids and battery technology can address variability in supply and support the ~45 million people without grid access

EV³ market is growing cautiously, but underlying infrastructure is required to scale adoption

Remove CCUS

Important for transition industries in SEA (e.g., fossil fuels)

Some early activity in the region, with 7 projects identified by MNCs

Early SEA movers:

SENSOR FLOW

Smart energy management system



SUNSEAP

Solar photovoltaic (PV)



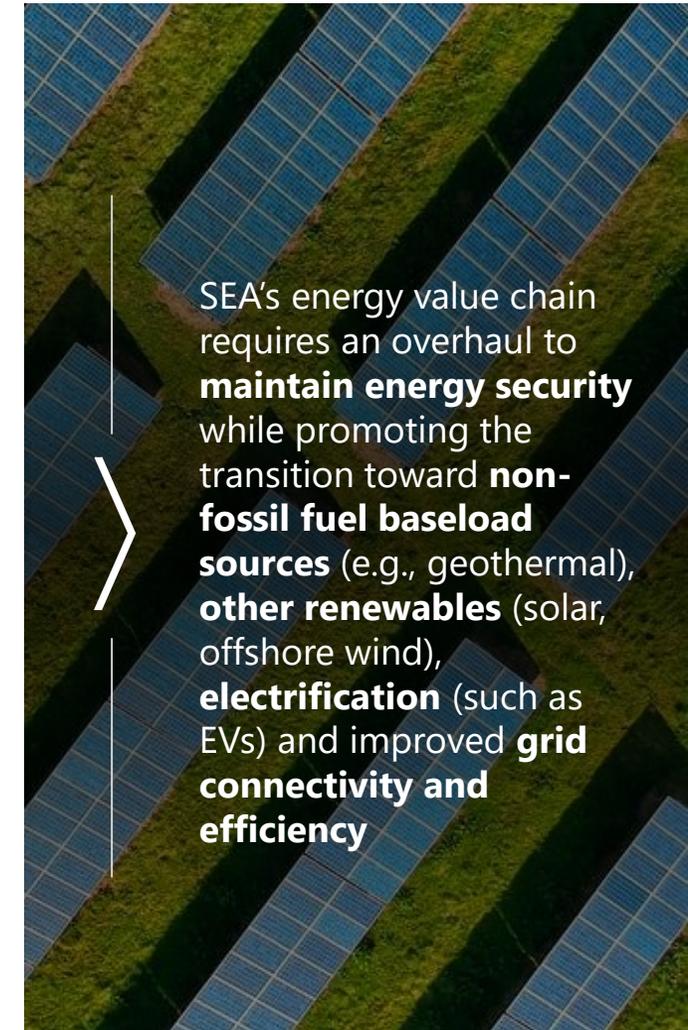
CANOPY POWER

Solar PV, battery, smart grid, and energy management



PETRONAS

Carbon capture, utilization, and storage



SEA's energy value chain requires an overhaul to **maintain energy security** while promoting the transition toward **non-fossil fuel baseload sources** (e.g., geothermal), **other renewables** (solar, offshore wind), **electrification** (such as EVs) and improved **grid connectivity and efficiency**

Notes: 1. Based on ASEAN Centre for Energy's ASEAN target scenario (Phase II: 2021 – 2025) that assumes member states' renewable energy targets are met, in the progressive scenario, energy demand is still expected to increase 83% between 2017 and 2040; 2. Laos and Myanmar were not included in the assessment; 3. Electric vehicle

Sources: ASEAN Centre for Energy; Company websites; IEA; IRENA; ERIA; ERCE; Black and Veatch; Numbeo; World Bank; WRI; The Economist

Energy transition: Efficiency solutions, renewables adoption, and grid improvements are viable today, while more advanced options may be unlocked as unit economics improve

Commercial opportunities

1 Here and now

Energy efficiency technologies

Relatively mature “quick-win” opportunities with positive ROI for businesses to assess and adopt

Solar energy with battery storage

Highly scalable solutions benefiting from declining tech costs and growing SEA governmental renewable energy targets

Grid infrastructure overhaul

Increasing renewables capacity and improving grid interconnectedness will unlock investment opportunities

2 Over the horizon

⌚ 0-5 years

EV ecosystem

Shifting customer demand and increasing tax incentives favor the shift to EVs, but enabling infrastructure required

⌚ 5-10 years

CCUS

Unit economics limit opportunities today but can be alleviated with subsidies. Direct air capture could be a game changer but is further from commercialization

⌚ 5-10 years

Low/no-carbon hydrogen

Low-carbon hydrogen can unlock opportunities in energy storage, chemical feedstock, and transport fuels. No-carbon hydrogen has even more potential but requires significant cost decline (~\$2/kg) for commercial viability



02

CATALYZE THE JOURNEY

Surbana Jurong leverages Internet of Things (IoT) and data to improve electrical efficiency of buildings and cities while reducing their carbon footprint

Global urban, infrastructure, and managed services consulting firm headquartered in Singapore, with over 70 years of experience delivering projects in more than 30 countries

DECARBONIZE

ENERGY TRANSITION



Sj SURBANA JURONG

CASE STUDY

Sources: Company website; Company interviews



Digital facilities management

Digital platform using IoT sensors to improve building operations efficiency

> 32,000

IoT sensors installed and managed across buildings in Singapore since 2000

44% savings

in energy consumption in Surbana Jurong's new campus



Smart city-management service

City management as a service using digital twins and predictive modelling to increase efficiency and climate resilience

30% reduction

in resident complaints

80% increase

in user feedback through natural language processing algorithms

THE JOURNEY



Launch of 24K integrated platform to operationalize IoT sensor data

Legacy telemonitoring of 24,000 lifts spurred Surbana Jurong's push toward smart buildings and city management. Through the 24K platform, users can visualize real-time monitoring data on an integrated dashboard, enabling better management of energy consumption and indoor air quality



Surbana Jurong's new campus at the core of sustainability ethos

Slated to launch by the end of 2021, the campus embodies sustainable design principles such as use of precast materials, rooftop solar panels, and smart energy-management systems to minimize the building's carbon footprint

LEARNINGS

Demonstration of value critical for adoption of sustainability solutions

Surbana Jurong helps clients quantify the impact of embodied carbon in tangible terms (e.g., equivalent to the number of cars on the road) and provide sustainable alternatives that minimize any potential negative cost impact

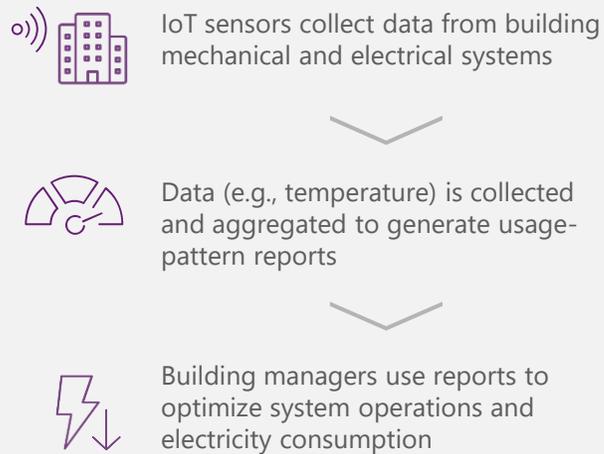
“

Data and technology underpin our entire sustainability journey. With our 24K platform, clients can elevate their sustainability journey and achieve their goals through close energy efficiency monitoring and granular scope 1 and 2 emissions data capture



HOW IT WORKS

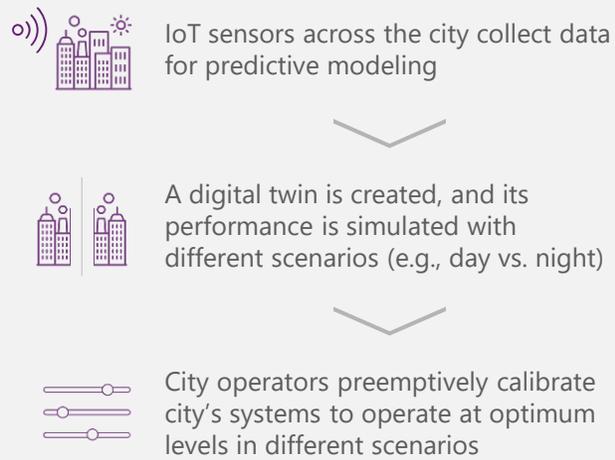
Digital facilities management



Use cases:

- Energy management
- Security and surveillance
- Indoor air-quality monitoring

Smart city-management service



Use cases:

- Energy management
- Climate and flood modeling
- Traffic monitoring

WHAT'S NEXT

| | |
|---|--|
| Singapore-wide digital twin operationalized for climate resilience | Create an AI/ML-powered predictive engine that uses real-time data from IoT sensors to create digital twins, better anticipate climate incidents (e.g., floods), and facilitate rapid response to minimize disruptions |
| Integration of 24K platform to improve access to green financing | Provide banks and insurers more transparency and data on building and operational emissions to better enable green debt and insurance underwriting (i.e., improved financing terms, reduced premiums) while reducing "greenwashing" risk |
| Affordable, sustainable housing with biomimetic design | Provide affordable and sustainable housing to lower-middle income families in the region that are more energy efficient by leveraging biomimetic designs |

“ We are pushing aggressively to break the norms of design; our ambition is for *all our projects to be sustainable while incorporating more digital innovations* ”

Eugene Seah, Managing Director, Smart City Solutions, Surbana Jurong

02

CATALYZE THE JOURNEY

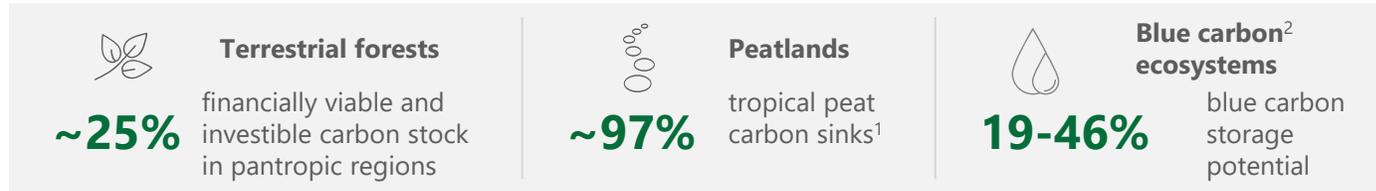
DECARBONIZE

NATURE

Nature: SEA holds the world's most valuable natural capital

SEA's natural carbon sinks have the **highest global climate mitigation potential**:

Globally, SEA holds



Non-exhaustive

Key imperatives for SEA:

Conserve

Avoid land use change from agriculture and illegal logging

~80% of forest loss in SEA due to commodities such as palm and rubber, and 50% of timber in Indonesia is logged illegally. Remote monitoring can be used to identify deforestation risk, while spatial productivity tech reduces the need for land conversion

Restore

Restore forests, peatlands, and blue carbon ecosystems

SEA is experiencing rapid deforestation, peatland degradation, and mangrove loss. Geospatial mapping and drone tech can be utilized for large-scale, automated seeding, replanting, and reforestation

Manage

Remotely monitor health of natural forests and working lands

With ~200 million ha of forests in SEA, telemetry using remote sensors and autonomous data processing using ML will make natural capital management more feasible

Scale voluntary carbon markets

Provides financing mechanism and revenue streams for otherwise unviable nature-based projects and incentivizes sustainable working land management (e.g., timber). *Find out more about carbon markets as an enabler [here](#)*

Early SEA movers:



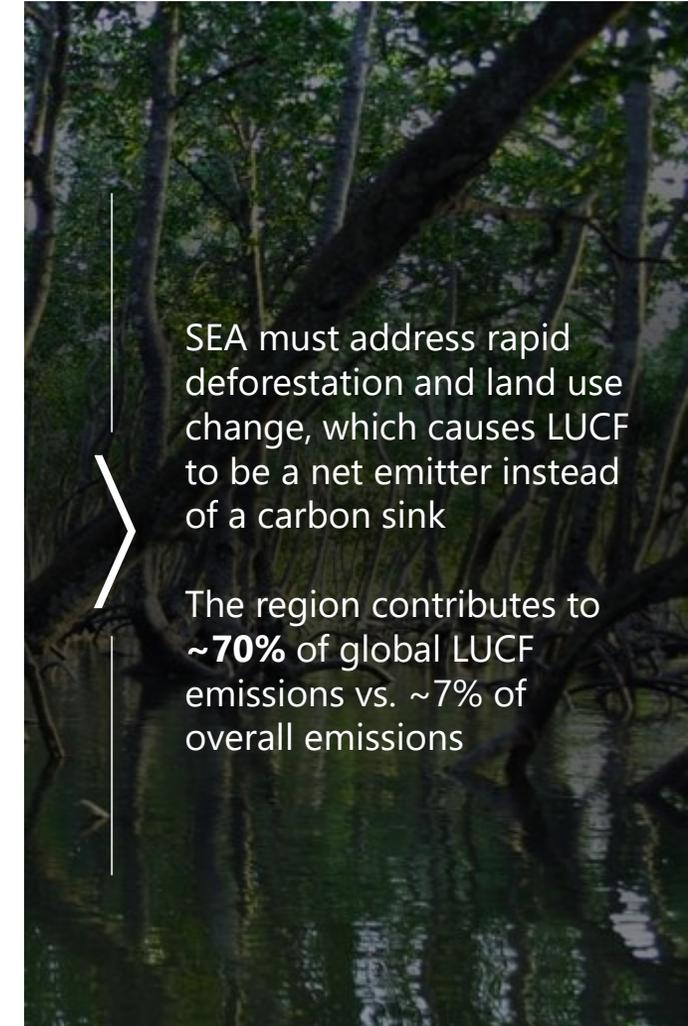
Terrestrial ecosystem monitoring in SEA³



Drone-based reforestation



IoT forest management



SEA must address rapid deforestation and land use change, which causes LUCF to be a net emitter instead of a carbon sink

The region contributes to ~**70%** of global LUCF emissions vs. ~7% of overall emissions

Notes: 1. Based on recent estimates that SEA's tropical peatlands feature 50.4 Gt of carbon storage, compared to global total of 52.2 Gt. By area, SEA represents ~56% of tropical peatlands and ~6% of all peatlands (inclusive of boreal and temperate peatlands); 2. Blue carbon refers to carbon stored in coastal and marine ecosystems (mangroves, tidal marshes, seagrasses), % based on estimates that SEA contains 4.8 Gt of blue carbon storage potential, out of a global estimate of 10.4–25.1 Gt; 3. Rainforest

Connection projects began in Indonesia and expanded to the Philippines and beyond SEA

Sources: [Nature](#); [Ecosperity](#); [Peatlands](#); Industry interviews; Bain analysis

Nature: Mitigation today will focus on terrestrial forests and peatlands, while digital and data advancements will enable new opportunities in blue carbon and automation

Commercial opportunities

1 Here and now

Forest conservation projects

High scalability of projects and potential to generate high-quality carbon credits with premium from co-benefits such as biodiversity

Peatland maintenance or rewetting projects

Strong carbon credit potential, with 10-20x more carbon sequestration than a typical mineral forest

Remote monitoring technologies

Significant demand for risk mitigation from illegal logging, land use conflicts, and forest fires

Spatial productivity for working lands

Technologies that enhance agricultural yield can reduce need for forest conversion

2 Over the horizon

 5-10 years

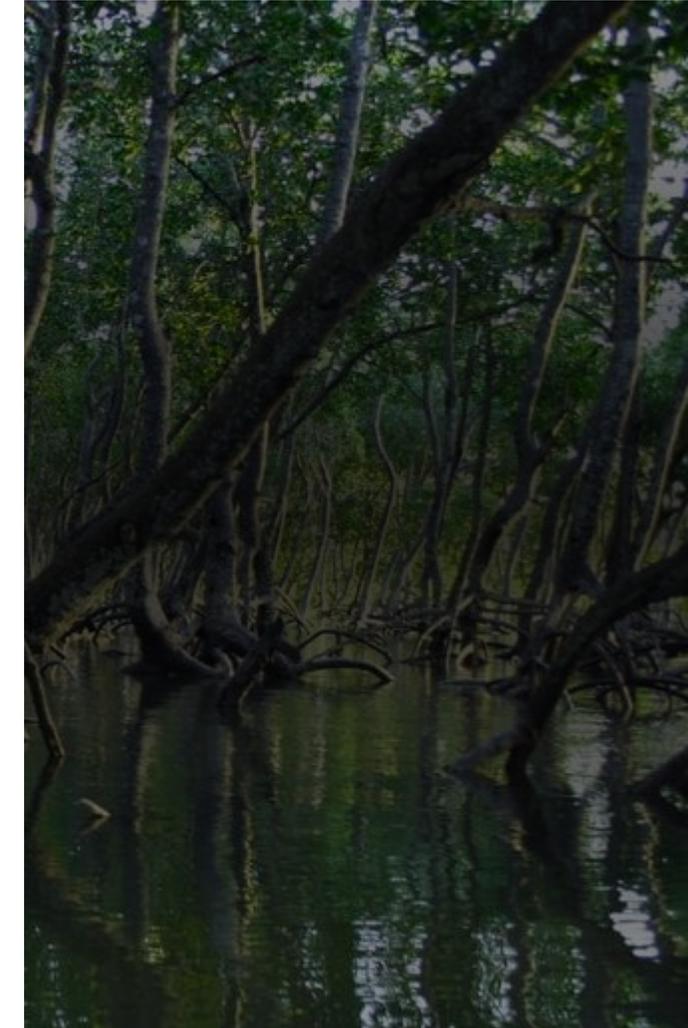
Advanced/automated reforestation

Advancements in drone and geospatial technologies can drastically reduce cost and improve ROIs

 0-5 years (mangroves)
5-10 years (seagrass)

Blue carbon restoration and conservation

Newly established methodologies to measure wetland carbon may make carbon crediting more viable



02

CATALYZE THE JOURNEY

Jejak.in protects Indonesia's forests by using a wide array of technologies to measure, report, and verify (MRV) carbon sequestration

Seed stage start-up focused on carbon measurement in forest areas
Based in Jakarta, launched in 2018 with 1-10 employees to date

DECARBONIZE

NATURE



CASE STUDY



Digital forest monitoring program

Devices developed in-house to monitor forests and collect critical data (e.g., soil and air quality)

10 million

trees are registered under Jejak.in's monitoring program

28,400 ha¹

of land are registered under Jejak.in's monitoring program



Online carbon offset marketplace

Enables individuals and businesses to purchase carbon credits to offset their carbon footprint

> 15,000

tons of carbon sequestered through online marketplace

> 3,000

individuals planting trees via online marketplace

20 partners

today supported by more than 1,000 forest caretakers



Jejak.in helps passengers calculate their carbon footprint and offers carbon credits for purchase via its online marketplace

THE JOURNEY



Better impact monitoring for conservation programs

Corporate conservation initiatives have faced challenges from manual monitoring, double counting, and the inability to accurately measure the carbon sequestration potential and impact of projects. Jejak.in's platform enables accurate impact measurement and forest monitoring while augmenting on-the-ground verification personnel (e.g., mobile upload of environmental data, augmented reality tree measurement). Leveraging IoT and light detection and ranging (LiDAR) sensors, drones, and satellites, environmental data (e.g., carbon storage and sequestration, biodiversity) are collected. They are then automatically analyzed with AI/ML models, thereby reducing reliance on manual efforts and increasing the reliability of measured impact



Development of an end-to-end solution to streamline climate action

Leveraging Microsoft's AI for Earth grants and technical resources, Jejak.in has developed a holistic solution that enables businesses to independently calculate emissions, offset carbon via forest conservation programs, and remotely monitor forest conservation efforts

“ When we started, we realized that corporate forest conservation programs **lacked the ability to accurately monitor and measure their carbon sequestration potential.** With Jejak.in, corporations now have **more visibility on their impact** and consequently a **better way to evaluate their programs**

Notes: 1. Represents 0.03% of Indonesia's total estimated forest acreage (92.1 million ha)

Sources: Company website; Company interviews



HOW IT WORKS

Forest conservation monitoring



IoT sensors in the forest, drones, and satellites collect detailed environmental data in forests (e.g., carbon stock, biodiversity) that allows for **accurate carbon stock monitoring** and the **generation of high-quality carbon credits**



Notes: 1. Additionality ensures carbon reduction that would not have happened in the absence of offset, no leakage ensures that the offset does not result in redirection of emissions and permanence ensures carbon removed does not re-enter the atmosphere

LEARNINGS

Government engagement critical to establish ecosystem fundamentals

During the development of Jejak.in's platform, engaging with Indonesia's Ministry of Environment and Forestry was critical as they provided large reliable environmental databases while research institutes were crucial in providing the expertise to accurately measure carbon emissions and sequestration potential

High-quality carbon offsets crucial to reduce greenwashing risks

Generating high-quality verifiable carbon offsets through an automated monitoring platform that have additionality, no leakage, and permanence¹ is critical to reduce the risk of "greenwashing." As such, Jejak.in's founder recognized early on the need to hire those with deep sustainability expertise to develop the platform

“ Access to reliable data was a big challenge for us. By partnering closely with various key stakeholders, we were able to tap into their databases and expertise to **build an accurate and reliable AI/ML model**

WHAT'S NEXT

Expansion into new markets

Expand and launch products and services in other countries in SEA, by the end of 2021

Establishment of Indonesia's first carbon offset marketplace

Launch Indonesia's first digital blockchain-based carbon offset marketplace, to more accurately prevent double-counting issues

“ The **climate crisis we are facing is real and we need to do something about it.** Indonesia and its natural capital has the potential to play a leading role

Arfan Arlanda, CEO & Founder, Jejak.in

02

CATALYZE THE JOURNEY

DECARBONIZE

AGRI-FOOD

Agri-food: SEA must empower smallholders while establishing the region as a global food tech hub

SEA is heavily reliant on agriculture, with increasing associated emissions as the sector expands to meet growing needs

~10%

GDP contribution in SEA overall

17%

expected growth in agriculture production¹ by 2029

>5X

emissions intensity of rice (~80% of region's cereal production) vs. average cereal crops

60%

of agriculture products are from smallholders

Key imperatives for SEA:

Sustainable production

Diffusion of innovative practices and tools

Drip irrigation, genome editing, and precision farming can increase productivity and sustainability. However, smallholder farmers lack climate awareness and base decisions on tangible financial benefits.

Education, carbon credit generation, subsidy conditions, asset-leasing models, and PPPs² can incentivize smallholder adoption

Optimize protein mix

Alternative protein

Increased supply of protein alternatives can help meet SEA's growing needs sustainably while fulfilling SEA's potential as food-tech hub

Traceability and waste

Advanced digital tools and data standards

Rising internet penetration (~60% in SEA) and data democratization enable sophisticated supply chain traceability tools (e.g., blockchain-enabled traceability)

Dietary shift

Education and access

Shift in demand toward more sustainable consumption required, such as sourcing locally and consuming less emissions-intensive proteins

SEA's growing nutritional needs must be met in a sustainable manner

Steps must be taken to increase sustainability adoption among smallholders, who are critical to agricultural change in the region

Notes: 1. Based on Indonesia, Vietnam, Thailand, and Philippines; 2. Public-private partnerships

Sources: [ASEAN](#), FAO; OECD; Oxford Economics; Vijay et al., 2016; The ASEAN Post; Company websites; 2020 SEA e-Economy Report

Early SEA movers:



IoT, monitoring, and analytics to support production



Cell-based protein



IoT and process/tracking digitalization



Conscious-consumption platform



Agri-food: Precision farming, digitalization, and plant-based proteins are feasible today, while enhanced upcycling and cell-based alternatives hold promise for the future

Commercial opportunities

1 Here and now

Advanced production tools

Innovative financing (e.g., asset leasing models) can drive adoption of smart farming tools to boost productivity and sustainability

Digital supply chain solutions

Democratization of data and visibility across the supply chain can lead to tangible cost savings and enhanced sustainability and resilience

Digital service platforms for farmers

Increased connectivity allows smallholders to access sophisticated services (e.g., remote analytics and advisory)

Plant and fermentation-based alternative-proteins

Plant-based protein alternatives are ready to scale, while bio-fermentation can radically reduce land use needs

2 Over the horizon

 0-5 years

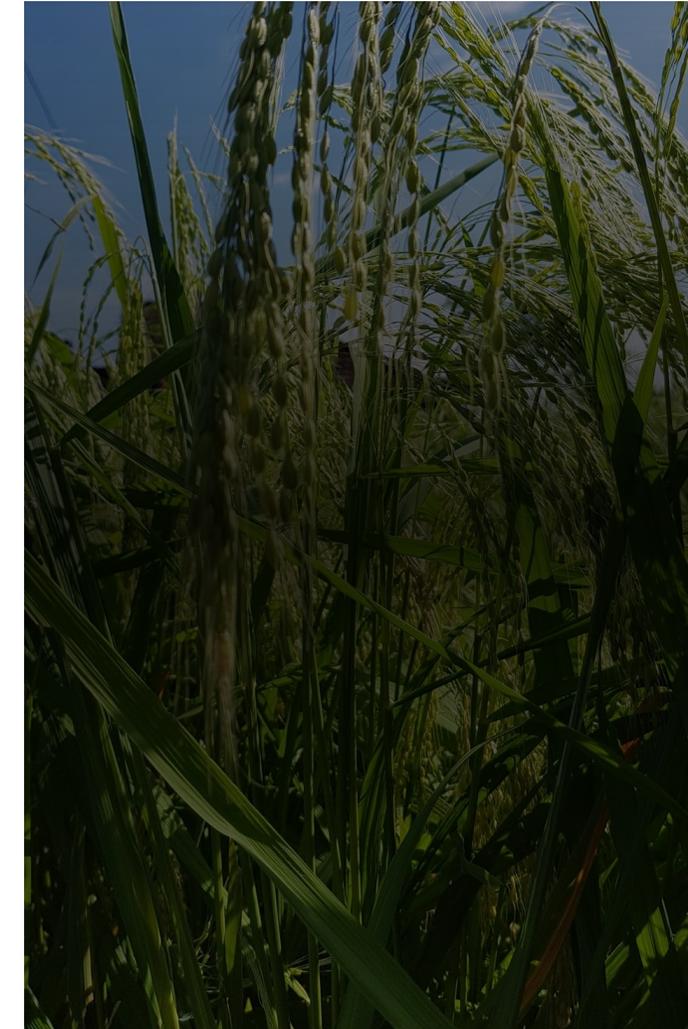
Upcycling technologies

Evolving suite of new tech can unlock significant value from food loss along value chain

 5-10 years

Cell-based alternative-protein

Lab-based proteins can benefit from the sustainable consumption movement and fulfil SEA's potential as a global food tech hub



02

CATALYZE THE JOURNEY

eFishery uses data and IoT to improve smallholder fishery productivity and sustainability

Series B agri-tech start-up (\$20 million raised) focused on aquaculture intelligence in Indonesia (pilots in Thailand and Vietnam)
Based in Bandung, launched in 2013 and has more than 250 employees

DECARBONIZE

AGRI-FOOD

 eFishery

CASE STUDY

Sources: Company website;
Company interviews



IoT fish and shrimp feeders

optimize feed quantity and automate feeding time for smallholder farmers

> 15,000 farmers

have purchased feeders

> 30% reduction

in production lead time by optimizing feeding schedule and frequency

Up to **~35%** reduction

in feed waste



Smallholder fishery services

host an online marketplace to market produce and provide smallholders access to financing

Up to **~2x** increase

in farmer annual net profit

Up to **35%** increase

in production yield by reducing feed waste

THE JOURNEY



Feeders as productivity tools to empower underserved smallholders

Few innovations address smallholder farmers' needs due to the perception of unattractive economics. As such, smallholders typically still feed by hand, resulting in sub-optimal feeding, water pollution (nitrogen from excess feed), and wastage. The eFisheryFeeder helps farmers optimize feed costs (~70-90% of all costs) by improving productivity while reducing wastage and water pollution, thereby empowering farmers to be more sustainable while improving their profitability and livelihoods



Smallholder farmers' needs at the core of the innovation process

eFishery's design process focuses on developing products that farmers can afford and understand. For example, eFishery uses vibration-based sensors (fish movement correlates with hunger) over more sophisticated underwater cameras and acoustic sensors because they are more affordable and easier to operate

“ *As a former fish farmer, I knew that if the feeder was too expensive or complex, farmers would not be able to afford or understand it. As such, my biggest aim and challenge was to design **a feeder that kept the complexity and costs as low as possible***



HOW IT WORKS

eFishery platform



eFisheryFund

Provides farmers increased financing access through BNPL¹ loans underwritten by smart-feeder data



eFisheryFresh

Farmers can sell their produce via an online marketplace for more profit enabled by eFisheryFeed's lower cost feed



eFisheryFeeder

The feeder and mobile app collect fish yield and harvest profit data through IoT sensors and farmer inputs, combined with AI/ML, to calibrate feed dosage and underwrite loans to farmers



eFisheryFeed

eFishery's BNPL loans enable farmers to purchase lower cost feed through bulk purchase programs

Notes: 1. Buy-now pay-later

LEARNINGS

Community building and education critical for smallholder adoption

Building a personal relationship and educating farmers to move away from entrenched traditional methods (e.g., hand feeding) were critical for early adoption

Important to ensure fair value distribution across supply chain

Including incumbent distributors into the marketplace allowed eFishery to create a mutually beneficial system that leveraged distributors' supply chain capabilities to expand farmers' reach while creating incremental value for all stakeholders

“ You **cannot ‘hack’ smallholder penetration** – it’s **all about relationship building**. What mattered to farmers in the early days was not our tech but **the quality of our relationship and trust with them**. **The positive word of mouth from our first customers** then helped us generate more traction **”**

WHAT'S NEXT

By 2025:

~1 million

farmers with eFisheryFeeders

~10

countries (which hold ~80% of global aquaculture production) with eFishery presence

Gibran Huzairah, CEO & Co-founder, eFishery



“

*Our ambition is **to become the world's largest aquaculture cooperative**, to empower smallholder farmers with sustainable practices and encourage consumers to **transition from higher-emission meats** (e.g., beef and lamb) **to fish, which has a lower carbon impact***

Gibran Huzaifah, CEO & Co-founder, eFishery

02

CATALYZE THE JOURNEY

Building blocks on SEA's Net Zero journey

Decarbonize



Energy transition

Address growing energy security and demand through cleaner sources



Valuing nature

Assign value to and protect the region's natural capital as carbon sinks and biodiversity banks



Agri-food system transformation

Empower smallholders to adopt sustainability while building out SEA as the alternative-protein hub



Others: Waste and industry emissions management

Leverage enablers



Voluntary carbon markets

Compensate for hard-to-abate emissions, scale decarbonization solutions by pricing carbon, and protect SEA's natural capital while leveraging its potential to serve global need and contributing to the region's socioeconomic development



Data and digital

Catalyze innovation and scale sustainability impact through the "green data revolution"

Scaling the voluntary carbon markets can accelerate SEA's Net Zero transition

Developing a robust carbon market will allow SEA to:

Enable and scale Net Zero levers



Balance climate targets with economic growth

While emissions reduction should remain the priority, SEA's economic growth and energy needs mean that fossil fuels cannot be cut out overnight. Carbon markets will allow countries to compensate for these hard-to-abate emissions while facilitating the gradual transition to a Net Zero economy



Scale decarbonization by pricing carbon

Voluntary markets can help to establish a carbon price (especially in the absence of compliance schemes or carbon taxes), enabling firms to better internalize the cost of emissions, while revenues from carbon credit generation can encourage smallholders to adopt more sustainable practices



Operationalize mitigation as quickly as possible

Nearer-term solutions to decarbonize will have a more significant climate impact relative to a perfect solution that is still years from deployment - carbon markets can facilitate mitigation while buying time for further technological development

Meet global need while contributing regional socioeconomic benefits



Propel the region on a global stage

SEA's wealth of natural capital makes the region an ideal front-runner to meet the market needs, but supply and infrastructure will need to be developed quickly before the world meets its needs elsewhere



Generate socioeconomic co-benefits

Carbon crediting activities often result in preservation of biodiversity, improvements in ambient air and water quality, and protection of economic sectors such as agriculture, fisheries, forestry, and ecotourism



Spur green finance by improving bankability

Carbon credits provide an additional revenue stream to incentivize development of nature-based projects and decarbonization technologies that may be economically unviable today (e.g., direct air capture, etc.)

02

CATALYZE THE JOURNEY

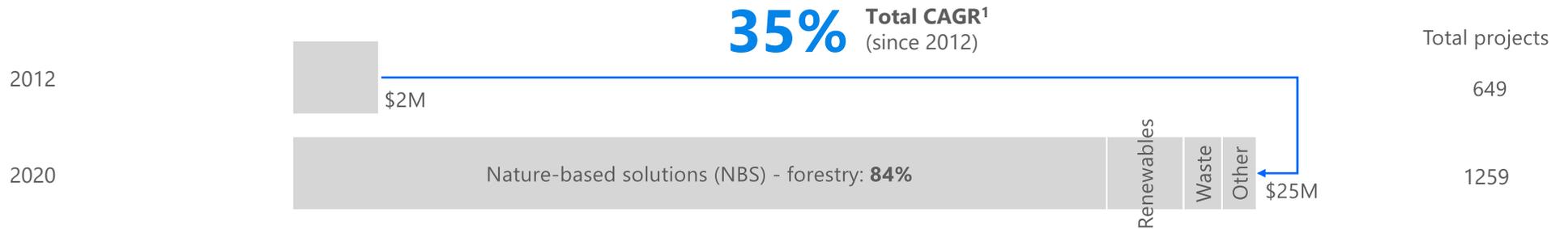
LEVERAGE ENABLERS

CARBON MARKETS

SEA voluntary carbon markets are nascent but growing quickly

Significant headroom for SEA's carbon markets to grow, especially given the region's outsized potential for nature-based solutions

SEA voluntary markets transactions are mainly made of forestry credits today



SEA contribution to global:

Voluntary offsets transactions



Annual investible carbon potential



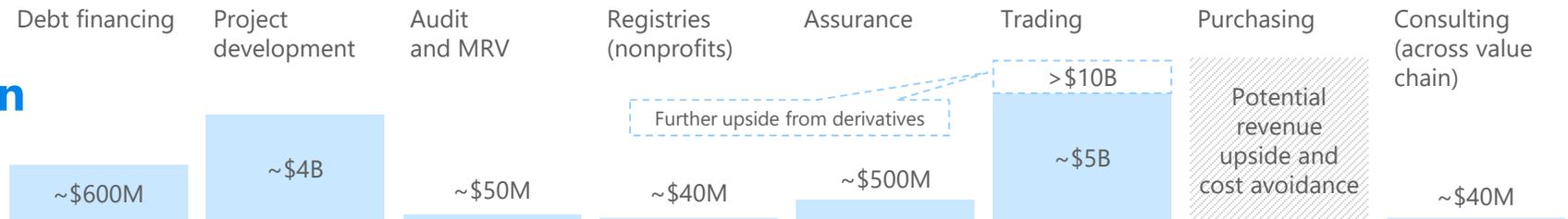
Notes: 1. Compounded annual growth rates; 2. Based on estimates of investible carbon stock in terrestrial forests in global pantropic regions; 3. Revenues across value chain from interest payments, offset sales, audit and monitoring fees, registry fees, assurance fees, offset resale, and commissions, respectively

Sources: Koh et al.; Allied Offsets; State of Voluntary Carbon Markets; Bain analysis

By 2030

~\$10 billion

In annual revenue pools across the value chain³



02

CATALYZE THE JOURNEY

LEVERAGE ENABLERS

CARBON MARKETS

Key enablers to scale the region's carbon markets

Scaled-up supply of **high-quality credits** with improved **transparency and integrity**



While SEA holds immense potential for nature-based solutions, the carbon markets are held back today by low trust in the quality of offsets from this region and low liquidity, among other issues. Digitally-enabled technologies such as blockchain tokenization and remote monitoring provide opportunities to improve confidence cost effectively and attract the investors/buyers and capital required to scale. Favorable government policies are also required to incentivize project development

Strong **demand signal from governments** and plan for **voluntary markets to coexist alongside compliance markets or carbon taxes**



Carbon pricing mechanisms that factor in the true cost of carbon, combined with the acceptance of (high-quality) offsets by governments, will drive a big shift in capital and demand into the voluntary carbon markets. California, Japan, and China are examples of regions that allow use of offsets (within boundaries) in ETS

Regional framework to establish **credible cross-border markets at scale**



To truly scale SEA carbon markets on a global level, the region's countries will need to avoid carbon nationalism. Instead, policymakers from each country need to work together to establish a standard set of objectives, rules, and terminology that communicates clearly the role of offsets in the region's overall Net Zero agenda, with regionally-centralized registries and a system for corresponding adjustments¹

Notes: 1. Corresponding adjustments are a tool designed to promote the integrity of emissions accounting under the Paris Agreement, preventing "double counting" of emissions

Sources: [WRI](#); [Brookings](#)

02

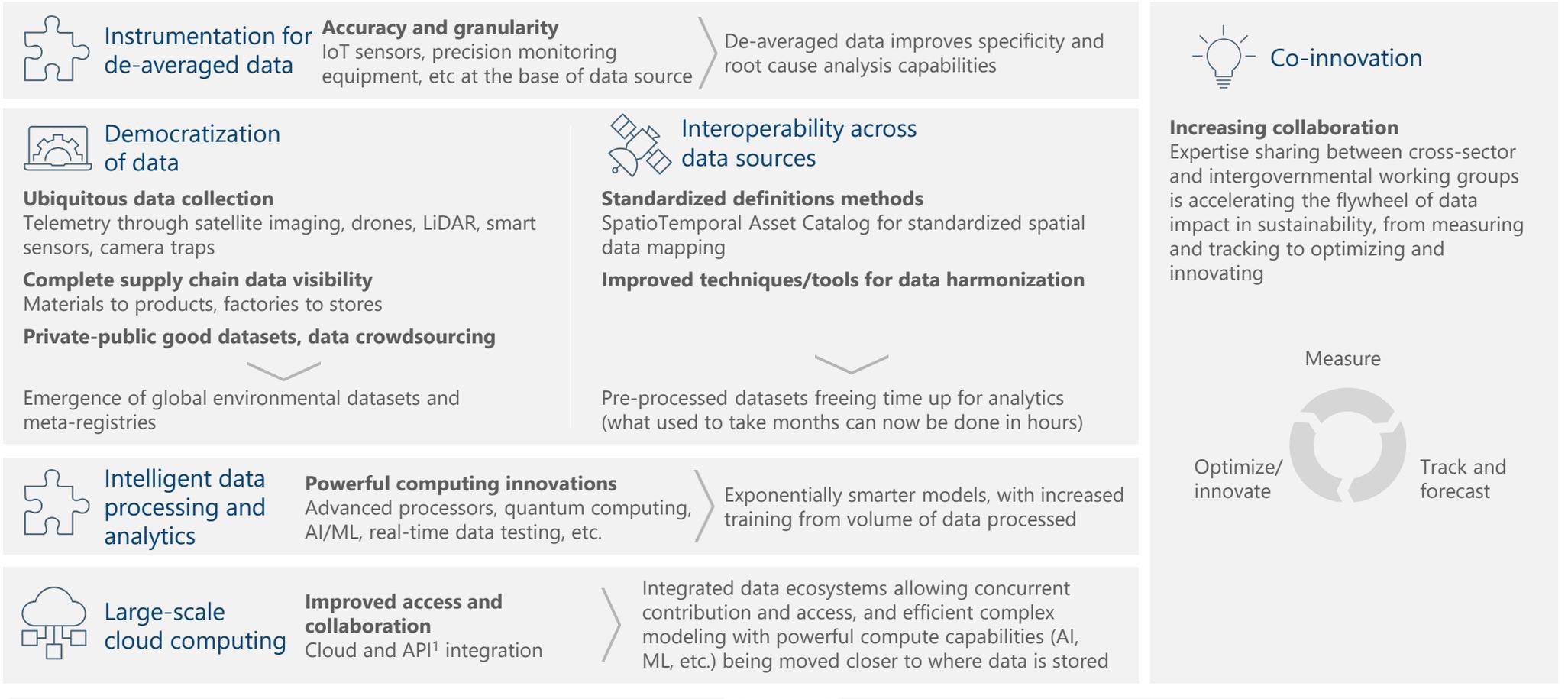
CATALYZE THE JOURNEY

LEVERAGE ENABLERS

GREEN DATA REVOLUTION

The "green data revolution" is a major catalyst for innovation and scaling sustainability impact

Thematic developments in data and digital innovations are supporting scale-up of solutions



Empowering leaders to jointly solve problems at scale with sharpened, data-driven insights and intelligent decision-making models

Notes: 1. Application programming interface

Sources: [Datacenter News](#); [Datacenter Knowledge](#); Bain experience; Industry interviews; Company websites

02

CATALYZE THE JOURNEY

LEVERAGE ENABLERS

GREEN DATA REVOLUTION

Large-scale data collaborations are poised to increase adoption of sustainability solutions globally

Data collaborations between global stakeholders such as ecologists, climate scientists, data scientists, and governments are driving game-changing outcomes by democratizing data and insights for businesses and decision makers

Non-exhaustive

| |  |  |  |  |  |  |
|-----------------|--|---|--|--|--|---|
| Use case | Energy | Energy Agri-food | Energy Agri-food Nature | Energy Agri-food Nature | Nature | Nature |
| Description | Open platform digital twin technologies to optimize urban planning, energy efficiency, and disaster planning | Open-source platform to aggregate data, modeling and computing for climate-integrated investing | Comprehensive single-access-point ecosystem for environmental data | Datasets, industry-leading AI, and cloud computing tools to solve environmental problems | Largest open-source satellite imaging and spatial mapping platform for management of natural assets | Provider of ready-to-use, future climate data for impact studies and risk assessment |
| Features | Integrated data on environment, buildings, transport, drainage, traffic, etc. Simulations and scenario analysis | Physical-economic models Global data compendium Scenario-based predictive analysis | Harmonized data from multiple sources using APIs Statistical and analytical packages | AI for Earth multi-petabyte planetary computer Hyperscale cloud, AI, and IoT digital twins | Real-time satellite imaging Analytics on changes in forest cover, land use, climate, and biodiversity | Projections of rainfall, wind speeds, temperatures, and solar radiation using advanced statistical processing |
| Users/ Partners |       |       |       |       |       |      |

Sources: Microsoft; Geoportal; CrunchBase; 51World; OS-Climate; Regrow; Global Forest Watch; The Climate Data Factory

02

CATALYZE THE JOURNEY

Huge potential for SEA to leverage global data and digital innovations to accelerate the Net Zero journey

While potential is significant, it is critical to scale use of data innovations sustainably

LEVERAGE ENABLERS

GREEN DATA REVOLUTION



Image credits: 51World, YouTube

Singapore's Digital Twin by 51World

Enables city operators to monitor various aspects and make better decisions by providing data and scenario modeling

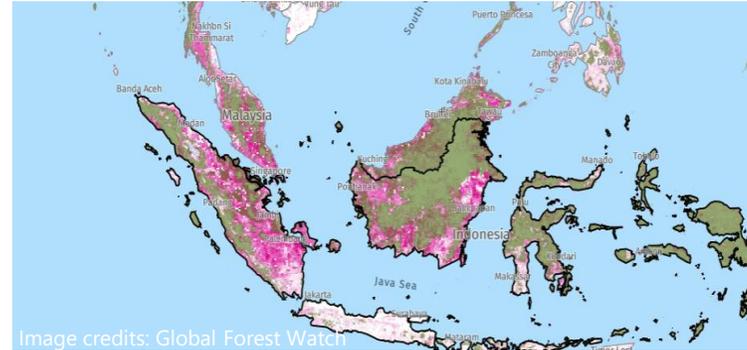


Image credits: Global Forest Watch

Geospatial mapping of forests in SEA by Global Forest Watch

Enables remote monitoring and management of natural capital by providing real-time geospatial data via satellite imaging

Potential use cases:

Monitor building characteristics and sunlight to plan for **solar**



Image credits: 51World, YouTube

Simulate floods and other climate events for **disaster planning**



Potential use cases:

Alert on **illegal deforestation activities** at project sites



Image credits: Global Forest Watch

Monitor and ensure **deforestation-free supply chains**



Non-exhaustive

Key watch-out:



Data center (DC) management

As **data/digital penetration** grows, **sustainable management** of DCs will be critical:

>95% of SEA DCs use inefficient air-based cooling systems

12% of Singapore's energy will be consumed by DCs¹ by 2030



Aiming to power all data centers with **100% carbon-free** energy by 2030

- **Liquid cooling** to increase energy efficiency
- **Large batteries** to replace diesel generators as backup energy assets
- **'Temporal Matching'** of clean energy purchases with consumption on hourly basis

Notes: 1. Singapore accounts for 60% of SEA's data center supply

Sources: Unreal Engine; NRF; Global Forest Watch; 51World; Datacenter News; Datacenter Knowledge

Emerging Net Zero activity by SEA companies

Curious to find out more?
Read the deep dive here

Decarbonization efforts by leading SEA players

| |  |  |  |
|------------------------------|---|---|--|
| Baseline and ambition | SBTi target set (<2°C) Reduce scope 1 and 2 emissions by 28% and scope 3 from capital goods by 22% (per m ²) by 2030, vs. 2019 baseline | SBTi committed 28% emissions reduction by 2030, vs. 2007 baseline | Electric and hybrid fleet Full fleet running on clean energy by 2030; Net Zero targets and roadmap to be announced next year |
| Levers | <ul style="list-style-type: none"> Higher energy efficiency and green building certification Use of digital tools such as Building Information Modeling and Intelligent Building Platform Use of more sustainable and locally sourced materials Promotion of water and waste circularity | <ul style="list-style-type: none"> Increasing use of biomass and renewables with multiple solar PV projects/pilots AI solutions to manage energy in production units, reducing emissions by 1,600 tons of CO₂/year Roll-out of low-carbon cement and greening of supply chain Investments in forest rehabilitation | <ul style="list-style-type: none"> Partnerships with governments to develop and grow infrastructure for electric vehicles Pilot feature for users to choose EV rides and offset carbon emissions on app Investments in carbon offset and solarization projects New EV business models piloted |
| Enablers | <ul style="list-style-type: none"> Sustainability council established, reporting to board of directors and supported by group Chief Sustainability Officer Systematic KPIs¹ tied to remuneration Internal carbon price across global portfolio in progress Sustainability X Challenge set up | <ul style="list-style-type: none"> Sustainable development committee established, reporting to President and CEO and comprising multiple subcommittees (e.g., circular economy, climate change, etc.) Internal carbon price piloted at rate of \$18 per tCO₂ and used for evaluation of rooftop solar project | <ul style="list-style-type: none"> Sustainability Steering Committee established, reporting to Executive Committee and supported by regional sustainability teams |

Notes: 1. Key performance index

Sources: [CapitaLand Sustainability Report \(2020\)](#); [SCG Sustainability Report \(2020\)](#); [Grab ESG Report \(2020\)](#); [Nikkei](#); Company website; Bain interviews

03

Unlocking Capital for Sustainability

Increasing flows, but sizeable headroom

▶ Curious to find out more?
Read the deep dive here

Fundamental shifts have taken place in the past ~18 months

1 SEA investor sentiment is shifting from risk avoidance to opportunity seeking

| | No sustainability focus | Negative screening | Sustainability integration | Impact seeking |
|----------------------------|-------------------------|--------------------|----------------------------|-----------------|
| 2019 – 2021 ¹ : | -7% pt. | +12% pt. | +5% pt. | +19% pt. |

“ Climate risk modeling is a key part of our strategy now – this was not conceivable even 12 months ago

SEA Senior VP,
International PE Fund

2 Heightened pressures and demand from stakeholders

Regulators are increasingly enforcing compliance with reporting and investing standards (e.g., Task Force on Climate-Related Financial Disclosures [TCFD], UN PRI)
Demand from clients and LPs,² especially high-net-worth individuals (HNI), for sustainable products and practices is accelerating the shift
Public scrutiny and reputational risk of unsustainable practices is on the rise

“ Sustainability interest and queries reached a tipping point in the last year, especially from high-net-worth clients and investors

Former Head of Sustainable Investing
Global Investment Management Co

3 Emerging recognition of value from sustainability

There is increasing evidence that sustainability is associated with improved tangible financial returns through
Value creation (cost reduction and revenue growth)
Value preservation (mitigation against risk of financial externalities)

“ Investors have started to realize that there is real fundamental value to be gained by early movers (in sustainability)

VP,
Asia-Pacific PE Fund

4 Increasing regulatory support

State machinery is mobilizing capital support to spur businesses to action through
Grants/co-investments
Tax incentives
Guarantees

“ Governments are now trying to create conditions in which private investments in sustainable assets are commercially viable

Managing Director,
SEA SWF Co

Notes: 1. Change in percentage of SEA funds indicating that they adopt the said strategy. Adoption of multiple strategies is possible; 2. Limited partners

Sources: Bain Asia-Pacific PE Survey 2019; Bain Asia-Pacific PE Survey 2021; Industry interviews

Green capital is beginning to flow in SEA, though still at early stage

| UNLOCKING CAPITAL | | | UNLOCKING CAPITAL | | |
|--|----------------------------|------------------------------------|--|---------------|-----------------------------------|
| Green fundraising has been on a strong upward trajectory over the last 3-5 years | | | While share of capital deployment into green assets is increasing, overall growth is less strong compared to fundraising | | |
| | Capital raised | Annual growth | Capital deployed | Annual growth | Share of total value ³ |
| | 2020 | | 2020 | Since 2016 | 2020 2016 |
| Debt | \$11.9 billion debt issued | 151% since 2016 | Corporates⁴ \$4.9 billion | 22% | 11% 3% |
| IPO | \$1.4 billion IPOs | 45% since 2016 | PE/VC⁵ \$1.9 billion | 50% | 19% 5% |
| PE/VC | \$0.5 billion funds raised | 53% since 2017 ¹ | Infrastructure \$1.9 billion | -18% | 36% 23% |
| Public funds² | \$0.6 billion total AUM | 40% since 2018 | Total \$8.7 billion | 6% | 15% 7% |

Notes: 1. No green funds raised in 2016; 2. Includes funds raising capital for environmental and social objectives; 3. Total value only includes SEA countries with available data for each asset category in SEA; 4. Excludes investments <\$15 million; 5. Excludes deals <\$10 million

Sources: Bain analysis

Key **sectoral themes** attracting capital today

Energy solutions, green buildings and construction, waste and water, and sustainable materials are currently center stage

Sectors attracting capital



Energy solutions

Low-carbon energy (e.g., solar, hydropower, geothermal, wind), energy efficiency and grid solutions

Share of sector of total green:¹

Debt: 31% | IPOs: 45% | Corp.: 89%
PE/VC: 72% | Infra: 78%

Drivers

SEA energy transition agenda

~33% renewable energy capacity target by 2025, vs. ~24% today

Regional unconditional target to reduce emissions by 26% by 2030



Green buildings and construction

Smart buildings that optimize energy consumption, use sustainable materials, and embrace on-site renewable energy

Debt: 49% | IPOs: 27%

Government financial support and incentives for sustainable infrastructure development

Estimated ~\$400 billion in investments needed for sustainable buildings between 2021 and 2030



Waste and water management

Waste and water management and treatment and innovative solutions to reduce waste

Debt: 9% | IPOs: 2% | PE/VC: 18% | Infra: 14%

Rapid growth of waste volume, and rising adoption of Waste-to-Energy (WTE)

>90 WTE plants to be operational by 2022 in the region, with combined capacity of ~800 MW



Sustainable materials

Recyclable plastic alternatives, sustainably designed packaging, and low-carbon building materials

IPOs: 23% | Corp: 2% | PE/VC: 3%

SEA's worsening plastic waste crisis and increasing consumer discernment

4 out of the 5 countries responsible for ~60% of ocean plastic are in SEA

Nascent but promising



Sustainable food systems

Alternative proteins, aquaculture, controlled environment agriculture, and sustainable production

Share of sector of total green:¹

Corp.: 7% | PE/VC: 3%

Opportunity thesis

Prioritization of food security in the region, rising consumer preference and demand (for protein and rice staples), and the advent of technologies to increase yield and lower costs



Conservation and restoration of nature

Nature-based solutions to conserve and restore ecosystems
Limited private investments today but poised for change

Rising trend of carbon prices, new carbon crediting methods (e.g., for blue carbon), and emergence of catalytic financing (which absorbs risks from private capital)

Notes: 1. 2020 figures shown apart from IPOs (2016-2020 cumulative) and PE/VC (2011-2020 cumulative)

Sources: [ADB](#); [e-Economy SEA](#); [The Straits Times](#); [Science Magazine](#); [The ASEAN Post](#)

03

UNLOCKING CAPITAL

While a promising start, **a lot more is needed**

There is plenty of **headroom to grow**



Notes: 1. Includes funds raising capital for environmental and social sustainability objectives; 2. Energy investments needed based on IRENA's Transforming Energy Scenario (compatible with well below 2°C, and toward 1.5°C Paris agreement targets). Water estimated based on G20 Infrastructure Outlook (inclusive of investment needed to meet Sustainable Development Goals [SDGs]), includes wastewater, water collection, treatment and processing, transmission and distribution assets including desalination, excludes land purchases. Rail investments include Metro and high-speed rail (HSR) investment needs only. Waste investments estimated for total waste management sector, inclusive of WTE, landfills, composters, recycling and other waste infrastructure

The **scale of investment** required² to deliver SEA's green transition is massive

~\$2 trillion

sustainable infrastructure investment required between 2021 and 2030, which can be seen as **an obstacle or an opportunity**



~\$50 billion investments in nonrenewable energy

Everyone is needed

40%

of infrastructure investments will need to **come from the private sector**, according to ADB forecasts

Governments cannot do this alone. Public-private partnerships and catalytic mechanisms like blended financing will play a critical role to meet the investment needs of the region

Sources: Bain analysis; [Global Infrastructure](#); [IRENA](#); World Bank; IFC; ADB; [DBS](#)

Several barriers impede green capital flows today

| Macro challenges | Immature ecosystem | Low quality and high risk | Organizational hurdles |
|---|--|--|---|
|  <p>Inconsistent government policies</p> <p>“ (Clean energy) investments are heavily infrastructure-related, and lack of predictable policies and government support make investors hesitate to put capital in</p> <p>Director, Energy Investments SEA Government Investor Co</p> |  <p>High transaction and compliance costs</p> <p>“ The cost of environmental compliance in SEA today is too prohibitive</p> <p>Senior MD SEA, Global PE fund</p> |  <p>Limited quality assets and project developers</p> <p>“ There is a surplus of interested capital chasing scarce quality assets in the region</p> <p>Sustainability Director SEA Government Investor Co</p> |  <p>Lack of sponsorship from leadership and organization inertia</p> <p>“ Organizational change will not happen without alignment and focus from senior management</p> <p>Senior MD SEA, Global PE fund</p> |
| <p>“ We need better advocacy from SEA governments – they need to lead the sustainability agenda</p> <p>Chief Procurement Officer, Global Consumer Products Co</p> |  <p>Complex and evolving standards and expectations</p> <p>“ Every organization has its own framework where the definition of green varies... hard for new adopters to get it right</p> <p>Executive Director SG, Global Business Coalition</p> |  <p>Long lead times and volatility associated with returns</p> <p>“ Investments in sustainable assets often have longer horizons and uncertain returns, which is inconsistent with the largely impatient capital in the private sector</p> <p>Director of AI, Global Development Org</p> |  <p>Unclear capital allocation principles with misaligned incentives</p> <p>“ We need a GAAP-style¹ global standard to account for and price climate outcomes... only then will you see actual action</p> <p>Senior MD SEA, Global PE fund</p> |
| |  <p>Lack of consistent measurement and value of co-benefits</p> <p>“ Mapping and valuing co-benefits are extremely challenging, with multiple schools of thought... but are critical in making the market more efficient</p> <p>Professor of Conservation Science, SEA University</p> | | |

Notes: 1. Generally Accepted Accounting Principles
Sources: Industry interviews

Critical enablers required to unlock full potential

Curious to find out more?
Read the deep dive here

Strong government support and consistent policies



- Consistent government signals and policies to strengthen investor confidence and attract more capital into the green economy (e.g., corporate tax benefits and land use incentives, etc. for solar energy in Vietnam)
- Financing and incentives aligned with achieving national green goals, and initiatives to support the transition of impacted sectors

Blended financing



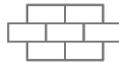
- Use of creative financial instruments through public-private partnerships such as blended financing and take-out facilities (TOFs) to align different stakeholder objectives and incentives, de-risk investments and attract more private capital
- Mobilization of private sector green infrastructure financing to reduce burden on pandemic-strained government budgets (e.g., ADB's ASEAN Catalytic Green Finance Facility [ACGF] supports SEA governments to finance sustainable infrastructure)

Digital platforms and data-enabled solutions



- Digital infrastructure and automated, data-enabled processes to minimize friction, optimize processes, and scale sustainability measurement and reporting while reducing transaction costs and efforts (e.g., SGX and Temasek partnership to develop a blockchain-based digital asset infrastructure)

Ecosystem fundamentals and infrastructure



- Ecosystem-wide guidelines to define sustainability impact and materiality (e.g., ASEAN Taxonomy)
- Short-term debt instruments to mobilize working capital and trade facilities for green projects
- Buildout and scaling of liquid, regional sustainable asset markets (e.g., regional carbon markets)

Fit-for-purpose fund allocation and operating principles



- Recognized metrics to assign value to social and environmental factors, in addition to financial return, to enable systematic allocation of funds to achieve highest impact
- Established operating principles to mitigate misaligned incentives that underpin impatient capital

Conclusion

Leading by Doing

Collective vision and efforts are required to achieve a sustainable SEA

A sustainable SEA needs both individual and collective action

Communities

Crystalize the shift to “conscious consumption” while proactively engaging and lobbying stakeholders (e.g., governments, corporates, investors) for systemic change

Governments

Set favorable national policies, remove regulatory impediments, and establish incentives for new sustainability investments while managing the impact of stranded assets



Investors

Unlock green and transition capital through intentional investments, catalytic financial instruments and novel financial products, and adoption of internationally recognized investing frameworks and standards

Businesses

Decarbonize all scopes of emissions, treat sustainability as a value creation transition (vs. pure risk management), and invest strategically in innovation to create commercial value from low-carbon business models



Investors can play a critical role in **unlocking green or transition capital**

INVESTORS

01 **Embed sustainability imperative**, strategies, and practices throughout portfolio

02 **Set KPIs and targets** for portfolio companies to measure and report against, adopting internationally recognized standards

03 **Develop novel financing solutions** (e.g., outcomes-based payments, blended financing), and data-driven models to price sustainability outcomes and facilitate capital efficiency

04 **Develop green, sustainability-linked, and transition products** that align returns to performance against agreed outcomes to drive **incremental allocation** to this space (not just re-labelling)

05 **Raise green and transition capital** and actively **pursue thematic investments** in such sectors and assets

06 **Lower barriers to and incentivize financing** for green and transition sectors



SEA governments have a leadership role to play in SEA's transition

GOVERNMENTS

01 **Develop a comprehensive Net Zero plan** including dedicated state funding to green infrastructure development and detailed, interim milestones and targets that account for the country's development needs

02 **Assign price to carbon** through an ETS or carbon tax while fostering the region's voluntary carbon markets

03 **Establish national policies and incentives** to remove regulatory impediments, create investible environments for sustainable assets and manage impact of stranded assets

04 **Rally government-linked enterprises to action** while supporting and building capabilities of SMEs

05 **Incentivize foreign direct interest** to contribute to building out SEA's sustainability ecosystem (e.g., IOCs with renewables opportunities)

06 **Ensure a just climate transition** for local communities and at-risk workers with robust policies and regulations



For the CEO, a few key takeaways

BUSINESSES



01 Act now – do not let perfect be the enemy of good

It can seem like a complex system – but **inaction is worse than getting some things wrong**

Start simple and evolve – sustainability is a multi-year journey and you will need time to invest in and build up the right capabilities

Capture quick-win opportunities – many **decarbonization levers can also save costs** through efficiencies

02 Treat sustainability as part of the core

Integrate sustainability into the core business strategy – it is not a separate corporate social responsibility (CSR) consideration

Regularly **assess and integrate climate-related risks** into business continuity planning and align ambition to what is needed – not just what is feasible

Go beyond risk management to think of sustainability as **a value creation transition**

03 Measure, measure, measure – what you don't count won't get counted

Invest in data and digital technology infrastructure to improve visibility, reporting, and ultimately, performance

Adopt internationally recognized standards of measuring and reporting (e.g., TCFD, GRI¹), establishing an informed and evolved process (beyond ticking boxes)

Leverage **materiality assessments** to set goals and prioritize resources

Notes: 1. Global reporting initiative



04 Make decarbonization everyone's responsibility

Lead from the top – it is critical to have C-suite champions

Translate decarbonization goals to KPIs and cascade goals to the line to motivate action, while establishing a **systematic link to the bottom line**, e.g., through an internal carbon tax

Integrate sustainability as a key pillar of employee culture to build "sustainability DNA"

05 Use sustainability as a catalyst for innovation

Unlock innovation and accelerate execution by creating new incentives for decarbonization

Develop **new products and business models** (e.g., carbon-free, circular) to accelerate Net Zero beyond the core

Adopt a systematic approach to **drive business value** from sustainable innovation

06 Drive transformation at scale

Create two-way **communication channels** for influential third-party providers, customers, and employee groups

Proactively **engage key stakeholders and partner across the ecosystem** to learn, grow, and amplify transformational impacts

07 Lead a just transition

Actively **engage suppliers** and explore innovative models to **support their transition**

Establish **lasting economies for local communities** and incorporate **net job creation and fair labor metrics**

Aim to exceed the minimum standard and establish a dialogue with internal and external stakeholders (especially local communities)



Ultimately, scaling SEA's green economy will need **collective action**...

COLLECTIVE ACTION

Key ingredients:



Ecosystem
co-innovation



Transition support



Regional
collaboration

State of play in SEA

Greater **cross-sector connectivity** on a regional and global level

Increasing **entrepreneurial spirit** and **capital interest** in the region

Building awareness and recognition among business leaders that **collaboration is critical**

Large **reliance on fossil fuels** like coal and oil, and significant risk of **stranded assets**

High concentration of **siloed smallholder farmers and SME** suppliers with low sustainability awareness

Low **sustainability expertise** in workforce and increasing importance of **digital and data literacy**

Diverse region with **disparate** level of development, needs, and circumstances across nations

Country-level differences in terms of access to **renewable energy resources** and **natural capital**

“ We know we **cannot achieve our Net Zero target alone**, and not with current technologies – therefore we are working with the government, partners, and start-ups to innovate

Sustainability VP,
SG Multinational Co

“ This shift, especially for **businesses in SEA, cannot be done overnight**. It is not helpful to be hardline 'green' – we need **transition support**

Director,
Indonesia Energy Co

“ A **transnational framework** to collectively address emissions will **go much further than localized solutions**

Sustainability Director,
SEA Government Investor Co



...at an ecosystem level

COLLECTIVE ACTION

Key ingredients:



Ecosystem co-innovation



Transition support



Regional collaboration

Imperatives for the region

Cross-sector innovation collaboration

for start-ups, corporates, think tanks, etc. to jointly accelerate commercialization of low-carbon technologies that meet SEA-specific needs (e.g., food tech, CCUS)

Alliances for action

across value chains to facilitate co-investments for scaled solutions and increase data, standards, and knowledge sharing for better visibility and impact

Valuing SEA’s natural capital

by mobilizing private and public sector capital through innovative partnerships to realize SEA’s natural capital carbon sink potential while SEA transitions away from fossil fuels

Transitioning “hard-to-abate” sectors

and mitigating impact of stranded assets through catalytic instruments like blended financing and TOFs to de-risk and incentivize private capital (e.g., ADB and banks’ Asian coal plants closure plan)

SMEs and smallholders’ support

by reducing transaction costs and frictions to green capital (e.g., asset leasing models, incentive schemes) and building capabilities

Workforce upskilling and retraining

to build up regional human capital through capacity building programs co-developed by employers, higher-learning institutions, and government

Regional Net Zero transition plan

that accounts for diverse nation states and development needs and emphasizes cross-border cooperation

Cross-border carbon trading system

with a common framework and credible, functioning market dynamics that assigns value to SEA’s natural capital while meeting regional need for high-quality offsets

Interconnected grid for clean energy

to address regional imbalances in renewables resources by connecting demand with supply and solving for variability in renewables generation

Leapfrog to leadership

The sustainability journey holds immense potential for SEA to transform **locally** and make a measurable contribution **globally**

Decarbonize



Leverage enablers



Our future depends on today – **the time to A.C.T. is now**

Aim high with bold ambitions

Commit resources and investments needed

Track and report against clear targets

By 2030, SEA's

Green Economy

will contribute

\$1 trillion Economic opportunities

5–6 million New jobs

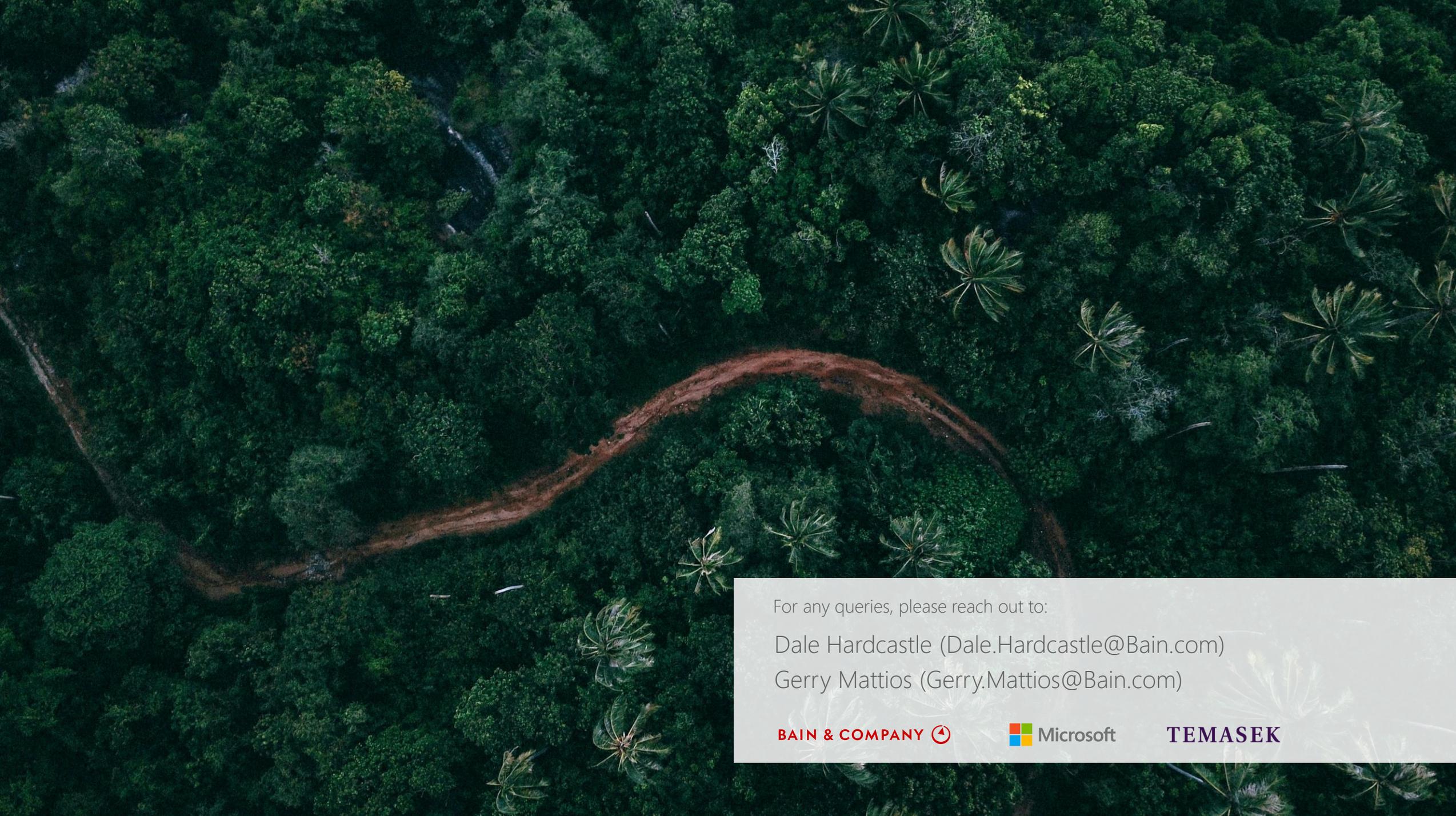
6–8% GDP from new growth areas

Glossary of acronyms

| Acronym | | Acronym | |
|---------|---|---------|--|
| ADB | Asian Development Bank | IMO | International Marine Organization |
| AI | Artificial intelligence | IoT | Internet of things |
| AI/ML | Artificial intelligence/machine learning | KPI | Key performance index |
| API | Application programming interface | LiDAR | Light detection and ranging |
| ASEAN | Association of Southeast Asian Nations | LP | Limited partners |
| AUM | Assets under management | LUCF | Land use change and forestry |
| BAU | Business-as-usual | ML | Machine learning |
| BNPL | Buy-now pay-later | MNC | Multinational corporation |
| CAGR | Compounded annual growth rate | MRV | Measure, report, and verify |
| CCS | Carbon capture and storage. See also CCUS | NDC | Nationally determined contributions |
| CCUS | Carbon capture, utilization, and storage. See also CCS | P&L | Profit and loss |
| CORSIA | Carbon Offsetting and Reduction Scheme for International Aviation | PE | Private equity |
| DC | Data center | PRI | Principles for Responsible Investment |
| ESG | Environmental, social, and governance | PV | Photovoltaic |
| ETS | Emissions trading scheme | R&D | Research and development |
| EU | European Union | ROI | Return on investment |
| EU/AM | Europe and Americas | rPET | Recycled polyethylene tetraphyte |
| EV | Electric vehicle | RSPO | Roundtable on Sustainable Palm Oil |
| GAAP | Generally Accepted Accounting Principles | SDGs | Sustainable Development Goals |
| GDP | Gross domestic product | SEA | Southeast Asian nations, including Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Singapore, Thailand, the Philippines, and Vietnam unless otherwise stated |
| GHG | Greenhouse gases | SME | Small and medium enterprises |
| GRI | Global reporting initiative | TCFD | Task Force on Climate-Related Financial Disclosures |
| HNI | High-net-worth individuals | TOF | Take-out facilities |
| HSR | High-speed rail | UNFCCC | United Nations Framework Convention on Climate Change |
| ICAP | International Carbon Action Partnership | VC | Venture capital |
| IEA | International Energy Agency | WTE | Waste-to-Energy |

Glossary of terms

| Term | |
|---------------------------------|---|
| Annex I countries | Developed countries and countries undergoing the process of transition to market economy, with specific limitation targets for greenhouse gas emissions. Example countries include the industrialized countries that were members of the OECD in 1992 |
| Bonds | Senior unsecured bonds, senior secured bonds, subordinated unsecured bonds, perpetual bonds, Sukuks, and medium-term bonds |
| Catalytic mechanisms | Mechanisms to spur further green investments by mitigating risks through innovative finance structures. Examples include ADB's ASEAN Catalytic Green Finance Facility (ACGF) |
| Climate risk modeling | Building and running models to evaluate the negative impacts of severe weather events on businesses |
| Co-benefits | Positive benefits related to the reduction of greenhouse gases (according to IPCC) |
| Conditional targets | Reduction of emissions dependent on availability of international support, such as technology transfer or financial aid. See also unconditional targets |
| Conscious consumption | Consumption with the awareness of how it affects society at large |
| Debt | Bonds, loans, private placements, and project finances. See also bonds and loans |
| Family-run businesses | Businesses with more than half of their shares controlled by (more than 1) members of the same family |
| Green business/investment | Businesses/investments that protect or improve the environment |
| Green debt | Bonds, loans, private placements, and project finances that protect/improve the environment or reduce emissions. |
| Green funds | Funds that have positive environmental outcomes/objectives |
| Green infrastructure | Infrastructural spending, such as power plants or waste management facilities, that protect/improve the environment or reduce emissions |
| Green IPO | Initial public offerings that protect/improve the environment or reduce emissions |
| Green PE/VC | Private equity/venture capital funds or deals that targets startups that that protect/improve the environment or reduce emissions. Excludes fixed asset/property investments |
| Impact seeking | Having dedicated impact investing fund which focuses on maximizing environmental, social, and financial returns |
| Loans | Term loans and bridging loans |
| Negative screening | Avoiding certain sectors given ESG risks |
| Outcomes-based payments | A payment model in which the performance-related incentive payments depend on achieving certain (sustainable) KPIs |
| Public funds | Open-end mutual funds and exchange traded funds. Money market funds, feeder funds, and funds of funds are excluded |
| Public-private partnership | Collaboration between a private company and public entity, in the context of financing or operating a project |
| Scope 1 emissions | Direct emissions from company-owned and controlled resources |
| Scope 2 emissions | Indirect emissions from the generation of purchased energy from a utility provider. See also scope 3 emissions |
| Scope 3 emissions | All other indirect emissions that are not included in scope 2 that occur in the value chain of the company. See also scope 2 emissions |
| Social business/investment | Businesses/investments that increase access to basic resources/services or improve social mobility |
| Sustainable business/investment | Businesses/investments that have both positive environmental and social outcomes/objectives |
| Sustainability integration | Inclusion of sustainability as a consideration in investment thesis |
| Sustainable finance | The practice of integrating ESG criteria into financial services to bring about sustainable development outcomes |
| Sustainable funds | Funds that have both positive environmental and social outcomes/objectives |
| Unconditional targets | Unconditional reduction of emissions, independent of external support. See also conditional targets |



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