Catalyzing Indonesia’s Green Growth Potential

In partnership with BCG
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Executive Summary
Indonesia has a valuable opportunity to transition towards a lucrative green growth economy but doing so will require the participation of a broad ecosystem of innovators. This ecosystem will need to integrate startups, micro, small, and medium-sized enterprises (MSMEs), and investors and financiers to catalyze a genuine green growth economy and unlock the benefits this transition can deliver.

Indonesia’s economy, and its people, have greatly benefited from the nation’s strong economic growth over the past five decades, but 50 years of rising affluence has come at a cost to the environment. Indonesia is now the fourth largest annual greenhouse gas (GHG) emitter globally by annual tons of CO2 released.

With large, significant coastal populations, and a rapidly developing economy with key climate-vulnerable sectors, Indonesia is critically exposed to the worst impacts of unchecked climate change. It is vital, therefore, that ‘green growth’ is the driving force for future national development, providing an economic pathway characterized by robust but sustainable growth.

A broad ecosystem of innovators will be vital in charting this path to more sustainable economic foundations, but in doing so they look set to unlock significant value for themselves and the wider economy. Collaboration and cooperation between government, public bodies, financiers and investors, and businesses of all sizes will be crucial in realizing this goal.

Innovators can realize value by supporting Indonesia’s shift to a green growth economy with a potential value of up to US$400B by offering products and services in three key areas:

**Drive Green Growth strategy and green professional services.** Provide products/services that clarify and guide clients’ Green Growth journeys; potential for the market to reach US$46B/yr by 2030

**Generate Green Growth solutions.** Provide products/services that optimize clients’ GHG intensity; potential for the market to reach US$350B/yr by 2030

**Enable emission offsetting.** Enable clients to generate and trade credits for carbon offsetting; potential for the market to reach US$3.5B/yr by 2030
Collaboration across both demand-side and supply-side stakeholders will be essential to develop Indonesia’s green growth maturity, helping develop a robust end-to-end ecosystem to support this transition.

On the demand side, individuals and businesses should stimulate demand for green growth offerings, including products and services, carbon credits, green financing, and decarbonization solutions. On the supply side, the national provision of these offerings must be equally robust. Collaboration across all parties will be critical to developing the two engines of this green transition.

Building green talent. Build and nurture a local talent pool that has the necessary experience and expertise to drive the green growth transition forward.

Boosting scale and accessibility of green financing. Boost the availability of financing for those seeking to undertake their own green growth journeys.

Developing supportive regulatory framework(s). Develop effective and equitable regulations to guide Indonesia’s entire economy toward green growth behaviors.

Fully realizing these opportunities will require a conducive national ecosystem enabled by three essential pillars:
Indonesia’s Green Growth: Opportunity in the Face of Disruption
Indonesia is Southeast Asia’s largest economy and has experienced rapid socioeconomic growth over the last 50 years of development. Indonesia boasts the fourth largest growth rate by gross domestic product (GDP) per capita of all large-and-medium-sized economies since 1968, behind only Korea, Singapore, and China, and is on track to become the world’s fourth-largest economy by 2050 according to research by the International Energy Agency. Indonesia’s rapid growth and expanding affluence now position it as the seventh-largest economy globally for purchasing power parity (PPP).

This economic growth has provided substantial benefits for the people of Indonesia, with an expanding and increasingly affluent population that grew from ~180 million in 1990 to ~280 million by 2021. Robust economic growth has lifted millions out of poverty, with the number of Indonesians living in poverty falling from ~69 million in 1970—equivalent to 60% of the population—to ~27 million by 2021—less than 10% of the population.

However, this rapid growth has not come without its challenges, not least the invisible impact of economic activity on the environment. Indonesia is now fourth on the list of the world’s largest annual GHG emitters—behind only China, the United States, and India—responsible for ~4% of annual GHG emissions. [Exhibit 1.]

Share of world’s top-10 GHG emitters (2019, % of global GHGs) Exhibit 1

<table>
<thead>
<tr>
<th>Country</th>
<th>% of Global GHGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>24</td>
</tr>
<tr>
<td>United States</td>
<td>12</td>
</tr>
<tr>
<td>India</td>
<td>7</td>
</tr>
<tr>
<td>Indonesia</td>
<td>4</td>
</tr>
<tr>
<td>Russia</td>
<td>4</td>
</tr>
<tr>
<td>Brazil</td>
<td>3</td>
</tr>
<tr>
<td>Japan</td>
<td>2</td>
</tr>
<tr>
<td>Iran</td>
<td>2</td>
</tr>
<tr>
<td>Canada</td>
<td>2</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>1</td>
</tr>
</tbody>
</table>

Indonesia’s annual emissions are dominated by land use change and forestry (LUCF) and energy, which together accounted for 83% of total annual emissions in 2019. [Exhibit 2.]
Indonesian GHG emissions (% 2019) Exhibit 2

- **LUCF.** Accounted for roughly half of total annual GHG emissions in 2019, driven by deforestation, forest degradation, and forest and peat fires. While Indonesia’s LUCF emissions footprint is substantial—accounting for ~58% of total global LUCF emissions—it also reflects Indonesia’s vast natural resources and potential to develop nature-based solutions (NBS) as a major carbon sink.

- **Energy.** Accounted for a third of total annual GHG emissions in 2019, driven predominantly by emission-heavy electricity generation, heat and steam generation for industry, and combustion of fossil fuels for transport. Indonesia’s heavy reliance on coal-generated power underpins a carbon-heavy power landscape, positioning it as one of the most carbon-intensive electricity supplies among peer G20 nations—behind only South Africa and India. [Exhibit 3.]

G20 members’ carbon intensity of electricity (grams CO₂e/kWh, 2021) Exhibit 3
Continued economic growth is integral to sustaining Indonesia’s impressive socio-economic trajectory but doing so comes at the risk of further increasing the nation’s GHG emissions. The World Bank still assesses Indonesia as a lower middle-income country, with GDP per capita (PPP) equivalent to ~50% of the average for the G20 group and ~20% that of OECD countries. Strong economic growth will be essential to drive GDP per capita higher over the coming decades while catering to continued population growth projected to grow at 0.74% per year to reach ~323 million people by 2045.

The Government of Indonesia (GoI) has set targets to drive robust economic development across both short-term and long-term strategies, designed to deliver equitable economic opportunity for a growing nation.

- **Short-term goal.** GoI projecting average GDP growth of at least 5% per year to 2025 to reduce the poverty rate below 4%.
- **Long-term goal.** GoI aspires for Indonesia to become the world’s fifth-largest economy by 2045.

These socio-economic goals for growth must be framed against an accelerating global climate emergency, and sustainability and green growth must be integral if the increasing demand for goods and services is not to drive Indonesia’s GHG burden higher.

Indonesia is critically vulnerable to the impact of climate change. In a 2021 assessment of climate resilience by the Swiss Re Institute of 48 countries which together account for 90% of the global economy, Indonesia ranked last.

**ECONOMIC IMPACT**

Indonesia stands to lose 17%–40% of its GDP should global warming breach the 2°C above pre-industrial levels laid out in the Paris Climate Agreement [Exhibit 4]. In this scenario, key sectors in Indonesia will suffer significant negative impacts. In the agricultural sector, crop yields will be significantly impacted by droughts and flooding, and labor productivity hampered by extreme heat. Indonesia’s valuable tourism sector would also be heavily impacted by extreme weather events.
Indonesia’s economy would be severely negatively impacted by temperature rises by mid-century

Simulating for economic loss impacts from rising temperatures in % GDP, relative to a world without climate change (0°C) Exhibit 4

SOCIETAL IMPACT

An estimated ~19 million Indonesian citizens, equivalent to 7.4% of the population, live in areas five meters or less above sea level. This puts significant populations at risk should global warming rise above 2°C, and trigger accelerating sea-level rises. [Exhibit 5.]

If global warming exceeds 2°C (compared to pre-industrial times), Greenland ice will melt and sea levels will rise ~7m

Percentage of population living at 5m elevation and below

<table>
<thead>
<tr>
<th>Country</th>
<th>Relative</th>
<th>Total (Mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>7.37%</td>
<td>19.058</td>
</tr>
<tr>
<td>Thailand</td>
<td>10.34%</td>
<td>6.976</td>
</tr>
<tr>
<td>Malaysia</td>
<td>5.10%</td>
<td>1.614</td>
</tr>
<tr>
<td>Vietnam</td>
<td>36.97%</td>
<td>34.271</td>
</tr>
<tr>
<td>Philippines</td>
<td>5.65%</td>
<td>5.834</td>
</tr>
<tr>
<td>Myanmar</td>
<td>10.97%</td>
<td>5.806</td>
</tr>
<tr>
<td>Singapore</td>
<td>10.33%</td>
<td>0.579</td>
</tr>
<tr>
<td>Cambodia</td>
<td>7.19%</td>
<td>1.089</td>
</tr>
<tr>
<td>Brunei</td>
<td>1.61%</td>
<td>6.806</td>
</tr>
<tr>
<td>Laos</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>SEA</td>
<td>11.86%</td>
<td>75.236</td>
</tr>
</tbody>
</table>
Indonesia’s Current Carbon Pathway
Indonesia is already taking important steps to enhance its climate response, with Enhanced Nationally Determined Contributions (ENDC) in 2022 that set out more ambitious emission-reduction targets to 2030. [Exhibit 6.]

These include an unconditional pledge (CM1) to limit total GHG emissions to 1,954 million tons of CO2 equivalent (MtCO2e) by 2030, representing a 915 MtCO2e reduction from the projected business as usual (BAU) scenario. This enhanced commitment covers a reduction equivalent to the total annual emissions of Iran in 2019—at a point when the Middle Eastern nation was ranked as the world’s ninth-largest annual emitter.

Indonesia has pledged even more substantial conditional (CM2) reductions, conditional on relevant international support and financing, to limit emissions to 1,630 MtCO2e by 2030. This would reflect an even greater 1,283 MtCO2e against BAU, equivalent to Japan’s total emissions in 2019 when it was ranked seventh for GHG emissions globally. The Just Energy Transition Partnership—which recently announced US$20 billion funding to support Indonesia’s energy transition—offers a compelling example of the role global collaboration could play in funding Indonesia’s sustainable transition.

**Indonesian GHG emissions (MtCO$_2$e)** Exhibit 6

Indonesia plans to meet these expanded pledges by reducing the carbon intensity of key GHG emitting sectors, including:

- **Land Use Change and Forestry (LUCF).** Transform LUCF into a net carbon sink by 2030, with measurements including:
  - Reducing emissions from deforestation and forest degradation
  - Increasing carbon sequestration capacity of natural forests
  - Increasing carbon sequestration of land systems
  - Reducing emissions from fires and peat decomposition, and bolstering law enforcement
**Energy and transportation.** Improve sustainability of energy and transportation by:
- Shifting the energy mix away from GHG-intensive fossil fuels such as coal, and towards renewable and low-carbon energy sources
- Aim to increase renewable share of the energy mix from 13.5% in 2021 to at least 23% by 2025, and 31% by 2050, with the recent Indonesia Just Energy Transition Partnership (JET-P) targeting 34% renewables by 2030
- Accelerate adoption of EVs in road transportation

**Waste Management.** Enhance sustainability of the waste sector by:
- Developing a comprehensive strategy to improve policy and institutional capacity at the local level
- Enhancing management capacity of urban wastewater
- Reducing landfill waste by promoting the ‘reduce, reuse, recycle’ approach
- Utilize waste and garbage in energy production

The scale of Indonesia’s combined CM1 and CM2 emission-reduction targets is considerable, particularly given the strong projected economic growth Indonesia is expected to deliver by 2030, with significant implications around the need to decouple carbon emissions from growth.

Assuming Indonesia delivers average GDP growth of 5.5% between 2021 and 2030, Indonesia will need to achieve a ~40% reduction in carbon emissions per unit of GDP to meet CM1 ambitions, or a ~50% reduction in carbon emissions per unit of GDP to meet CM2 ambitions over and above the business-as-usual state.

**Carbon Intensity of Indonesian Economy (tCO$_2$/m GDP)** Exhibit 7
Indonesia’s ambitious decarbonization journey will require considerable investment to realize and will be an economy-wide effort. Sustainable, environmentally friendly growth must be the engine for the next stage of Indonesia’s economic journey. This transition pathway must be comprehensive, and far-reaching, involving:

- **All stakeholders.** The transition will require complementary support from the government, businesses, financiers/investors, and consumers.

- **Across all sectors.** The transition will require action from stakeholders across all industrial and economic sectors.

- **Of all sizes.** The transition is not only the responsibility of large players. Indonesia’s MSME sector—representing ~97% employment and ~60% GDP—is a key contributor to Indonesia’s GHG emissions and must be involved in the transition. [Exhibit 8.]

### Enterprise contribution to Indonesian employment (%)

**Exhibit 8**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Micro</th>
<th>Small</th>
<th>Medium</th>
<th>Large enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSMEs</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Enterprises</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Enterprise contribution to Indonesian GDP (%)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Micro</th>
<th>Small</th>
<th>Medium</th>
<th>Large enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSMEs</td>
<td>38</td>
<td>14</td>
<td>10</td>
<td>39</td>
</tr>
<tr>
<td>Large Enterprises</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
While this transition is vital, it’s essential that a green transition promotes, rather than hinders Indonesia’s continued robust growth, ensuring equitable, sustainable opportunities for citizens, businesses, and the economy.

This central vision is why participation by a broad ecosystem of innovators is so vital to embed and sustain the changes throughout Indonesia’s economy.

The report ‘Accelerating Asia’s Advantage: A Guide to Corporate Climate Action’ published by the World Economic Forum (WEF) in collaboration with Boston Consulting Group (BCG) and SAP, discussed in detail Asia’s opportunity to accelerate climate action, and provided a corporate climate framework to guide businesses in

1. setting their climate action priorities,
2. embarking on their decarbonization journey, and
3. unlocking green growth opportunities.

In this report, we will build on the findings of the WEF–BCG–SAP report, and zoom into Indonesia’s challenges and opportunities for a low-carbon green economy, to understand:

- **Key opportunities.** The key opportunities presented to smaller-scale ventures such as startups and MSMEs, as well as their investors and financiers, from Indonesia’s transition to a green growth economy.
- **Key levers.** The key levers that must be utilized to unlock the greatest possible value from these opportunities.
Indonesia’s Green Growth Opportunity
The value of Indonesia’s green growth opportunity is immense, with a total market value estimated at US$400B when combining both industry revenue and carbon offset market opportunities. That value is captured across three core opportunities for ventures seeking to drive Indonesia’s green growth transition—Drive Green Growth, Generate Green Growth, and Enable Emissions Offsetting.

<table>
<thead>
<tr>
<th>Drive Green Growth Strategy and Green Professional Services</th>
<th>Generate Green Growth Solutions</th>
<th>Enable Emission Offsetting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide products and/or services that clarify and guide clients’ green growth journeys</td>
<td>Provide products and/or services that optimize clients’ GHG intensity</td>
<td>Generate and trade credits for carbon offsetting (carbon markets)</td>
</tr>
<tr>
<td>Support economy to…</td>
<td>Support economy to…</td>
<td>Support economy to…</td>
</tr>
<tr>
<td>▶ Baseline emissions</td>
<td>▶ Optimize own emissions</td>
<td>▶ Establish carbon-offset projects</td>
</tr>
<tr>
<td>• Quantify current and future carbon footprint/emissions</td>
<td>• Optimize energy mix (e.g., % of renewables) and storage</td>
<td>• Establish nature-based solution (NBS) offset projects (e.g., reforestation campaigns, carbon-sequestering farming techniques, etc.)</td>
</tr>
<tr>
<td>▶ Set green growth strategy and targets</td>
<td>• Utilize electric vehicles/ fleet</td>
<td>• Establish high-tech carbon capture and storage (CCS) initiatives</td>
</tr>
<tr>
<td>• Identify and select key levers to optimise for green growth</td>
<td>• Establish low-carbon processes (e.g., industrial, operational)</td>
<td>▶ Issue and/or trade carbon credits</td>
</tr>
<tr>
<td>• Establish governance to drive/lead green growth efforts</td>
<td>▶ Optimize supplier and customer emissions</td>
<td>• Build and operate carbon-trading platform</td>
</tr>
<tr>
<td>• Set emissions targets</td>
<td>• (Re)design products for sustainability</td>
<td>• Access and use carbon credit markets (compulsory and voluntary)</td>
</tr>
<tr>
<td>▶ Track and report on green growth journey</td>
<td>• (Re)design supplier network for greater sustainability</td>
<td></td>
</tr>
<tr>
<td>• Monitor and course-correct progress towards targets</td>
<td>• (Re)model waste management and prevention practices to drive green growth ambitions</td>
<td></td>
</tr>
<tr>
<td>• Disclose/report on green growth journey</td>
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Up to US$46B/yr by 2030

Up to US$350B/yr by 2030

Up to US$3.5B/yr by 2030
Indonesian players looking to transition to green growth must work to fully understand the nature and scale of their green growth journey. That means clearly comprehending what their respective green growth journey should achieve, including specific and measurable objectives, and how to achieve them. With this vision in place, players should look to efficiently—and in compliance with all regulatory requirements—progress toward the objectives of that journey.

As players within Indonesia’s economy increasingly adopt a green growth mindset, the maturing ecosystem will present a greater depth of products and services to support that vision. These supporting services will enable players to better understand their existing and future projected emissions, including the scale and drivers of emissions. They will help players better define their respective green growth strategy, including key levers, objectives, roadmap, and business requirements. Ultimately, this maturing solution landscape will enable players to track, course-correct, and report progress towards green growth goals, represented by metrics such as overall decarbonization targets.

The market for providers helping drive green growth strategy and broader green professional services will be significant, with expectations it could reach US$46B by 2030.

### CASE STUDY: Unravel Carbon

Unravel Carbon is a Singapore-based, AI-powered enterprise platform established in 2022 that assists companies to measure, track, reduce, and report their carbon emissions, with a focus on supply-chain (scope 3) emissions. It aims to enable enterprises to decarbonize themselves, and their large ecosystems of suppliers or investments, at speed, and at scale. One example of this is a portfolio module, which can be used by investors and financial institutions to measure their financed emissions and used as the basis for analyzing climate risk exposure.

Co-founders Grace Sai and Marc Allen identified a need for a scalable product that could assist with non-financial reporting in the ESG space. Market analysis identified that carbon accounting offered the most objective and scalable metric to meet this need. Inspired by Marc’s 16+ year career in sustainability consulting and Grace’s determination to leave her four-year-old daughter a habitable world, the co-founders decided to build a solution for businesses leveraging accounting data to estimate supply-chain emissions.

Unravel Carbon is now an established solutions provider enabling businesses with a software-as-a-service (SaaS) decarbonization platform to quantify supply chain emissions and generate customized...
reduction pathways to net zero, backed by auto-generated regulatory disclosure reports to ensure business compliance. They act as sustainability experts to advise and guide businesses’ decarbonization strategies. Unravel Carbon also supports businesses to go deeper into their data analysis, refining supply-chain or portfolio-financed emissions estimates by supporting clients to obtain supplier or company-specific emissions data.

This data-driven business ethos has seen huge interest from investors and customers, with Unravel Carbon raising a SG$10 million seeding round in Q2 2022, with the round 5X oversubscribed. The platform is now being used by customers in more than twenty countries globally, including a partnership with AC Ventures to measure and track emissions across its portfolio companies.

The experience garnered by Unravel Carbon offers some important advice for founders and players looking to enter the space:

**Help with real-time decision-making.** Demand exists for technology that will enable real-time decision-making on climate and sustainability. Chief Sustainability Officers are uniquely disadvantaged in not having access to real-time data that’s needed to make judgments in their roles. Platforms like Unravel can help to solve this need.

**Hire climate experts.** Secure deep climate science expertise within your team. Customers need products and/or services that are grounded in genuine climate science.

**Be transparent.** Build audibility into your business, products, and services from day one to embed transparency from the start.

**Drive adoption.** Buying behavior for SaaS platforms in Southeast Asia remains nascent. Ensure you take time to engage and educate customers on the value of SaaS offerings and involve them in product design and adoption.
The application of low-carbon technologies with a genuine impact on how we live, work, and play will be an essential catalyst of Indonesia’s green growth transition. The nature and scale of these solutions will vary depending on the needs of different economic sectors, but there are already strong examples of startups generating impacts with green growth solutions across many of Indonesia’s high-intensity emissions sectors.

### Key Sectors and green growth solutions

<table>
<thead>
<tr>
<th>Energy Solutions.</th>
<th>Examples of Indonesian startups in the sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support economy to optimize energy mix (e.g., an increasing share of renewables/clean energy sources)</td>
<td><strong>ION Mobility</strong> Aims to create affordable, desirable, and sustainable mobility for all by offering high-quality electric motorbikes designed for urban environments.</td>
</tr>
<tr>
<td></td>
<td><strong>beam</strong> Aims to reduce city pollution and congestion by offering safe, affordable, and sustainable electric-powered micro-mobility options (e-scooters, e-mopeds, e-bikes) to city dwellers.</td>
</tr>
<tr>
<td></td>
<td><strong>XURYA Energy Solutions</strong> Aims to be the leader in sustainable and clean energy tech and solutions by assisting Indonesian companies to adopt renewable energy. Designs, installs, operates, and maintains customers’ rooftop solar installations.</td>
</tr>
<tr>
<td></td>
<td><strong>Synergy Energy Solutions</strong> Aims to drive energy efficiency across Southeast Asia by designing, financing, and implementing energy-saving solutions for customers’ projects and facilities.</td>
</tr>
</tbody>
</table>

### Waste Management Solutions.

Support economy to reduce waste/adopt recycling practices

<table>
<thead>
<tr>
<th>Waste Management Solutions.</th>
<th>Examples of Indonesian startups in the sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aims to become a leader in ethical and responsible waste management solutions by optimizing individuals’, communities’, and companies’ waste management through education on and implementation of best practices.</td>
<td><strong>waste4change</strong> Aims to reduce food waste by providing a platform that allows local food businesses, hotels, and farms to sell their overstocked/imperfect produce to customers at a discount, avoiding edible food going to landfill.</td>
</tr>
</tbody>
</table>
Agriculture Solutions.
Support economy to adopt and drive sustainable agricultural practices

Aims to drive safe and impactful agricultural funding by enabling the public to invest in local farmers via the app. Monitors farming partners’ activities to ensure sustainable farming practices are followed.

Aims to connect small-scale community fishermen to the global market through technology; integrating the marine supply chain in Indonesia and providing fishermen with data-driven insights to reduce costs and carbon footprint.

Aims to build a resilient and sustainable agriculture system by improving productivity and efficiency of the entire agriculture supply chain through data and technology.

Indonesia’s Ministry for National Development Planning estimates that public and private spending, including upfront investment and operation maintenance, will reach US$350 billion a year by 2030 to put the nation on track to achieve the nation’s current 2060 net-zero ambitions. This significant spending need reflects the substantial market size for green growth solutions.

Initiatives to drive these net-zero ambitions will incorporate the entire energy and waste ecosystem, including energy efficiency, carbon capture and sequestration, low-carbon energy technologies, land-based interventions, waste management and prevention, and more.
Maka Motors (PT Kendaraan Listrik Nusantara) is an electric vehicle (EV) enterprise founded in 2022 with the mission of accelerating EV adoption in Indonesia, starting with two-wheeler vehicles. Maka Motors was co-founded by a team of motorbike enthusiasts who gained a deep understanding of the needs and pain points of ride-sharing motorbike drivers during their time at Gojek (one of Indonesia's largest ride-sharing platforms). They learned that Indonesian ride-sharing motorbike drivers, and Indonesian motorbike drivers in general, have a high interest to switch to EVs in order to save costs on fuel but that no two-wheeler EV product currently available in the market is able to provide them with comparable performance to their current ICE bikes (in terms of driving range and motor power) while also being at a comparable price point.

Most electric two-wheelers in Indonesia are white-label products supplied from China and rebranded locally. The imported design often does not meet the needs of the Indonesian market; particularly Indonesian ride-sharing drivers who need longer range, greater power, and longer seat space for their work.

In an alternative approach to most Indonesian auto players that focus on assembly and sales/after-sales, Maka Motors adopted a vertically integrated value chain across R&D, product design, assembly, and sales/after-sales. This vertically integrated model enables them to design and manufacture EV products tailored to the needs of the Indonesian market and allows them to have a more affordable price point compared to white-label products with similar specs (battery size, motor power) due to their more efficient cost structure. Maka Motors deals directly with the component suppliers instead of going through a design and integration partner who takes a margin, and work with suppliers directly to quickly adjust component specifications if needed in order to reduce cost while maintaining performance.

Several challenges are currently faced by players such as Maka Motors in driving EV adoption in Indonesia, including:

**Demand side** – Indonesian consumers’ cost sensitivity and a lower priority on environmental sustainability as buying criteria; expensive financing products for purchasing EVs; and nascent EV ecosystem supporting infrastructure such as workshops and charging stations.

**Supply side** – Lack of harmonized standards such as on battery packs and charging plugs; talent especially in R&D.
The GoI’s strong narrative on the nation’s EV commitments and incentives both on the supply side (such as reduced import duties for core EV components), as well as the demand side (such as incentives for SOEs to purchase EVs, or direct subsidies to two-wheeler EV consumers), have been helpful to support EV adoption in the country. Nevertheless, further collaboration is required to address the challenges still faced today, particularly on the supply side for two-wheeler EV companies who do their own R&D and develop their own IP, e.g., providing support and incentives for companies to invest capital in production tooling (body panel molds, etc.) to manufacture their own custom design at scale.

There is potential to accelerate the development of an end-to-end two-wheeler EV supply chain in Indonesia through an effective industrial policy that incentivizes two-wheeler EV companies to build in-house R&D capabilities and develop their own IP.

“We think that electric vehicles are key to Indonesia’s decarbonization journey, paving the way for a cleaner, sustainable future.

To get Indonesian consumers to switch from their gasoline vehicles, EV players will have to deliver lower total cost of ownership without compromising on what consumers already get from their current gasoline vehicles: driving range, power, usability, durability, and affordability. This is what we aim to achieve at Maka Motors, and we’re thrilled to be part of Indonesia’s journey towards full electrification.”

Raditya Wibowo
Co-founder & CEO, Maka Motors
dito@maka-motors.com
Catalyzing Indonesia’s Green Growth Potential

Achieving Indonesia’s carbon goals will require a transformation of the domestic emissions landscape, and will be predicated on a radical transition of the nation’s rich forestry and land-use (LUCF) resources. Transforming LUCF from the highest GHG-emitting sector today to a vast, net-carbon sink will offset up to 300 MtCO₂e of emissions by 2050. [Exhibit 10]

Offsetting emissions will be crucial to Indonesia’s green growth journey, as the nation seeks to achieve its stated ambition to reach net-zero emissions no later than 2060. [Exhibit 9]

Exhibit 9

Exhibit 10

Achieving Indonesia’s carbon goals will require a transformation of the domestic emissions landscape, and will be predicated on a radical transition of the nation’s rich forestry and land-use (LUCF) resources. Transforming LUCF from the highest GHG-emitting sector today to a vast, net-carbon sink will offset up to 300 MtCO₂e of emissions by 2050. [Exhibit 10]

Emissions (GtCO₂e) Exhibit 10

2030 Ambition
CMI 1,940 MtCO₂e
CM2 1,632 MtCO₂e

2050 Emissions Goal
540 MtCO₂e

NZ Emissions Goal
Net-zero 2060 or sooner
Indonesia is well-positioned to leverage this natural resource and meet the growing global demand for carbon credits. International demand for voluntary carbon credits is expected to grow rapidly from ~100 MtCO₂e in 2020 to ~1,100 MtCO₂e by 2030, equivalent to a compound annual growth rate (CAGR) of ~27%.

With the world’s third-largest NBS potential, and one-fifth of the world’s cost-competitive NBS priced at under US$10/MtCO₂E, Indonesia is ideally positioned to meet surging domestic and international demand for carbon credits. [Exhibit 11]

Indonesia is estimated to have largest source of cost competitive NBS carbon offsets in SEA....

**Cost competitive NBS potential, MtCO₂e (2030)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Potential (MtCO₂e/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>1,032</td>
</tr>
<tr>
<td>Malaysia</td>
<td>160</td>
</tr>
<tr>
<td>Myanmar</td>
<td>106</td>
</tr>
<tr>
<td>Thailand</td>
<td>76</td>
</tr>
<tr>
<td>Vietnam</td>
<td>58</td>
</tr>
</tbody>
</table>

~20% of world’s supply

---

1. 2030 NBS potential listed refers to the maximum theoretical potential of these solutions and does not necessarily account for additionality.

Given these strong fundamentals, Indonesia’s carbon credit market is projected to expand significantly over the coming decade, growing from ~40 million tons issued in the period 2009–2019 to up to 140 million tons in 2030 alone.

This robust growth frames a significant opportunity to generate value. Assuming a credit price of US$25/ton in 2030, Indonesia’s voluntary carbon credit mark could boast an estimated value of US$3.5 billion by the same year.

...and is currently hosting some of the largest NBS projects globally

- **Rimba Raya**
  - 4 mn cc²/year + largest orangutan sanctuary

- **Katingan Mentaya**
  - 7 mn cc²/year, largest forest & peatland project

- **Sumatra Merang**
  - 1.5 mn cc²/year

This broader space offers numerous niche and targeted opportunities for smaller ventures to generate and trade carbon credits, or facilitate others to do so, as part of a maturing domestic carbon credit ecosystem.
Fairatmos is an Indonesian-based, climate-tech venture founded in 2022 that helps developers of carbon mitigation projects establish their businesses and gain access to carbon markets. Its objective is to democratize and unlock wider access to carbon markets.

The founder, Natalia Rialucky Marsudi, was inspired to launch Fairatmos due to a perceived lack of climate mitigation funding reaching those communities that needed it most—small-holder farmers and communities that could actively mitigate climate change through carbon sequestration projects. Fairatmos delivers on this goal through the provision of four key technology platforms:

- Digital pre-FS tool to assess project feasibility, including carbon potential and key risks
- Expert network to understand technical and market considerations of setting up GHG sequestration projects
- Fundraising platform to fund projects
- Carbon credit marketplace to trade carbon credits generated from projects

Fairatmos is now working with over 80 communities and companies across Indonesia, with carbon sequestration projects covering 2 million hectares of land.

The company has had to address several major challenges to achieve this scale. That includes navigating complex regulations which can demotivate developers or investors engaging with the space, as well as challenges in sourcing the requisite talent with experience in carbon accounting and estimation—facing the sought-after intersection of technology, coding, and climate. Sourcing appropriate data also remains a challenge, with key resources such as GoI mangrove and peat maps no longer publicly accessible.

Fairatmos’ experience building out solutions in this space provides insight on two key lessons for founders and players:

- **Showcase your tech.** Clearly demonstrating how your solutions practically help developers and communities, and how they can scale, is key to winning customers.
- **Go together.** The climate-tech space is not a winner-takes-all market. It will be impossible to survive without support from others in the ecosystem. Players should look to join with an open and collaborative mindset to unlock shared value.
Koltiva is an Indonesian–Swiss agritech start-up founded in 2013 with a vision to be the world’s leading technology company in building ethical, transparent, and sustainable supply chains. Koltiva works with some of the world’s leading multinational companies and over 1,000,000 mostly smallholder farmers across 52 countries and 47 different commodities to improve the integrity of agricultural supply chains and deliver insights to farmers that enhance their productivity.

Koltiva offers a suite of end-to-end solutions for all supply chain actors, including:

- **KoltiTrace**: An integrated multi-crop platform for businesses and producers that enables traceability solutions to provide transparency from seed to table.
- **KoltiPay**: A responsible digital finance platform that offers cashless payments, loans, savings, micro-insurance, and bill payments.
- **KoltiTrade**: Distribution of agricultural inputs and single-origin crop trading
- **KoltiSkills**: Skills development and professional services, providing boots on the ground for farming support and carbon monitoring.

Koltiva has had to address varying levels of climate literacy amongst their stakeholders, from well-resourced corporate sustainability divisions right down to smallholder farmers with limited business and scientific acumen.

Developing this understanding is one of the areas where Koltiva has had the biggest impact on the lives of their smallholder partners, helping them to understand basic business practices and improve buying, selling and cultivation approaches to improve their annual income. Koltiva has had to take a proactive approach to develop these capabilities, building basic training applications and deploying a network of field agents to reach beyond the bounds of reliable internet access.

Traders and producers often operate on low margins and will need to see benefits from the adoption of green practices to prioritize green action. A clear, transparent supply chain like that fostered by Koltiva helps to provide these signals, communicating consumer and civil society pressure through the supply chain and incentivizing producers to adopt sustainable practices.
At Koltiva, we understand the urgent need to tackle the world’s environmental challenges, and we recognize our responsibility to lead the way toward a sustainable future. We take immense pride in showcasing our unwavering commitment to fostering a green economy and reducing carbon emissions in Indonesia.

Through our end-to-end technology ecosystem and extension service with our field experts and agronomist teams, we drive environmental preservation, biodiversity, climate-smart agriculture, ethical sourcing, and empower rural communities through financial and digital literacy.

Manfred Borer
Co-founder & CEO, Koltiva
manfred.borer@koltiva.com
Unlocking Opportunities in the Decarbonization Space
Indonesia’s transition to a green growth economy will be vast and complex. Through direct interviews with green start-ups as well as insights from a ‘Carbon Circle’ forum held by the Paloma Sjahrir Foundation, Ecoxyztem and P4G [Exhibit 12] with key Indonesian green growth stakeholders, three key enablers were identified to support Indonesia’s green transition and the innovators that will drive it forward.

**Exhibit 12**

Paloma Sjahrir Foundation is a Non-Profit Organisation founded in 2022 by Pandu Sjahrir and Ratna Kartadjoejema, aiming to build a better ecosystem for impact startups. PSF helps these startups grow and scale by connecting them with strategic partners and investors.

Ecoxyztem is a venture builder for climate tech startups in Indonesia. They aim to enable ecopreneur to solve climate challenges at scale by providing early-stage startups with continuous involvement and support as it is called “Co-Founder as a service” to focus on building and scaling up their impactful and profitable business.

P4G – Partnering for Green Growth and the Global Goal 2030 – accelerates pioneering market-based partnerships to build sustainable and resilient economies. They invest in impact to deliver inclusive and tangible solutions to build back better and greener to meet the United Nations Sustainable Development Goals and the Paris Agreement.

These enablers are building green talent, developing supportive regulatory frameworks, and boosting the scale and accessibility of green funding. [Exhibit 13]
Indonesia faces a significant challenge around access to available and suitable talent. A 2019 report by RGF noted that around 50% of Indonesian employers across 10 sectors faced a notable talent shortage. This talent shortage is particularly acute in the startup space, with the GoI estimating that the nation needs nine million tech talents by 2030 to support Indonesia’s growing digital economy. This represents a ten-fold increase on the ~900,000 advanced digital talent workers that called Indonesia home as of 2020. [Exhibit 14]

**Digital Skilling of Indonesia’s Workforce (2020) Exhibit 14**

<table>
<thead>
<tr>
<th>Category</th>
<th>Workforce Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance Skilled</td>
<td>Uses more advanced analytical skills and theoretical knowledge. This level of skills is typically required in occupations with a high level of ICT intensity, for example, artificial intelligence specialist</td>
</tr>
<tr>
<td>Intermediate Skilled</td>
<td>Uses a range of digital technologies that are related to their occupations. This level of skills is typically required in middle-level occupations, for example, journalists should be able to use digital tools to collect, search, and analyze information</td>
</tr>
<tr>
<td>Basic Skilled</td>
<td>Can conduct simple tasks using simple digital technologies for non-job-specific occupations, for example, Microsoft office, google chrome for browsing, and email</td>
</tr>
<tr>
<td>Unskilled</td>
<td>Not familiar with using simple digital technology or has low exposure to digital technology</td>
</tr>
</tbody>
</table>
Green startups face an even bigger hurdle in achieving their workforce goals, with participants in the Carbon Circle forum noting the knowledge gap and shortage of expertise in Indonesia as one of their major challenges. Sourcing talent with a combination of tech, industry, and climate expertise is a particular barrier in Indonesia’s emerging green growth space. Indonesian fishery industry e-commerce platform Aruna offers a focused example of this difficulty—requiring talent with data science, fishery industry, and climate science rolled into one—a rare mix to source globally, and even more difficult in a relatively nascent domestic talent marketplace. As a result of this, top talent remains in high demand and low availability, making it difficult for green startups to attract, and ultimately retain relevant much-needed talent.

Indonesia could go some way to alleviating this issue by better attracting skilled foreign workers, but there remain notable hurdles including language barriers, complex and restrictive application processes, and political or legacy workforce opposition—the latter more focused on upskilling and retaining talent or attracting back diaspora Indonesian talent.

The GoI is implementing a number of flagship policies to develop the local tech talent workforce, recently establishing the National Talent Management (MTN) body. A key objective for MTN is to develop and retain talent in the research and development sector, with a target of increasing the ratio of human resources in science and technology per one million population and supporting the talent to gain international recognition.

While this is an encouraging step, this plan is targeted at developing future talent in the medium and long term. In the short term, public and private sector stakeholders must collaborate to understand how to attract, train, and retain top talent today. There are four key levers that should be explored to deliver on this need:

► **Develop focused training programs.** Formal, vocational, and on-the-job training programs should be developed, focused on upskilling Indonesia’s workforce for success in the green startup, tech, and venture spaces, including targeted technical training and upskilling of English language skills that underpin global tech literature and learning.

► **Build out access to infrastructure.** Building greater access to tech infrastructure such as IT infrastructure, internet, and access to electricity, to enable Indonesia’s people to access digital networks, participate in the digital economy ecosystem, and learn vital tech skills.

► **Attract Indonesian talent back to the domestic workforce.** Attract back top Indonesian talent working overseas in the green tech/venture space. Engage with the diaspora to build awareness and interest in Indonesia’s green growth opportunities, while establishing effective incentives for returning Indonesians—including residence permits for foreign family members upon return.

► **Improve international ease-of-access.** Improve ease of access for foreign workers seeking roles in Indonesia, helping plug acute skills gaps while enabling valuable knowledge transfer.
Indonesian businesses will need to invest to transition to green growth models. It is therefore imperative that cost-effective financing is available and accessible for businesses of all sizes to fund this transition. Feedback from the Carbon Circles forum reflected this concern, highlighting regulatory uncertainty, as well as a lack of integration of climate initiatives within the Indonesian industrial supply chain which hinders the process of developing projects and finding customers.

The GoI has already recognized and is actively looking to address this need. In 2019, Indonesia’s central bank joined the Network for Greening the Financial System (NGFS)—a global network of 114 central banks and financial supervisors that aims to define, promote, and contribute to the development of green finance.

Indonesia’s Financial Services Authority (OJK) has also developed its own sustainable finance roadmaps, with the latest iteration (Phase 2, 2021–2025) aimed at making sustainable finance the ‘new normal’ in Indonesia’s financial services sector. While Indonesia’s green financing sector has shown signs of encouraging growth in recent years, the OJK highlights three key barriers impinging on future growth—lack of supply, lack of demand, and lack of standards.

Exhibit 15

**Lack of Supply**
Limited understanding & participation of financial industry players in green financing; viewed as cost center

**Lack of Demand**
Limited awareness of businesses to undertake sustainability projects & utilize green financing

**Lack of Standards**
Absence of commonly-agreed ESG standards & taxonomy, hindering risk assessment & investment in green financing / initiatives
Overcoming these barriers will require policymakers, investors and financiers, and businesses to play a role in developing Indonesia’s green finance ecosystem, collaborating across four key levers:

**Improve awareness and education.** Improve awareness and education of all market participants on the value and impacts of green financing activities, including potential future leaders.

**Adopt and implement clear and consistent standards.** Adopt clear and consistent standards and taxonomy around green investment and financing, building clarity into the space. OJK’s Indonesia Taxonomy Edition 1, released in January 2022, was a welcome development in this regard, with the aim of guiding policy and practices underpinning the green finance system.

**Build ESG into risk management.** Build environmental, social, and governance (ESG) into risk management assessment and practice.

**Co-create green financing products and services.** Co-create cost-effective green financing products and services that hold significant dormant demand. For example, Indonesia was the first country to issue a sovereign green sukuk, or Sharia-compliant green bond, in 2018, and the first to issue a retail green bond via retail green sukuk issuance in 2019.
Policymakers must provide Indonesian businesses, investors and financiers, and the public with robust regulatory frameworks that guide attitudes and behaviors if it is to drive a true green growth transition.

Ensuring a ‘just transition’ will be vital to steering this change, unlocking a fair, equitable economic transformation that delivers value for all stakeholders and communities. Indonesia’s Enhanced Nationally Determined Contributions (ENDC), submitted in 2022 under the United Nations Framework Convention on Climate Change, highlights “greening [of] the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind.”

The policies and frameworks established by the GoI to action this vision must therefore be (1) comprehensive in driving green growth across the economy, and (2) considerate of the interests of, and impacts on, all stakeholders involved in the transition—economic, social, and environmental.

Indonesia’s green policy landscape is broad, but opportunity still exists to boost policy coverage further, particularly in the emissions-intensive electricity and heat sector. Comparing the coverage of Indonesia’s green policy allocation per sector against G20 peers reveals both areas of strength and opportunities for growth. [Exhibit 16]
Catalyzing Indonesia’s Green Growth Potential

**General (Cross-Sectoral)**

- Broad supportive policy on **climate strategy** (including coordinating body), GHG reduction targets & decarbonizing technologies
- Lack/insufficiency of supportive policy on reduction of fossil fuel subsidies

**Agriculture & Forestry**

- Supportive policy on **green agri-practices/products**, incl incentives to reduce deforestation, drive reforestation/afforestation & reduce CH from agriculture
- Lack/insufficiency of supportive policy incentivizing reduction of CO₂ or N₂O emissions from agricultural practices

**Land Transport**

- Supportive policy on **energy efficiency** (vehicle emission standards), renewables adoption (biofuel switch) & fuel/emissions taxes
- Lack/insufficiency of supportive policy on urban planning & infrastructure investment

**Electricity & Heat**

- Supportive **renewables** policies – energy target for electricity sector, renewable support schemes (19 related policies) & grid infrastructure dev. & electric storage
- Lack/insufficiency of supportive policy on overarching carbon pricing scheme/taxes, coal/oil phase-out & adoption of CCS technology

**Industry**

- Supportive policy on **energy efficiency** (energy efficiency in industrial production, energy reporting & audits, performance & equipment standards)
- Lack/insufficiency of supportive policy on overarching carbon pricing scheme/emissions caps/taxes & low-carbon tech (e.g., CCS, CO₂ sequestration)

**Building**

- Supportive policy on **green urban planning strategies**, green building codes/standards, & green performance/efficiency standards for equipment/appliances
- Lack/insufficiency of supportive policy on renewables adoption & energy taxes

**G20** Avg. policy coverage per sector of G20 countries (excl. EU & Indonesia)

- Greater coverage than G20 avg.
- Equal coverage to G20 avg.
- Lesser coverage than G20 avg.
**Areas of strength.** Indonesia boasts a number of areas of strength when compared against the policies of G20 peers, with greater or equal policy coverage for:

- **General policies.** These policies provide framing for, or enable the implementation of, other sectoral policies. They offer essential cross-sectoral and sector-agnostic policy support fundamental to setting overarching, economy-wide-green transition strategies. Still, some notable policy gaps around the removal of fossil-fuel subsidies.

- **Agriculture and forestry.** These policies aim to increase sustainable agricultural practices and improve forest management. This policy area is particularly important due to the significant role LUCF will play in Indonesia’s net-zero journey.

- **Land transportation.** These policies relate to all modes of land transport and infrastructure programs that might reduce transport needs, for instance, urban planning. This area is significant as Indonesia’s transport sector is a key GHG emitter, responsible for almost a quarter (24%) of annual emissions as of 2019.

**Opportunities for growth.** Compared to its G20 peers, Indonesia has less depth in policy coverage for three key areas of electricity and heat, industry, and buildings, providing opportunities for future impact.

- **Electricity and heat.** Boosting policy coverage in areas of electricity and heat represents Indonesia’s most significant opportunity to drive forward positive carbon goals. The sector accounted for a third (33%) of Indonesia’s GHG emissions in 2019 and remains a major contributor to national annual emissions. Indonesia’s expanding economy and growing middle-class demographic are projected to further drive up demand in coming years.

- **Industry, and buildings.** The lack of robust policy around carbon pricing, renewable energy adoption, and energy taxes creates opportunities within the industry and the building sectors. While this is an opportunity that should be addressed, these are lesser levers than the more significant electricity and heat industry, with industry and buildings contributing just ~2% of GHG emissions each in 2019.

**CONSIDER THE INTEREST OF ALL STAKEHOLDERS**

The GoI has stated its intent to drive a just transition that considers the interest of all stakeholders, and this will be vital in embedding a sustained, and sustainable, green growth economy. There are no one-size-fits-all solutions for the green transition—a wide variety of options adapted to local nuances will be required, with far-reaching consequences across the economy, society, and environment. [Exhibit 17]
**Unique insights into complexity of Just Transition issues** Exhibit 17

### Shift away from fossil fuels
- **Loss of jobs from coal phaseout** – mitigated by replacing with solar
  - However, site may not be most optimal for solar production & jobs may not be directly replaced
- **Less pollution and carbon emissions**
  - Solar requires large area – may lead to deforestation
- **Jobs help maintain economy**
- **Deforestation impacts livelihood of communities & removes carbon sink**

### Afforestation for carbon credits
- **Previously agricultural land afforested for carbon credits project**
- **CO2 tax to raise climate funds**
  - Spend on mitigation or adoption?
  - Prices rise, affecting the low-income
- **Workers, Community, Nation & Govt**
  - Loss of jobs leading to long term economic impact
  - Upskilling/ reskilling required for farmers to engage in non-farm employment
  - Able to buy offsets to help meet net zero targets and incentivize conservation

### Climate funding & allocation
- **Govt**
  - Jobs help mitigation or adoption?
  - Reduced in agricultural activity & exports and associated tax revenues
- **Business**
  - Climate funds
  - Increase in agricultural activity & exports and associated tax revenues

### Adapting to rising sea levels
- **Seawall built & land reclaimed to protect against sea level rise, however with adverse impact on marine ecosystem**
- **Workers, Community, Govt, Business**
  - Temporary job creation for seawall/land reclamation projects
  - Impacted marine system subsequently impacts livelihood of fishing community
  - Safeguarding local communities and businesses
  - Higher tax burden to fund seawall construction

### Construction of hydropower plant
- **Workers, Community, Business**
  - Construction of hydropower plant for clean energy
  - Flooding leading to loss of biodiversity
  - Increased flooding risk
  - Impact on livelihood due to water contamination and fisheries decline

### Positive impact • Negative impact • Neutral
As a result, the GoI’s policies must be made with a clear understanding of how these far-reaching consequences will impact a broad variety of stakeholders, framed by a mindset that seeks to mitigate the holistic, short- and long-term harms to businesses, communities, and citizens.

Indonesian policymakers have a variety of levers that may be utilized to drive a just transition, with a number of examples from markets around the world. [Exhibit 18]

<table>
<thead>
<tr>
<th>Providing workers &amp; communities with new opportunities</th>
<th>Protecting disadvantaged, at-risk groups from rising costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve gender equality in Just Transition through targeted policies</td>
<td>Enact progressive carbon pricing regulations</td>
</tr>
<tr>
<td>Spain includes gender provisions in its national Just Transition Strategy</td>
<td>Sweden’s carbon tax provided subsidies to households to lower financial impact</td>
</tr>
<tr>
<td>Provide short term social security</td>
<td>Invest in adaptation projects to safeguard livelihoods of at-risk groups</td>
</tr>
<tr>
<td>Australia provided climate transition funds for Victoria’s coal plant closure</td>
<td>Niger gov’t invested in promoting climate-smart agriculture and sustainable land mgmt. to protect local farmers</td>
</tr>
<tr>
<td>Mitigate mid-long term structural unemployment</td>
<td>Provide incentives to shift consumption towards green products and services</td>
</tr>
<tr>
<td>India provided tax incentives for new developments and job opportunities</td>
<td>Kenya increased investments with high focus on renewable energy to improve electrification rate</td>
</tr>
<tr>
<td>Diversify economic opportunities in impacted region</td>
<td>Create public-private setup for sustainable infrastructure</td>
</tr>
<tr>
<td>Poland turned coal mining town into a special economic zone through investments and tax incentives</td>
<td>Temasek, HSBC, Clifford Capital &amp; ADB established debt financing platform to support sustainable infrastructure projects in SEA to fight climate change</td>
</tr>
<tr>
<td>Facilitate transition planning &amp; social dialogue with stakeholders</td>
<td></td>
</tr>
<tr>
<td>Canada created Just Transition Task Force</td>
<td></td>
</tr>
</tbody>
</table>

Exhibit 18
## Ensuring Green Growth financing supports Just Transition

<table>
<thead>
<tr>
<th>Policy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enact climate legislation with Just Transition elements in funding</td>
<td>The US’ IRA includes JT provisions for project development</td>
</tr>
<tr>
<td>Set up Just Transition fund for climate action</td>
<td>The EU setup a Just Transition Mechanism to alleviate socioeconomic impacts of transition</td>
</tr>
<tr>
<td>Issue sovereign green bonds to raise funding for Just Transition</td>
<td>The UK gov’t is utilizing green gilts to support Just Transition</td>
</tr>
<tr>
<td>Set up funding mechanism specifically for climate adaptation</td>
<td>Indian gov’t set up National Adaptation Fund for Climate Change to support adaptation measures</td>
</tr>
<tr>
<td>Enable greater capital flow to emerging markets</td>
<td>South Africa is partnering with developed states to drive efforts</td>
</tr>
</tbody>
</table>

## Mitigating negative impacts of Green Growth on environment

<table>
<thead>
<tr>
<th>Policy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set sectoral policies to protect land use and biodiversity</td>
<td>Malaysian gov’t pledged to maintain at least 50% landmass as forest</td>
</tr>
<tr>
<td>Provide technical support to drive policy success</td>
<td>Nepal gov’t published hydro EIA manual to guide EIA report prep</td>
</tr>
<tr>
<td>Provide direct investment or subsidies to drive policy success</td>
<td>To avoid deforestation, Indian gov’t subsidized cost of wasteland to be used for solar development</td>
</tr>
<tr>
<td>Engage the public for holistic decision making</td>
<td>Chinese gov’t promoted public consultation by including affected community in decision making to ensure sustainable hydro projects</td>
</tr>
</tbody>
</table>

- Policies and regulations
- Public fund
- Government Incentives
- Stakeholder Collaboration/Partnerships

Efforts to move forward with Indonesia’s Just Transition should include the strategic introduction of key policies for businesses, investors, and the public.

### POLICY FOR BUSINESS

Developing policies that encourage businesses to adopt a green growth mindset is vital. Particular attention should be paid to implementing policies that drive green growth in the key emissions-intensive sectors such as LUCF, and those projected to drive increasing GHG emissions such as energy, power, and heat.
POLICY FOR INVESTORS

The policy should be developed to encourage and embed green finance and investment, improving both clarity and transparency for players.

- **Clarity in the space.** The policy should provide investors and financiers with certainty on green assets and activities, as well as how to incorporate ESG into investment decisions. OJK’s Indonesia Green Taxonomy Edition 1 is a positive step, but the guidance does require further development.

- **Drive disclosure.** The policy should mandate climate-related financial disclosures to catalyze the ‘greening’ of portfolios through enhanced scrutiny from the public and investors. The Task Force on Climate-Related Financial Disclosure (TCFD) recommends disclosure on:

1. governance around climate risks and opportunities,
2. actual and potential impacts of climate-related risks and opportunities on strategy and financial planning,
3. approach to identifying, assessing, and managing climate-related risks, and
4. metrics and targets used to assess and manage relevant climate-related risks and opportunities.

POLICY FOR THE PUBLIC

Policymakers should develop policies that positively shift public attitudes and behavior toward the adoption of green products and services, such as proving evidence-based guidance on carbon market policies and practices in Indonesia. Policies should also be designed to align with an equitable just transition, ensuring those at risk of being left behind—such as workers in legacy high-emission industries—are supported to benefit from the transition.
The next steps for Indonesia
Indonesia is presented with an opportunity for a generational shift, transitioning to a green growth economy where sustainability and robust economic growth are mutually reinforcing.

This transition will be catalyzed by an ecosystem of innovators that support Indonesia’s businesses and citizens to succeed, and empower stakeholders to successfully undertake their own green growth journeys.

A robust and maturing ecosystem of innovators will be fundamental in driving this transition forward.

This will necessitate collaboration across a broad group of stakeholders—government, public, financiers and investors, and businesses—with a diverse range of roles in developing the demand and supply drivers of a sustained green growth transition.

[Exhibit 19] Realizing this vision will not only help unlock equitable economic opportunities for Indonesia but be pivotal in enabling the nation to achieve its net-zero goals.
### Exhibit 19

<table>
<thead>
<tr>
<th><strong>Demand-Side Action</strong></th>
<th><strong>Supply-Side Action</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government</strong></td>
<td><strong>Equip Indonesia’s economy with resources needed to deliver Green Growth transition, including:</strong></td>
</tr>
<tr>
<td>Stimulate economy-wide demand for sustainable products &amp; services</td>
<td>► Grow Green Financing - Stimulate growth of green financing/investing ecosystem by building understanding of, &amp; ‘incentivizing participation in, space</td>
</tr>
<tr>
<td>► Create policy that incentivizes Indonesia’s businesses, financiers/investors &amp; public to adopt Green Growth practices &amp; behaviours</td>
<td>► Build Green Talent - Grow much needed talent to drive Indonesia’s Green Growth transition forward (e.g., workforce with climate &amp; tech experience/capabilities)</td>
</tr>
<tr>
<td><strong>Public</strong></td>
<td><strong>Upskill in Climate &amp; Tech</strong></td>
</tr>
<tr>
<td>Make decision to “Go Green”</td>
<td>► Consider investing in developing climate &amp; tech skillsets; these are crucial to drive Indonesia’s Green Growth transition, and are highly sought-after by the dynamic start-up &amp; tech space</td>
</tr>
<tr>
<td>► Individual consumer decisions matter - whenever feasible, consumer should opt for sustainable goods &amp; services to drive demand-led growth of green practices</td>
<td></td>
</tr>
<tr>
<td>► Seek support from Green Growth ecosystem to understand carbon footprint &amp; identify ways to reduce and/or offset emissions</td>
<td></td>
</tr>
<tr>
<td><strong>Financiers / Investors</strong></td>
<td><strong>Build robust Green Financing ecosystem</strong></td>
</tr>
<tr>
<td>Align own business around Green Growth principles &amp; practices</td>
<td>► Create offerings to finance Green Growth journeys of other economic actors; add “Green Growth lens” into investment/financing decisions</td>
</tr>
<tr>
<td>► Decarbonize business operations, including those from affiliated third-parties (e.g., business supply-chains, investment portfolio companies)</td>
<td></td>
</tr>
<tr>
<td><strong>Businesses</strong></td>
<td><strong>Develop offerings to support Green Growth across economy</strong></td>
</tr>
<tr>
<td>Seek support from Green Growth ecosystem to define Green Growth strategy, reduce carbon intensity of business &amp; offset remaining emissions</td>
<td>► Develop products and/or services to enable the decarbonization journeys of others, including driving Green Growth strategy, generating Green Growth solutions &amp; enabling emission offsetting</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td><strong>Collaborate to develop Demand &amp; Supply-side drivers of Indonesia’s Green Growth transition</strong></td>
</tr>
<tr>
<td>All players should actively collaborate to develop Demand &amp; Supply-side drivers needed for the Green Growth transition, including co-creating policy and products/services (e.g., Green Financing)</td>
<td>► All must have a seat or be represented at the table to ensure a Just Transition</td>
</tr>
</tbody>
</table>
About Boston Consulting Group (BCG)

Boston Consulting Group partners with leaders in business and society to tackle their most important challenges and capture their greatest opportunities. BCG was the pioneer in business strategy when it was founded in 1963. Today, we work closely with clients to embrace a transformational approach aimed at benefiting all stakeholders—empowering organizations to grow, build sustainable competitive advantage, and drive positive societal impact.

Our diverse, global teams bring deep industry and functional expertise and a range of perspectives that question the status quo and spark change. BCG delivers solutions through leading-edge management consulting, technology and design, and corporate and digital ventures. We work in a uniquely collaborative model across the firm and throughout all levels of the client organization, fueled by the goal of helping our clients thrive and enabling them to make the world a better place.

Marc Schmidt
Managing Director and Partner

Brendan Board
Project Leader

Tom Davies
Project Leader

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Consultant

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About AC Ventures

AC Ventures (ACV) is a top Southeast Asian venture capital firm that invests in early-stage startups focused on Indonesia and ASEAN, with over US$500 million in assets under management.

The firm’s mission is to empower entrepreneurs with more than just capital by combining operational experience, industry knowledge, deep local networks, and resources.

ACV’s team has invested in over 120 tech companies in the region since 2012. With a team of more than 35 professionals led by Adrian Li, Michael Soerijadji, Helen Wong, and Pandu Sjahrir, it has offices in Jakarta and Singapore.