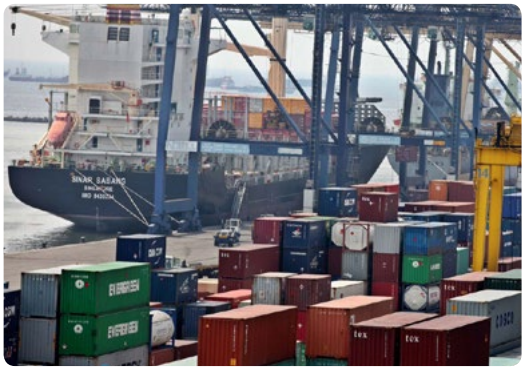
Global Green Growth Institute

Delivering Green Growth for a Prosperous Indonesia

A Roadmap for Policy, Planning, and Investment



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"This roadmap will help policy makers and others understand Indonesia's impressive green growth progress and potential. I believe it can be enormously helpful as a guide to further strengthen Indonesia's commitment to green growth."

Yvo de Boer
Director General of
Global Green Growth Institute

Contents

GREEN GROWTH

LIST
of Figures, Tables and Boxes

LIST *of Abbreviations*

AMDAL	Environmental Feasibility Assessment
BAPPENAS	Ministry of National Development Planning
BFCP	Berau Forest Carbon Program
BIG	Geospatial Information Agency
BMS	Building Management Systems
BPN	National Land Affairs Agency
BPS	Central Statistics Agency
CBA	Cost-Benefit Analysis
CBFM	Community Based Forest Management
CDM	Clean Development Mechanism
COREMAP	Coral Reef Rehabilitation and Management Project
CRI	Climate Risk Index
CTF	Clean Technology Fund
eCBA	Extended Cost-Benefit Analysis
ECR	Ecosystem Restoration Concession
EIA	Environmental Impact Assessment
EMRP	Ex-Mega Rice Project
F&A	Facts and Analysis
FCPF	Forest Carbon Partnership Facility
FMU	Forest Management Unit
FREDDI	Fund for REDD+ in Indonesia
GCI	Green Corridor Initiative
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFF	Geothermal Fund Facility
GGAP	Green Growth Assessment Process
GGF	Green Growth Framework
GGGI	Global Green Growth Institute
GGP	Green Growth Program
GHG	Greenhouse Gas
GoI	Government of Indonesia
GPB	Green Planning and Budgeting Strategy
GVA	Gross Value Added
IDR	Indonesian Rupiah
IEA	International Energy Agency
IFACS	Indonesian Forest and Climate Support project
IFC	International Finance Corporation
I-GEM	Indonesian Green Economy Model
IKLH	Environmental Quality Index
INCAS	Indonesia-Australia Forest Carbon Accounting System
INDECON	Indonesian Ecotourism Network
ISPO	Indonesian Sustainable Palm Oil
KADIN	Indonesian Chamber of Commerce
KEHATI	Indonesian Biodiversity Foundation
KFCP	Kalimantan Forests and Climate Partnership
KLHS	Strategic Environmental Assessment
KPH	Forest Management Unit
KSN	National Strategic Area
MCA-I	Millennium Challenge Account - Indonesia
MEMR	Ministry of Energy and Mineral Resources
MP3EI	Masterplan for Acceleration and Expansion of Indonesia's Economic Development
MSF	Multi-Stakeholder Forum
MSW	Municipal Solid Waste
NCE	New Climate Economy
NR	Natural Resources
NRM	Natural Resources Management
NTFP	Non-Timber Forest Product
OECD	Organisation for Economic Co-operation and Development
PES	Payments for Ecosystem Services
PLN	State Electricity Company
PLUP	Participatory Land Use Planning
PPCDAm	Action Plan for the Prevention and Control of Deforestation in the Legal Amazon
PPP	Public-Private Partnership
RAD-API	Regional Action Plan for Climate Change Adaptation
RAD-GRK	Regional Action Plan for Reducing Greenhouse Gas Emissions
RAN-API	National Action Plan for Climate Change Adaptation
RAN-GRK	National Action Plan for Reducing Greenhouse Gas Emissions
RAPBN	State Budget Plan
REDD+	Reducing Emissions from Deforestation and Forest Degradation
Renja KL	Ministry or Agency Work Plan
RENSTRA	Sectoral development plans
RKA KL	Ministry or Agency Work Plan and Budget
RKP	Government Work Plan
RPJMN	National Medium Term Development Plan
RPJPN	National Long Term Development Plan
RSPO	Roundtable on Sustainable Palm Oil
RTRW	Spatial Plan
RTRWN	National Spatial Plan
SCP	Sustainable Consumption and Production
SE4ALL	Sustainable Energy for All
SEA	Strategic Environmental Assessment
SME	Small and Medium-sized Enterprises
Solar PV	Solar Photovoltaic
SRAP	REDD+ Strategy and Action Plan
SVLK	Indonesian Timber Legality Verification System
TFCA	Tropical Forest Conservation Act
UNFCCC	United Nations Framework Convention on Climate Change
WDI	World Development Indicators
WWF	World Wide Fund for Nature

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Dwellings nestled among rice fields near the edge of Gunung Halimun National Park, West Java
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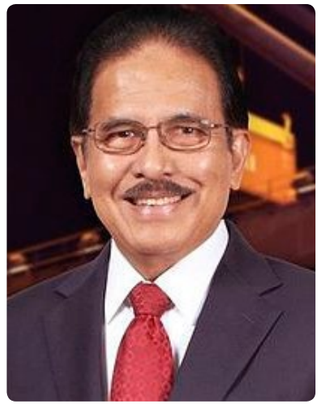
Foreword



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Sofyan A. Djalil
Minister of National Development Planning

Since a generation ago, Indonesia has made great strides in its economic development. Over the past 25 years, our rate of growth has been one of the highest in the world. We have emerged as a middle-income country and a member of the group of major economies, or G20. But this economic success has come with an environmental and social cost. Many of our natural resources, on which growth for so long relied, are being depleted. People in both urban and rural communities suffer from the insidious effects of air and water pollution. And opportunities for economic and social progress are not evenly and equitably distributed among all our people.

The challenges Indonesia faces in the next 25 years are, in some ways, even greater than those of the last generation. We must avoid the 'middle income trap' that can cause economic growth to falter. We must cope with the effects of climate change, which are already being felt across the country and which will grow worse. We must wisely invest in infrastructure to connect the disparate regions of the archipelago. What is required is new vision and a new approach to economic growth that values both human and natural capital. This new approach is green growth.

Examples of change are all around us. In many sectors of the economy and many parts of the country, people are experimenting with new business models that value rather than disparage natural capital and the services provided by healthy ecosystems. Newer, more efficient, and cleaner forms of energy are being brought into use by the private sector and government. Less wasteful forms of production and consumption are being introduced. More and more people recognize that economic growth is possible without the wasteful and destructive practices that caused so much harm in the past. Instead, with green growth, we can achieve prosperity as well as social progress and a clean and healthy environment.

What we need now is a systematic approach to policy-making, planning, investment, and action that will move Indonesia towards a vision for a green economy. This roadmap is a guide to just such an approach. It makes the case for why green growth is not only desirable but necessary. It presents a wealth of evidence and examples of how green growth can work—and in many cases is already working—in key sectors of the economy. The roadmap explains how policies, planning, and investment can be more systematically aligned to achieve green growth outcomes and how we can measure the performance of green projects and programs. Finally, the roadmap offers an action plan of 50 priority actions that will help Indonesia achieve a vision for green growth in the near, medium, and long term.

The true engine of growth for Indonesia is not any one sector or technology. Rather, it is the dynamism and creativity of our people, together with our rich natural and cultural heritage. As a nation, we face a choice. Shall we continue on the path of growth which, as in the past, imposes a growing burden of social and environmental costs? Or shall we choose a new, greener path? It is our choice to make, in this generation, but it is one that will profoundly affect generations to come. If we choose the path of green growth, as I believe we must, this roadmap will help us chart a course.

PART 1

Indonesia's Growth Trajectory

THE CHALLENGE of Green Growth

> *"The Government of Indonesia understands the opportunities which a green economy and its potential for sustainable economic growth, job creation and poverty reduction can bring to Indonesia. What is required to advance green growth in Indonesia is a systematic approach with concrete steps that take us from where we are today to our vision for a green economy."*
>
> **Dr Lukita Tuwo**
> Secretary of Coordinating Ministry for Economy

Indonesia has enjoyed strong and consistent economic growth over the past 15 years. GDP has risen by around 6% per annum, fuelled by access to abundant natural resources, population growth, rising living standards and expanding domestic markets. Indonesia aims to become a high-income country in the 2030s. This will require continued rapid economic growth. As Joko Widodo has pointed out, that growth needs to be people centered, so as to provide a high standard of living to all citizens, in all parts of the country.

The nature and type of future growth that Indonesia pursues will be critical in determining its long-term sustainable economic prosperity. The quality of growth is as important as its rate.

Green growth is an approach to achieving a number of simultaneous objectives that together can bring Indonesia closer to true sustainable development. It is designed to deliver sustainable and equitably-distributed increases in GDP and standards of living while, at the same time, curbing pollution, making infrastructure clean and resilient, using resources more efficiently, and valuing the often economically invisible natural assets that have underpinned economic success over the centuries and on which human welfare ultimately depends.

The nature and type of future growth that Indonesia pursues will be critical in determining its long-term sustainable economic prosperity. The quality of growth is as important as its rate.

If Indonesia's future economic growth is environmentally unsustainable, this will ultimately reduce future prosperity. By contrast, green growth focuses on the quality of economic growth, providing economic prosperity with better social outcomes and less stress on Indonesia's environment and natural capital. It can also provide food, energy, and maritime security. While there will be costs, at least in the short term, in making the transition to green growth, overall these will be more than balanced by benefits. Thus, there does not have to be a trade-off between environmental sustainability and economic progress. On the whole, greening of economic growth does not need to inhibit either wealth creation or employment; in fact, it will mean progress on many social goals, including more inclusive growth.[1] However, for this to happen, the right policies and active involvement by the business community are vital.

Obstacles to green growth range from undervaluation of natural resources and ecosystem services, the persistence of established investment patterns such as expansion of resource-depleting activities and the commercial interests they create, to institutional barriers and challenges for the policy debate to envision new models of economic prosperity. Obstacles also include the need to manage the transition to new models of growth, which at least in the short term may create losers as well as winners. Indonesia's historical experience with economic reform shows that the benefits can far outweigh the costs of adjustment, as new models of growth provide opportunities for both business and society overall.

This roadmap offers a guide to how Indonesia can meet the challenge. It is not a detailed blueprint or plan.

Rather, it is intended to guide an overall approach to green growth based on: creating the enabling conditions to foster and accelerate green growth within and across sectors; following a coherent and well-coordinated planning process; supporting investment in sustainable activities; and monitoring and measuring green growth performance. The roadmap is intended to complement and support policy initiatives such as the Green Planning and Budgeting (GPB) Strategy launched by the Ministry of Finance and the Sustainable Consumption and Production efforts of the Ministry of Environment and Forestry. Many of the actions recommended in this roadmap draw on, or otherwise complement, such initiatives.

Part 1 gives an overview of Indonesia's impressive record of economic growth in recent decades, but also shows that these positive results have come with an increasing economic, social, and environmental burden that threatens to become unsustainable. An alternative way forward, that of green growth, is introduced. **Part 2** examines opportunities to move towards green growth within and across key sectors of the economy and presents case studies of projects and initiatives already underway and which would benefit from scaling-up. **Part 3** lays out the enabling conditions needed to build a conducive investment climate to boost green growth. It presents the means for achieving green growth systematically, with particular attention to mainstreaming green growth in development planning; enhancing spatial planning and strategic environmental assessment; applying techniques for assessing and designing green investments; and monitoring and measuring the performance of projects and policies. Finally, **Part 4** offers a preliminary vision for Indonesia's green growth future along with a detailed suite of priority actions for achieving it over the next 35 years.

FIVE DESIRED OUTCOMES OF GREEN GROWTH

Green growth is concerned not only with the rate of economic growth but also with its quality, that is, the ability of growth to deliver multiple economic, social, and environmental benefits that improve the quality of people's lives across all segments of society.[2] The Green Growth Framework (GGF) for Indonesia, developed with a diverse group of government and non-government stakeholders,[3] articulates five desired outcomes of an economy in which high-quality green growth is well integrated throughout all its productive sectors:

FIGURE 1.1
Five desired outcomes of green growth

> *"Green growth is concerned not only with the rate of economic growth but also with its quality"*

1. Sustained economic growth

highlights the importance of Indonesia's economic growth being sufficiently robust and diverse to support broad-based people-centered development. It emphasizes that this development should be measured in a sufficiently broad way to capture the economic, social and environmental dimensions that affect quality of life, and the importance of being able to deliver benefits both today and into the long-term. With the right policies and enabling conditions, growth can leapfrog the resource-intensive and environmentally unsustainable model of industrial development pioneered by advanced economies.

2. Inclusive and equitable growth

highlights growth for the benefit of all segments of society: all children, women, and men, in all regions of the country, including not only the affluent and well connected, but also poor and marginalized groups. Well governed, accountable institutions and people-oriented policies that empower communities are critical for achieving this. This outcome is correlated with the quality of economic growth and the environment. Countries with higher levels of poverty and environmental degradation tend to have greater inequality; these countries are likely to benefit most from green growth interventions, as the poor are hit the most by environmental degradation.

3. Social, economic and environmental resilience

highlights growth which builds capacity for maintaining or restoring economic, financial, social, and environmental stability in the face of shocks. Examples are adapting to the physical impacts of a changing climate, including creating new infrastructure, diversifying economic sectors, bolstering food, energy and maritime security, and managing currency and trade stability. Countries that are more exposed to the physical and resource impacts of climate change, and countries which have generated most of their GDP from extractive and resource-intensive sectors, are likely to benefit more from green growth interventions.

4. Healthy and productive ecosystems providing services

highlights growth which sustains natural capital, that is, the stocks of natural resources which normally supply a continuous flow of benefits in the form of ecosystem services. These services, such as the provision of clean water and productive soil that facilitates food security, make essential contributions to economic growth and human well-being but are often not valued as inputs to economic production and thus omitted from decision-making. Green growth seeks to redress these market failures by fully and explicitly valuing ecosystem services.

5. Greenhouse gas emission reduction

highlights the importance of low-carbon growth that contributes to global and national efforts to mitigate climate change and minimize future adverse impacts on local and international society, while simultaneously improving energy security. Countries with higher greenhouse gas (GHG) emissions intensity have greater opportunities for cost-effective emissions reduction and more urgent need for assistance. A reduction in greenhouse gas emissions will usually go hand in hand with improved local air quality, through reduction in air pollutants. Actions to reduce GHG emissions will also improve performance on other local pollution issues, such as water and soil pollution, which are important for improving health outcomes and the quality of life for Indonesians.

The five desired outcomes of Indonesia's green growth are illustrated in **Figure 1.1.** These outcomes are closely aligned with the guiding principles discussed within the Green Planning and Budget (GPB) strategy, prepared by the Ministry of Finance.[4] For instance, the GPB adopts 'stronger valuation of natural resources' as one of its core principles, which it ties to the 'healthy and productive ecosystems' outcome discussed above. Similarly, the GPB's emphasis on the need for 'food, water and energy security' mirrors the focus on 'social, economic and environmental resilience.'[5]

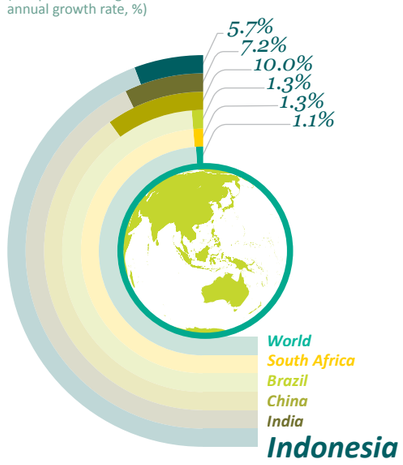
Some of the key ingredients for success in achieving green growth are common across a number of developed and developing countries.[6] These include political leadership, private sector leadership, and the right mix of policies and incentives to shift production, consumption, and investment towards more sustainable practices.

Key drivers of green growth[7] include the following:

- ***Efficient use and good management of natural resources and ecosystem services,*** *continued availability of which is critical to long-run economic prosperity and quality of life.*
- ***Invest in low-carbon, climate-resilient infrastructure,*** *which underpins modern economic growth.*
- ***Stimulate innovation and private sector investment in new and adaptive technologies*** *to deliver productivity improvements essential for sustained economic growth.*
- ***Focus on human capital*** *to provide a skilled and educated workforce needed for an economy less dependent on resource extraction, while fostering better social outcomes.*
- ***Address market failures in pursuit of economic, social and environmental goals,*** *as economic growth is catalyzed by more efficient allocation of resources.*

These drivers are reflected in the various enablers of green growth in different sectors, in **Part 2**, and summarized in the Action Plan in **Part 4**.

GDP GROWTH, 2003-13
(compound average annual growth rate, %)



PER CAPITA INCOME
(PPP, constant 2011 international $)

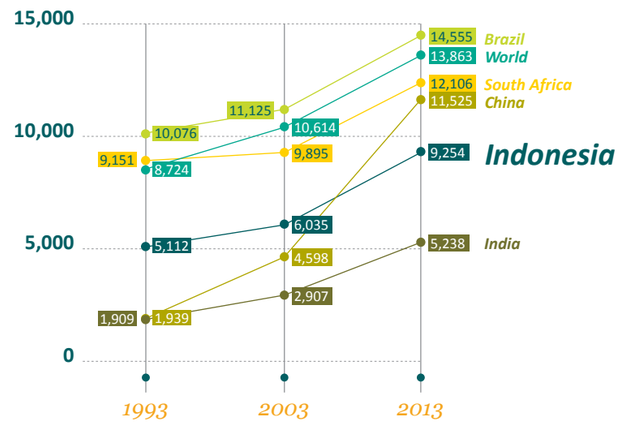


FIGURE 1.2
Indonesia's economic development in international comparison

Source: World Bank World Development Indicators

PAST TRENDS,
Projections, and Costs of the Status Quo

RECENT ECONOMIC TRENDS

Indonesia has been growing consistently fast for over a decade and is on its way to becoming an upper-middle income country. While Indonesia's growth rates have been lower than those of China and India, they have been higher than those of many other large developing countries. **Figure 1.2** shows changes in per capita income in various developing countries and the world as a whole since 1993.

Indonesia's economic development has been partly built on unsustainable expansion of natural resource based industries, especially mining, energy, agriculture, and forestry, as well as the availability of low cost labor. Fossil fuels have also played an important role. The country–which now must import oil—was a large net exporter of oil in previous decades and today is a significant exporter of natural gas and a larger exporter of coal for electricity generation. The production volume of coal increased more than fourfold over the decade 2002 to 2012.

> The structure of Indonesia's economy is already changing, with a gradual shift from primary to secondary and tertiary industries.

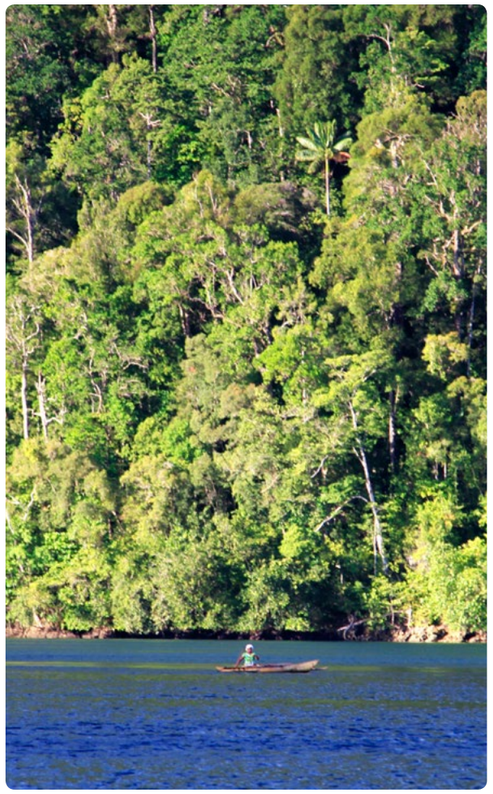
Revenues from natural resources increased even faster during the times of the global resources boom over the last decade. For example, the dollar value of palm oil exports rose more than three-fold from 2006 to 2011, or by almost 30% on average per year, on the back of higher world market prices as well as expanded production.[8] However, the present trend has resource prices falling and revenues declining, with likely negative effects on the profitability of, investment in and tax revenue from, resource-based industries. This trend may continue, particularly if China's growth continues to moderate.

Revenues from fossil fuel exports have helped finance state budgets, including investments in human capital and infrastructure. On the other hand, subsidies for transport fuels and private electricity use have resulted in inefficiencies and large budgetary costs. Recent cuts in fossil fuel subsidies have partially ameliorated these problems. The heavy reliance on fossil fuels has also meant that Indonesia's economy and government finance has

been vulnerable to changes in international energy prices, and the increasing reliance on coal brings with it significant environmental burdens (see **Figure 1.3**).

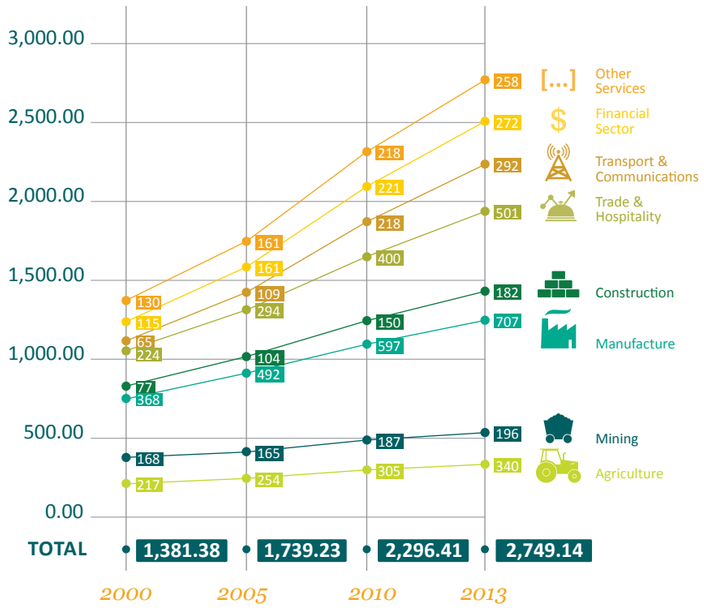
Growth has also come from structural change within the economy. The structure of Indonesia's economy is already changing, with a gradual shift from primary to secondary and tertiary industries. Agriculture accounted for 16% of GDP in 2000 and 12% in 2013; mining for 12% in 2000, and only 7% in 2013. The corresponding gains were in the services sector, which increased its share in GDP from 39% to 48% over the 13-year period, representing an average annual growth rate of 7.2%. There have also been impressive increases in investment, with Gross Fixed Capital Formation increasing from around 20% of GDP in 2000 to around 30% of GDP in 2013. While accurate data is sparse, there is evidence that this has been partly driven by private investment: the amount of investment in infrastructure with private participation has grown from around US$ 1.5 billion per year at the turn of the century to closer to US$ 4.4 billion per year in 2013 data.[9] Overall foreign direct investment has risen from negligible/negative amounts to around 2.5% of GDP over the same period.[10]

Indeed, the combination of this restructuring, international price movements and, in some cases, resource depletion means that the economic rents generated from Indonesia's resources overall have declined in recent years (see **Figure 1.4**). Combined resource rents from energy, minerals and forests accounted for over 10% of GDP during most of the last 40 years (and for well over 20% during much of the 1970s). Since 2009, however, they have declined to around 8%, driven largely by falls in oil and gas rents.



▲ ***Indonesia's wealth of natural and human capital (from top):***
Ecotourism in West Java *© Berto Wedhatama*
Pristine forest and lake in Papua *© Martin Hardiono*

FIGURE 1.3
GDP by sector over time



Source: BPS, via CEIC Indonesia database.
Note that definitions of sectors here differ from those in **Part 2** of the roadmap.

SOCIAL AND ENVIRONMENTAL IMPACTS

Economic expansion has brought prosperity and improved living conditions to local populations, including through jobs, infrastructure investment, and increased availability of essential services like transport, communication, health and education. The poverty rate has fallen. Health outcomes have improved dramatically, in large part as a result of a sustained increase in health expenditure. Likewise, educational attainments have consistently improved over time.

Yet Indonesia's current growth path is also resulting in very real social and environmental challenges. For example, Indonesia's growth has been characterized by increasing income inequality: the Gini coefficient of inequality has risen from 0.33 in 2002 to 0.42 in 2012.[a]

Other social and environmental challenges, both local and global, are also coming to the fore. The continuing conversion of forest to palm oil plantations is a prime example. This has been among the leading causes of Indonesia's deforestation in recent years,[11] affecting watersheds and the ecosystem services these watersheds provide to support local economies,

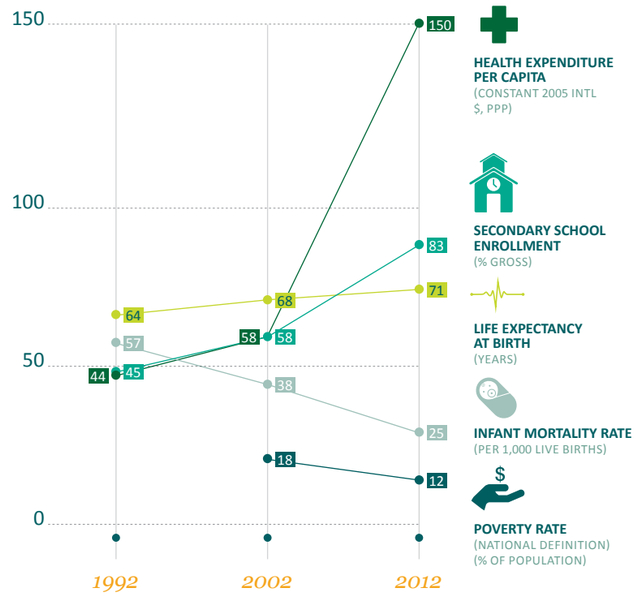
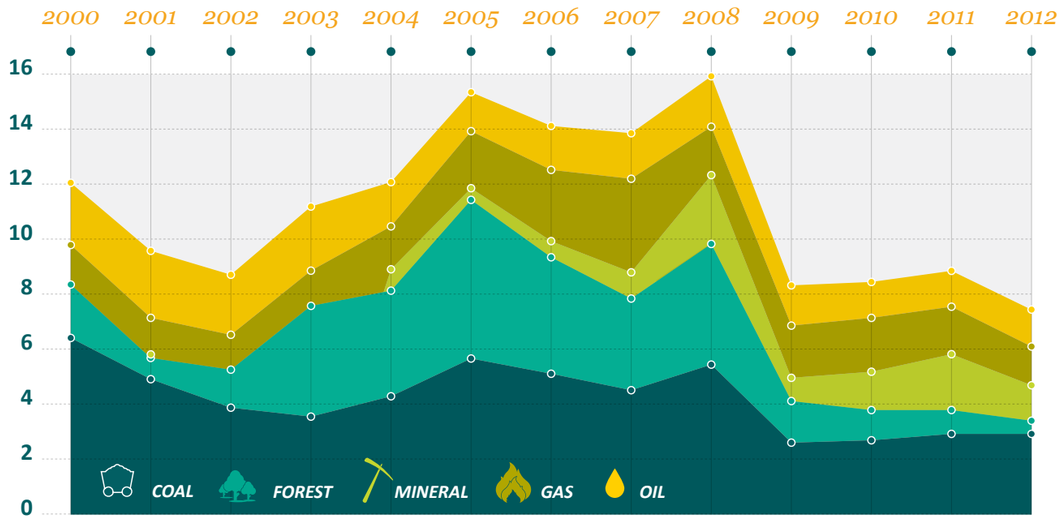


FIGURE 1.5
Selected social indicators

Source: World Bank World Development Indicators

FIGURE 1.4
Indonesia's resource rents



Source: World Bank World Development Indicators

a. The Gini coefficient is a measure of the inequality of a distribution, a value of 0 expressing total equality and a value of 1 maximal inequality. Data taken from Milanovic, B. (2014) 'All the Gini's dataset.'

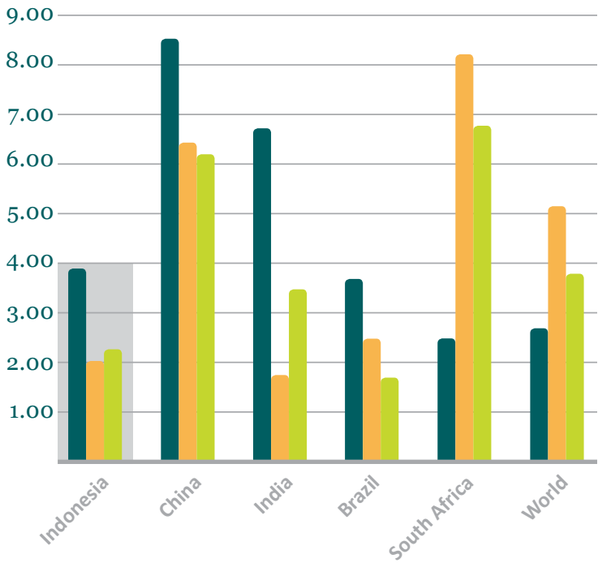
increasing GHG emissions, and leading to extensive losses of biodiversity. Damage to local forests can also imperil local livelihoods and negate the potential for tourism.

Where land clearing was or is (usually illegally) done by fire, it also imposes significant damages on Indonesia and its neighbors in the form of air pollution resulting in health problems and lost productivity. Environmentally destructive land clearing and land management practices thus not only cause environmental damage, but are a lost opportunity for people, harming their economic prosperity.

Considering only energy use, and thus excluding emissions from deforestation and forest degradation, Indonesia's economy is significantly less carbon intensive than that of China, India or South Africa. However, it is on a trend of rapidly rising CO_2 emissions, principally because of the rapid growth in fossil fuel consumption, especially coal for electricity.

As described further below, these environmental challenges are already causing very real costs and imposing substantial burdens on the people of Indonesia and on the country's food and energy security.

FIGURE 1.6
Indonesia's CO_2 emissions from energy use in international comparison



THE FUTURE CHALLENGE

The future economic challenge is to deliver a rapid, yet inclusive and people-centered, form of economic growth in order to achieve Indonesia's ambitious social goals. However, increasing pressures on the environment are threatening these goals. Indonesia's natural capital base is being eroded, with corresponding impacts on the country's food, water and energy security, and, ultimately, on the prosperity of all Indonesians.

Green growth will require new technologies, organisations and processes, effective government policies to protect the environment, and consistent involvement by private business in the shift to cleaner, more inclusive growth.

Greener growth means relatively less expansion in extractive and resource-intensive activities, and faster growth in services and manufacturing, with ongoing productivity gains. The slowdown in the global resources demand limits the extent to which resource-intensive activities can contribute to macroeconomic growth in the short-term; in the medium to long term, further expansion of extractive and resource-based industries will reach physical and environmental limits, and it will be increasingly difficult to achieve productivity gains in these industries.

Policy can accelerate the structural change already underway. Indonesia is currently enjoying a demographic dividend, with an increasing share of the population of working age. However, harnessing this potential for Indonesia's economy requires productive employment opportunities for the increasing number of working age Indonesians. Over coming decades, the trend is set to reverse, with the share of working age people in the population declining. Achieving productivity gains will then become essential to maintain economic growth and achieve rising per capita incomes for the entire population.

Sustained economic growth will also require continued improvements in social outcomes. A harmonious society is a crucial underpinning of a sustainable rise to high-income status. Social stability and a desirable local environment are prerequisites for attracting high value adding manufacturing and services industries in a globally competitive market place for investment and business locations. Indonesia has great potential in this competition, with its attractive natural, cultural and social values, and democratic political system.

Indonesia can also make dramatic improvements in the emissions intensity of its economy. Recent national analysis for a global UN-led project shows how Indonesia can achieve a low-emissions trajectory to 2050, without sacrificing opportunities for economic prosperity, while outlining the viability of developing clean, renewable energy, including solar power.[12] Investment in low-grade equipment that will last well into the second half of the century is not compatible with the ambitions of a sustainable high-income economy. This was emphasized in the recent OECD report, *Towards Green Growth in Southeast Asia*.[13] The next few years, as investment rapidly increases, offers an opportunity to determine the infrastructure and built environment that will define energy consumption, pollution and resilience in coming decades. Notably, the large majority of power sector investment in China now is at the leading edge of available technology.

Indonesia also has tremendous potential for renewable energy which can reduce its vulnerability to energy price fluctuations, and also has low local environmental impacts and close to zero carbon emissions. Opportunities for expansion include geothermal power, solar power, small-scale hydroelectricity and biomass.

Investment costs for clean technology do not need to be borne by the government budget; government policies can do much to encourage private investment here. Options include regulatory standards and carbon pricing (emissions trading or a carbon tax), which can even provide a net source of revenue for the government. In contrast to international carbon markets, domestic pricing of carbon can also provide a direct source of fiscal revenue for Indonesia. The Green Planning and Budgeting Strategy discusses these options and shows how a green growth trajectory for the economy can be achieved without the need for additional government expenditure.[14]

▲ *Geothermal energy in West Java*
© Berto Wedhatama

> ***"Indonesia has tremendous potential for renewable energy which can reduce it's vulnerability to energy price fluctuations"***

▼ *Indonesia's wealth of natural resources spans the country, such us this rice fields in Sumatra*
© Aulia Erlangga / CIFOR

PROJECTIONS FOR A GROWING, GREENER ECONOMY

A simple numerical exercise can show the powerful effect that a shift to greener growth, through gradual yet persistent changes in economic structure and technology, could have on aggregate environmental outcomes in 25 years' time.

As an illustration of overall resource efficiency and environmental pressure, these projections use Indonesia's total energy use and total carbon dioxide emissions. Macro-level projections for Indonesia's economy to 2040 are made under two scenarios:

1. Business-as-usual scenario,
with continuation of trends over the past two decades; and

2. Green Growth scenario,
with accelerated structural change, faster improvement in resource and energy productivity, and increased efforts in technological updating and environmental protection.

Both scenarios are based on the same projections for population growth and GDP growth, and hence growth in per capita income. The differences are in the composition of the economy, and outcomes for resource and environmental indicators. In reality, a green growth scenario may well lead to higher GDP growth rates and higher per capita incomes as well, if potential extra productivity gains are reaped. In this sense, the scenarios here understate the potential gains from green growth.

The box and tables overleaf provide details about the assumptions and data behind the two scenarios. The assumptions in the business-as-usual scenario roughly extrapolate past trends. The green growth scenario maps out a constellation of continuous improvement that appears feasible in light of some other countries' experiences and technological development. The scenarios are not meant as predictions, but as illustrations of what could be achieved over coming decades, with gradual but continued changes in economic structure and technology.

The key variables are Indonesia's total energy consumption, as a proxy for overall resource intensity of the economy, and Indonesia's total CO_2 emissions from energy use, as a proxy for overall environmental impacts from industry, transport and energy use by households. Emissions from land-use change and agriculture are not included; including them would further accentuate the differences in environmental outcomes between the two scenarios.

▼ *(From left to right):*
Costs of 'business-as-usual': urban slum in Jakarta
© Axel Drainville, ***Jakarta traffic*** *© Charles Wiriawan / CC BY-NC-ND 2.0*

FIGURE 1.7
Business As Usual vs. Green Growth

Source: Vivid Economics, based on BPS data

Box 1.1 ASSUMPTIONS IN THE BUSINESS-AS-USUAL AND GREEN GROWTH SCENARIOS

GDP and population
In both scenarios, Indonesia's GDP increases 4.4 times from 2013 to 2040, with per capita income rising 3.5-fold, to US$ 32,000 per person (in 2011 international dollars). The annual GDP growth rate is assumed to be 6.5% per year until 2020, and then to gradually moderate to 4.5% pa by 2040. Average annual growth is 5.8% during the 2020s and 4.8% during the 2030s. Population projections are as in Indonesia's latest official population projection (from BPS, as reported in McDonald, 2014, BIES 50:1, 123-12).

Energy
In the business-as-usual scenario, the annual increase in energy productivity of GDP is assumed to start out at 2.5% per year (a 2.5% pa reduction in the emissions intensity of the economy). This is the rate observed over the last ten years in Indonesia. This rate is assumed to slowly moderate, by 0.05 percentage points per year, to 1.1% per year at 2040. By comparison, the annual improvement in energy productivity in OECD countries was 1.7% during the last decade. As a result, energy use increases by almost 4% per year over the entire projection period.

In the 'green growth' scenario, the annual increase in energy productivity of GDP is also assumed to start out at 2.5% per year. However rather than slowing down, it is assumed that the rate of improvement increases gradually over time, by 0.05 percentage points per year, to 3.8% per year at 2040. This is approximately the current rate of reduction in energy intensity of China's economy, and high in global historical comparison. As a result, total energy use increases by on average only 2.3% per year over the entire projection period, and by less than 1% per year in the second half of the 2030s.

Carbon dioxide emissions
In the business-as-usual scenario, the annual change in carbon intensity of energy supply starts out at the value observed in Indonesia over the last decade, an increase of 1.3% per year. This is the result of continued rise in coal in Indonesia's energy mix, principally for electricity generation. It is assumed that the rate moderates by 0.05 percentage points per year, to reach 0% per year at 2040. In other words, it takes until 2040 for the emissions intensity of Indonesia's energy supply to stop rising. Per capita carbon dioxide emissions from energy use increase from 1.8t currently to 4.6t by 2040, well more than double the level that is feasible on average globally if global warming is to be kept to two degrees Celsius.

In the green growth scenario, the annual change in carbon intensity is assumed to improve more rapidly, by 0.2 percentage points per year until 2020, and by 0.1 percentage points per year thereafter. As a result, the carbon intensity of Indonesia's energy supply peaks in 2020, and by 2040 it declines by 2% per year. This scenario would require an immediate slowing down of the expansion of coal-fired electricity generation, with greater use of gas and renewables, followed by a sustained effort to expand renewable energy in preference to fossil fuels. Total CO_2 emissions from energy use peak in the 2030s. CO_2 emissions per capita from energy use increase from 1.8t currently to 2.5t by around 2030, and then slowly fall to come back to 2020 levels by 2040.

This box provides full documentation of the data and assumptions used in constructing the two scenarios.

The 'business-as-usual' scenario is informed by recent trends in the resource and energy intensity of Indonesia's economy, and in the carbon intensity of Indonesia's energy supply. It extrapolates trends, with a gradual moderation over time. The 'green growth' scenario, by contrast, is informed by rates of change in energy intensity of the economy and in the carbon intensity of the energy system that have been shown possible in other countries. The scenario assumes that Indonesia's rates of changes in energy intensity and carbon intensity very gradually approach world's best practice observed to date.

Under the 'business-as-usual' scenario, Indonesia's energy consumption continues rising, to 2.7 times the current level by 2040, while carbon dioxide emissions rise even faster, to 3.2 times the current level by 2040. Both energy consumption and emissions continue rising after 2040 on such a trajectory.

Alternatively under the 'green growth' scenario, total energy use in the Indonesian economy would level off by 2040 while the economy keeps growing quickly. In both scenarios, Indonesia's GDP increases 4.4 times from now to 2040, with per capita income rising 3.5-fold, to 32,000 dollars per person per year (in 2011 international dollars). This implies a dramatic rise in energy productivity (the amount of energy used per unit of GDP).
Under the 'green growth' scenario energy productivity increases 2.4-fold, compared to 1.6-fold in the 'business-as-usual' scenario.

In the 'green growth' scenario, carbon dioxide emissions from energy use would peak in the early 2030s, at a level of just 2.5 tonnes of CO_2 per person, far below the present levels in developed countries and China, potentially making Indonesia a leader in constraining energy-related carbon dioxide emissions. This is possible because the improvements in energy productivity are compounded by improvements in the carbon intensity of energy through a gradual shift towards cleaner energy options, including renewable power.

These illustrative scenarios are only for energy use and carbon dioxide emissions; as such, they omit many other important aspects of resource use and pollution. Nevertheless, they can be seen as high-level, qualitative proxies for other important facets of green growth.

First, energy productivity can be a proxy for other types of resource intensity in an economy. This is because accelerated structural change to low-energy using activities and increased investment in modern energy efficient technologies will generally go hand in hand with more efficient usage of other resources, such as freshwater in business or residential use, or land for agricultural production.

Second, the drivers that can accelerate the decoupling of carbon dioxide emissions from economic growth are similar to the drivers of reduced local pollutants. Both represent a shift to less polluting ways of producing key commodities (in the scenarios, energy) by substituting inputs and investing in cleaner, modern technology.

Therefore, qualitatively similar trajectories could be observed for variables such as air pollution, water pollution and chemical pollutants, although the rates of change and peak dates would vary.

By gradually approaching the best practice frontier, Indonesia could drastically decrease environmental damage while maintaining a rapid growth rate. The end product is a more robust economy with greater well-being for the wider population–driven not only by improvements in income, but also by benefits to health, food and energy security and sustainability that are possible only when damage to environment and ecosystems is limited.

BUSINESS-AS-USUAL SCENARIO VS GREEN GROWTH SCENARIO

TABLE 1.1
Data and assumptions, Business-as-usual scenario [15]

	2013	2020	2030	2040	Annualised average growth rates 2020s	2030s	Source for current data	Assumptions
CO_2/energy t/TJ	49	53	57	58	0.7%	0.2%	calculated	Annual increase of 1.3% pa, reduced by 0.05 percentage points per year.
Energy/GDP PJ/$billion	4.0	3.4	2.8	2.5	-1.9%	-1.4%	calculated	Annual reduction of 2.5% pa at start, reduced by 0.05 percentage points per year.
CO_2/capita t/person	1.8	2.4	3.4	4.6	3.6%	3.0%	calculated	calculated
CO_2 Mt	458	652	1,018	1,449	4.6%	3.6%	IEA	calculated
Energy use PJ	9,275	12,235	17,877	24,994	3.9%	3.4%	IEA	calculated
GDP/capita Const. 2011 intl $ '1000	9.3	13.2	21.4	32.3	4.9%	4.2%	calculated	calculated
GDP Const. 2011 intl $ billion	2,312	3,590	6,339	10,178	5.8%	4.8%	WDI	6.5% pa until 2020; then reduced by 0.05 percentage points per year.
POPULATION million	250	271	296	315	0.9%	0.6%	BPS official projections, as per McDonald 2014	BPS

TABLE 1.2
Data and assumptions, green growth scenario

	2013	2020	2030	2040	Annualised average growth rates 2020s	2030s
CO_2/energy t/TJ	49	51	48	41	-0.6%	-1.6%
Energy/GDP PJ/$billion	4.0	3.3	2.4	1.7	-3.1%	-3.6%
CO_2/capita t/person	1.8	2.2	2.5	2.2	1.1%	-1.1%
CO_2 Mt	458	608	739	702	2.0%	-0.5%
Energy use PJ	9,275	11,889	15,281	16,961	2.5%	1.0%
GDP/capita Const. 2011 intl $ '1000	9.3	13.2	21.4	32.3	4.9%	4.2%
GDP Const. 2011 intl $ billion	2,312	3,590	6,339	10,178	5.8%	4.8%
POPULATION million	250	271	296	315	0.9%	0.6%

Delivering Green Growth for a Prosperous Indonesia
A Roadmap for Policy, Planning, and Investment
Past Trends, Projections and Costs of the Status Quo

THE COST OF THE STATUS QUO

The preceding analysis suggests that sustained effort at a manageable scale could yield drastically improved outcomes in resource efficiency and environmental outcomes for Indonesia. Green growth will, however, require investment; the case for pursuing it depends on the substantial costs associated with maintaining the status quo.

Air, water and land-based pollution and other pressures on the environment are already having negative impacts on Indonesia's economic and broader social objectives, such as health and equity. In particular, they often lead to lost or damaged ecosystem services and consequently result in unproductive soils, reduced water supply and other impacts that undermine food and water security. Other examples include reductions in the capacity of the environment to provide the services underpinning human activity and the economy, such as clean water or protection from flooding; damage to infrastructure; adverse effects on people's health; reduction in species diversity and potential flow-on effects on agriculture; and lower quality of environmental systems.

In some cases, it is difficult to assess the magnitude or even nature of adverse environmental impacts; in most cases, it is difficult to put a monetary measure on economic costs from environmental degradation. However, some measures exist that can give an aggregate impression of the possible magnitude of economic costs associated with a business-as-usual pathway that puts ever greater pressure on environmental systems and corresponding consequences for the people of Indonesia.

Local air quality

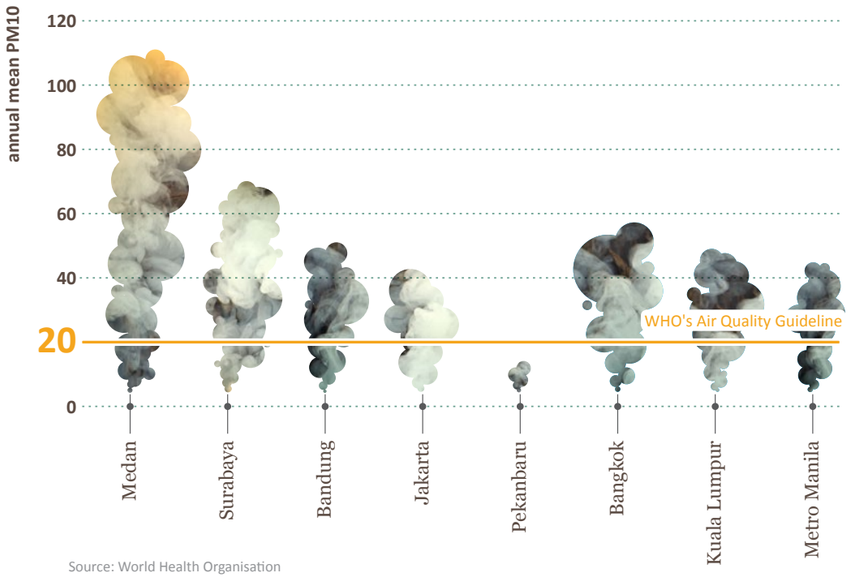
Emission of noxious gases and particulates has degraded air quality in many cities. Sources for these particulates include the combustion of coal, as well as the combustion of other solid and liquid fossil fuels and peat fires. Most cities in Indonesia are now exceeding the World Health Organisation's air quality guidelines for particulate levels, as shown in **Figure 1.8** below. Outdoor air pollution in Indonesia was estimated to cause 32,000 deaths per year in 2004 (WHO, 2009) and is likely to have worsened since then.

Recent estimates put the costs of mortality from outdoor particulate (PM2.5) air pollution in Indonesia around 3% of GDP in 2010. This is lower than the estimated costs in China, India and many developed countries, but nevertheless a sizeable economic cost, and one that is set to rise unless pollution is better managed.[16]

Chronic peat fires are also a significant and recurring source of haze, and pose a serious health hazard to the people of Indonesia.

▼ ***Costs of 'business-as-usual': air pollution in Jakarta***
© Ansyor Idrus

FIGURE 1.8
PM10 levels in Indonesia and other Southeast Asian cities exceed the WHO's guideline [b]



Source: World Health Organisation

b. All data for 2008 except for Metro Manila (2007). The annual mean PM10 is a population-weighted average for urban population in cities above 100,000 inhabitants. The 2005 WHO Air Quality Guideline for annual mean PM10 is 20µg/m3.

A recent study found that landscape fires in Southeast Asia increase regional adult cardiovascular mortality by 2% annually.[17] These estimates are likely to underplay the effect on the Indonesian population, who bear a disproportionate share of the health risk.[18] The wildfires of 1997–the most thoroughly studied among such events—are estimated to be responsible for over 16,400 child deaths in Indonesia.[19]

Groundwater abstraction, drainage, and subsidence

In the Jakarta basin, almost all industrial water needs are met by groundwater abstraction rather than from surface water. Enforcement of groundwater abstraction regulations remains weak, while incentives to encourage efficient use of water are weak or non-existent. The result has been significant subsidence–lowering of the land–with studies suggesting subsidence rates of 15-20 cm/year[20] and cumulative subsidence of more than 4 meters over the last three decades.[21] Densely populated parts of the Jakarta are now around 2 meters below sea level.

These risks will be massively aggravated by sea level rise brought about by climate change: studies examining the interaction between sea level rise and coastal flooding estimate that Jakarta is likely to be in the top 20 most exposed cities in the world to coastal flooding in the 2070s, with perhaps as many as 2.2 million people at risk.[22] Palembang is also highly exposed, with expected losses of local GDP of 0.4% per year as a result of flooding alone.

These problems have led to the recent commencement of a sea wall for the capital that will cost up to US$ 40 billion.[23]

▲ ***Jakarta's waterways*** *© World Bank Photo Collection / CC BY-NC-ND 2.0*

Similar problems are caused where peat swamps are drained for conversion to agriculture. A recent study concluded that the drainage of Southeast Asian peatlands could lead to severe flooding within a few decades and bring an end to agricultural production in between 30% and 69% of the coastal peatlands within 50 years. The study suggests that these problems may be particularly acute in Indonesia.[24]

Water availability and quality

Both deforestation and mining have had large effects on water availability and quality. For instance, deforestation and soil compaction can result in lower base flow during the dry season. This can lead to water shortages downstream, forcing households, businesses and utilities to seek expensive alternative sources. A recent study focusing on the Heart of Borneo found that a water utility in the Sanggau district of West Kalimantan had two of its water springs dry up in the dry season due to the expansion of palm oil plantations upstream.[25] Water utilities in Kalimantan have also seen declining base flow, forcing price increases, water rationing and investment in alternative sources.

Low discharges in dry seasons are also resulting in saltwater intrusion, which is increasingly affecting water quality in cities such as Pontianak and Banjarmasin. In Pontianak, the costs of obtaining water upstream is estimated at USD $2 million per year.[26] Serious pollution is also occurring as a result of mining activities, with mercury, manganese and cyanide contaminating water sources and creating profound risks to human health. Other estimates put the total cost of cleaning up water pollution up to 2025 at US$ 2 billion.[27]

Water availability is a growing problem across Indonesia as a whole. A recent report found that 14% of drainage basins are in a critical condition, while a 2008 Ministry of Environment survey found that the majority of the country's rivers are heavily polluted.[28] This is particularly problematic in the context of rapid economic growth and rural-urban migration.

Industrial uses of water are increasingly competing with agricultural uses, which currently account for over 80% of total water usage.[29] The combination of growing demand with environmental degradation and pollution is likely to endanger food security, making it harder and harder for Indonesia to achieve agricultural self-sufficiency. In addition, deteriorating water quality poses a serious health risk to those who rely on river water for drinking.

River sedimentation

Sedimentation resulting from deforestation and unsustainable practices in the forest and land use sector is a growing problem in Indonesia, restricting transport capacity and contributing to infrastructure instability. Coal mining companies are increasingly finding that sedimentation is rendering rivers unnavigable. For example, the upper reaches of the Barito River, in Central Kalimantan, is not navigable during 40% of the year, and the sea channels for the ports of Pontianak and Banjarmasin report dredging costs of US$ 3 million and US$ 11 million respectively.[30]

River sedimentation has also been linked to increased flooding. Government officials have, for instance, linked sedimentation of rivers in Central Java to heavy floods in late 2008 and early 2009. Normalization of these rivers is a significant, ongoing expense; at the time, utility estimates for the total cost of normalizing the eight rivers closely connected to the flooding was US$ 64 million.[31]

Local impacts of coal mining and combustion

Mining and burning coal has environmental impacts that impose costs on society, including through health impacts in mining communities, environmental damages in mining areas and from coal transport, and health effects of the emissions of air pollutants from combustion. A recent estimate for the externalities related to coal production and use in the US is US$ 345 billion per year (range: US$ 175 billion to US$ 523 billion), or around US$ 280 billion—even excluding future climate change damages.[32] An estimated US$ 100 billion or so of these damages may be connected to mining and transport.

Applying the estimates from the US study to Indonesia would lead to a central cost estimate of the order of US$ 100 billion per year, excluding climate change damages. Of course such damage cost estimates are subject to many uncertainties and value judgments, and local conditions in Indonesia may warrant different valuations. Nevertheless, the external costs of coal mining, transport and combustion in Indonesia are undoubtedly sizeable and will continue to increase until a greener growth trajectory is chosen.

Social cost of carbon

Indonesia's current emissions of CO_2 from fossil fuel consumption are around 500 million tonnes per year, while net emissions of CO_2 from land-use change and forestry may be more than 1 billion tonnes per year. In particular, the greenhouse gas emissions from peat fires within Indonesia are massive. The peat fires in 1997 and 1998 alone released approximately 0.95 Gt of carbon–equivalent to around 15% of global fossil fuel emissions at the time.[33] These emissions impose economic costs on future generations in Indonesia and globally.

The future global costs of current greenhouse gas emissions, through the negative effects of climate change on future economic activity, are estimated based on a "social cost of carbon".

Estimates of the social cost of carbon used by the US government [c] imply a total social cost of Indonesia's annual CO_2 emissions of US$ 20 billion per year for the energy sector, and perhaps another US$ 40 billion for the land-use change and forestry sector. Thus, the future economic cost to the world of Indonesia's current CO_2 emissions may be in the order of 1% to 3% of Indonesia's current GDP, and up to 8% of GDP according to high-end estimates.

Using global data for the future cost of climate change masks Indonesia's unusually high vulnerability to damages from climate change. Increased temperatures, changes in rainfall and more common extreme weather events are all likely to have detrimental effect on agricultural yields and food security.

c. The social cost of carbon estimates the economic damage caused by each additional tonne of CO2 emitted in a given year. The US administration's 'central estimate' is US$ 39/tCO2 at 2015 (with a range from US$ 12 to US$ 116), and US$ 65 at 2040 (range US$ 22 to US$ 204). See Interagency Working Group on Social Cost of Carbon (2013) Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866.

▲ *From top:*
Smoke haze from Sumatra
© NASA Goddard Space Flight Center / CC BY 2.0
Crude palm oil (CPO) plant in Jambi, Indonesia
© Iddy Farmer CC BY-NC-ND 2.0

Conclusion

Indonesia's economic growth record over the past three decades has been impressive, driving improved living standards and reductions in poverty across the country. In the future, the challenge will be to both maintain robust economic growth and ensure that it is achieved in a sustainable manner. Continued economic growth must be leveraged to facilitate broad-based improvements in the health and well-being of the Indonesian population and in particular must not be allowed to endanger food and energy security. The costs associated with the status quo are substantial; they include adverse health consequences of poor water and air quality, food insecurity resulting from uncertain water availability, and increased flood damages resulting from deforestation and river sedimentation.

Many opportunities for green growth already exist in Indonesia. Although a more comprehensive and systematic approach will be needed to mainstream green growth through the country, a good start has been made in many instances by national and local governments, private firms, communities, and civil society organizations supported by both private and public investment. The opportunities, and some of the projects and initiatives already underway in various sectors and parts of the country, are the subject of **Part 2.**

PART 2

Green Growth Opportunities

Green growth is not a novel concept in Indonesia. Positive but isolated examples exist across the archipelago.

Many opportunities exist to facilitate the transition towards a green economy. In **Part 2**, the roadmap examines these opportunities within and across key sectors, pointing to key enablers for advancing green growth—many of which have already begun to be put into action by government, the private sector, or others. The projects and initiatives highlighted here illustrate promising means and approaches to achieving green growth outcomes.

A VISION
For A Green Indonesia

A key step in delivering green growth for Indonesia is to build consensus around a vision for the kind of country that Indonesians would like to see by 2050—one tied to a comprehensive strategy of green growth. Such a vision will reflect the diversity, as well as the unity, of the nation; its wealth of human and natural capital; and the strong leadership and commitment required to move steadily and successfully onto a path towards green growth. The roadmap includes a simple statement designed to frame the challenge of achieving meaningful green growth outcomes by 2050 (see **Box 2.1**).

PRIORITY OPPORTUNITIES TO FOSTER GREEN GROWTH

Achieving the above vision will require taking strategic advantage of current and future opportunities for green growth. Opportunities abound across multiple economic sectors. Indeed, some are already reflected in emerging policies and are being taken advantage of by a variety of actors and agencies, though so far in an isolated and fragmentary way. These opportunities, if capitalised upon correctly, can all contribute towards shifting Indonesia's trajectory away from the 'business-as-usual' scenario towards the 'green growth' scenario depicted in **Figure 1.7.**

The roadmap groups examples of 'green growth' opportunities across a range of sectors into four clusters: (i) energy and extractives, (ii) manufacturing, (iii) connectivity, and (iv) renewable energy resources. Within each cluster, opportunities are illustrated with brief case studies of projects in Indonesia and good practices from other countries. In addition to the four sectoral clusters, a fifth involves emerging markets and business models that derive financial value from the non-consumptive use of natural capital and ecosystem services. Together, the opportunities in and across these clusters offer pathways to a unique, Indonesian style of green growth that will contribute to socially inclusive growth while avoiding, reducing, or mitigating the environmental costs discussed in **Part 1**.

Table 2.1 describes the clusters, which together account for around two-thirds of current Indonesian GDP.[34] For each sectoral cluster, and for the cross-cutting category, a number of key enabling actions are presented as ways to drive green growth policies, practice, and investment, overcome barriers to change, and avoid or mitigate the economic, social, and environmental costs of current trends. Many of these enabling actions are already being put into practice, often in the form of pilot projects that have potential to be scaled up. They include payments for environmental services (PES) and other economic instruments, such as tax incentives, green investment funds, and environmental insurance.[d] The enablers featured in the roadmap do not provide an exhaustive guide to making green growth a success; they do, however, constitute a well-balanced and realistic set of policies and initiatives. Further policies and enablers can be developed in response to future events in line with the broad themes identified in this section.

Each of the above sectors offers opportunities to develop new and innovative business models that more explicitly value natural capital. The roadmap identifies some of the most promising of these opportunities.
Figure 2.1 illustrates the way in which the emerging markets for natural capital sector cluster feeds into the other sector clusters.

These examples, developed from a wide-ranging consultation process, are both specific and tangible. They represent a mere fraction of the green growth opportunities that are available to Indonesia.

Further dialogue will identify many more, particularly related to the service sector, which is not covered here.

Box 2.1 WHAT KIND OF INDONESIA DO WE WANT IN 2050?

Indonesia in 2050 is an advanced, cohesive, post-industrial democracy spanning a highly connected archipelago of great cultural and natural diversity and exemplifying the national motto of *Bhineka Tunggal Ika*, or "unity in diversity." A green Indonesia has achieved a per capita income of some US$ 32.000, population growth has levelled off and the population of 315 million is well educated, healthy, and economically productive, ranking in the top 10% of the global Social Progress Index. Ecosystem services are valued and sustained in both urban and rural areas, which are highly interdependent and resilient to climate change and other perturbations.

The country has avoided the "middle-income trap" by investing heavily in basic human services, connectivity, and rapid development of the services sector. As a result of strategic public and private investments across the whole country in green infrastructure, communications, clean technology, education, and health care, a child born in 2050 in Papua, Maluku, or Nusa Tenggara enjoys the same life chances and standard of living as her compatriot in Java, Sumatra, or Bali.

Indonesia's prosperity in 2050 derives from a diversified, low-carbon, service-based economy that invests in, rather than exploits, human and natural capital. The country has moved away from dependence on extractive sectors and towards renewables, innovative technology and services. The loss of species-rich forests and coral reefs has been halted and, in some places, reversed through ecological rehabilitation. Forest-based sectors and fisheries are once again thriving. The service sector of the economy has expanded rapidly and is an international leader in a range of areas, including ecotourism and biodiversity-based technologies, with strong export earnings. Indonesia makes wise use of its geothermal, solar, and hydro-power together with biofuels, recycling, and energy efficiency to ensure food and energy security. The trajectory of Indonesia's annual GHG emissions is on a declining pathway.

FIGURE 2.1
Relationship between sector clusters

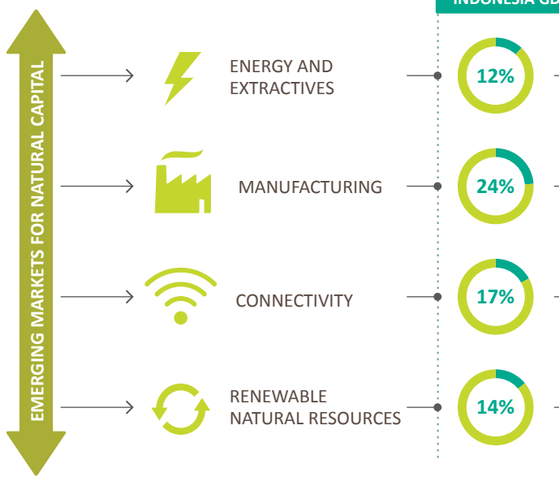


TABLE 2.1
Sector cluster definitions

	CURRENT % OF INDONESIA GDP	SECTORS INCLUDED	RATIONALE FOR SECTOR CLUSTER
ENERGY AND EXTRACTIVES	12%	Oil Gas Renewable power generation Non-renewable power generation mining	This cluster includes the processes involved in the generation of renewable and non-renewable power, as well as the raw material inputs into non-renewable power generation. 'Extractives' relate to the extraction of fossil fuels for energy, but can also include the mining of other minerals. This makes a clear distinction between this cluster and the next cluster. This cluster focuses on extraction, whereas the manufacturing cluster focuses on the subsequent processing of these materials. This distinction is important when considering green growth opportunities.
MANUFACTURING	24%	Production and processing industries Clean technologies Recycling waste	Parallels exist between increasing value added and efficiency across all processes and sectors.
CONNECTIVITY	17%	Telecommunications Transport Infrastructure Construction	Planning and financing requirements of each sector are similar and can be cross-cutting.
RENEWABLE NATURAL RESOURCES	14%	Forestry Agriculture Fisheries Land use activities Marine activities	The principles of sustainable practices and regulations are similar for all renewable natural resource sectors.

"Achieving the vision for a green Indonesia vision will require taking strategic advantage of current and future opportunities"

d. The Environmental Protection and Management Act (Law 32 of 2009) provides for a suite of economic instruments that national and local governments can use to regulate and provide incentives to achieve green goals. Examples of some of these are featured in this section.

ENERGY AND EXTRACTIVES

Moving towards low carbon energy sources and value-added extraction models can unlock significant growth opportunities benefiting the whole population.

This cluster, accounting for around 12% of Indonesia's current GDP, includes the oil and gas industries, renewable and non-renewable power generation, and mining. Its significance for green growth lies in opportunities to reduce currently severe negative environmental impacts, particularly by increasing efficiency and shifting toward renewable resources. Key recommended actions include evaluating the overall costs, benefits, and financial viability of feed-in tariffs, attracting the private sector to invest in geothermal energy, and capitalizing on the comparative advantage derived from siting mineral processing near auxiliary resources such as water and low-carbon energy.

TABLE 2.2
Key enablers for energy and extractives

THEME	KEY ENABLERS	SUGGESTED INDICATORS
Increase access to modern energy services in remote rural areas of Indonesia	1. Conduct regional assessments to determine appropriate energy solutions 2. Provide incentives for investment in clean energy access solutions 3. Investigate localised barriers to investment and develop knowledge transfer	• % of population with electricity connection • Country score on SE4ALL[e] multi-tier framework
Orient the energy sector towards lower carbon energy sources	4. Evaluate feed-in tariffs 5. Remove fossil fuel subsidies 6. Implement carbon pricing 7. Explore options for domestic gas as a bridging fuel 8. Attract the private sector to geothermal by addressing financial barriers and sharing risk	• % generation with renewables • % generation with gas • Energy Sector Carbon Intensity Index
Increase value added in mineral extraction	9. Develop targeted approach to increasing value added in mineral processing 10. Develop mineral processing industries in areas with renewable energy, water supply or other auxiliary resources	• Gross value added of minerals processing sector • Employment of minerals processing sector

INCREASE ACCESS TO MODERN ENERGY SERVICES IN REMOTE RURAL AREAS OF INDONESIA

The government aims to increase the current electrification rate of 77% to 100% by 2020.[35] While this is a challenging target, its achievement would bring huge development benefits to local communities by facilitating basic social needs such as water sanitation and health services that are important to achieving equitable and inclusive growth. It would also increase economic activity while reducing air pollution and health costs. Additional benefits will be realized by providing modern cooking options to the 42% of the population that rely on traditional fuel types, primarily wood and in some areas peat.

One way to meet these needs is through low-cost, renewable distributed generation (see **Box 2.2**) that harnesses locally available resources. Globally, there is a host of innovative on and off grid business models that seek to overcome the challenges associated with energy access in rural areas. Many of these are likely to be appropriate for replication and scaling up in Indonesia.

e. SE4ALL, or Sustainable Energy for All, is a worldwide initiative that works to connect people around the world with sustainable energy sources. They produce a framework which assesses the extent to which a country's population has access to sustainable energy.

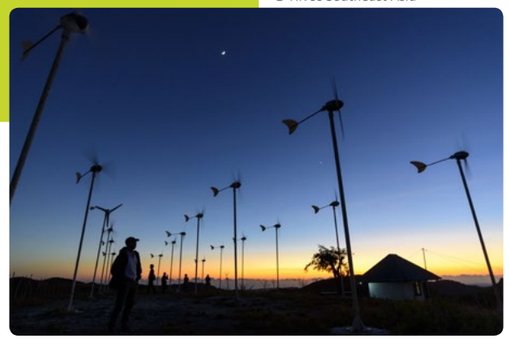
Box 2.2
100% RENEWABLE ENERGY PLAN FOR SUMBA ISLAND

The Sumba Iconic Island project demonstrates the scalable green growth opportunities available to Indonesia. The majority of Sumba's 650,000 inhabitants currently have no access to electricity. Diesel generators have long been the main source of electricity, and many people remain dependent upon expensive and unreliable diesel supplies. Inhabitants also use polluting and expensive kerosene for lighting along with firewood for cooking—both of which are associated with damaging health impacts.

The project objectives are to increase the electrification ratio to 95% and to increase the share of renewable energy on Sumba to 100%. Small-scale renewable energy projects will provide electricity to non-connected communities. Biogas and improved cook-stoves will lead to healthier living conditions. Powerful renewable energy sources from wind, hydro, solar PV and biomass will replace solar diesel generators, while future plans could look at biofuel use for transportation.

While the project was initiated by the Ministry of Energy and Mineral Resources together with the Dutch organization Hivos, the roadmap for achieving 100% renewable energy plan has been developed by all relevant stakeholders under the responsibility of a taskforce formed with an MEMR Decree. Several renewable electrification projects—including hydro, wind, biogas, biomass and solar—have already started to roll out with significant support from a variety of stakeholders. The Sumba example has significant potential for replication in other small islands that promote multi-stakeholder approaches, with a clear, ambitious target and based on in-depth research and proven solutions.[36]

▼ *Kalihi Windmill, Kamanggih Village, East Sumba*
© Hivos Southeast Asia



ENERGY AND EXTRACTIVES ENABLER 1
Conduct regional assessments to determine appropriate energy solutions (short-term implementation)

Determining the best technological solutions to meet Indonesia's energy demands will require regional assessments. For instance, the feasibility of generating power from landfill gas depends on factors such as frequency of waste collection, development of landfill sites suitable for methane recovery, the chemical composition of waste, etc.[37] Such factors are site-specific and must be taken into account by planners when selecting the most effective means of generating power. The distribution format must also be considered on a case-by-case basis, particularly given the wide variety of geographies across the archipelago. A number of options are available, such as expanding the main grid, establishing mini-grids or even individual household-level solutions.[f]

ENERGY AND EXTRACTIVES ENABLER 2
Provide incentives for investment in clean energy access solutions (medium-term implementation)

Promoting clean energy access requires setting price signals to encourage investment, especially in off-grid and micro-grid power schemes. This requires regularly reviewing the investment climate, from a green growth perspective, to ensure that inconsistent policies do not create conflicting incentives.[39] This will help to address the financing barriers that limit investment in these energy sources. Key institutions that contribute to the setting of incentives should also be engaged to contribute towards the greening of the investment climate. For instance, the recent commitment by the State Electricity Company (PLN) to provide renewable distributed generation for any areas (primarily isolated islands) demanding less than 10MW of power should be monitored to ensure they deliver upon this promise.

ENERGY AND EXTRACTIVES ENABLER 3
Investigate localised barriers to investment and develop knowledge transfer (short-term implementation)

Lack of information for communities and project developers is a significant barrier to the uptake of distributed renewable energy generation. The barrier can be overcome through knowledge transfer programs involving all levels of planning agencies and using materials, tools and workshops to facilitate information dissemination. Raising awareness regarding generation methods among communities and project developers will help bring about a competitive, distributed energy market, increased use of renewable generation technologies, and improved access to electricity. Awareness raising could be accompanied by research to identify investment and regulatory barriers inhibiting wider usage of renewable energy. The findings of these investigations would then be fed back into the knowledge transfer program.

f. The 'grid' in on or off-grid power refers to the national electrical power grid. Off-grid power still runs on a grid but is independent of the national system. Micro-grid power is connected to the national grid, but can operate independently if necessary. On-grid decentralised energy is provided by small scale generators (mostly from renewable sources) which generate energy close to or within the areas which they serve. These projects can be complemented by smaller scale off-grid solutions for isolated communities.

Box 2.3
WASTE TO ENERGY EXTENDING ACCESS TO ELECTRICITY IN MAMMINASATA

Converting municipal solid waste (MSW) to energy is proposed as a possible policy intervention in the joint green growth program research around the KSN National Strategic Zone in Mamminasata, South Sulawesi. Currently, waste decomposition produces large quantities of environmentally-damaging methane. Methane-capture to fuel electricity generation could reduce environmental damage and increase access to modern energy services. Following an extended cost-benefit analysis, the technology was found to be viable in the KSN National Strategic Zone.

It is estimated that a methane capture and usage project would generate US$ 109 million in net societal benefits from an investment cost of US$ 12.4 million. As well as increasing access to energy, it would provide a variety of social and economic benefits to communities:

1. It would increase energy independence in the local economy due to the use of energy from a local, non-fossil fuel source.
2. MSW to energy requires local management, which provides a driver for the local economy.
3. It would contribute to the manufacturing enabler 'Establish small industries around waste products' by generating energy from waste materials.
4. It would aid sustainable land use management, by reducing the number of areas required for landfill.
5. From an environmental perspective, the release of up to 9,000 tonnes CH_4/year, as well as the construction of new fossil fuel-burning plants, could be avoided.[38]

ORIENT THE ENERGY SECTOR TOWARDS LOWER CARBON ENERGY SOURCES

Indonesia has already committed to sourcing 25% of its energy from renewable sources by 2025.[40] This would be a greater percentage than for any other individual fuel source.[41] This transition will reassure industry players and investors that low-carbon energy is a reliable and secure alternative to fossil fuels and will boost the competitiveness of Indonesian industry while reducing many of the costs associated with such fuels (see **Part I**).

ENERGY AND EXTRACTIVES ENABLER 4
Evaluate feed-in tariffs (short-term implementation)

A transparent, robust and consistent process for setting and revising feed-in tariffs should be developed to increase investor faith in the pricing policy framework.[g] Key elements include a clear and transparent process for determining when and whether prices should be adjusted, full transparency over the financial models used for setting and revising tariffs, and clarity over price escalation. Credibility could be enhanced by the establishment of an independent energy regulator, as in the United Kingdom.[42] These measures could help to encourage green technologies such as solar photovoltaic (PV), waste-to-energy, wind power, biomass and mini and micro hydro which are currently managed through feed-in tariffs. The process to tender should also be reviewed for project implementation, with consideration given to innovative strategies such as South Africa's auctioning of tenders for renewable energy generation projects.[43] Another strategy that should be considered is direct public investment in renewable energy projects to kick-start activity and increase investor confidence that renewable technologies constitute viable alternatives to fossil fuels.

g. Indonesia, like many other countries, provides these price signals for many renewable power options through feed-in tariffs. These tariffs are intended to provide a guaranteed fixed price for all qualifying renewable power options.

ENERGY AND EXTRACTIVES ENABLER 5
Remove fossil fuel subsidies (short-term implementation)

The International Energy Agency (IEA) has recognized the recent progress made through the gradual removal of energy subsidies, with staged price increases for end-users in 2013 and 2014.[44] The complete removal of subsidies to discourage the production and use of polluting sources of energy will generate substantial health benefits and reduce burdensome traffic congestion.[45] This could be supported by:

- ***Continued promotion of gas in industry and transport;***
- ***Enforcement of biofuel blending mandates for transport fuels and industry;***
- ***Investment in alternative fuels and more fuel-efficient vehicles, including the introduction of vehicle fuel efficiency standards;***
- ***Investment in modern industrial equipment.***

These measures will require changes in the Oil and Gas law. They will also need to be accompanied by compensation to affected parties—including business, as well as low-income consumers. The mechanism used to distribute this compensation should be subject to discussion; one solution that would avoid high administration costs is unconditional cash transfers to low-income consumers.

Future adjustments will need to be predictable and provide sufficient time for consumers to adjust. China and India have plans to reduce subsidies over a ten-year timeframe; this could be the maximum for Indonesia if it is to seize green industry opportunities.

ENERGY AND EXTRACTIVES ENABLER 6
Implement carbon pricing (medium-term implementation)

Reducing energy subsidies will create an opportunity to build on the country's preparatory work by putting a financial value on carbon dioxide emissions. The energy sector is an appropriate place to begin this process. Accounting for the carbon costs of energy production and use in energy prices will make renewable energy sources more competitive and increase uptake, while also encouraging much needed improvements in energy efficiency.

ENERGY AND EXTRACTIVES ENABLER 7
Explore options for domestic gas as a bridging fuel (short-term implementation)

Gas represents an acceptable short-to-medium-term opportunity to bridge the gap between more carbon-intensive coal and oil and renewable energy. Usage of a non-renewable fuel is not conducive to green growth on a longer-term basis. However, with careful management and a clearly demarcated timeframe for use, it can lower emissions, improve energy security and help facilitate the move towards a green economy. Providing sufficient domestic gas supply to move away from more carbon-intensive fossil fuels will require major infrastructure improvements. Facilities must be developed to transport gas across the archipelago, either by liquefying gas at ports for domestic shipment or through pipeline transportation.

▼ ***Badak natural gas liquefaction in Bontang, East Kalimantan*** © www.badakIng.co.id

▲ *Coal mining in Murung Raya, Central Kalimantan © FFI*

The IEA offer useful guidance as to how a fully operational domestic gas market could be established, such as by using an independent, well-sourced regulator to ensure a transparent market.[46] Carbon pricing will also make gas more attractive due to the lower carbon content of gas per unit of energy.[47] Coal also has a role to play in Indonesia's transition towards a low carbon future. Different policy options to manage its role can be discussed, such as levying the kWh price to finance heavy investment in clean coal technology. Since coal will be available domestically at a low price in the short-medium term, it improves energy security and lowers the cost of doing business in Indonesia. This can sustain economic growth while lower carbon energy sources are developed alongside innovations in clean coal. However, any policy decisions related to coal must be carefully assessed to ensure that incentives encourage green growth over the longer term .

ENERGY AND EXTRACTIVES ENABLER 8

Attract the private sector to geothermal by addressing financial barriers and sharing risk (medium-term implementation)

Indonesia has large, untapped geothermal energy potential, especially in Sumatra and Java, that are close to major cities and industrial centers. However, though limited grid capacity and investment risk are constraints to expansion.[48] Key barriers have included uncertainty as to whether geothermal power could be produced and sold at a rate that would recoup investment costs. In addition, under legislation passed in 2003, developers have had to bear the full cost of exploration of potential sites regardless of whether they were found to be viable.[49] The development of the Geothermal Fund Facility (GFF), along with the establishment of a feed-in tariff for geothermal energy generation, are positive steps to address these barriers. The GFF's development should be prioritized so it becomes operational and disburses resources as soon as possible. The fund could reduce risks and eliminate financial barriers to geothermal exploration.

There will be a need to specify the exact products that the GFF will be funding. For instance, there are three different geothermal technologies: the question of which technology is most appropriate will depend on the temperature and pressure of geothermal activity at potential sites. Dry steam plants directly use steam from geothermal activity, flash steam plants move high-pressure geothermal water into low-pressure tanks to produce a flash of steam to power

turbines and binary cycle plants use geothermal water to heat a secondary fluid which spins a turbine. Since there are more hot water resources than pure steam or high-temperature water sources, there is more growth potential in the binary cycle, heat exchanger design.[50] It will also be important to ensure that there is consistent interpretation of planning regulations affecting geothermal projects across all tiers of government.

The stabilization of renewable pricing policy, the removal of fossil fuel energy subsidies and the introduction of carbon pricing would all help to boost to the competitiveness of geothermal. A total of US$ 400 million has recently been secured from the Clean Technology Fund (CTF) to develop approximately 800MW in new geothermal generation supply at three sites and to create risk sharing and finance facilities designed to accelerate investments in energy efficiency and renewable energy. This will play an important role in leveraging geothermal investment on a national scale.[51]

INCREASE VALUE ADDED IN MINERAL EXTRACTION

Moving away from reliance on crude mineral exploitation will provide a basis for an economically secure future. Processing raw materials, as one element of a broader expansion of manufacturing activity, can increase value added, provide jobs, and diversify the economy. While exploitation of minerals has provided Indonesia with foreign exchange earnings, employment opportunities are relatively limited in such capital-intensive sectors and contribute relatively little to localized economies. For example, 'Agriculture, Forestry, Hunting and Fishing' employed 25 times the number of people that 'Mining and Quarrying' employed in 2014.[52] Given that China accounts for roughly 50% of Indonesia's coal export trade and that China's coal consumption will likely peak in the near term,[53] there is a strong case for adopting a value-added approach.

ENERGY AND EXTRACTIVES ENABLER 9

Develop targeted approach to increasing value added in mineral processing (short-term implementation)

The current mineral export ban could be complemented or ultimately replaced by more flexible, case-by-case relationship building with investors, along with positive incentives such as fixed-term tax holidays. This would encourage major foreign and domestic investors to invest in mineral processing in Indonesia rather than abroad and support export earnings. The Singapore Development Board's relationship-building with foreign investors with a view to securing domestic investment provides an excellent example of how this might be achieved.[54] The government could also consider making large, direct investments to establish mineral-processing industries in key economic areas.

ENERGY AND EXTRACTIVES ENABLER 10

Develop mineral processing industries in areas with renewable energy, water supply or other auxiliary resources (medium-term implementation)

Responsible prospecting for auxiliary resources near mineral deposits across the archipelago—such as areas of abundant water supply—could unlock multiple opportunities to add value through exploitation of comparative advantage. Decision making over which minerals to process could move away from focusing purely on the availability of the mineral in question, and take a more holistic approach that accounts for the availability of other resources required for processing, including water and energy. For example, alumina processing has recently received significant investment, driven in part by the onsite availability of geothermal energy for smelting, which provides an energy source at low marginal cost. Beyond the economic advantage over international competitors, this can form the basis for mineral processing which places less strain on infrastructure, is less carbon-intensive, less water intensive in relative terms (due to high water availability) and increases resilience. This model can potentially be replicated for other processing industries that could be situated near auxiliary resources in the manufacturing sector cluster. However, all proposals of this nature should be thoroughly assessed with the tools and methods outlined in **Part 3** to ensure they do not damage the natural resources they seek to utilise, e.g. by polluting water supplies.

MANUFACTURING

Measures such as efficiency improvements and better waste management could stimulate significant green growth in the manufacturing industries while reducing environmental and social costs.

This cluster accounts for almost a quarter of Indonesia's economic activity. It includes production and processing industries, emerging technologies for green manufacturing, and waste recycling. Continued, sustainable growth in these sectors is essential to improving the prosperity of Indonesia's citizens, particularly given the substantial employment opportunities. Key recommended actions include establishing small industries in the vicinity of waste streams, developing fiscal incentives for energy efficiency, and investing in research and development in clean technology.

TABLE 2.3
Key enablers for manufacturing

THEME	KEY ENABLERS	SUGGESTED INDICATORS
Improve energy efficiency	1. Develop fiscal incentives for energy efficiency 2. Remove fossil fuel subsidies and introduce carbon pricing 3. Improve production methods in heavy industries including the refining sector 4. Engage key industry players on energy efficiency	• Energy consumption per unit GDP • Emissions from manufacturing per unit GVA
Develop cleantech sector	5. Invest in R&D in cleantech for processing materials 6. Support SMEs in the cleantech industry	• Gross value added of clean tech sector
Promote better waste management	7. Establish new industries around waste products and processing 8. Stimulate investment in low GHG landfills and ensure project execution	• Gross value added from waste management industries • % of waste diverted to landfill

IMPROVE ENERGY EFFICIENCY

The Ministry of Energy and Mineral Resources Vision 25/25 aims to reduce energy consumption by 15.6% against a business-as-usual baseline by 2025.[55] Meeting this target will require extensive investment in enhanced energy efficiency. However, doing so will boost Indonesia's energy security, improve the export competitiveness of its energy-intensive sectors, and create opportunities for manufacturers of energy efficiency equipment across the Indonesian economy, including the transport, commercial and residential buildings and industrial sectors.

Current steps to mobilize the necessary funding include a commitment by the Indonesian Chamber of Commerce (KADIN) to a green economy, which gives priority to investment and spending that stimulates green economy activities nationally and at local levels. Opportunities to build on this progress are captured in the enablers on opposite page.

▲ ***High-tech manufacturing in Tangerang*** *© Ricky Yudhistira / The Jakarta Post*

MANUFACTURING ENABLER 1

Develop fiscal incentives for energy efficiency (short-term implementation)

Establishing incentive mechanisms to encourage energy efficiency would encourage such improvements in industry. International practice suggests that this may be best achieved through corporate income tax relief, concessional finance or accelerated depreciation allowance for firms investing in identified high-performing equipment. These fiscal incentives could be accompanied by raising awareness—both in industry and amongst investors—of cost-saving efficiency technologies such as Building Management Systems (BMS). These control the mechanical, electrical and plumbing systems in a building by tracking energy consumption over time and can reduce commercial building energy consumption—which represents an average of 30% of operating budgets—by up to 30%. Savings such as these strengthen the business case for investing in energy efficiency improvement measures.[56]

MANUFACTURING ENABLER 2

Remove fossil fuel subsidies and introduce carbon pricing (medium-term implementation)

Both fossil fuel subsidies and the absence of carbon pricing—which would make lower-carbon fuels more competitive—are holding back the adoption of energy efficiency opportunities. As such, the same enablers discussed in the energy and extractives cluster related to the removal of fossil fuel subsidies and introduction of carbon pricing can also help to incentivise energy efficiency improvements.

MANUFACTURING ENABLER 3

Improve production methods in heavy industries, including the refining sector (medium-term implementation)

There are important opportunities for improving energy efficiency across Indonesia's heavy industries. One of these involves the modernization of the oil refining sector, which is lagging well international best practice. Lessons in the modernization of industrial production plants can be learned from China, Korea and Singapore. Investment in research and development into efficiency improvements, as well as fiscal mechanisms to encourage resource efficient technology and behaviours, can stimulate large-scale reforms over the longer term. Foreign direct investment in such opportunities can be fostered by ensuring that Indonesia's physical and regulatory infrastructure, as well as its tax system, attracts investment in efficiency improvements.

MANUFACTURING ENABLER 4

Engage key industry players on energy efficiency (short-term implementation)

Energy-intensive processing industries, including cement and steel, are relatively inefficient in their use of energy and thus generate substantial emissions. Identifying and engaging with key industry groups–such as the Indonesian cement industry association–is essential to raise awareness of the importance of energy efficiency throughout the manufacturing cluster. The public sector can work alongside such groups to develop train-the-trainer programs in how to improve energy efficiency, while sharing experiences of best practice and energy efficiency research. Key benchmarking targets for the energy intensity of these key industries can also be developed.[57]

DEVELOP CLEANTECH SECTOR

By promoting energy efficiency and renewable energy (see above), Indonesia can develop a thriving cleantech sector that innovates, develops and manufactures the equipment that these sectors will need. Clean technology, or "cleantech," is designed to minimize the negative environmental footprint and pollution caused by economic activities and processes. Examples include recycling, waste reduction, the use of renewable energy, and associated information technology.

MANUFACTURING ENABLER 5

Invest in R&D in cleantech for processing materials (short-term implementation)

Special economic zones such as the Maloy development in Kalimantan provide focus areas to target investment in R&D into green growth technologies. This approach can be replicated across Indonesia to create 'centers of excellence' for R&D. This should be accompanied by increasing the number of courses and students related to renewable energy technologies, especially at the key engineering universities. The careers of graduates should also be tracked to identify talent loss to overseas employers and to careers not compatible with green growth. The outcomes of this tracking can then inform future investments in education to ensure there is a pool of talent for the special economic zones to draw upon. These actions will support the existing World Bank cleantech education, training and research program and help to provide the technical skills and knowledge needed to expand cleantech markets.[58]

MANUFACTURING ENABLER 6

Support SMEs in the cleantech industry (medium-term implementation)

Lack of early and growth-stage financing has been identified as a significant barrier to the development of small to medium-sized cleantech businesses. Best practice around the world suggests that strategies such as viability gap financing, market development and review of the legal and regulatory framework can all stimulate growth in cleantech industries. Such steps would help create a sustainable and wealth-producing cleantech sector. Jobs in cleantech also compare favorably to those in other sectors, requiring more skill and delivering better pay and on-the-job safety.[59]

▼ ***Waste-powered manufacturing is energy efficient and reduces pressure on landfills*** *© Holcim*

PROMOTE BETTER WASTE MANAGEMENT

Investment in the waste management supply chain and treatment capacity along with incentives and mechanisms could help to formalize a sector vulnerable to social and economic marginalization and reduce the environmental impacts of waste. The waste management sector also has the potential to stimulate economic growth through value-added products derived from waste materials.

For example, the Indonesia Domestic Biogas Program, managed and implemented by the NGO Hivos since 2009, has helped small-scale farmers convert animal dung and other organic materials into biogas. The program has contributed towards environmental sustainability while supporting economically vulnerable communities.[60]

MANUFACTURING ENABLER 7

Establish new industries around waste products and processing (medium-term implementation)

Material currently considered as waste represents an important opportunity for growth if processed industrially to add value. Doing so would bring environmental and economic benefits by reducing waste to landfill, while simultaneously providing a marketable commodity for local communities.

Manufacturers, public authorities and households will need to work collectively to improve current practices. Examples of good practice include the community-based pilot scheme to improve waste management in Batam city, which addressed domestic solid waste that was polluting coastal waters.

Waste was collected, stored and then treated, with organic waste used locally as fertilizer and non-organic waste sent to landfill. The system has helped address marine pollution by preventing untreated dumping into coastal waters—a clear benefit to the renewable natural resources cluster. Economic results include healthier fish stocks, as well as increased fertilizer production. This model of processing waste delivers a range of cross-cutting benefits across the sector clusters that have their roots in green manufacturing. With regional adaptations, simple pilot models such as the Batam city example could be scaled across Indonesia.

Box 2.4
CEMENT PRODUCTION POWERED BY MUNICIPAL WASTE

The cement manufacturer Holcim has taken an innovative approach to cement manufacturing which demonstrates the potential for clean technology in the manufacturing sector cluster. Holcim powers its plant in Jakarta by co-processing non-recyclable sorted municipal waste. Co-processing utilizes caloric (recovery energy) and mineral (material recycling) inorganic waste both as an alternative fuel and as raw materials. This replaces a proportion of the main fuel and raw material used in the cement-making process. These waste materials would otherwise be sent to a hazardous waste incinerator or landfill. As such, this approach capitalises on the green growth opportunities of promoting better waste management and improving energy efficiency. Furthermore, it contributes towards the long-term ambition of a circular economy and reduced GHG emissions.

"Material currently considered as waste represents an important opportunity for growth if processed industrially to add value. Doing so would bring environmental and economic benefits by reducing waste to landfill, while simultaneously providing a marketable commodity for local communities."

MANUFACTURING ENABLER 8

Stimulate investment in low GHG landfills and ensure project execution (long-term implementation)

Low-emission landfills utilise a variety of technologies to lower emissions, including flaring off of biogas and, in more sophisticated systems, using biogas to produce electricity.[h] There are a number of ways to stimulate investment in these technologies. Development can be encouraged through investment in feasibility studies and provision of preferential funding in early project development phases. The establishment of an operational domestic carbon price would also provide an important stimulant.

With a carbon price in place, responsible management of waste becomes a financial necessity and a potentially lucrative business. Engaging Indonesian enterprises in the World Bank's Auction Facility for Methane and Climate Mitigation could also be an effective strategy.

It will be crucial to ensure that financing mechanisms are kept stable throughout project development and execution by initially focusing on supporting pilot schemes to become fully operational before opening further sites. This support may need to be financial as well as advisory, since low-emission landfills require high-capital expenditure and are slow to recoup costs which can lead to abandonment. This will help to educate investors, potential operators and communities about the viability of low-emission landfills. These measures will help to address the problem of low-emission landfill projects being initiated (through mechanisms such as the Clean Development Mechanism), but later discontinued due to lack of funding.[62]

In the medium to long term, it will be important to keep aware of developments in international negotiations relating to the New Market Mechanism so that Indonesian stakeholders are well positioned to respond to international developments.[i]

Box 2.5
INCREASING VALUE ADDED FROM WASTE IN THE INDONESIAN FISHING INDUSTRY

Analysis of the KSN Mamminasata project by the GoI-GGGI Green Growth Program demonstrates the potential benefits of adding value to fish products. The project is located in the province of South Sulawesi.

One potential green growth policy intervention would involve the construction of industrial facilities to convert fish waste to fishmeal and fish oil along with high-value, high-protein feed stocks. This would result in an estimated US$ 29 million of economic growth benefits and US$ 67 million of social development benefits to Indonesia's economy. It would also make better use of natural capital stocks, contributing to the renewable natural resources sector cluster priority to manage land and sea use sustainably. Furthermore, it would encourage an economic growth model based upon increased processing, bringing more of the sector within Sulawesi's control and economy. Other, non-quantified benefits include a reduction in fish discards at sea, avoidance of rotting fish on land, reduced pressure on fish stocks, income benefits to local fisherman and increased local agricultural and aquaculture activity.[61]

▼ *Fisheries can be used more efficiently*
© Ilse Reijs and Jan-Noud Hutten / CC BY 2.0

h. The most common of these is flaring off the biogas, but in more sophisticated systems biogas can be used to produce electricity.

i. The New Market Mechanism (NMM) is being designed under UNFCCC auspices. Indonesia's 2013 submission defined the NMM as a mechanism which would operate under the guidance and authority of the Conference of the Parties comprising market-based schemes for emissions reduction initiatives. Indonesia differentiates the prospective NMM from other mechanisms through its openness to country participation regardless of categorization under the Kyoto Protocol and its ability to accommodate a broader range of projects and activities to reduce GHG emissions. See Indonesian Government, 'Submission by Indonesia on the new market-based mechanism', submitted to UNFCCC, 18th September 2013, accessed 2nd April 2015. http://unfccc.int/files/cooperation_support/market_and_non-market_mechanisms/application/pdf/fvanmanmm_indonesia_18092013.pdf

CONNECTIVITY

Unlocking the tremendous economic potential inherent in Indonesia's vast and diverse archipelago, and ensuring its resilience to climate change and other risks, will depend on critical investments in connectivity.

This cluster includes land and sea transport, telecommunications, and other infrastructure. Together, these account for around 17% of GDP but, more importantly, they are vital to the sustained growth of the Indonesian economy and to narrowing regional disparities in development. Coupled with continued economic growth, there will be extensive demand for new urban infrastructure for both land-based and maritime transportation. Given the long lifespan of ports, water and sanitation systems, and other major infrastructure, planning and investment decisions made in the next few years will have long-lasting impacts on Indonesia's success in moving along a green growth pathway. Key recommended actions include carrying out extended, socially and environmentally sensitive cost-benefit analyses of major connectivity solutions and embedding climate risk assessment into planning and investment for urban development.

TABLE 2.4
Key enablers for connectivity

THEME	KEY ENABLERS	
Build 'smart' cities	1. Create institutional structures and capacity for smart city planning 2. Embed climate risk assessment into investment processes for urban development	• Qualitative assessment of smart city program
Establish intermodal connections	3. Create institutional capacity for intermodal connectivity 4. Establish targeted pipeline for green infrastructure projects 5. Carry out extended cost-benefit analyses of major connectivity solutions	• Qualitative assessment of intermodal program

BUILD 'SMART' CITIES

"Smart cities" and coordinated spatial planning represent important opportunities to avoid inefficient usage of resources and can act as hubs for accelerated development of the service sector.[j] Examples under development in Indonesia include the city of Palembang, in South Sumatra, and the district of West Kutai, in East Kalimantan. Semarang also has a green vision that demonstrates many of the potential benefits of smart cities.

MANUFACTURING ENABLER 1

Create institutional structures and capacity for smart city planning (short-term implementation)

The development of smart cities will require political commitment and local institutional capacity.[63] Clear decision-making structures should be created within cities, incorporating cross-cutting responsibilities for urban transport, energy, water, and waste and inter-city transport links. By making the regulatory environment more attractive, Indonesia will reduce risks for private sector investors.

j. A smart city applies digital technology and other means to engage citizens interactively, strengthen resilience, and improve efficiency in key sectors such as transport, energy, water and waste management. See, for example, Department for Business Innovation and Skills, UK Government, 'Smart Cities', (October 2013), accessed 17th February 2015. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf

Box 2.6
SEMARANG: GREEN CITY OF THE FUTURE

The city of Semarang's spatial planning and infrastructure policy has been driven by the vision of making it a green city of the future. Green growth priorities have been embedded into the city's plans, including:

- Proposing 30% of the city as green open space;
- Targeting zero waste;
- Green procurement policies, including criteria relating to energy efficiency and recycled material requirements;
- Developing mass transportation solutions;
- Improving sewage management;
- Harvesting rainwater to improve sustainability;
- Upstream promotion of agro-forestry and sustainable land-use to reduce the impacts of climate risks, such as landslides, flood and tidal inundation, drought and coastal erosion;
- Promoting green buildings with natural air circulation, natural lighting, water recycling, and environmentally friendly materials.

The city's ambition has been well publicized and is recognized as an example of best practice by policymakers throughout the country.[64]

▼ *Semarang has a proud history and a green future* © Suherdjoko/The Jakarta Post

International expertise can also be drawn on for capacity building and technological innovations to apply in Indonesia. Examples of best practice, such as the green city of Semarang (see **Box 2.6**), can also provide lessons learned and ideas for smart city development. Contracting and procurement procedures should be transparent, with accountability for ownership and maintenance of systems. Extensive planning analysis will be required to forecast demand for city infrastructure and to consider linkages between its various parts.

MANUFACTURING ENABLER 2
Embed climate risk assessment into investment processes for urban development (long-term implementation)

An important element of smart city planning involves incorporating medium and long-term climate risks into the planning process. Finding ways to avoid or reduce flooding is of particular importance in urbanized coastal areas. Climate risk assessment will need to be embedded into urban planning processes and investment targeted towards proposals that appropriately account for climate risk.

ESTABLISH INTERMODAL CONNECTIONS

New infrastructure solutions will be needed as pressures on connectivity grow within and between cities. Moving towards a modern transport infrastructure of intermodal (land and sea-based) nodes would offer a more efficient way to link up the country.[65] These solutions can help achieve green growth outcomes by providing low-carbon infrastructure across the archipelago.

MANUFACTURING ENABLER 3
Create institutional capacity for intermodal connectivity (short-term implementation)

Political commitment and institutional capacity at city level needs to be coordinated at the national level in order to address the need for inter-city and inter-province links. The commitment of partner organizations to support sustainable infrastructure development is already creating an enabling environment for connectivity opportunities. For example, the Asian Development Bank has committed to playing an advisory role in project prioritization and resource utilization. This will improve transparency and governance in the development of the country's transport infrastructure.

Box 2.7
STIMULATING INVESTMENT IN MARITIME CONNECTIVITY

Plans have recently been unveiled to either build or upgrade 24 seaports within five years to enhance inter-island transportation. This will include the expansion of five major ports in North Sumatra, Jakarta, East Java, South Sulawesi and Papua to serve large vessels and build feeder lines for smaller ports. The planned investments would generate new economic opportunities for previously unconnected areas and help to better distribute national and international container traffic, which is currently concentrated mainly in the ports of Tanjung Priok and Tanjung Perak. This major undertaking has the potential to sharply increase the energy efficiency with which commodities move around the archipelago—if green growth priorities drive planning.

Positive steps have been taken thus far to ensure that these ambitious connectivity improvements can be financed. It has been proposed that these improvements are financed by state budget funds and private investors in public-private partnership (PPP) schemes. To facilitate this, port operations have been opened to greater foreign participation by Presidential Decree No. 39/2014. Foreign capital ownership in the supply of port facilities can now reach a maximum of 95% —formerly capped at 49% — within PPP schemes. Greater legal clarity and government guarantees have also increased the appeal of the government's overall investment framework for PPP projects. These commitments are opening the door to opportunities for foreign investment and expertise in connectivity improvements. This too can contribute to green growth outcomes, if green growth-oriented criteria govern decisions to award PPPs.[66]

▲ *Traditional craft, such as these in Bitung, Sulawesi, are still a vital part of the maritime economy* © Andrea Izzotti

MANUFACTURING ENABLER 4
Establish targeted pipeline for green infrastructure projects (short-term implementation)

Once institutional capacity is developed, a credible pipeline for green infrastructure can help secure finance for infrastructure required to underpin green growth reforms. Pipelines can be established for target areas in infrastructure, such as ports and airports. This will formalise commitment to infrastructure expansion, while also potentially helping to address the concerns of investors who may not see the immediate value in the higher upfront costs of green infrastructure.

MANUFACTURING ENABLER 5
Carry out extended cost-benefit analyses of major connectivity solutions (medium-term implementation)

All proposed projects established through the pipeline will need to be rigorously reviewed to ensure a focus on cost-effective projects that are people-centered, resource efficient and minimize environmental impacts. Green growth approaches offer many ways to government efforts to develop maritime infrastructure and connectivity. The construction of sea highways along the shore of Java, deep seaports and logistical networks as well as the development of the shipping industry can all be reviewed and redesigned through cost-benefit analyses that take into account social and environmental costs.[67] Examples of holistic decision-making can be followed and built upon, such as the decision not to proceed with the proposed Sunda Strait Bridge on the grounds that it would lead to further economic disparity between West and East and did not represent value for money.[68]

RENEWABLE NATURAL RESOURCES

Restoring ecological productivity and rewarding good management practices in forestry, agriculture, and fisheries could rehabilitate and protect valuable ecosystem services and secure the commodities on which tens of millions of people depend for their prosperity and well-being.

This cluster—consisting of forestry, agriculture, fisheries, land use and marine activities—accounts for about 14% of current GDP, and is responsible for much of the country's employment. Today, Indonesia's economic strength hinges upon its renewable natural resources, but poor forest and land use management has damaged the ecological functions that provide valuable ecosystem services. Measures are urgently needed to redress the degradation of renewable natural resources, mitigate further environmental damage, and rehabilitate or restore degraded ecosystems. Key recommended actions include strengthening environmental governance and institutions, accelerating the One Map initiative, moving towards international product certifications and engaging communities to restore the ecological productivity of terrestrial and marine ecosystems.

Green growth opportunities abound in this cluster, including improvements in productivity, efficient land use, and more sustainable resource management in all sectors. There are also opportunities to secure marine ecosystems and develop sustainable supply chains to improve food security.

Box 2.8
REDD+ IN INDONESIA

REDD+ is a mechanism which provides an economic incentive to encourage developing countries to reduce carbon emissions through sustainable forest management. With more than 130 million hectares of forests covering 70% of its land area, Indonesia is a prime candidate to apply REDD+. It is in Indonesia's interests to implement REDD+ programs to reduce substantial emissions from land use change including forestry by significantly reducing the rate of deforestation and forest degradation. It is a key part of Indonesia's Intended Nationally Determined Contribution (INDC) to mitigate climate change. Previously managed by an independent agency, REDD+ programs in Indonesia are now under the Ministry of Environment and Forestry.

Indonesia also has a strong interest in participating in efforts to curb global warming because of its vulnerability to climate change impacts. Through the implementation of REDD+, Indonesia will become eligible to receive financial performance based payments based on forestry sector reforms and reductions in emissions from forest loss. REDD+ offers the potential for innovative and stable forms of financing for local governments and community-based resource management. REDD+ could also assist in the distribution of benefits for community development aligned with national and local government policies.

A number of REDD+ related programs are featured in this sector cluster, including One Map, licensing reviews, fire mitigation, and indigenous peoples' rights programs. Overall, REDD+ is best applied within a broader, green economy framework to ensure that efforts to mitigate climate change and share benefits are aligned with development goals and are coordinated and consistent across sectors. This is in line with the so-called "jurisdictional approach" to REDD+ that operates through existing sub-national government structures.

▼ *Indonesia's wealth of natural resources spans the country, such as this forests in Papua* © Martin Hardiono

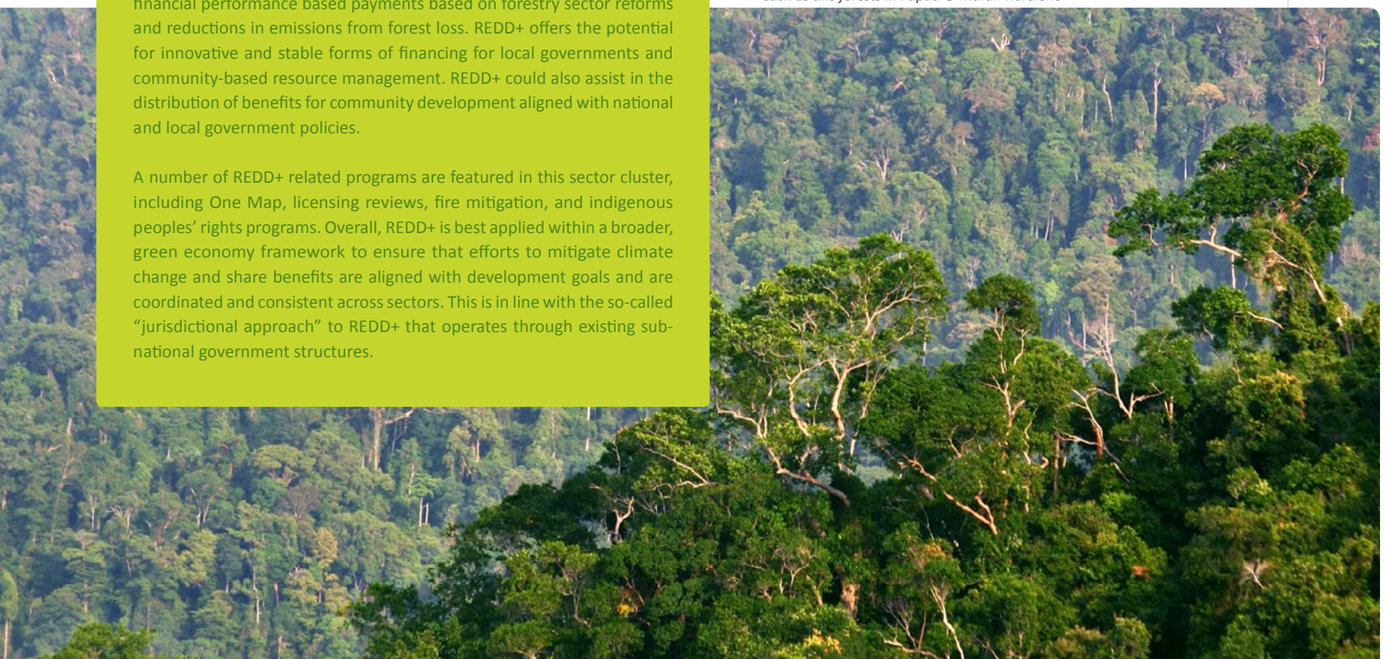


TABLE 2.5
Key enablers for renewable natural resources

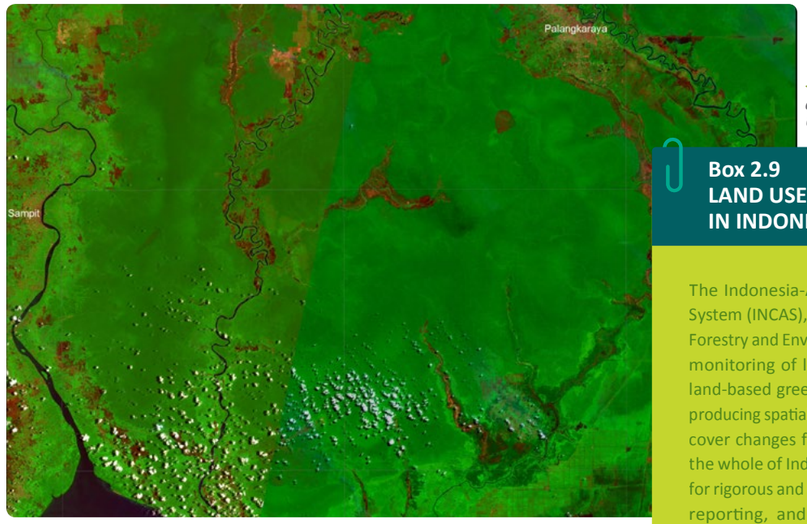
THEME	KEY ENABLERS	SUGGESTED INDICATORS
Improve forest and land management	1. Accelerate the One Map initiative 2. Monitor and ensure where/when concessions and licenses are awarded 3. Build environmental law enforcement capacity 4. Scale up innovative models for forest and peatland management 5. Address degraded peatland and peatland fires	• Forest cover change • Quality and flows of ecosystem services e.g. plant species recorded in specified area and time period • Number of forest concessions and plantations meeting good practice standards • Water coverage in peatland areas • Area of degraded peatland • GHG emissions from degraded peatland • Number of peatland fires/year
Secure marine ecosystems	6. Engage communities to restore ecological productivity of marine ecosystems 7. Improve management of industrial liquid and solid wastes in coastal areas	• Productivity or depletion of fish stocks • Species diversity of coral reefs • Area of quality reefs, sea grass, mangrove • Marine water quality
Develop sustainable supply chains	8. Scale up the Sustainable Consumption and Production program across ministries 9. Strengthen the ambition and enforcement of domestic product certifications 10. Develop knowledge transfer program on sustainable supply chains 11. Address role of smallholders in production 12. Promote natural alternatives to chemical fertilizers for soil fertility	• Value of certified sustainable production • Trackers on key product certifications e.g • Numbers of firms meeting RSPO or ISPO standards
Progress towards food security	13. Improve productivity of rice, palm oil and other key food commodities 14. Diversify staple foods 15. Direct public investment towards peatland rehabilitation activities 16. Support expansion of ecosystem restoration concessions	• Rice productivity per hectare • Number of staple foods in diet

IMPROVE FOREST AND LAND MANAGEMENT

Removing inconsistencies among local, national and sectoral policies can help improve regulation of land clearing and production, especially the rapid expansion of plantations. Increased consultation with communities, and integrated planning across ministries and tiers, can help to address these inconsistencies and deliver benefits to local populations. Improving transparency in natural resource licensing is also essential to promote participatory practices, particularly at the district level. Numerous examples of innovative programs to improve forest and land management can be identified which will reduce flooding, soil erosion and sedimentation, while improving soil health, air and water quality and reducing costs described in **Part 1**. For instance, the Green component of the National Community Empowerment Program is working to improve environmental and natural resources management (NRM) while increasing household incomes in poor communities, and empowering local groups who prepare and execute the sub-projects and activities. Adapting and then scaling such programs, while learning lessons from past experience, is crucial.

RENEWABLE NATURAL RESOURCES ENABLER 1
Accelerate the One Map initiative (short-term implementation)

The One Map initiative was initiated by a presidential instruction in 2010 to collate geospatial information. In April 2011, the Geospatial Information Law empowered the geospatial agency to collect and consolidate all the maps produced across agencies and regions.[69] A One Data program will help connect land use management



Satellite image of Katingan area in Central Kalimantan
© Martin Hardiono

decision-making through a society-wide dataset that will enable ministries to work with common data collected using standardized principles.[70] Ensuring that One Map holds accurate data for all of Indonesia, and is fully utilized by decision-makers across ministries, will greatly contribute to, and help streamline, planning and regulatory processes.

RENEWABLE NATURAL RESOURCES ENABLER 2

Monitor and ensure transparency in where/when concessions and licenses are awarded (short-term implementation)

A comprehensive monitoring system would help settle land tenure disputes involving ambiguous boundaries. External technical assistance could empower local stakeholders to hold perpetrators of license misallocation to account. This would respond to the growing public frustration over the way in which natural resource exploitation licenses undermine provincial spatial plans.[72] Limited resources and poor management of Indonesian forestry data and information create difficulties for institutions responsible for enforcing forest boundaries and approving concessions. Other issues relate to the monopolization of timber purchasing by corporations and regulations to prevent illegal logging not being effectively enforced.

This enabler would build on the strong degree of regional political will behind efforts to reform the prevailing system of natural resource exploitation licensing. Merangin, Tebo, and Muaro Jambi Districts in Jambi Province are now nationally-designated models for NR licensing process improvements. Reviewing concessions and licenses—as was done recently by BP REDD+ in Kalimantan—is also important.

Many districts are making significant progress towards more transparent natural resource exploitation licensing processes. This is already a part of MCA-I's Participatory Land Use Planning (PLUP) initiative, along with village boundary-setting.[73] Some districts, such as Sekadau in West Kalimantan, are trying to couple these kinds of transparency initiatives with one-stop shops for natural resource licensing. Scaling up these initiatives would contribute greatly to green growth.

Monitoring systems need to be managed at the provincial and national government planning level to ensure a balanced multi-sectoral approach. Environmental management is the responsibility of the Ministry of Environment and Forestry, but drivers of deforestation come from sectors governed by other ministries. Ensuring inter-ministerial coordination on policy will protect forests from over-exploitation by the agricultural, energy and extractive sectors. The recent merger of environment and forestry departments under one ministry is a step towards improving and coordinating regulatory oversight. Coordination of spatial planning under authority granted in 2015 to the Department of Agrarian and Spatial Affairs should help to avoid conflict over priorities in land use management.[74]

Box 2.9
LAND USE MONITORING IN INDONESIA AND BRAZIL

The Indonesia-Australia Forest Carbon Accounting System (INCAS), recently launched by the Minister of Forestry and Environment, provides for comprehensive monitoring of land use changes and estimation of land-based greenhouse gas emissions. The system is producing spatially-detailed annual monitoring of forest cover changes from time-series satellite imagery for the whole of Indonesia.[71] INCAS will provide the basis for rigorous and comprehensive annual measurement, reporting, and verification of GHG emissions in Indonesia's REDD+ program.

For more active monitoring and rapid response, Brazil's pioneering experience in land use monitoring can offer lessons for Indonesia. The Brazilian real-time satellite-based system, known as 'DETER,' can monitor and detect deforestation in 15-day intervals, thus helping to rapidly identify deforestation hotspots. With this information, the Brazilian Institute for the Environment and Renewable Natural Resources operates as an environmental police force, targeting law enforcement efforts based on DETER alerts. DETER's capacity to catch offenders enables the environmental law enforcement agency to apply severe penalties for illegal deforestation. It also has an important preventive function by deterring potential wrong-doing and is a key tool supporting Brazil's land use policies.

Box 2.10
REGULATION CAPACITY-BUILDING IN BRAZIL

Another relevant example from Brazil is the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm). The Action Plan includes measures to build regulation and enforcement capacity, including increasing the number and quality of enforcement staff. Brazil's 2007 Presidential Decree 6,321 established a legal basis for identifying municipalities with intense deforestation. It also established a tracking system for vehicles transporting forest products within and between concession areas, along with a custody chain tracking system for every tree felled. An independent forest audit system is designed to ensure that concessions are audited for compliance at least once every three years. Together, these measures have improved compliance by increasing the robustness of sanctions.

> ***Increased consultation with communities, and integrated planning across ministries and tiers, can help to address help to address inconsistencies among policies and deliver benefits to local populations.***

RENEWABLE NATURAL RESOURCES ENABLER 3

Build environmental law enforcement capacity (medium-term implementation)

Increasing the number and quality of environmental law enforcement personnel to improve the consistency of investigations and application of sanctions is essential. Penalties can include fines, embargoes, arrest and seizure, along with destruction of production goods, tools and materials. Indonesia could also consider publicly releasing a list identifying landowners of areas under embargo to encourage behavioural change.

At a regional level, a legal basis for identifying municipalities with intense deforestation and taking targeted action is urgently required. Emulating Brazil's example as well as implementing a system to ensure concessions are audited at least every three years may improve compliance. These measures will improve forest sector governance. They can also help to reduce the number of actual law enforcement agents having to deliver disciplinary measures which could put law enforcement agents in dangerous situations.

RENEWABLE NATURAL RESOURCES ENABLER 4

Scale up innovative models for forest and peatland management (short-term implementation)

A number of initiatives already under way in Indonesia provide scalable ways for the government and communities to manage forest environments more effectively. Well-managed land swaps allocate degraded land for non-forestry land use, and designated forest ecosystems are provided replacement land with better forest functions. Forest Management Units (FMUs) enable better forest management through community monitoring of forest inventories. The Green Corridor Initiative (GCI) is aiming to rehabilitate 400 ha of forest in order to reconnect two important ecosystems at the Halimun and Salak mountains and create a

Discussing village level planning in East Kalimantan © GIZ Forclime

Box 2.11
COMMUNITY-BASED FOREST MANAGEMENT IN SETULANG

The North Kalimantan government has collaborated with international donors on a five-year program to develop FMUs. The program aims to improve the institutional and regulatory framework for sustainable forest management, nature conservation and greenhouse gas reduction.

As a pilot, the Ministry of Forestry has granted three villages the right to use local forests as village forest (*hutan desa*) for a period of 25 years. More than 500 farmers and local staff in 15 established demonstration cocoa plots have been intensively trained in successional agroforestry. The NGO partners have helped to construct the forest inventory in Manua Sadap village. All parties involved in the inventory received training on data collection. The NGO partners have also supported the implementation of community-based forest management in both villages.

These actions have improved the land rights of local communities, while ensuring greater transparency, stronger participation in planning processes, and more efficient action. In the longer term, these interventions should help to reduce GHG emissions in the forestry sector and improve livelihoods in poor rural communities.[76]

corridor for the movement of key endangered species. Local community groups have been fully engaged in the restoration work, with a number of green jobs related to sustainable agricultural, development of community economic institutions and the development of a community learning center.[75]

Ecosystem restoration concessions (ERCs) provide an innovative, commercially viable model to tap private investment to help rehabilitate the ecological productivity of degraded forests. Pioneered by Burung Indonesia, ERCs encourage a shift away from the over-exploitation of timber to a more balanced, ecosystem-based approach to forest management with benefits for biodiversity and local communities. They are the preferred model for private investment in carbon-trading REDD+ projects, particularly in peat swamp forests because of their very large, below-ground carbon stocks. The area currently under ERCs, roughly 480,093 ha, is in fragmented and isolated patches. ERCs need to be scaled up to cover larger, contiguous areas corresponding to whole ecosystems or landscapes. Incentives to firms and local governments to expand will have a multiplier effect as isolated areas are connected to establish protected corridors. The case study featured in **Box 2.14** illustrates the potential of ERCs to provide additional revenue streams for communities as well as to restore valuable ecosystem services such as those from peat swamp forests.

RENEWABLE NATURAL RESOURCES ENABLER 5

Address degraded peatland and peatlandfires (medium-term implementation)

As described in **Part 1**, peat fires and GHG emissions from degraded peatland are imposing significant health and other costs which can be addressed in various ways.[77] An important step would be to implement the "Master Plan" for rehabilitating one million hectares of peatland in Central Kalimantan degraded by the "Ex-Mega Rice Project" (EMRP).[78] This could be complemented by channelling direct public investment, both from the government and from international climate funds, to specific peatland rehabilitation activities within the EMRP area and elsewhere in Kalimantan and Sumatra.[79] The expansion of ecosystem restoration concessions, as recommended in the above enabler, would also contribute towards peatland restoration. Finally, the moratorium on conversion of peat swamp forest could be extended and new plantations not be sited on peatland.[k]

SECURE MARINE ECOSYSTEMS

The World Resources Institute (WRI) calculates that Indonesia's reefs can yield potential sustainable economic net benefits of US$ 1.6 billion per year.[80] This makes them important commodities in natural capital-based markets. Safeguarding marine ecosystems is essential to improved food security given that 65% of total animal protein intake is derived from fish and fisheries products.[81]

The 2015-2019 medium-term development plan (RPJMN) includes actions to strengthen maritime sovereignty, suppress illegal fishing and piracy, curb marine pollution, and enhance food security. Each of these objectives can thus also contribute to a greener economy if executed with green growth outcomes in mind.

A variety of ongoing government programs in this area seek to improve community engagement in fisheries and reef management and build the capacity of local artisanal and commercial fisheries. For instance, during rebuilding after the tsunami, the capacity of local and provincial government as well as fishing communities was built to jointly manage coastal fisheries in a more sustainable fashion.[82] Positive steps like these have the potential—if scaled-up—to deliver substantial green growth benefits.

k. The extended Cost Benefit Analysis of a peat swamp forest restoration project conducted by the GoI-GGGI Green Growth Program supports this claim. For further details, see GGGI, Costs and Benefits of Investing in Ecosystem Restoration and Conservation: Green Growth Opportunities in Katingan Peatlands. Technical Report, 2014. Available at http://gggi.org/.

RENEWABLE NATURAL RESOURCES ENABLER 6

Engage communities to restore ecological productivity of marine ecosystems (medium-term implementation)

There is an important opportunity for government and coastal communities, working collaboratively, to restore and responsibly manage near-shore marine ecosystems, including coral reefs, sea grass beds, and mangroves. A number of community-based initiatives are already underway, such as the Ecological Mangrove Rehabilitation project at Bunaken National Park in North Sulawesi. From 1993 till 2011, the project successfully restored areas of degraded mangrove for the economic benefit of local communities.[83] Scaling up such efforts would go a long way to restoring the ecological productivity that sustains artisanal and commercial fisheries in many parts of the country.

The Coral Reef Rehabilitation and Management Project (COREMAP) has taken major steps since 2004 to rehabilitate coral reefs through locally regulated fishing and protection zones. This approach empowers fishermen to monitor and manage reef-based fisheries under the auspices of community-based institutions. COREMAP's third phase, begun in 2014, aims to institutionalize the COREMAP approach nationally under a policy and legal framework aimed at safeguarding marine ecosystems.[84]

▲ *Measuring mangroves in Kubu Raya, West Kalimantan*
© CIFOR / CC BY-NC 2.0

Safeguarding marine ecosystems is essential to improved food security given that 65% of total animal protein intake is derived from fish and fisheries products

RENEWABLE NATURAL RESOURCES ENABLER 7

Improve management of industrial liquid and solid wastes in coastal areas (medium-term implementation)

Capacity-building and knowledge sharing with heavy industry to illustrate the benefits of more responsible treatment of marine ecosystems can play an important role in the medium term. This has been achieved on a local scale with some success, demonstrating scalable potential to address marine pollution through behavioral change. One example is the pilot program to prevent industrial pollution of coastal waters in Batam city. At the end of 2007, 79 large industrial operations signed compliance letters obliging them to report on environmental monitoring and management processes. This was largely achieved through capacity building activities aimed at improving the management of industrial liquid and solid wastes. Positive environmental outcomes and reduced likelihood of regional disputes over spoiled natural resources were among the results.[85] This example could be expanded to a regional and ultimately national-level program for heavy industry in coastal areas.

◀ *Schooling bannerfish in Bunaken National Park, South Sulawesi*
© Ilse Reijs and Jan-Noud Hutten / CC BY 2.0

DEVELOP SUSTAINABLE SUPPLY CHAINS

Unsustainable models of production, by definition, impose excessive environmental and social costs and ultimately fail to feed growing populations. The development of sustainable supply chains can therefore play a key role in promoting food security, while reducing pressures on Indonesia's forest stocks. Beyond food security, developing sustainable supply chains will ensure that Indonesia's industrial activities have a healthy asset base from which to derive raw materials over the long term. They will also ensure that Indonesian products can compete domestically and internationally, given increased scrutiny from consumers. As such, these measures can significantly enhance the resilience of the manufacturing sector cluster.

RENEWABLE NATURAL RESOURCES ENABLER 8

Scale up the Sustainable Consumption and Production (SCP) program across ministries (short-term implementation)

The Sustainable Consumption and Production Program (see **Box 2.12**) has been incorporated into the 2015-19 medium-term development plan and will be fully taken up across ministries and institutionalized in various sectors with support from the private sector. Knowledge and capacity-building platforms will be developed along with a framework of indicators. The initial focus is on supply chains for paper, plastic, metals, and food products.

RENEWABLE NATURAL RESOURCES ENABLER 9

Strengthen the ambition and enforcement of domestic product certifications (medium-term implementation)

Encouraging Indonesian producers to meet more stringent product certifications will help open access to extensive international markets. The Timber Legality Assurance System (SVLK) can be improved particularly in the areas of chain-of-custody verification and certification and by taking account of laws and regulations beyond the forestry sector.[87] Strengthening these will help to ensure the sustainability of supply chains. Similarly, Indonesia Sustainable Palm Oil (ISPO) certification can be strengthened, capitalizing upon the legal obligation of suppliers to comply with ISPO while gradually increasing its requirements to bring them into line with international best practices and ensuring that compliance is comprehensively audited.

Box 2.12
THE SUSTAINABLE CONSUMPTION AND PRODUCTION PROGRAM

Led by the Ministry of Forestry and Environment and Bappenas, the SCP program is an ambitious, economy-wide program with a focus on changing unsustainable production and consumption habits across society. Implemented effectively, it could significantly contribute towards Indonesia's green growth outcomes.

The program aims to make economic production patterns more efficient by encouraging behavioral change in industry and consumption patterns more geared towards green products and services at a household and corporate level. SCP was launched as the 10-Year Framework of National Programs of SCP Indonesia (2013) with the following four quick-win programs:

- The Ministry of Energy developing criteria for eco-labelling, systems to verify labelling and public information to support this initiative, as well as green public procurement
- The Ministry of Industry working towards greening industry
- The Ministry of Public Works and the Green Building Council developing green building construction
- The Ministry of Tourism building capacity for ecotourism based on sustainable consumption and production models.

These programs have been followed by a number of others. For instance the Chamber of Commerce (KADIN) is working to improve domestic industrial capacity for the production of green products, the Research and Applied Technology Bureau are working to improve green product innovation, and the Consumers Foundation is working to improve consumer understanding of green products. SCP has been formally adopted in the 2015-19 medium-term development plan (RPJMN). The Ministry of Forestry and Environment, Bappenas and other relevant ministries are in the process of confirming and establishing a national inventory of SCP indicators across ministries and institutions.

The broad basis of initiatives reflects the necessity of inter-ministerial engagement with this program if it is to succeed. The program could harmonize consumption and production habits with the economy's natural asset base if it is embedded consistently across ministries and supported by appropriate economic and non-economic incentives such as taxes, tax exemptions, and certification.[86]

Traditional markets, such as this one in Tangerang, West Java, are still important trade links in the green economy
© Dhoni Setiawan / The Jakarta Post

RENEWABLE NATURAL RESOURCES ENABLER 10

Develop knowledge transfer program on sustainable supply chains (medium-term implementation)

A knowledge transfer program providing information related to REDD+, Sustainable Palm Oil (SPO) and other initiatives available in local languages, and explaining how such revenues will reach communities, can help clarify the potential value to be derived from sustainable supply chain management. Education and awareness initiatives can also contribute to more sustainable renewable natural resource management.

RENEWABLE NATURAL RESOURCES ENABLER 11

Address role of smallholders in production (long-term implementation)

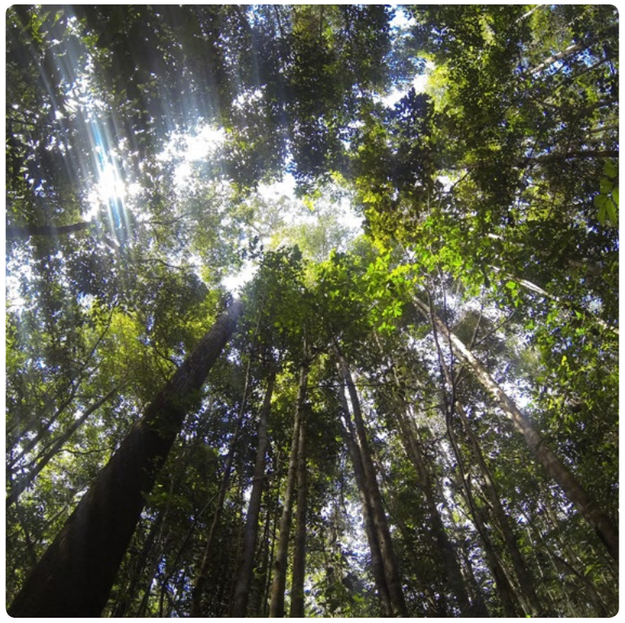
Fully recognizing the important role of smallholders in the production of palm oil and timber will be crucial to achieving truly sustainable supply chains in the longer term. While large corporations may be capable of making commitments to sustainability, smallholders who supply such corporations can be more difficult to access. Yet they represent a critical component of supply chains. Initiatives that engage with smallholders—including helping those engaged in sustainable business practices to access finance—would help to more widely demonstrate the economic benefits of sustainable land use management.

The Indonesian Biodiversity Foundation (KEHATI) has introduced measures to improve community agricultural livelihoods while protecting forests in southern Sumatra. Organic farming has been initiated in 34 villages with support from micro-finance schemes, while women in Way Kambas, Lampung, have been trained in organic fishery methods. Pilots such as this can be scaled up.[88] KEHATI has also established Community Based Forest Management practices (CBFM) across more than 60,000 ha in West Sumatra, Jambi and Riau. Communities are offered support to achieve RSPO certification and helped in other ways to shift agriculture towards more sustainable.

RENEWABLE NATURAL RESOURCES ENABLER 12

Promote natural alternatives to chemical fertilizers for soil fertility (medium-term implementation)

Chemical fertilizer delivers an important short-term yield response that benefits small farmers and consumers. However, it also leads to long-term loss of soil organic matter and nutrients. At present, the government annually spends about IDR 21 trillion on fertilizer subsidies, which are designed to target smaller farmers.[89] A green approach cannot immediately stop these subsidies, because of their significance for the viability of small farmers and for rural populations. Instead, a green approach can promote alternative sources of natural soil fertility, including the use of conservation farming techniques that boost organic soil matter. Chemical fertilizer subsidies could be reduced as these alternatives become available. In addition, a green approach places even higher emphasis on the important of effectively directing remaining fertilizer subsidies mainly to poorer farmers.



▲ ***Indonesia's rich natural capital (clockwise):***
Lush forest in Kalimantan *© YLI*
Rivers in Kalimantan *© KFCP*
Working the land in Toraja, South Sulawesi *© Martin Hardiono*
Barsha pumpin in Kadahang Village, East Sumba *© HIVOS Asia*

PROGRESS TOWARDS FOOD SECURITY

Food security is a strategic priority for Indonesia; green growth can help ensure its achievement. Despite being the world's third-largest rice producer, Indonesia remains a net importer of rice. This situation persists due to inefficient agricultural techniques, along with a heavy reliance on rice in average diets. [90] Measures to increase the efficiency of rice production, alongside that of other key food products, can boost social and economic resilience across the archipelago. However, it is important that green growth aspirations are taken into consideration by policy makers to avoid incurring unnecessary environmental costs during the pursuit of food security.

RENEWABLE NATURAL RESOURCES ENABLER 13

Improve productivity of rice, palm oil and other key food commodities (short-term implementation)

Given the central role of rice in most Indonesians' diets, increasing rice productivity is of crucial importance to achieving food security. KADIN is currently developing a partnership program with rice smallholders that aims to increase rice production through the use of new technologies and innovative financing programs. The program could be scaled if it proves successful.[91]

Focusing on increasing productivity, rather than merely production, can help ensure that production increases do not incur unnecessary environmental costs, for example, due to inefficient land use. Similarly, increasing productivity of palm oil should be a priority given the crop's significance as a generator of revenue and food as well as its potential to degrade the environment. Both of these measures can help to boost food security by increasing resilience to imported food price fluctuations. Other benefits of productivity increases include potential opportunities for export revenues if surpluses are produced along with reduced plantation expansion into valuable forest and peatland areas.

RENEWABLE NATURAL RESOURCES ENABLER 14

Diversify staple foods (medium-term implementation)

Diversification of staple foods will help reduce demand for rice, promote more locally appropriate crops and support healthy, balanced diets. Diversification can also boost food resilience to climate risk in the face of an uncertain future. This can be achieved by distributing information on different crop varieties, as well as by encouraging knowledge sharing among farming communities. Seed subsidies for underused crops such as Sago—long a staple in Eastern Indonesia—should also be considered.[92] This approach links to the enabler 'Establish, support and monitor new natural capital-based markets,' which recommends developing and using databases of underused species. Thus, crop diversification has the potential to generate revenue, as well as to increase food security.

> ***"Despite being the world's third-largest rice producer, Indonesia remains a net importer of rice. This situation persists due to inefficient agricultural techniques, along with a heavy reliance on rice in average diets."***

NEW NATURAL CAPITAL-BASED MARKETS

Recognizing and capitalizing on the value inherent in natural resources can unleash a variety of new opportunities for sustainable economic growth.

Indonesia has great natural wealth, including the world's most biologically diverse forests and coral reef ecosystems, fertile volcanic soils, and highly productive freshwater ecosystems. Business models based on the non-consumptive use of this natural capital offer a spectrum of cutting-edge opportunities, some of which—such as pharmaceutical biotechnology—are still in their infancy. Recognizing and capitalizing on the inherent value of natural resources can expose a variety of new opportunities for sustainable economic growth. Key recommended actions include scaling up ecotourism across Indonesia's archipelago, nurturing new natural capital-based markets, such as establishing arrangements for payments for ecosystems services (PES) on a large scale, developing a domestic carbon market, and mobilizing forest carbon finance.

TABLE 2.6
Key enablers for new natural capital-based markets

THEME	KEY ENABLERS	SUGGESTED INDICATORS
Scale up ecotourism	1. Roll out ecotourism training and monitoring	• Qualitative assessment of ecosystem program
Identify new natural capital-based markets	2. Establish, support and monitor new natural capital-based markets 3. Undertake responsible bioprospecting to underpin the development of biotechnology industries	• Gross value added of new natural capital markets
Establish payments for ecosystems services	4. Introduce PES governance	• Volume of PES finance disbursed
Accelerate international and domestic carbon offsetting	5. Develop framework for domestic carbon market 6. Respond dynamically to international discussions on carbon pricing	• Volume of carbon financing for Indonesian projects • Number of new projects registered under carbon offsetting
Mobilize forest carbon finance	7. Develop a prioritized pipeline of activities 8. Establish preferential long-term debt financing	• Volume of REDD+ finance disbursed

SCALE UP ECOTOURISM

Indonesia's tourist revenues represented 9.1% of GDP in 2013. They are largely contingent on the quality of the country's natural environment.[93] As part of a broad shift towards a service-based economy, Indonesia's ecotourism industry needs to be scaled up. This will require consistent, long-term policies and incentives that encourage appropriate models of ecotourism. Some 10% of international visitors are eco-tourists, a sub-sector which is growing at a rate of 30% per annum, with particular growth in marine ecotourism.[94]

▲ *Indonesia's rich marine biodiversity offers great opportunities for ecotourism* © *Manta Ray of Hope*

Box 2.13
THE MANTA RAY OF HOPE ECOTOURISM PROJECT [95]

Manta rays face increased threats from targeted and bycatch fisheries, and are classified as species vulnerable to extinction in the wild. While they are not considered a sustainable fisheries resource, there is a destructive market for the sale of manta gill rakers for medicinal purposes. To combat this, the Manta Ray of Hope project is proposing responsibly-managed tourism based around watching manta rays as a potentially lucrative economic alternative. It has been estimated that manta ray tourism could have an estimated global value of over US$ 100 million per year, compared to US$ 11 million for the global gill raker trade.

A number of strategies have been proposed to achieve this transition. These include the development of eco-tourism in coastal communities; education of consumers to disprove claims about the medicinal benefits of gill rakers; emphasis on international protection measures; trade moratoriums on the centers of the gill raker trade; protection of critical manta ray habitats; and enforcement strategies for all protective measures. With the support of the Manta Ray of Hope project, Indonesia has approved legislation to fully protect all manta rays within its nearly six million square kilometer exclusive economic zone, making it the largest sanctuary for manta rays in the world. This demonstrates the green growth outcomes that can be achieved if natural resources are viewed as lucrative revenue opportunities to be managed responsibly, rather than crudely exploited.

Ecotourism is a highly adaptable model which could provide revenue streams from cultural and creative offerings as varied as archaeology, villages, crafts workshops and cultural festivals alongside flora and fauna. If the private sector has the opportunities and incentives to green the tourism supply chain, shared benefits in terms of jobs, poverty reduction and conservation of Indonesia's biodiversity can be significant.

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 1
Roll out ecotourism training and monitoring (long-term implementation)

Maximizing benefits from ecotourism depends on proper management, which will require increased government capacity to oversee the industry as well as support from organizations such as the Indonesian Ecotourism Network (INDECON). Challenges include ensuring that tourism operators claiming to be 'eco' deliver the benefits that they promise. In parallel, efforts should be made to engage with the conventional tourism industry in Indonesia. Demonstrating ecotourism best practice and business opportunities to influential business figures would help lead to greening of the conventional tourism industry, and ultimately to increased employment opportunities and greater demand for service industries in line with longer-term growth targets.

IDENTIFY NEW NATURAL CAPITAL-BASED MARKETS

The relative novelty of economically valuing natural capital, combined with Indonesia's ecological riches, means that this area has numerous untapped opportunities. If investors can be reassured of this potential, in tandem with government efforts to provide stability in these markets, they could generate significant economic growth. The industries that have developed around Indonesia's rich biodiversity of palm species (such as sagua, aren and siwalan) provide powerful examples of the economic benefits that can be enjoyed if natural capital-based markets are identified for the numerous medicinal plants and root crops throughout the country.

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 2

Establish, support and monitor new natural capital-based markets (medium-term implementation)

Various examples of innovative standalone business models that rely on the sustainable use of Indonesia's natural capital can be scaled up. Butterfly ranching to capitalize on global collector demand has already enjoyed some success in Papua supported by the WWF and could be scaled. It works as a conservation tool for the butterflies and also for their habitats, since the butterflies must be reared in natural forest environments. By providing an alternative means of employment this relieves economic dependence on shifting agriculture and therefore also helps to prevent destruction of primary habitat.[96]

Gaharu, or aloes wood, is also highly sought after and represents another key revenue opportunity if the efforts already made to improve cultivation methods are bolstered and scaled up, particularly for the benefit of smallholders in forest-edge communities.[97] Databases on underused species with high commercial potential should be utilized to direct government engagement strategies.[98] Supportive measures will help ensure that it is smallholder farmers rather than large commercial operators who benefit primarily from this process and that production strengthens community-based food and livelihood security.

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 3

Undertake responsible bioprospecting to underpin the development of biotechnology industries (long-term implementation)

Responsible bioprospecting can provide the basis for a lucrative biotechnology industry that uses living systems to create useful products. Bioprospecting, or searching for new species with potential for commercial use, is well suited to Indonesia's wealth of biodiversity as well as the extensive indigenous knowledge of this wealth.[99] The Environment Ministry has already set up biodiversity centers in several provinces to identify and list Indonesia's endemic genetic resources.[100] Similarly, traditional medicines (*jamu*) are now produced commercially, with the herb products sold by local producers and used mainly in medicines, candles, supplements and spa treatments.[101]

It is crucial that any such schemes are correctly established and monitored by government agencies to regulate access to, and sharing of benefits arising from, the utilization of resources.[102]

$ ESTABLISH PAYMENTS FOR ECOSYSTEMS SERVICES

Watersheds, timber production, carbon sequestration, peat lands and mangroves provide important services in need of protection. Payments for Ecosystem Services (PES) represent a particularly effective way of doing so. Examples include a scheme in West Kalimantan that focuses on sustainable utilization of timber, non-timber forest products (NTFPs) and ecosystem services, and one in Lombok that focuses on community-based agro-forestry for upper watershed rehabilitation.[103] These programs could be scaled up, and their number expanded, as well as being brought into a framework that guarantees fairness and consistency.

▼ *A waterfall in Gunung Simpang, West Java*
© Yayan Indriatmoko / CC BY-NC-ND 2.0

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 4

Introduce PES governance (short-term implementation)

Although economic instruments to promote environmental protection have been mandated by law since 2010, the drafting of government regulations on these instruments is still in progress. There are hopes to finalise regulations this year which would constitute a major step forward in the widespread establishment of PES.[104] Extended Cost Benefit Analysis (eCBA, explained in **Part 3**) will be key to identifying new areas for PES. Technical support would be needed to establish a suitable process for developing, enforcing, and administering PES contracts. The innovative PES model currently under development in Sangihe by KEHATI in which micro-hydro power is built using revenue from forest conservation, could also provide useful lessons here.

Box 2.14 ECOSYSTEM RESTORATION CONCESSIONS IN CENTRAL KALIMANTAN $

Most of Indonesia's forests are production forests, and are thus open to economic activities. Efforts to restore and maintain natural capital need to be economically competitive in order to succeed.

According to project proponents and investors, carbon credits (purchased by either domestic or international buyers) are so far the most viable source of revenue to justify investment in ecosystem restoration concessions (ERCs). However, ERC development faces significant regulatory uncertainties and business risks. As a result, ERCs cannot currently compete with alternative land uses for production forests such as palm oil and timber.

Analysis undertaken as part of the GoI-GGGI Green Growth Program suggests that with a carbon price of USD 2.57/tonne, ERC investment would break even. With a price of around USD 9.3/tonne, it could even outweigh the business-as-usual scenario. This represents a major opportunity to secure forest ecosystems if a carbon price can be established and widely accepted.[105]

▲ ***Degraded peatlands such as those in Katingan, Central Kalimantan, are critical targets for rehabilitation to restore their ecological, social, and economic value*** *© Rimba Makmur Utama*

$ ACCELERATE INTERNATIONAL AND DOMESTIC CARBON OFFSETTING

In 2009, Indonesia committed to reducing its GHG emissions by 26% and by 41% with international support, a commitment reaffirmed in the RPJMN. Indonesia further committed, in the Intended Nationally Determined Contributions (INDCs), to reduce its emissions by 29% by 2030.[106] Market-based mechanisms can play an important role in facilitating these emission reductions in a cost-effective manner. They can also provide finance for projects that support the maintenance and development of Indonesia's natural capital, and thus the livelihoods that depend on it. Finally, the ancillary activities required to sustain these markets provide an opportunity for the development of Indonesia's service-based economy. Nevertheless, carbon offsetting requires complex international and national frameworks, as well as long-term policy commitments.[l] Full implementation and operation of carbon offsetting should therefore be viewed as a longer-term goal alongside the other themes and enablers outlined in this cluster.

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 5

Develop framework for domestic carbon market (short-term implementation)

In the short-term, opportunities for using international offsets in the natural capital cluster are most likely to come from voluntary markets. This will require improved monitoring, reporting and verification of emission reductions, which can be challenging for many emission reduction opportunities associated with natural capital.[m]

l. Carbon offsetting is the measured reduction or avoidance of carbon dioxide emissions from one source to counterbalance an equivalent amount of emissions from other sources.
m. Valuing natural capital and ecosystems services was a key challenge while conducting the extended Cost Benefit Analysis of peat swamp forest restoration during the joint green growth program. For further details, see GGGI (2014) Costs and Benefits of Investing in Ecosystem Restoration and Conservation, op. cit.

▲ ***Forest scenery of Gede Pangrango, West Java, in the morning*** *© CIFOR / CC BY-NC-ND 2.0*

At the same time, domestic offsetting mechanisms such as the Nusantara Carbon Scheme could be tested, potentially working alongside domestic carbon pricing pilots, with successes and challenges carefully monitored, so as to promote eventual scale up. Development of bespoke methodologies for measuring emission reductions—especially in relation to REDD+ and other emission reductions from the afforestation, forestry and other land use change sector—maybe helpful. The increases in environmental law enforcement capacity recommended in the Renewable Natural Resources cluster will be important to underpin the success of a potential carbon market.

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 6

Respond dynamically to international discussions on carbon pricing (medium-term implementation)

In the medium term, the actions described above should be complemented by a strong focus on the emerging discussion at the global level on the use of international credits to support emission reductions in relation both to REDD+ and the New Market Mechanism. Monitoring these discussions closely will allow Indonesia to move nimbly when the mechanism becomes clearer, so as to minimize the kinds of challenges Indonesia faced in relation to the Clean Development Mechanism (CDM).

$ *MOBILIZE FOREST CARBON FINANCE*

Indonesia is well placed to attract public and private investment in activities that mitigate climate change in the forest sector. The government is working with, among others, the World Bank's Forest Carbon Partnership Facility (FCPF) and the Forest Investment Program of the Climate Investment Funds to develop such activities. In 2010, Norway pledged US$ 1 billion for reducing emissions from deforestation and forest degradation (REDD+).[107] Forest carbon thus provides a major opportunity to channel finances to projects if Indonesia can prepare and utilize one or more effective mechanisms, where appropriate on a "contribution for verified emission reduction" basis.

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 7

Develop a prioritized pipeline of activities (short-term implementation)

There are already 11 REDD+ provinces in which 526 activities have been identified from 8 SRAPs, 10 RAD-GRKs. REDD+ projects are being supported by NGOs, CSOs, donors and the private sector.[108] There is currently a shortage of international capital for forestry projects, and fierce competition for limited capital. Building a credible pipeline of projects could significantly contribute to green growth, given that deforestation and forest degradation are the single biggest contributors to Indonesia's CO_2 emissions. In the medium-term, developing a pipeline of activities could also be important as funding becomes available from the Green Climate Fund.

NEW NATURAL CAPITAL-BASED MARKETS ENABLER 8

Establish preferential long-term debt financing (medium-term implementation)

A long-term debt financing fund could play a central role in developing a strong assessment framework to build a large pipeline of forestry projects and channel preferential long-term funding towards their development. This could give the government an interest in the success of such projects, adding impetus to harmonizing national-local government coordination. Traditional financial institutions are unlikely to invest in these projects at present as they feature a higher risk profile and lower returns than competing investment opportunities such as palm oil or mining.

PART 3

Mainstreaming Green Growth in Policy, Planning, and Investment

▲ *Discussing green growth strategy at district level* © GGGI Indonesia

Moving beyond the promising but mostly isolated green projects portrayed in **Part 2** will require a commitment and systematic effort to mainstream green growth principles, approaches, and practices into national and sub-national policies, planning, and investment. This will help create conditions for replicating and scaling up promising pilot efforts such as those described in **Part 2**. **Part 3** describes green growth-oriented policies and enabling conditions, tools to shape investment decisions, and monitoring mechanisms to measure the green growth performance of investments.

Mainstreaming is most effective when guided by a comprehensive green growth strategy with objectives and actions that are integrated into regulations, incentives, development plans, and budgets leading to project-level design and investment. Indonesia has already put in place national and sub-national strategic action plans for climate change, and some districts and cities are moving towards green growth strategies, often with a "landscape" approach to spatial planning that aims to integrate a number of otherwise competing goals of conservation and development.[n] [109] Some of these local efforts are featured here as case studies. However, Indonesia has yet to formulate a national green growth strategy. This roadmap can be seen as a stepping stone towards the development of such a national strategy.

> Mainstreaming is most effective when guided by a comprehensive green growth strategy with objectives and actions that are integrated into regulations, incentives, development plans, and budgets leading to project-level design and investment.

The Ministry of Finance recently launched the Green Planning and Budgeting Strategy for Indonesia's Sustainable Development in 2014.[110] Although only covering a five-year timeframe, it provides a good basis for a comprehensive, long-term national green growth strategy. Key policy recommendations of the green planning and budgeting (GPB) strategy are presented below.

The approaches and methods discussed in **Part 3** build on existing government systems and procedures but with the aim of enhancing their efficiency, accounting for social and environmental costs and benefits as well as economic ones, and resulting in the desired outcomes of green growth. First, fiscal policies that will enable and guide green growth planning and investment, as set forth in the GPB Strategy, are described. Next, the main features of Indonesia's development planning are outlined and strategic entry points for green growth approaches, methods, and tools are identified, along with how they can be used to overcome challenges to adopting "greener" planning, projects, and investment. **Part 3** concludes with a look at indicators for monitoring and measuring green growth performance.

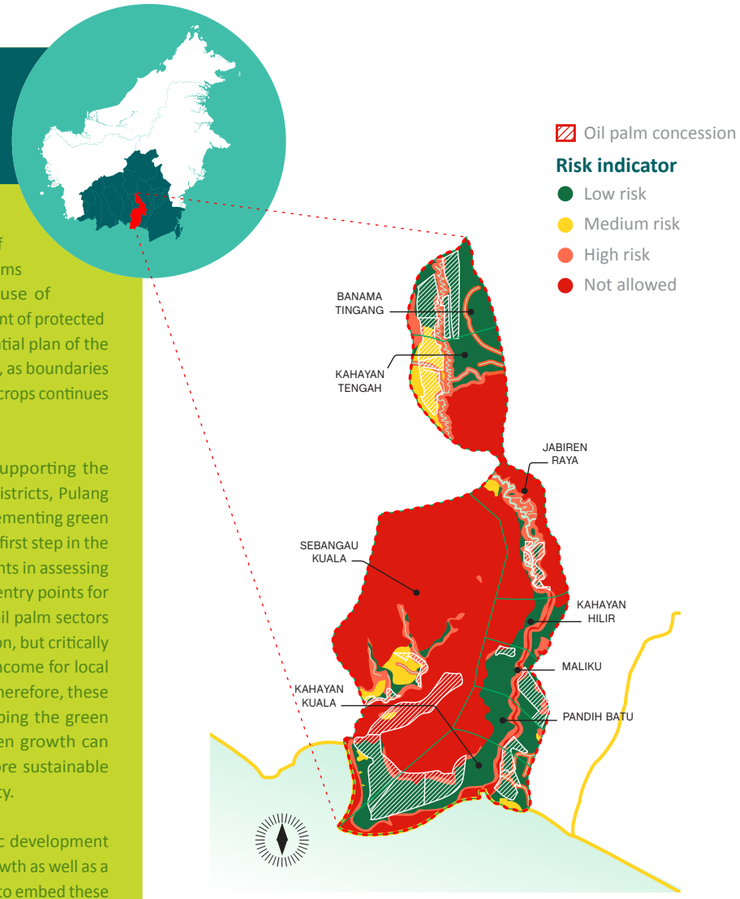
n. The authors of the OECD's 2014 study, Towards Green Growth in Southeast Asia, found that "efforts to pursue green growth are most effective when guided by a national strategy… [and] integrated into existing national development plans and budgets" (p. 65). So far, only two ASEAN countries—Cambodia and Vietnam—have adopted national green growth strategies, according to the study.

Box 3.1
SUPPORTING DISTRICT GOVERNMENTS TO MAKE GREEN GROWTH STRATEGIES

The province of Central Kalimantan is facing considerable challenges related to expansion of oil palm and rubber plantations. These problems include extensive illegal deforestation, abuse of licenses, destruction of peat lands, encroachment of protected areas and social conflicts. The incomplete spatial plan of the province complicates many of these problems, as boundaries are unclear. The continuing expansion of these crops continues to lead to massive destruction of forests.

The GoI-GGGI Green Growth Program is supporting the provincial government and specifically two districts, Pulang Pisau and Murung Raya in designing and implementing green growth strategies across their jurisdictions. A first step in the process was to support the district governments in assessing current planning procedures and identifying entry points for improving spatial planning. The rubber and oil palm sectors are the most important drivers for deforestation, but critically they are also the most important source of income for local livelihoods as well the province as a whole. Therefore, these sectors were specifically targeted in developing the green growth strategies and identifying how green growth can deliver benefits to local people through more sustainable livelihoods and increased economic prosperity.

This work has been used to develop strategic development plans for each sector as a pathway to green growth as well as a district wide spatial plan. Efforts are underway to embed these recommendations in the next revisions of the spatial plans.



PULANG PISAU
HCV Risk Indicator and Palm Oil Concessions

MAINSTREAMING
Green Growth into Fiscal Policy

A number of fiscal policy interventions and policies will help support the realization of Indonesia's national green growth strategy. Many of these build on the recently published Ministry of Finance GPB Strategy. This section outlines four such policies and the potential of each to contribute to green growth.

PROVIDE THE RIGHT PRICE SIGNALS FOR PRIVATE SECTOR INVESTMENT

Green growth relies on providing the right price signals for the private sector to take account of both economic and human and environmental considerations. Recent changes in energy subsidies—freeing up resources for other government initiatives while providing incentives for efficiency—exemplify how green growth considerations reinforce existing policy directions. Looking ahead, policies that provide further subsidy reform, a robust incentive regime for renewable energy, payment for ecosystem services schemes, and possibly carbon pricing, can all strengthen incentives for investment that will generate green growth.

PROVIDE THE RIGHT INCENTIVES FOR PUBLIC SECTOR INVESTMENT

The public sector should also face appropriate incentives for green spending. The intergovernmental fiscal transfer system can be used to incentivize district and provincial government to support green growth by providing supplemental flows to local governments for the delivery of green growth objectives, including application of tax instruments such as land value capture mechanisms.

MAKE MORE EFFECTIVE USE OF PUBLIC EXPENDITURE

Public expenditure can be used to leverage private capital and there by increase green investment flows. This allows green growth to be pursued without an overall increase in public expenditure, but rather through redirecting existing public expenditure levels in a strategic way. Revolving funds and loan guarantees in renewable energy and energy efficiency will help crowd in private sector investment through reducing risk and improving availability of finance. This will also require provision of budgetary cover for loans that do not deliver against intended objectives and "go bad."

ADDRESS OTHER MARKET FAILURES

The government also needs to intervene in cases where market failures prevent the private sector from taking full account of social and environmental impacts. As noted in the GPB Strategy, this can include investing in applied agriculture research or supporting research and development into renewable technologies. In both cases there is potential to fuel improved economic performance while reducing environmental intensity. Command and control regulations may also be required to limit economic and environmental damage from unsustainable practices. Examples from the GPB Strategy include licensing in forestry, certification in agriculture and regulation in energy efficiency.

Investment in public transportation, such as the MRT under construction in Jakarta, helps to alleviate congestion and reduce pollution in Indonesia's crowded cities © Dhoni Setiawan / The Jakarta Post

Box 3.2 LEVERAGING PRIVATE SECTOR GREEN INVESTMENT

Several international reports consider the extent to which public expenditure for green growth can leverage private sector investment. This includes work by the UN High Level Advisory Group, the Green Investment Report, a review of IFC's climate portfolio and work by the World Resources Institute. For direct expenditure on public services and infrastructure, leverage ratios are generally estimated at less than 1:1. For modalities that explicitly aim to promote private investment, international evidence suggests that leverage ratios can vary from 2:1 to over 10:1. Direct support to businesses,such as through grants, tends to generate leverage ratios at the bottom end of this range. The highest leverage ratios are found in policies that rely mainly on regulations.

There is little direct evidence of the leverage ratios achieved in Indonesia. However, the GPB Strategy suggests that, if international norms were achieved, an average leverage ratio of about 1.9 might be possible in the short-term. In the medium-term—with a greater focus on policies that rely on markets, the financial sector and on regulations—the leverage ratio could increase to as much as 3.4, at which point it would be about a third of the levels typically achieved in developed countries. The implications of this improvement for green growth are substantial and could result in as much as 5% of all investment, both public and private, being devoted to green growth.

MAINSTREAMING
Green Growth into Economic Development Planning

This section describes the main planning cycles and the institutions involved in development and economic planning in Indonesia. It identifies critical entry points for green growth to be incorporated into plans, spatial planning, budgeting and investment decision making. These entry points take account of both the challenges to mainstreaming green growth and solutions to overcome those challenges.

Box 3.3 CURRENT NATIONAL PLANNING PROCESS

The current planning system may be described as follows. A National Long-Term Development Plan (RPJPN), covering a 25-year span (currently 2005-2025), reflects a diverse range of strategic priorities, including accelerating poverty reduction, transforming the industrial structure, increasing drinking water access, consolidating democracy, and improving energy security. Although the long-term development plan sets targets for each province, it is not spatially explicit. Rather, spatial issues are addressed in the National Spatial Plan (RTRWN).

These two documents together provide the framework for Medium-Term Development Plans (RPJMN), which cover each of the five-year periods within the RPJPN. The medium-term plans cover development strategy, general policy, ministerial/agency programs, inter-ministerial/agency, region and inter-regional programs, and include macro-economic frameworks that highlight economic conditions and fiscal policy. Among the strategic priorities related to green growth in the current medium-term plan, which covers the period 2015-2019, are achieving food and energy security, securing maritime resources, investing in maritime connectivity and other infrastructure, expanding tourism, and investing in human development and a more service-oriented bureaucracy.[111] Provinces, districts (including metropolitan regions), and even villages and urban neighborhoods each prepare their own medium-term development plans according to different five-year cycles. These are meant to be harmonized with plans of the larger jurisdictions within which they are nested.

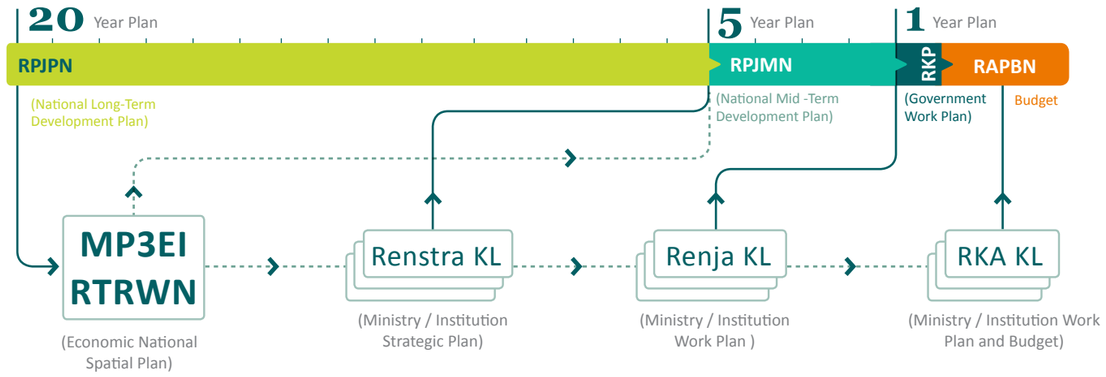
The long-term national development plan is translated into the Government Work Plan (RKP) and guides formulation of the State Budget Plan (RAPBN), which must gain legislative approval. The long-term plan also guides individual ministries and other agencies in forming their own five-year strategic plans (RENSTRA) and annual work plans. Other, thematic plans, such as the National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) cut across sectors and agencies. The national planning process is illustrated in **Figure 3.1.**

EMBEDDING GREEN GROWTH IN PLANNING

The aim of mainstreaming green growth within the planning process is to ensure that green growth issues are not peripheral, but rather are embedded in day-to-day decision-making by government and others. Mainstreaming also aims to ensure that green growth actions are coordinated and integrated across sectors and line ministries, and that sectoral synergies are realized.

During the planning process, green growth policies can be harmonized with other objectives and policies to ensure that they are working towards and not against Indonesia's strategic national and regional goals. Mainstreaming in a systematic fashion will help ensure that policies and plans for green growth are implemented in a cost-effective way and without creating unnecessary institutional resistance, by modifying or upgrading existing processes rather than designing new ones from the start.

FIGURE 3.1
Overview of the national planning process [112]



▲ ***Local communities involved in spatial planning process*** *© Moses Ceaser / CIFOR / CC BY-NC-ND 2.0*

CHALLENGES TO MAINSTREAMING GREEN GROWTH IN PLANNING

There are four key challenges to the mainstreaming process:

Confusion caused by overlapping plans

There are multiple plans that aim to guide and provide opportunities for green growth. These include the RPJM/P and RTRW, *ad hoc* plans arising from the international climate change negotiations, such as the national action plan for reducing greenhouse gas emissions (RAN-GRK) and its regional constituents (RAD-GRK), the national action plan for climate change adaptation (RAN-API), and the MP3EI plan for accelerating national economic growth. These plans need to be consistent and well-coordinated in order to avoid creating confusion among would-be investors in green growth. The current administration is moving in this direction.

Limited capacity at regional government levels

Regional governments often have difficulty meeting the additional demands imposed by the new climate change action plans, as well as the relatively new requirement for strategic environmental assessment of all major new policies, plans and programs. Regional agencies perceive these new requirements as additional administrative burdens placed on them with limited budgets and capacities, although there is also a risk that they could be seen as new rent seeking opportunities.

Difficulty in vertical and horizontal integration

There are a number of challenges involved in achieving systematic coordination (*konkurensi*) among government agencies concerned with development planning drafting and implementation—both at the same jurisdictional level and between national and regional jurisdictions. Village jurisdictions are commonly left out of planning coordination except as objects. This is true despite the fact that they—all 80,000 of them—cover the entire land mass of the nation and could be key players in delivering green growth nationwide. The new Law number 6 of 2014 on Village Governance begins to address these challenges by allocating more development funds directly to villages, strengthening their legal status as self-governing communities, and investing in the capacity and transparency of local institutions.

Inadequate licensing process

Spatial plans can be circumvented through manipulation of natural resource licensing processes that should—but often do not—conform to the spatial and developmental dictates of the plans. Although spatial plans (RTRW) and strategic environmental assessment (SEA or KLHS) indicate the space for green growth, they alone will not encourage viable green growth investments unless there is proactive enforcement of environmental laws. This includes, in particular, efforts to mitigate destructive environmental practices through a well-regulated process of natural resource licensing for infrastructure, mining, forestry, plantations and fisheries. Good governance and increased transparency in this area will raise public scrutiny and accountability of licensees and license givers, enable a greater role for civil society and local communities, and attract more responsible investors.

OVERCOMING THE CHALLENGES

In response to the challenges identified above, two main solutions can help embed green growth into the planning process. First, it is crucial to agree on a common spatial framework, including one map, which includes village settlements and adopts a landscape approach to spatial planning. Second, the wider application of Strategic Environmental Assessment (SEA) to evaluate the potential environmental impacts of policies can significantly strengthen green growth outcomes. Each solution is discussed below.

Enhance equity and transparency in spatial planning

Responsibility for leading and coordinating spatial planning, formerly situated in the Department of Public Works, was transferred in 2015 to the National Land Affairs Agency (BPN) within the Ministry for Land and Spatial Affairs. Prior to that, the Directorate General for Spatial Planning in Public Works had already begun to strengthen village-level spatial planning as envisaged in Spatial Planning Law 26 of 2007. [113]

Given that efforts to mainstream green growth involve both equity and safeguards against unintended effects, a key step is to identify—especially in spatial plans—where people live and how they earn their livelihoods. For example, the provincial government of Papua pioneered first steps towards "*Placing the People of Papua in the Plan*" by overlaying the locations of village settlements on key spatial planning maps.[114] Civil society organizations can play a critical role in reaching local communities and facilitating their participation in planning.

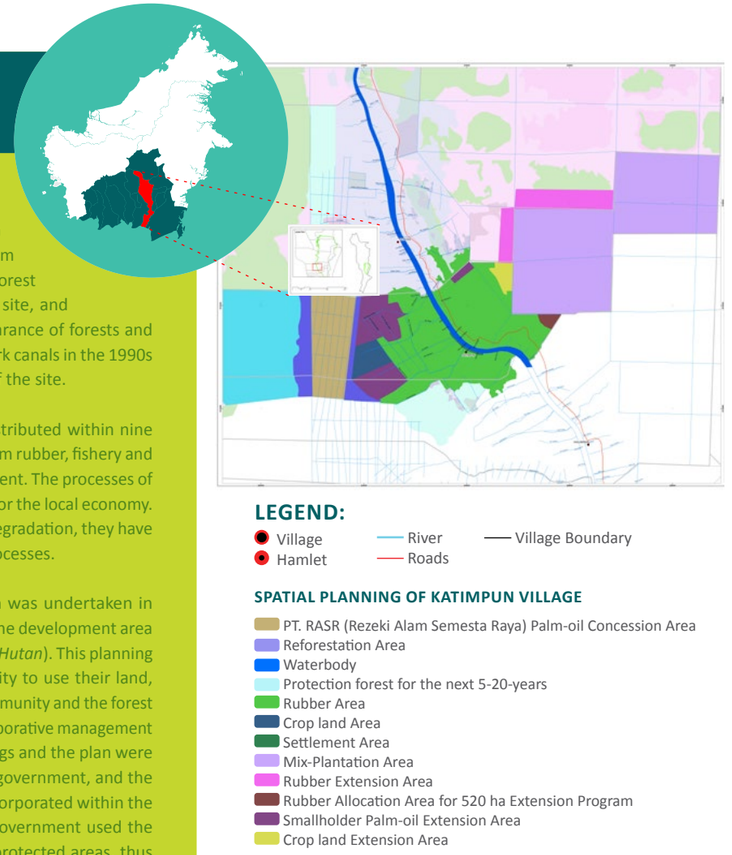
In a move towards greater transparency and consistency, the government of Indonesia has already recognized the need to develop a single, common national base-map to serve as a reference to all sectors and levels of government in the planning of activities and allocation of licenses for plantation, logging and mining concessions, and ecosystem restoration concessions projects. This "One Map" policy is expected to help resolve longstanding overlapping land claims among different sectors and jurisdictions.

Box 3.4
VILLAGE-LEVEL PLANNING IN CENTRAL KALIMANTAN [115]

Located in a peat dome in Kapuas district, Central Kalimantan, the Kalimantan Forests and Climate Partnership (KFCP) area consists of two different landscapes: (a) an intact peat swamp forest which provides important ecosystem services, including maintaining and storing carbon in the forest and the underlying peat soil in the northern half of the site, and (b) largely degraded peat forest, following large scale clearance of forests and drainage of peatlands through the construction of a network canals in the 1990s to support a rice cultivation project in the southern half of the site.

Approximately 10,000 people live in the project area, distributed within nine villages along the Kapuas river. The majority earn a living from rubber, fishery and forest crops, which are directly dependent on the environment. The processes of deforestation and degradation have severe consequences for the local economy. Since local people are directly affected by environmental degradation, they have been significantly involved in the village-level planning processes.

In 2013-14, a participatory land use planning approach was undertaken in participating villages to map and define an action plan for the development area (*Kawasan Budidaya/Non-Hutan*) and forest area (*Kawasan Hutan*). This planning approach directly addressed the security of the community to use their land, identified the potential land-based conflict between the community and the forest management unit (KPH), and explored the potential for collaborative management practices between the village and the KPH. The field findings and the plan were then negotiated among the local community, the district government, and the KPH. The participatory land use plan was subsequently incorporated within the KPH management plan. In addition, the Kapuas district government used the plan to renew the boundary between development and protected areas, thus ensuring that the local communities had sufficient space for their livelihoods.



Multiple uses of natural resources in a karst landscape in Berau, East Kalimantan © InnervisionArt / Shutterstock

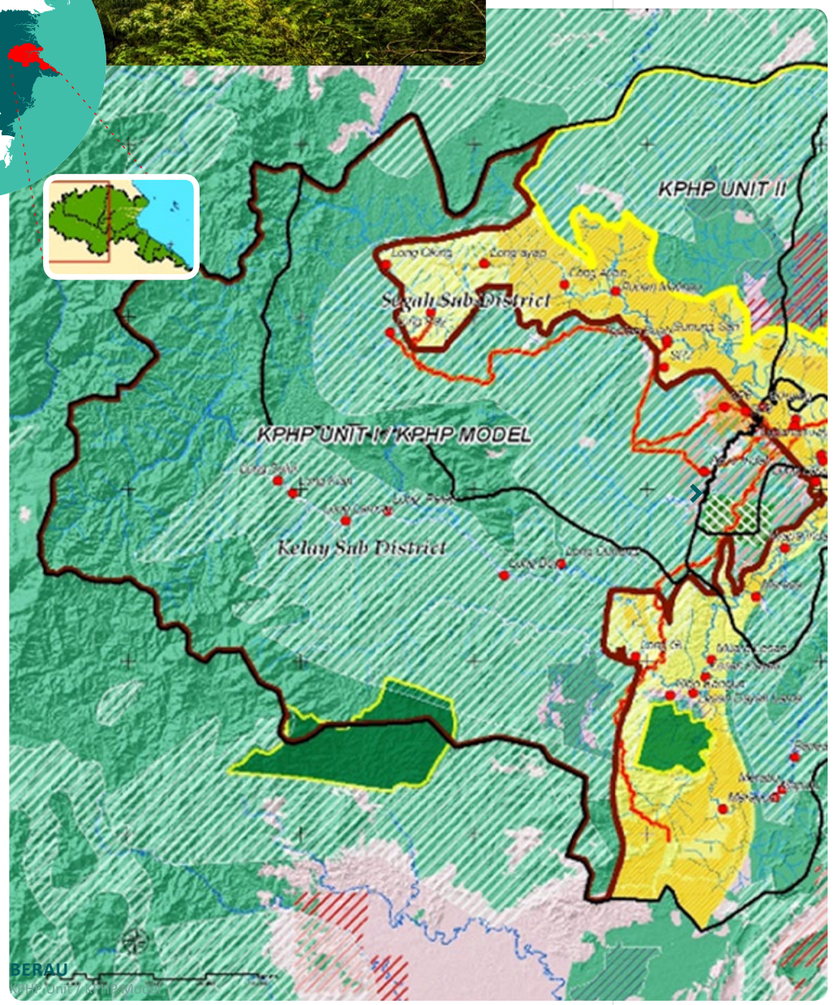
Box 3.5
LANDSCAPE PLANNING IN EAST KALIMANTAN

The district-wide Berau Forest Carbon Program (BFCP) is a carbon finance mechanism in development that will bridge the gaps between small, isolated emission-reduction projects and a potential nationwide REDD+ program. The BFCP has the potential to provide key lessons to address the challenge of scaling up isolated projects to achieve green growth at scale.

Forests in the Berau district of East Kalimantan are threatened by expansion of oil palm and coal mining. The BFCP seeks to establish a REDD+ program that delivers effective incentives to reduce emissions from forest loss in the district. The project is being implemented through four phases: a scoping phase, development phase, pilot demonstration phase and full implementation phase.

The project has a range of environmental, social and governance objectives that it aims to achieve through more effective spatial planning and community engagement. Environmental objectives include a carbon emissions reduction of around ten million tons of CO_2 over five years, and ecosystem and biodiversity protection. Social objectives include public welfare improvements for the 5,000 people living within or around the forest area. Governance objectives include the improvement of spatial planning and permitting process, institutional capacity building, and learning and replication on a district, national and potentially international level.

A key lesson learned during the project is the importance of combining spatial planning with community engagement by tailoring planning to local knowledge and priorities and by grounding measures in local forest management practices. This can be achieved through an inclusive partnership approach engaging a variety of stakeholders.



LEGEND:

- Village
- Water Body
- District Boundary
- Sub District Boundary
- Village Boundary
- Roads
- Protected Area
- STREK*
- KPH Unit I / KPH Model
- KPH Unit II

CONCESSION
- Logging Concession
- Mining Concession
- Crop Concession

LANDCOVER 2007
- Forest
- Non Forest

** Silvicultural Techniques for the Regeneration of Logged Over Rain Forest in East Kalimantan Plot (1996-2003)*

Data consolidation is being supported by institutional consolidation. The centralization of land data management in the Geospatial Information Agency (BIG) and of spatial planning in the National Land Affairs Agency (BPN) is expected to contribute to consolidated and more efficient coordination of spatial planning.

A common spatial framework, along with accurate and complete data, enables the use of a "landscape" approach to spatial planning.

This approach is based primarily on natural features of the landscape, ecological functions, and the distribution and abundance of natural resources, including biodiversity. This makes it a particularly useful way to integrate planning and decision making related to natural capital and ecosystem services within the same framework as social and economic development. Landscape approaches to planning have been used in many parts of Indonesia, as illustrated in the case study above (**Box 3.5**).

Extend Use of Strategic Environmental Assessments

Chief among the entry points or mechanisms for mainstreaming green growth in development planning is strategic environmental assessments (SEA or KLHS). SEA, though still new, is required by law in Indonesia for all strategic planning at national and sub-national levels, including sectoral development plans (RENSTRA).[o] SEA is similar in purpose to environmental impact assessment (EIA or Amdal) but it is applied on a larger scale, to plans or policies rather than to projects. The widespread use of SES in will contribute to mainstreaming environmental sustainability in spatial and economic planning, as it necessitates a comprehensive mapping of ecological hotspots and assessment of land use options in terms of natural capital and ecosystem services.[116]

SEA offers a potent and pragmatic way to guide spatial and development planning formulation and implementation. SEA informs policy-makers, decision-makers and planners, as well as would-be investors, about the value and risks of achieving economic growth that depends on environmental management, ensuring sustainability of natural capital, safeguards for investment impacts, and social inclusivity. For example, SEA is the basis for the landscape approach to US$ 250 million of green investment currently being developed by the Millennium Challenge Account Indonesia (MCA-I) Green Prosperity program in Indonesia[117] as an extension of its Participatory Land Use Planning (PLUP) that enables investments in renewable energy and improved natural resource management.[118] The Indonesian Forest and Climate Support (IFACS) project has assisted 13 districts in forested landscapes across Indonesian to use SEA to assess development priorities from multiple perspectives, including economic growth, health, biodiversity conservation, watershed management, and infrastructure development.[119] The largest and most comprehensive SEA ever undertaken anywhere in the world was that undertaken by the Environmental Support Programe (ESP3), under the auspices of Bappenas, for the Masterplan for Acceleration and Expansion of Indonesia's Economic Development (MP3EI). The SEA covered the MP3EI's national policies, as well as each of the six economic corridors linking infrastructure development projects across each of Indonesia's largest islands. [120]

SEA is still a new procedure in Indonesia and has significant potential to be extended to evaluate the potential environmental impacts of proposed policies, or the efficacy of green growth planning and policies. In particular, SEAs can elicit a greater sense of stakeholder ownership in development planning at the initial, scoping phase, which is technically less demanding, tends to focus more on major environmental issues, and is more readily understood by government and non-government stakeholders.[p] The scoping phase of SEAs may also be considered more generic in its application, as it has broad relevance to other planning instruments, as well as to regional policy-making. The scoping can also help to alert potential green investors to investment opportunities. Social legitimacy of development planning can be greatly enhanced through SEA, especially in today's Indonesia, where there is ever greater public expectations growth and development will be both equitable and environmentally sound.

By way of illustration, the following elements of the SEA scoping phase indicate various opportunities to nurture green growth:

- *Include what cannot readily be included in a planning instrument, such as details of relevant community aspirations and concerns.*
- *Provide ideas to potential green investors, as well as a sense of the overall investment climate.*
- *Cover a wider scope than an environmental impact assessment, capturing critical environmental impacts that are strategic, cross-regional, cross-sectoral, cumulative and remote.*
- *Leave sophisticated technical questions to a later stage under management of specialized entities, including analyses of: (i) carrying capacity and land suitability estimates, (ii) economic natural resource valuation, (iii) probabilities and impacts of climate change, (iv) environmental risks, and (v) efficiency of sustainable natural resource management.*
- *Invite public debate that can be managed by local government about the core principles of SEA that underpin international best practices.*

Above all, the SEA scoping phase offers a ready opportunity to build greater levels of stakeholder participation into development planning that balances economic and environmental priorities. The mechanism for ensuring participation in an SEA is to present to key stakeholders a draft for feedback at a multi-stakeholder forum (MSF). MSFs may have already been instituted for other reasons in a district or province, and that experience can be built on.

o. SEA is required under the Environmental Management Act of 2009. However, the implementing regulation governing its method and application has not yet been issued.
p. The scoping phase is an important preliminary stage of the SEA in which social, economic, and environmental features are identified along with strategic issues, existing development plans and targets. See, for examples, http://www.ifacs.or.id/who-we-work-with/urs/ and http://www.urdi.org/research-project/mcc-indonesia-support-services-for-gp-project-implementation

Box 3.6
STRATEGIC ENVIRONMENTAL ASSESSMENT: THREE CASE STUDIES

Strategic Environmental Assessment (SEA) is fundamental to achieving green growth in spatial planning. SEA makes it possible to clearly articulate, early in the planning process, the potential social and environmental impacts of policies and practices affecting land-use change and so enables better-informed decision making within and across sectors and regions.

SEA of the MP3EI

Indonesia's Environmental Support Program (ESP3) conducted an SEA of the Masterplan for Acceleration and Expansion of Indonesia's Economic Development (MP3EI). SEA was used as one of several methods for integrated policy assessment and planning.

National-level SEAs were used to estimate the monetary value of natural capital at risk from M3PEI if additional mitigation was not undertaken, using different metrics, across the six economic corridors in the MP3EI.[121] Impacts were considered cumulatively, with the aim of prioritizing areas to be addressed. Kalimantan was shown to be the economic region most at risk, and coastal wetlands the habitat most at risk from unmitigated MP3EI interventions.

At a more local level, SEA was used to estimate specific environmental impacts within MP3EI corridors. For instance, the map shows the estimated magnitude of coastal impacts from MP3EI projects in the Kotabaru Regency in South Kalimantan. Geographic data on human settlement, industry, and natural resources were mapped to identify vulnerable biodiversity and natural habitats in light of current development plans. Going forward, SEA results need to be scrutinized by the public and more fully embedded in planning processes. [122]

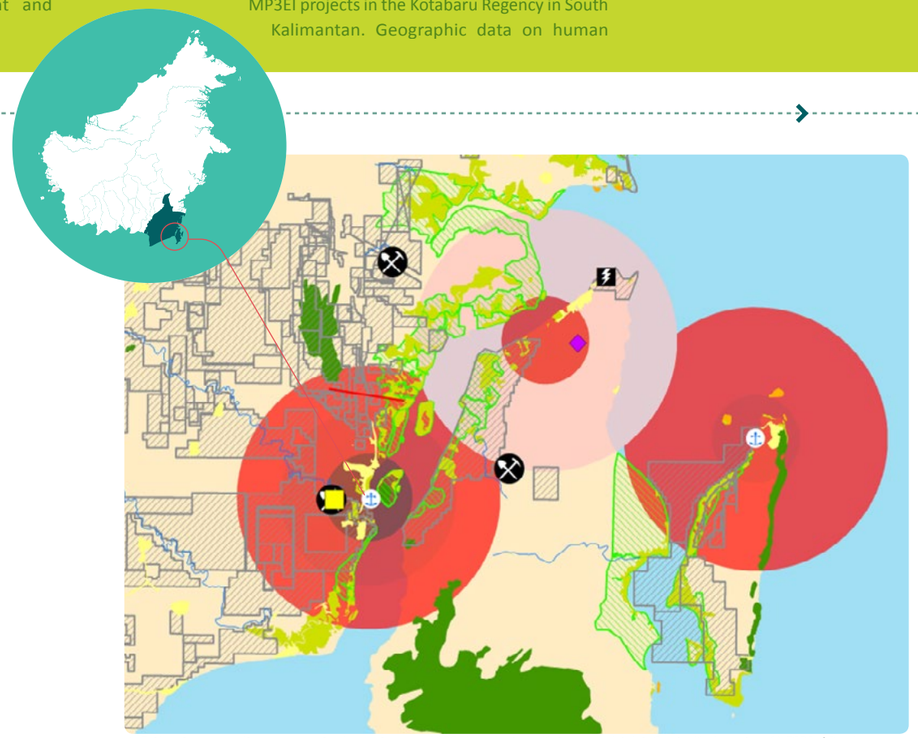
Formulation of SEA for Papua's provincial spatial planning

Papua's SEA in its crucial early stages benefited from robust public consultations in parallel with the required stages of spatial planning and feedback from government and non-government stakeholders leading up to the first draft spatial plan.

Significantly, the technical part of the SEA scoping phase was underpinned with the findings of the spatial plan's Facts and Analysis (F&A) Report. Another key feature of the process was to iteratively adjust the SEA as the long-term spatial planning process itself played out.[123] Accepting that SEA and F&A follow different guidelines but cover much of the same ground, this experience made clear the need for better integrating both during the five-year period of review of spatial plan (RTRW) enactment, as well as when these plans come up for renewal at 20-year intervals—or sooner, if policy reform demands it. Both SEA and F&A are useful reference points for the review of enacted spatial plans when they and the medium-term development plans (RPJM) are expected to incorporate climate change actions plans (RAD-RGK, RAN-API, and in the future, RAD-API).

Applying SEA to the Green Prosperity Program

The Green Prosperity (GP) program of Indonesia's Millennium Challenge Account (MCA-I) provides some promising indications of the value of the SEA scoping phase. These were conducted with multi-stakeholder forums in the districts of Merangin and Muaro Jambi in Jambi province and Mamasa and Mamuju in West Sulawesi. The SEA brought together representatives of NGOs, private sector and local government to identify related environmental, social and economic challenges facing their communities and districts. An interesting feature was the breakout session. Among the findings of the Merangin district SEA were the importance of resolving natural resource licensing problems, the need for village boundary-setting and the lack of sufficient coordination horizontally and vertically.



▲ *Estimated magnitude of coastal impacts from MP3EI projects in Kotabaru district, South Kalimantan* © ESP3 / Danida

◀ *People participating in SEA for Papua's spatial planning*
© Michael Padmanaba / CIFOR

Box 3.7
THREE MAIN POLICIES TO DESIGN GREEN SPECIAL ECONOMIC ZONES

Policies to establish green SEZs can contribute to economy-wide green growth outcomes in three major ways.

- **Incentivize green products to enter the SEZ:** This would help regulate and incentivize good practices outside of the zone, including imported and exported manufacturing products.
- **Design green growth policies for the entire SEZ in the earliest planning stage:** Another set of policies aim to plan and build SEZs to improve overall environmental performance of the entire zone by ensuring all investment have to consider the 5 desired outcomes of green growth.
- **Provide incentives and regulate economic activities to attract green technologies and innovation within the SEZ:** This objective would result in SEZ policies that aim to de-risk green investment by reducing operating costs for the investor.

SPURRING GREEN INNOVATION IN SPECIAL ECONOMIC ZONES

Special economic zones (SEZ) are geographically and legally delimited areas, administered by a single body, that offer certain incentives to businesses physically located within the zones. Traditionally SEZs have offered incentives such as duty-free importing and streamlined customs procedures. However, they can also serve as zones of innovation for (among other things) green growth, where government, the private sector, and others can "experiment to discover the optimal combination of policy instruments and regulatory mechanisms that maximize the economic benefit from cost internalization and sustainable use of natural capital and ecosystem services." Green SEZs can serve as testing grounds for innovative, green technologies and incentives which, if they prove workable, can then be scaled up through broader reforms throughout the whole economy. **Box 3.7** presents the three main policies needed to design green SEZs. [124]

An example of a more conventional form of SEZ in East Kalimantan, KIPI Maloy, is presented in **Box 3.8** along with an illustration of how its design can be improved, from a green growth perspective, by the use of socially and environmentally sensitive cost-benefit analysis.

Delivering Green Growth for a Prosperous Indonesia
A Roadmap for Policy, Planning, and Investment
Mainstreaming Green Growth in Economic Development (Planning)

FIGURE 3.3
Stylized overview of a "greened" planning and project appraisal process in Indonesia

ASSESSING AND DESIGNING
for Green Investment

Achieving green growth depends on understanding the macro-level impacts of micro-level investments and other interventions on the ground, and the consequent implications for the quality of Indonesia's growth. The bulk of green investment will come from the private sector. Therefore, government plans and policies need to take account of what drives—or inhibits—private investment, as well as requiring that projects meet certain standards of design and execution. Assessing the green growth performance of projects and policies on the ground provides an opportunity to redesign these investments, thereby improving the quality of their impacts. This section highlights the important role that tools and methodologies can play in assessing and designing for green investment.

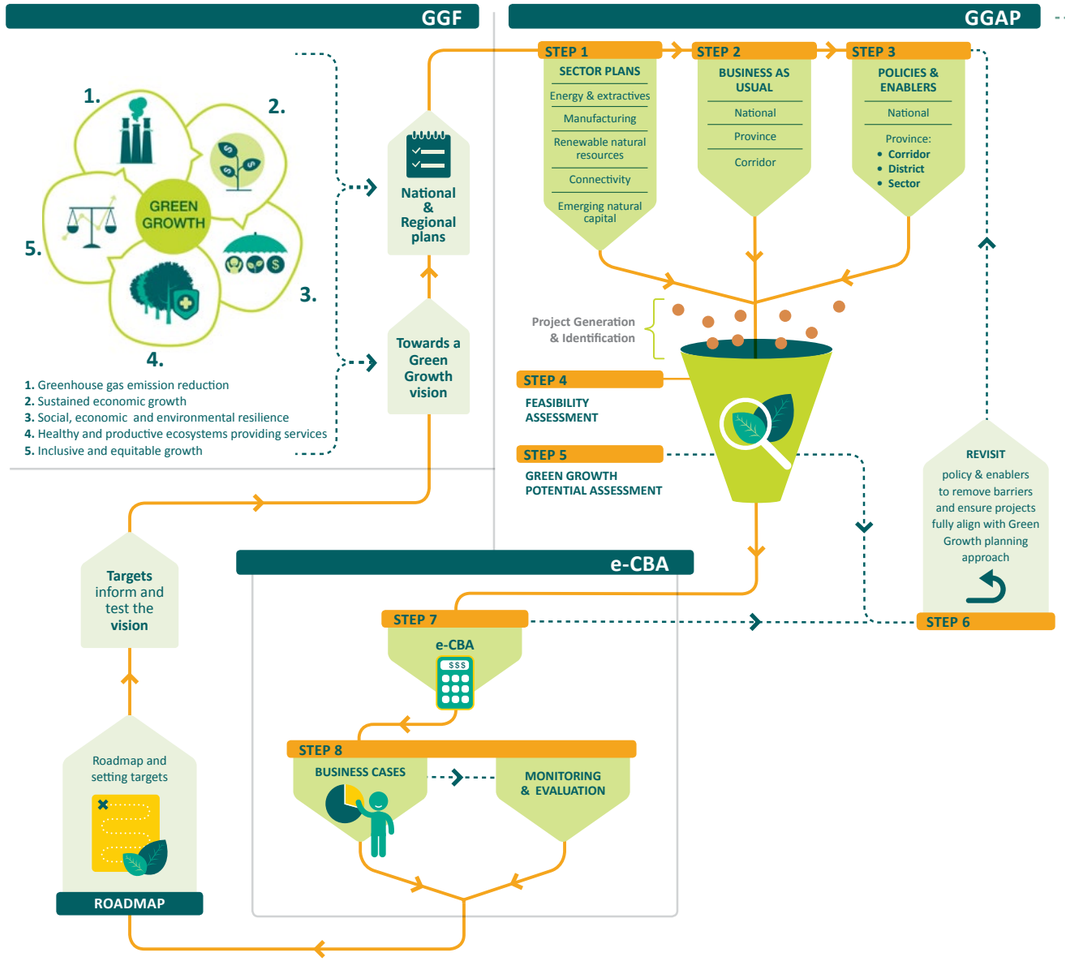
The Green Growth Assessment Process (GGAP)[125] (**Figure 3.2**) is an eight-step process through which various tools are used to help identify and promote green growth project outcomes. GGAP was developed to create indicators specific to projects, sectors, districts, provinces and Indonesia as a nation, and to use tools to prioritize and assess projects or policies for green growth in a consistent manner. In particular, it emphasises the robust assessment of the green growth performance of projects and policies on the ground to help improve both the design of planning processes at the macro level and the quality of investments that are implemented. It is fundamental to achieving Indonesia's desired green growth outcomes.

Applying appropriate tools and methodologies is essential if green growth is to be transformed from a vision into a reality within the five-year cycles of development planning. They can be applied at the specific points in the planning cycle in order to guide and implement green investment. **Figure 3.3** shows the entry points where these tools can help bring a green growth perspective into mainstream planning of investments.

Figure 3.3 presents a stylized overview of the current planning process and indicates how new processes and tools could be integrated into this system. For example, the EIA (Amdal) process—which assesses project-level impacts—can run in parallel with project preparation and intersect with the planning process at multiple points, beginning with the feasibility analysis and ending with the project approval process. Likewise, the SEA is designed to be an iterative, interactive process running throughout policy or program development.

The eCBA process (explained on opposite page) makes a rather different contribution towards the greening process through its emphasis on a comprehensive, integrated assessment of impacts in monetary terms across the five desired outcomes of green growth. Ultimately, a more formal integration of these tools may be desirable. EIA is required by law, whereas eCBA and similar assessments of social costs and benefits are not.

FIGURE 3.2
The Green Growth Assessment Process (GGAP)



PROJECT AND POLICY ASSESSMENT TOOLS

These tools, by analysing specific projects or policies, enable decision makers to measure the contribution that different development options make towards the green growth outcomes. The selection of the appropriate tools depends upon what questions policymakers are seeking to answer, such as:

- ***Does the intervention offer net positive benefits and should it proceed?***
- ***Are there opportunities to re-design this project or policy to enhance green growth performance?***
- ***Are there policies that might drive better outcomes for this and other projects?***

Cost Benefit Analysis (CBA) and extended CBA (eCBA)

Cost benefit analysis and extended cost benefit analysis (eCBA) are project and policy assessment tools focused directly on achieving green growth outcomes. These tools assess the performance of specific project or policy options in terms of meeting desired green growth outcomes.

In so doing, they provide a practical methodology to assess projects and policies at micro level and complement the macro-level tools.

Cost benefit analysis (CBA), as it is usually applied, quantitatively weighs up the relative financial costs and benefits of a potential decision. CBA is a popular tool for investment planning and decision making. eCBA is a variant of CBA that looks beyond financial costs and benefits to include also the social and environmental impacts. These are the hidden and external costs not usually accounted for in investment decision making. The eCBA approach is similar to that of social cost benefit analysis employed by the World Bank and some other international lending institutions. Indonesia does not currently require the use of extended or social CBA, but doing so for all public-private partnership investments would ensure greater attention to these broader costs and benefits to society.

The eCBA technique can be used for a specific investment proposal as well as for broader analyses; the term "project-level eCBA" is used when applying eCBA to individual projects and investments. A project-level eCBA is flexible in scope and can encompass different geographies and timeframes depending on project size. It can also be applied across different sectors by different users.

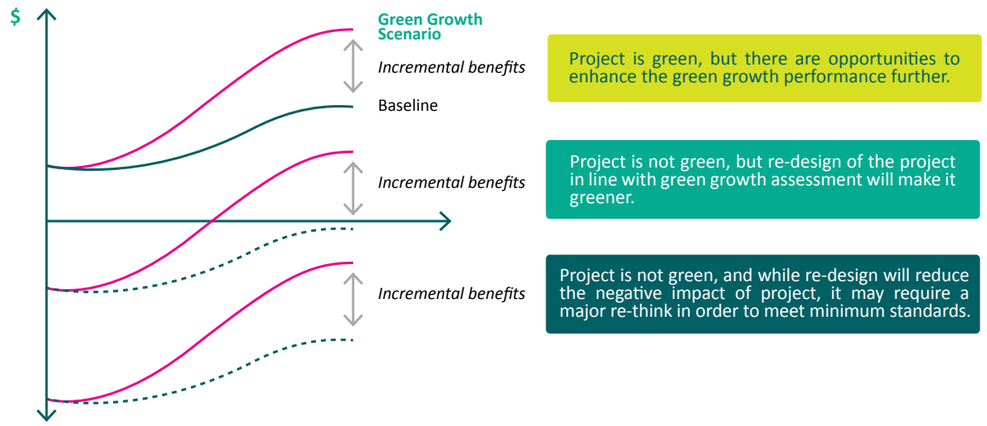
Full eCBA analysis aims to provide evidence-based value estimates of all costs and benefits, including social and environmental ones. As a result, it requires considerable data, time and skills. For some activities, it can also be possible to apply the basic concepts of eCBA, but to rely on expert opinion for estimates. In these cases, the objective of the analysis is not to give strongly defensible quantitative evidence, but rather to encourage explicit agreement about costs and benefits and to facilitate discussion, including amongst experts. This approach was used in the GPB Strategy.

▲ ***(Clockwise) green buildings in Jakarta*** *© Dhoni Setiawan / The Jakarta Post*, ***planning for green growth in East Kalimantan*** *© GGGI*, ***students learning about solar energy*** *© Ricky Yudhisira / The Jakarta Post*

A number of eCBAs undertaken by the GoI-GGGI Green Growth Program to review the impact of possible green growth interventions have demonstrated the tool's value in green growth planning for Indonesia. The eCBA on conversion of municipal waste to energy in the strategic zone in Mamminasata found that methane capture and usage could generate US$ 106 million of net societal benefits through poverty reduction and better waste management as well as avoiding the release of up to 9,000 tonnes CH_4/year. The eCBA of the KSN Mamminasata project found that conversion of fish waste into high value, high protein feed stocks could result in US$ 29 million of economic growth benefits as well as securing protection of natural resources. The eCBA on renewable energy technology solutions in Central Kalimantan indicated that off-grid micro-hydro could boost rural electrification, create new economic opportunities for rural communities and reduce dependence on solar diesel. However, it also found that such projects are unlikely to be financially viable unless the government provides funding to boost investment, most notably through better feed-in-tariffs, target guarantees and risk mitigation schemes. A case study of another eCBA, of a special economic zone in East Kalimantan, is featured below in **Box 3.8.**

These examples demonstrate the versatility of project-level eCBAs, and their power as tools for examining greener alternatives to baseline, business-as-usual (BAU) scenarios. Such alternatives typically enhance a project by minimizing green growth costs and maximizing benefits. **Figure 3.4** presents a stylized example of how a project-level eCBA can be used to estimate the difference between current plans and green growth scenarios. The horizontal line represents the minimum threshold at which a project can be considered to be contributing to a green economy.

FIGURE 3.4
Measuring current plans and green growth



Tangible project-level eCBA results such as these can provide substantive evidence to help make the case for green growth to decision makers. They can also be used to determine the size of investment needed to secure benefits over time. Their strength lies in their ability to identify the monetary values of public goods, environmental externalities and social returns associated with projects.

Another advantage of eCBAs is that they can help to avoid costly errors in decision making. For instance, a mega-project in Central Kalimantan in the 1990s to turn peatland into rice paddies caused considerable and cost environmental damage before it was abandoned. Poor planning has been identified as a key factor in this failure; eCBA provides a crucial means to avoid such mistakes in the future.[126]

While the key purpose of the eCBA is to enable the design or redesign of individual projects to better achieve the desired green growth outcomes, the tool can also be used to draw policy implications across the five desired outcomes of Indonesia's green growth. In particular, eCBA can be used in four broad ways to drive green growth policy and planning:

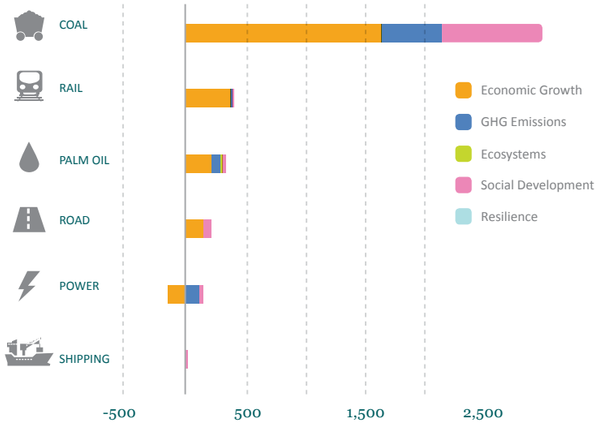
- *As a justification for change in public policy;*
- *As a tool for quantification of existing or proposed policy incentives;*
- *As a tool for prioritization of green growth policies; and*
- *As a validation mechanism before policies are enacted and implemented.*

Specifically, it can be used by both government and business

- *To allocate resources to the projects or policies with the highest green growth performance;*
- *To re-design and optimize publicly-funded projects;*
- *To inform policy on barriers and enablers of green growth;*
- *To build a business case for projects with green growth benefits in order to attract private investment;*
- *To re-design and optimize investment and operations to maximize value to the communities in which a project operates;*
- *To identify cost-saving ways of doing business.*

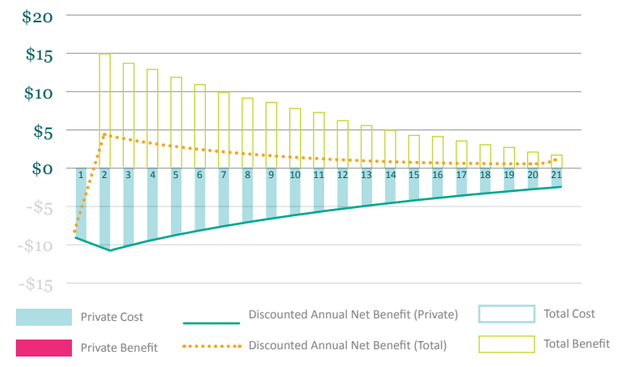
This box illustrates the usefulness of a project-level eCBA and how it can shed light on policies.

FIGURE 3.5
Impact of green growth Interventions on outcomes of green growth (in million USD (2013))



Source: GGGI

FIGURE 3.6
Profile of costs and benefits over time (in million USD (2013))



Source: GGGI

Box 3.8
APPLYING ECBA TO A SPECIAL ECONOMIC ZONE IN EAST KALIMANTAN

The extended cost benefit analysis (eCBA) of the KIPI Maloy Special Economic Zone in East Kalimantan evaluated the societal costs and benefits likely to be generated by proposed green growth interventions. The zone aims to build up a competitive industry cluster by generating increased value-added economic activities from natural resource-based industries.

First, the current, baseline performance of the zone was identified with the help of project representatives and stakeholders in East Kalimantan. Options were then identified to improve the zone's green growth performance with the help of local stakeholders and green growth experts. Impact pathways were then mapped out, linking changes in investment to estimated impacts on stakeholders. These impact pathways were then brought to life by gathering primary, secondary and international data for the eCBA. Finally, the assumptions and results were validated with local stakeholders.

From a green growth perspective, the baseline plan for KIPI Maloy Development does not represent the optimal development path for Indonesia. Even with strong environmental regulations there are a range of externalities and governance, policy and institutional factors that will prevent the KIPI Maloy Development from attaining the best green growth performance.

The eCBA assessment considered nine green growth interventions, including gasification of coal for power generation, rerouting of the railway to follow an existing road's route, and extension of the road to develop a tourist resort. The aggregate net benefits generated across the nine interventions is US$ 3.8 billion, which is equivalent to over 10% of East Kalimantan's GDP in 2012 and represents a benefit-cost ratio of over 1.9.

FINANCING GREEN INVESTMENT

Having a prioritized portfolio of green investment opportunities would help to ensure that finances are being channeled appropriately. After plans have been through the SEA process, and projects have been assessed through the eCBA process, a pipeline of high-quality projects should emerge for which investment will be needed.

An effective pipeline for green investment depends upon:

- *An adequate enabling environment for green investments with the necessary fiscal tools;*
- *Capacity to design projects consistently across ministries;*
- *Rewards being commensurate with risks;*
- *Project and non-project related risks mitigated where possible;*
- *Matching funding; and*
- *Achieving financial closure for private sector.*

Many of the fiscal tools outlined in **Part 2** are fundamental in underpinning an effective pipeline for green investment across sectors. These include feed-in tariffs, fossil fuel subsidy removal, fixed-term tax holidays, corporate income tax relief, concessional finance or accelerated depreciation allowance for investment in high-performing equipment, viability gap financing and payments for ecosystem services.

By following this methodology from macro-level assessments through financial feasibility reviews to project level assessments, projects can be approved which reliably contribute towards green growth outcomes. Well-designed policies and processes can make economic growth and climate objectives mutually reinforcing.[127] However, consistent, credible, long-term policy is crucial to shaping market expectations and encouraging investment. Similarly, the tools, policies and methods outlined in this chapter can only have significant green growth implications if they are applied consistently to all planning processes. This will involve the mainstreaming of relevant processes into policy down to project level, along with funding and commitment across government tiers.

Financial mechanisms—through a combination of private sector incentives and public-private partnerships—can be used to embed the correct price signals and to encourage industry to move in the direction of green growth. This applies across the sector clusters but is of particular relevance in the energy and extractives sector cluster. The following guarantees may be used to help stabilize price signals in the market and encourage private investment in the energy and extractives sector cluster:

- *PLN to consistently set purchase prices for electricity from renewable energy projects into the future;*
- *Government to provide set carbon prices to investors and recover costs or benefits by selling credits on voluntary markets.*

Tools for project cash flow assessments that incorporate price signals of new policies will support efforts to finance electrification. These can be produced and distributed with accompanying capacity building workshops for private sector investors and government officials at all levels.

The overall amount of funding available for green investments can be increased to the extent government is willing to share or reduce the risks to private developers of their initial capital investment. This is in the public interest if projects are likely to generate substantial social or environmental public benefits beyond the returns to private investors. The green assets can be sold by developers to institutional investors after the risky construction phase has been completed. At this point, institutional investors are attracted by the relatively stable cash flows that the assets generate over a long period of time. Meanwhile, the funds generated by the sale of assets can be reinvested in new green projects.

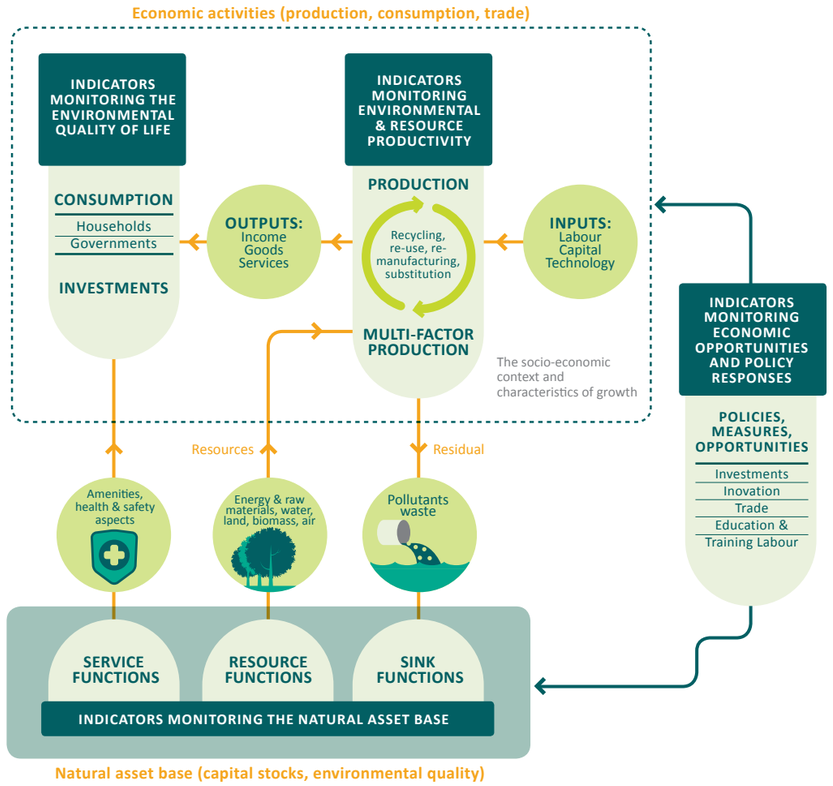
This virtuous recycling of funds will help to increase the degree of leverage from public resources. Domestic securitization structures can be established through bundling operating assets, e.g. generating steady streams of cash flows, thereby providing public loss layers to attract domestic institutional investors, and aggregating projects and issuing asset-backed securities.

The GPB Strategy shows the importance of increasing the average leverage ratio of public policy in green growth, if the challenges are to be addressed and growth is to be sustained. In the medium-term, the main strategy for achieving this is to expand the role of financial institutions in providing finance. OJK have produced a Roadmap for Sustainable Finance in Indonesia that reviews the main constraints and proposes a coordinated program that addresses both the supply of, and demand for, green financial products. It also proposes a 'policy umbrella' that help coordinate policy development, including removing bottlenecks and introducing new policies.[128]

MONITORING AND MEASURING
Green Growth Performance

Progress towards a greener Indonesian economy will require robust monitoring and measurement of economic performance. The roadmap offers a comprehensive suite of indicators for doing this. Together, these indicators span the five desired outcomes of the Green Growth Framework. As such, the proposed set of indicators is similar to the comprehensive measurement framework proposed by the OECD for green growth, which includes five types of indicators covering: a) resource productivity; b) natural assets; c) environmental quality of life; d) economic opportunities and policies; and e) socio-economic context and growth characteristics. The OECD conceptual framework, shown in **Figure 3.7**, demonstrates how indicators can be positioned to monitor flows between the natural asset base and economic activities, as well as government interventions.[129] It provides a means of monitoring positive economic growth and human development, while ensuring that natural assets continue to provide the resources and environmental services upon which well-being relies.

FIGURE 3.7
The OECD conceptual measurement framework for green growth[130]



The first set of indicators in the OECD framework monitors the environmental and resource productivity of the economy (production and consumption). The inputs to the economy captured by this set include labour, capital, and technology. This shows, from a green growth perspective, how well the economy uses the inputs it receives. Production creates goods, services and income, which must also be monitored.

The second set of indicators monitors the natural asset base, or natural capital, on which the economy relies for natural good and services, such as timber and water. Though crucially important to human well-being and economic performance, resource depletion and other changes in the natural capital base are largely missed by conventional economic indicators such as GDP.

Economic activity also impacts upon, and often degrades, the natural asset base, e.g. through pollution and waste. This has ramifications for both the natural environment and the communities and sectors that rely on it. A third set of indicators is therefore introduced to measure the environmental quality of life. This is primarily the environmental impact of the economy's processes upon the lives of people, but it could also include the results of global environmental change. This set includes indicators such as air and water quality.

Together, the three sets of indicators provide an overview of the broad state of the economy as defined by green growth. In order for green growth to be achieved, all of the indicators should show broadly positive trends. Since policies can impact upon both the economy and the natural asset base, a fourth set of indicators is introduced to monitor policies. The OECD framework therefore ensures that green growth outcomes are taken into account and drive policy-making, planning, and performance measurement at all stages of the movement of goods and services through society.[131]

GREEN GROWTH INDICATORS FOR INDONESIA

The green growth indicators proposed in this roadmap are intended to supplement indicators that are already used for routine planning; such indicators are well reported in statistical sources and are frequently referred to in planning documents. Thus, these green growth indicators do not include standard indicators of economic development (e.g. total and per capita GDP, investment, consumption, productivity) or poverty reduction (e.g. headline poverty rate, Gini coefficient, depth of poverty). Indicators of access to social services and related performance in health, education and welfare are widely used in sector planning,

▼ *A flowing creek in Gunung Halimun-Salak National Park, Java*
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INDICATORS FOR THE QUALITY OF ENVIRONMENTAL ASSETS

1.

Area of forest in good condition, defined as forest that provides: full watershed protection benefits, including run-off buffering and reducing soil erosion; carbon stocks; and strong biodiversity benefits, equivalent to those provided by mature rainforest. This indicator can be derived from the monitoring reported in the Ministry of Environment and Forestry's Statistics Yearbook and will draw attention to the importance of monitoring the quality of forests, as well as their area.

2.

An index of fish stocks and coral reefs in good condition that reflects species diversity as well as total volumes. This can be determined by surveys and is affected both by fishing policies and by water pollution.

3.

The GEF Benefits Index for Biodiversity, which seeks to measure the potential global benefits that can be realised from biodiversity-related activities. It therefore captures both the status of biodiversity and the extent to which human activity is promoting biodiversity conservation.

4.

The average air pollution faced by Indonesians living in cities and other areas affected by air pollution, including haze from peat fires.

INDICATORS OF RESOURCE EFFICIENCY

5.

Water use per capita for those Indonesians covered by an organised water supply. This indicator will show the trends in the efficiency of water use and will help to recognise the value of initiatives that promote improved efficiency of water use.

6.

Energy productivity (i.e. energy consumption divided by GDP). This indicator will measure whether Indonesia is moving towards international norms for middle-income countries and will encourage identification of which sectors are most energy intensive and so might benefit from energy efficiency programs.

7.

GHG emissions intensity of the economy, with emissions as reported by Indonesia to the UNFCCC. This is a well-established indicator that is included because it is central to the objective of mitigating climate change but not yet widely used in development planning and domestic reporting.

8.

Average years of remaining mineral reserves, at current extraction rates, weighted by the value of current extraction of each mineral. This can be calculated by dividing the latest estimates of mineral resources provided by the Ministry of Energy and Mineral Resources by the most recent year's extraction and weighting the results by the value of the extraction. The indicator will highlight the importance of forward planning on natural resources use.

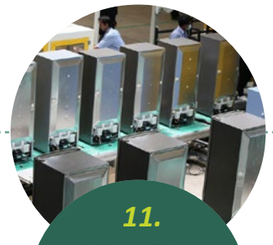
COMPOSITE AND POLICY TRACKING INDICATORS

9.

A composite indicator derived from data in the World Bank Country Policy and Institutional Assessment, to track progress related to capacity, institutions and governance.

10.

The value of fossil fuel subsidies, to indicate and signify progress on policy enablers and incentives.



11.

An indicator of 'Decent Green Jobs,' defined as employment in businesses and sectors that promote green growth. This indicator is defined by the International Labour Organisation and the Indonesian Green Economy Model (I-GEM) illustrates how it can be used in practice.[134] This indicator will capture environmentally and socially acceptable employment and encourage wider debate about exactly what constitutes decent green employment.

12.

A 'Vulnerability Index' that will measure social, environmental, and economic vulnerability to climate change. This can initially be based on the German Watch CRI score, but could be replaced by the Maplecroft Index or by an index developed in Indonesia.

and social infrastructure, including safe water and sanitation, electricity and the Internet. The international Human Development Index and Social Progress Index also provide options for monitoring social improvements. Environmental indicators are less widely reported, but indicators of air and water quality are included in Indonesia's Environmental Quality Index (IKLH). Forest area and forest cover change, which are measured by various remote sensing platforms and reported by a number of national and international agencies, will be systematically monitored under Indonesia's national REDD+ system for measurement, reporting, and verification (MRV).[132]

Nor does the roadmap present a single composite index, although options for this are available, including Green GDP,[q] various wealth measures and Total Material Output.[133] Rather, the proposed suite consists of a dozen key indicators that do not often feature in development planning and therefore add value to routine planning. Indicators that are used primarily for sectoral policy are not included, but could be developed for sectoral planning and monitoring. Several of the indicators are already included in the Environmental Quality Index (IKLH).

The proposed green growth indicators are grouped in three sets, covering (i) indicators of the quantity and quality of natural resources and ecosystem services; (ii) indicators for resource efficiency, productivity, and carbon intensity of the economy; and (iii) composite and policy tracking indicators covering institutional capacity, policy reform, and resilience.

Conclusion

In **Part 3**, we have seen how a comprehensive strategy of adopting policy enablers for green planning and investment, broad-based planning and decision-making guided by strategic environmental assessment and extended cost-benefit analysis, amongst other tools and methods, can help mainstream green growth beyond individual projects and initiatives into the wider economy. The mainstreaming approach from this chapter is tied to the sector cluster-specific opportunities identified in **Part 2**. It also informs the development of the overarching action plan for green growth presented overleaf in **Part 4**.

q. Green GDP is calculated by adjusting conventional GDP to take account of the economic cost of reduction in natural resources assets, including biological and mineral resources. Indonesia is one of the few countries in the world that has a long-standing practice of estimating Green GDP, through the Sisnerling system. However, this currently addresses only loss of mineral resources. There are initiatives to extent this to cover loss of forest resources and, importantly, degradation of forest resources.

PART 4

Delivering Green Growth for the Nation

▲ ***(From above) solar PV, a potential renewable energy source*** *© Getty images,* ***Ecotourism site of Raja Ampat*** *© GGGI Indonesia*

Indonesia has ample opportunity to move towards a green growth future, but time is pressing. Costs are mounting under the current, business-as-usual scenario. Environmentally-damaging human activities are resulting in lost ecosystem services, declining soil productivity, deteriorating food and water security, and negative health impacts.

This roadmap describes how Indonesia can shift its growth trajectory in ways that will deliver economic, business, social, and environmental benefits. Gradual, incremental improvements in productivity and structural change, sustained over the coming decades, can help Indonesia grow its economy five-fold while reducing its environmental footprint—including carbon emissions. By following this green growth vision, Indonesia can become an advanced economy with a productive and healthy population, well-functioning ecosystems, good infrastructure, and a diversified economy that invests in natural and human capital.

> By following this green growth vision, Indonesia can become an advanced economy with a productive and healthy population, well-functioning ecosystems, good infrastructure, and a diversified economy that invests in natural and human capital.

To achieve the vision, Indonesia will need to continue to modernize its economic structure and production processes, promote socially inclusive growth that benefits all segments of society, and ensure greater harmony between economic activity and the environmental underpinnings of a successful society and economy. Green growth will mean a progressively greater role for Indonesia's high-value-added activity in modern sectors including services, and sustained improvements in the productivity of labor, capital and resources—all resting on the use of modern technology, efficient infrastructure and a well-educated workforce.

Green growth requires enabling policies that create an attractive investment climate for the industries of the future. It involves shaping national and regional policies, plans and projects to integrate social and environmental benefits and costs from the start. Building capacity and institutions, and ensuring good governance, are each essential to underpin policies, incentives, plans and projects.

These objectives and approaches are not unique to an environmental protection perspective. Rather, they arise out of a much broader view of a desirable and successful economy and society that is already widely shared and supported in business, society, and government.

As described in **Part 2**, "green shoots" may be seen in various projects and initiatives underway across the country. If scaled up, these could act as important enablers of green growth, especially in combination with some of the more ambitious, new policies identified in this roadmap. Mainstreaming of a well-balanced, holistic green growth approach will require the right mix of policies and enablers linked to the integration of green growth into planning and investment decision-making, as described in **Part 3.**

ACTION PLAN
to Deliver Green Growth for Indonesia

The proposed action plan for green growth in Indonesia is based on three, mutually reinforcing sets of activities designed to achieve the five outcomes contained in the Green Growth Framework:

- *Create enablers and incentives that result in a conducive investment climate to reduce risks to investors.*
- *Shape national and regional policies, plans and projects so that they integrate social and environmental benefits and costs from the start.*
- *Build capacity and institutions, and ensure good governance, to underpin the targeted policies, incentives, plans and projects.*

This roadmap points both to concrete actions and broader approaches over various timeframes and across multiple sectors. Some of these enabling actions and approaches are already in motion. Others are achievable with additional, dedicated effort. Still others will require significant changes in thinking and practice. None are beyond reach and all will benefit the nation's broader objective of developing a modern, high-income, people-based economy that provides a high quality of life for citizens in all of its communities.

The enablers of green growth identified in this roadmap include a broad range of actions across the sector clusters of energy and extractives, manufacturing, connectivity and renewable natural resources, as well as within the cross-cutting area of emerging markets for natural capital. They include such diverse items as removing fossil fuel subsidies, investing in the research and development of clean technology, fast-tracking international sustainable product certification, improving community engagement in reef management and providing long-term finance for forestry projects. These enablers are not the only ones needed to make green growth a success. However, they represent a potentially robust set of policies and initiatives to put Indonesia on a green growth trajectory. Some actions have already begun. The action plan shows how the green growth opportunities described in the roadmap can be realized over time.

Table 4.1 below pulls together the green growth enablers from across the sector clusters to create an action plan for initiating green growth. Beginning at the bottom of the table, the three approaches outlined at the beginning of this chapter provide the essential principles for setting green growth in motion at a strategic level. Following this, key themes (drawn from the opportunities recognized in part 2) and indicators to measure progress are established for each sector cluster.

The enablers for each sector cluster are then listed as outcomes in the short-term (by 2020), the medium-term (by 2030), and the long-term (by 2050). Short-term priorities include both urgent interventions that cannot wait and early opportunities that can be taken. For example, a key short-term priority across sector clusters and ministries is the embedding of GGAP into planning processes. Medium- and long-term actions require other steps to be taken first or need more time to achieve results. High level economy-wide indicators are then listed above to monitor progress across sectors. The five outcomes of green growth sit over the entire action plan as both the driving force and the end goal of Indonesia's green growth vision.

TABLE 4.1
Action plan for green growth

50 ACTIONS TO DELIVER GREEN GROWTH

Sector clusters	Cross cutting enablers to drive actions	Short term enablers for Green Growth	Medium term enablers for Green Growth	Long term enablers for Green Growth
ENERGY AND EXTRACTIVES	1. Create policy enablers and incentives that result in a conducive investment climate. 2. Shape national and regional policies, plans and projects so that they integrate social and environmental benefits and costs from the start. 3. Build capacity, institutions, and ensure good governance to underpin the targeted policies, incentives, plans and projects. 4. Mainstream GGAP into planning processes across sectors. 5. Track and measure green growth performance in planning, policies, and investment.	6. Conduct regional assessments to determine appropriate energy solutions 7. Investigate localised barriers to investment and develop knowledge transfer 8. Review feed in tariffs 9. Remove fossil fuel subsidies 10. Explore options for domestic gas as a bridging fuel 11. Develop targeted approach to increasing value added in mineral processing	26. Provide incentives for investment in clean energy access solutions 27. Implement carbon pricing 28. Attract the private sector to geothermal by addressing financial barriers and sharing risk 29. Develop mineral processing industries in areas with renewable energy, water supply or other auxiliary resources	
MANUFACTURING		12. Develop fiscal incentives for energy efficiency 13. Engage key industry players on energy efficiency 14. Invest in R&D in cleantech for processing materials	30. Remove fossil fuel subsidies and introduce carbon pricing 31. Improve production methods in heavy industries including the refining sector 32. Support SMEs in the cleantech industry 33. Establish new industries around waste products and processing	46. Stimulate investment in low GHG landfills and ensure project execution
CONNECTIVITY		15. Create institutional structures and capacity for smart city planning 16. Create institutional capacity for intermodal connectivity 17. Establish targeted pipeline for green infrastructure projects	34. Carry out extended cost-benefit analyses of major connectivity solutions	47. Embed climate risk assessment into investment processes for urban development
RENEWABLE NATURAL RESOURCES		18. Accelerate the One Map initiative 19. Monitor and ensure transparency where/ when concessions and licenses are awarded 20. Scale up innovative models for forest and peatland management 21. Scale up the Sustainable Consumption and Production program across ministries 22. Improve productivity of rice, palm oil and other key food commodities	35. Build environmental law enforcement capacity 36. Address degraded peatland and peatland fires 37. Engage communities to restore ecological productivity of marine ecosystems 38. Improve management of industrial liquid and solid wastes in coastal areas 39. Strengthen the ambition and enforcement of domestic product certifications 40. Develop knowledge transfer program on sustainable supply chains 41. Promote natural alternatives to chemical fertilizers for soil fertility 42. Diversify staple foods	48. Address role of smallholders in production
NEW NATURAL CAPITAL-BASED MARKETS		23. Develop framework for domestic carbon market 24. Develop a prioritized pipeline of activities 25. Introduce PES governance	43. Respond dynamically to international discussions on carbon pricing 44. Establish preferential long-term debt financing 45. Establish, support and monitor new natural capital-based markets	49. Undertake responsible bioprospecting to underpin the development of biotechnology industries 50. Roll out ecotourism training and monitoring

by 2020 — by 2030 — by 2050

Figures 4.1 to **4.5** below contextualise the action plan by demonstrating how each enabler supports the overarching themes of green growth outlined at the beginning of this section. The figures also illustrate the period of time within which the sector cluster enablers would take place. For instance, some of these enablers are short-term quick wins, such as the removal of fossil fuel subsidies (which has already begun). In contrast, engaging communities to restore the productivity of marine ecosystems will be most effective if it begins now but also remains a priority over the long-term. These approximate time-frames can help to inform the allocation of budgets across ministries to achieve economy-wide green growth over time.

NOTE:

- Create policy enablers and incentives that result in a conducive investment climate.
- Shape national and regional policies, plans and projects so that they integrate social and environmental benefits and costs from the start.
- Build capacity, institutions, and ensure good governance to underpin the targeted policies, incentives, plans and projects.

FIGURE 4.1
Indicative cluster plan with enabling imperatives: energy and extractives

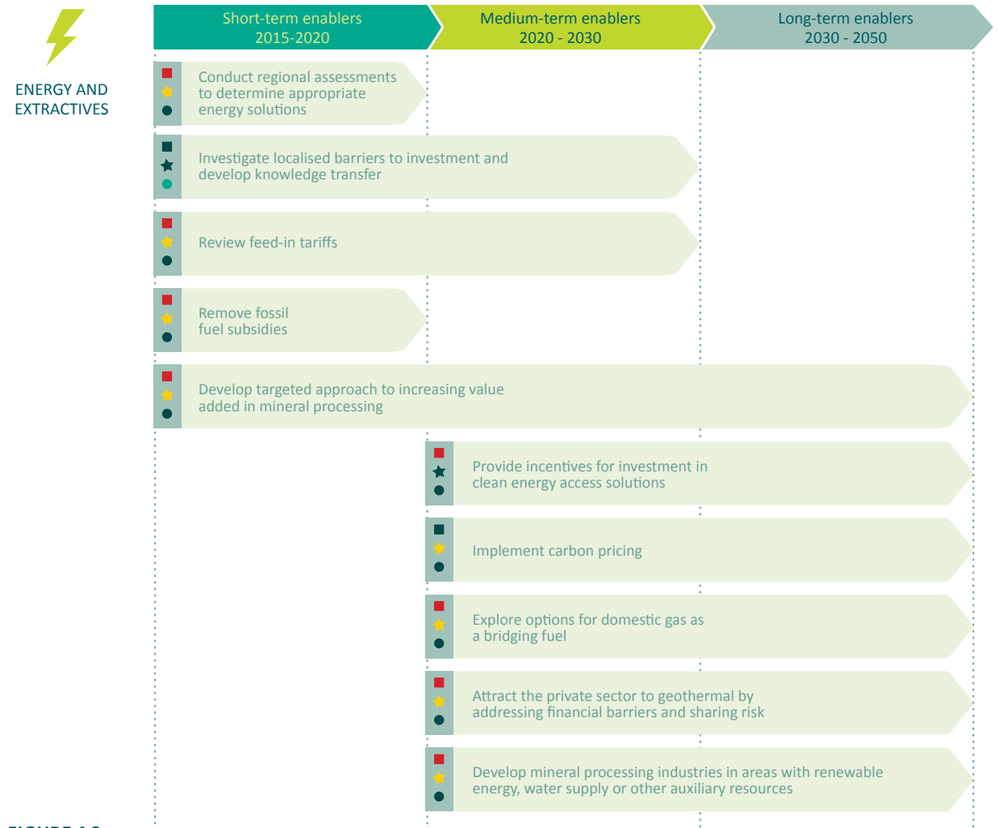
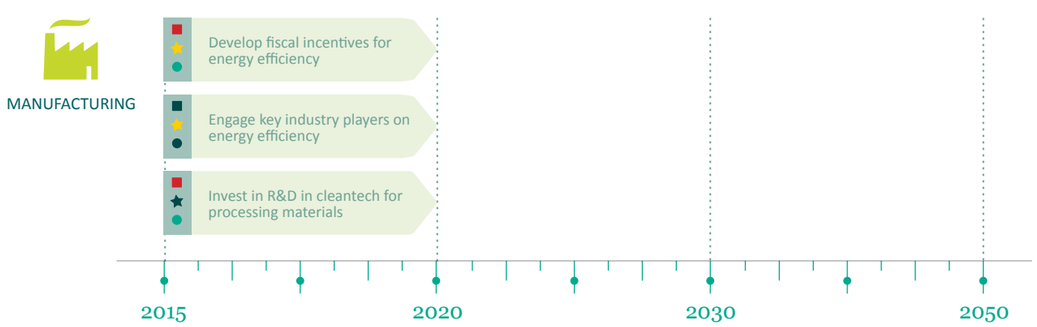


FIGURE 4.2
Indicative cluster plan with enabling imperatives: manufacturing



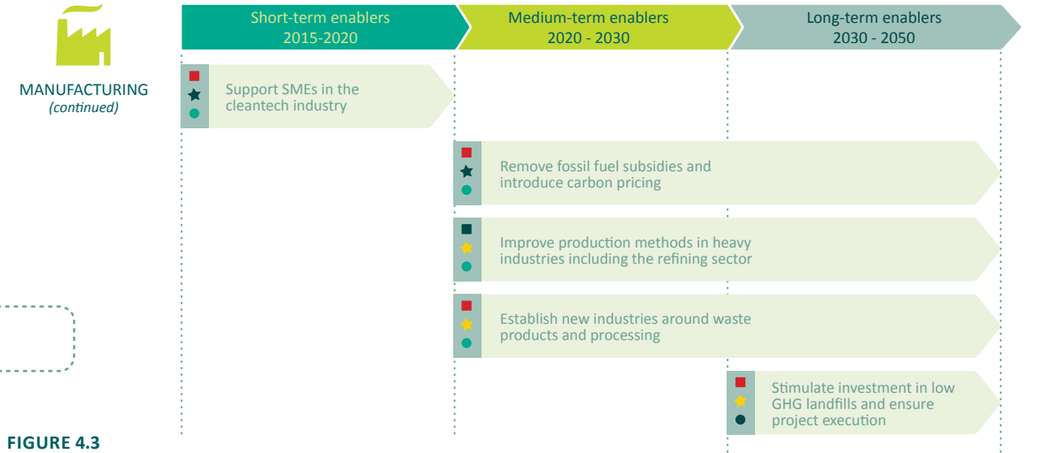


FIGURE 4.3
Indicative cluster plan and enabling imperatives: connectivity

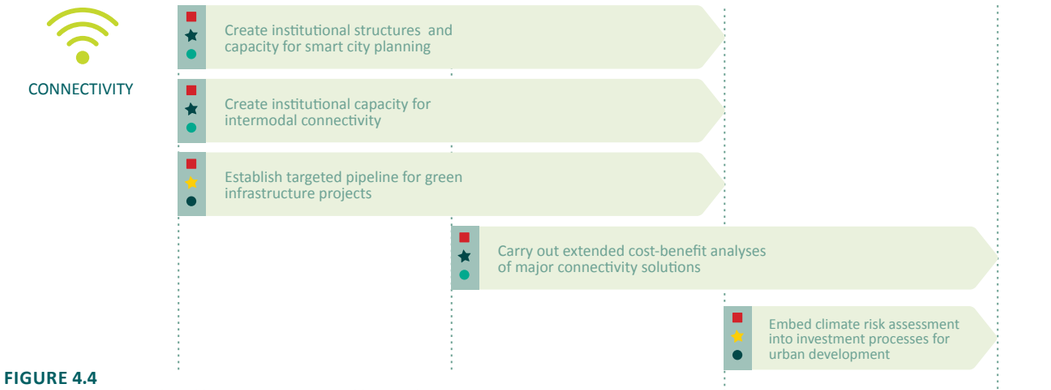
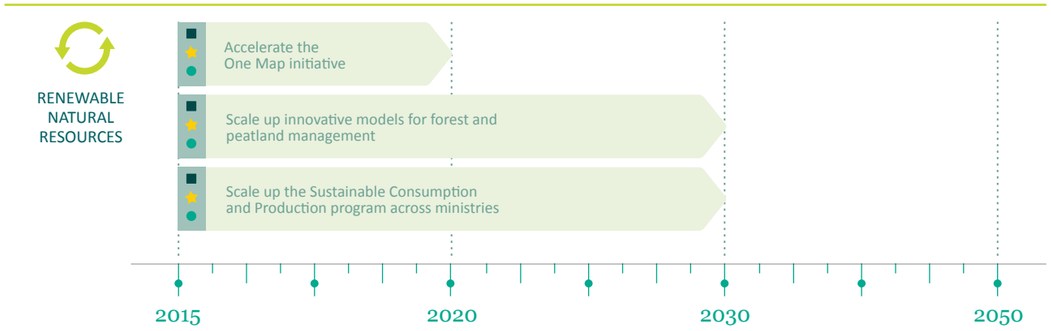


FIGURE 4.4
Indicative cluster plan with enabling imperatives: renewable natural resources



Many more actions can be identified beyond those listed here. These will become apparent to analysts and policy practitioners when they view policies, institutions and investments through the prism of a form of economic growth that is equitable, inclusive, and sustainable.

An additional, crucial element of Indonesia's green growth strategy is the development of an internationally competitive service sector. The roadmap does not address in any detail the opportunities and actions to accelerate the growth of the service sector. In broad terms, however, support to service sector development will entail: continued investment in human capital, especially tertiary education; an efficiently administered, predictable, legal and regulatory regime, and; the development of high-quality transport and urban infrastructure.

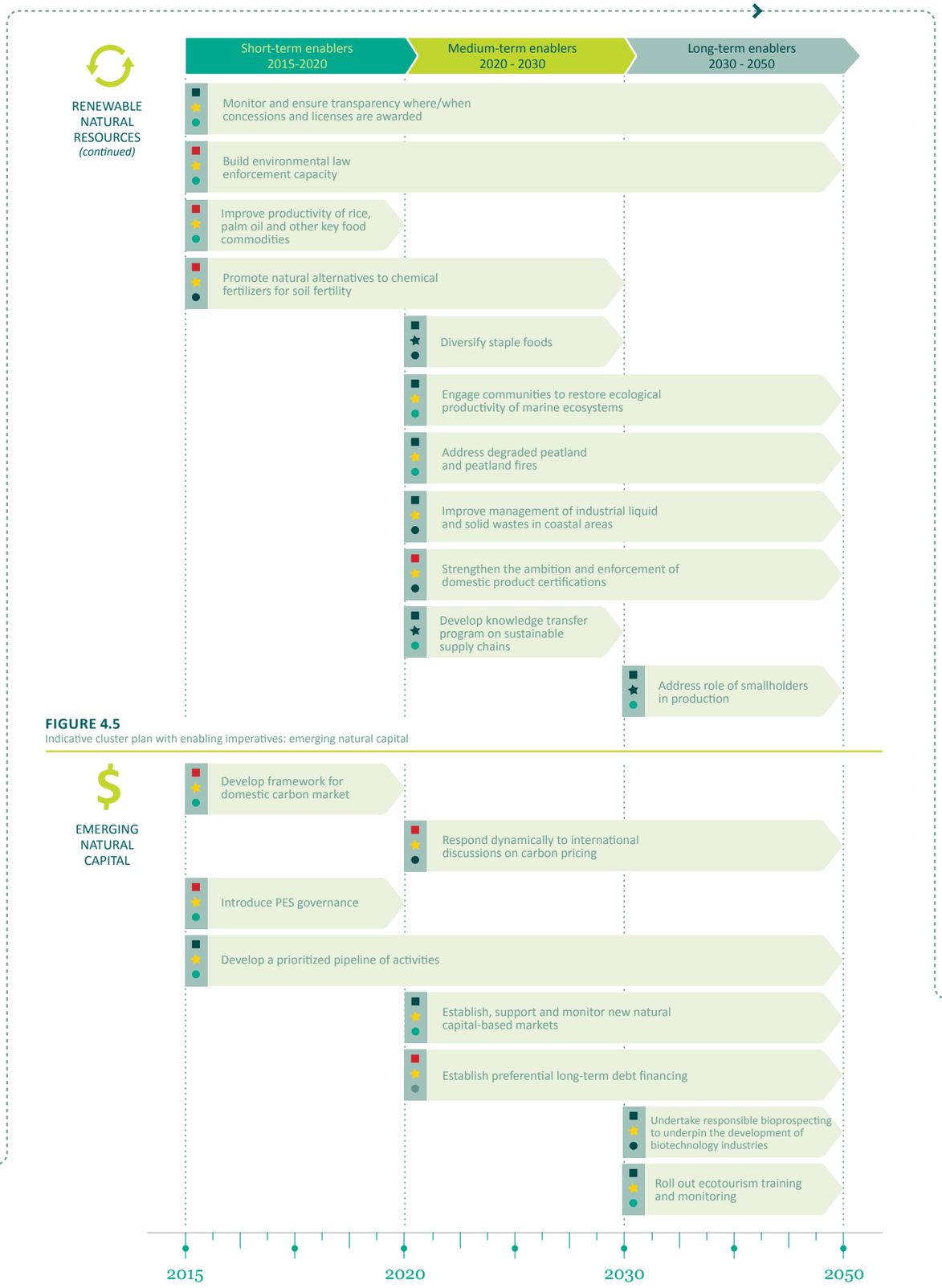


FIGURE 4.5
Indicative cluster plan with enabling imperatives: emerging natural capital

▲ *A 3-year-old girl showing a cabbage seed to be planted in a nursery area*
© CIFOR / CC BY-NC-ND 2.0

BUDGETING FOR GREEN GROWTH

The GPB Strategy estimated that, in order to protect growth from the threats posed by environmental degradation, social exploitation and climate change, total green investment (both public and private) will need to rise from the current levels of 2% of total investment (i.e. about IDR 53 trillion out of a total of 2,800 trillion) to about 15% in 2033. At present, government's share of total green investment is about 35% (i.e. about IDR 19 trillion); this share is expected to decline by about 1% a year as the country moves towards the norms of higher middle-income countries and, eventually, high-income countries, where public green investment is typically less than 10% of total investment.

The roadmap shows how instruments can be designed that work with markets to ensure that government policies achieve high ratios of leveraging private sector investment. The roadmap action plan contains 50 priority actions, of which about two-thirds work through instruments that are associated with high leverage ratios, including markets, incentives, information, and regulations. The actions can be classified as follows:

- *Five cross-cutting enablers to drive actions through policy-making and planning*
- *Ten actions involving public investment or promotion of private investment*
- *One change in subsidies*
- *Four actions involving incentives for private sector response*
- *Eleven policies for market promotion*
- *Nineteen studies, research and development actions and capacity building.*

The public costs of these policies will be included in national and local budgets, negotiated through the routine budget process and supported by the GGAP analysis. Initially, the largest budget demands are likely to be for public investment. However, the costs of introducing and managing incentives, as well as building the institutions for enforcing regulations, are often underestimated and will also require substantial budgetary allocations.

While the requirement to build measures designed to achieve green growth out comes into investment and policy will create some increase in up-front costs, both for government and the private sector, most GGAP work shows that there are substantial net benefits to be gained. Without the benefit of green growth policies, GDP growth would decline substantially as a result of climate change, environmental degradation and social tension. As a result, GDP levels in 2050 would be 3 to 3.5 times higher than at present, rather than 4.5 times higher, as currently projected. Government revenues will also be proportionally lower. In the mid to long-term, the budget balance under the Green Growth Roadmap will be substantially more healthy than if policies are driven purely by the pursuit of short-term economic gain.

TRACKING PROGRESS TOWARDS GREEN GROWTH

A small set of overarching aggregate indicators will be sufficient to track progress on each of the three sets of activities within the action plan. Indicators that are quantitative and already available will be preferred. Potential indicators include the following:

These economy-wide indicators are included in **Table 4.1** to demonstrate their role in measuring green growth across sector clusters. A wider and more fine-grained range of indicators can be identified to track progress towards a green economy. An indicative list of indicators is provided in **Part 3**. Even more so than in the case of the enablers of green growth, the list of indicators provided in this roadmap is illustrative rather than exhaustive. The practical implementation of steps towards green growth objectives will suggest additional suitable indicators beyond this list. The aim should be to provide policy-makers, planners, investors, and project managers with useful indicators suited to their needs and the needs of affected stakeholders. Thus, no set of indicators is best for all users or purposes.

Indicators that are quantitative and already available are generally preferable. However, there will be cases where existing indicators or the data that support them are inadequate, and new data or measures may be needed. In some cases, qualitative assessment will be more appropriate than quantitative measurement.

Once selected, the final sets of indicators used to track the progress of priority actions and gauge green growth performance may be presented in the form of a dashboard. This could be accompanied by more detailed, regular assessments of Indonesia's overall green growth strategy and efforts within each of the sectoral clusters. Such a "green growth dashboard" of indicators could be constructed at three levels of detail: a top level suitable for helping to keep the public informed and engaged; a middle level, to inform Indonesia's political and business leadership and the international investment community; and finally, a third, fine-grained level of monitoring that would inform ongoing planning, design and implementation of green growth initiatives.

▲ ***Modern mass media enable all stakeholders to have a voice in green growth*** © Hendrik Mintarno

COMMUNICATING GREEN GROWTH

Targeted communication can help ensure the mainstreaming of green growth into national and sub-national planning in Indonesia, including the implementation of actions and approaches identified in this roadmap. A communication strategy can focus initially on actions and recommendations for the short term (2015-2020). The strategy can be revised periodically to reflect lessons learned and possible future changes in the priorities of the roadmap.

The overall objective of a communications strategy will be to raise awareness about green growth, its underpinnings and benefits for various groups in Indonesia. The aim will be to mobilize a broad range of stakeholders to better integrate green growth into national and provincial processes and policies.

Key stakeholders in the communications strategy include policymakers at both national and provincial government levels who have influence over creating an appropriate enabling environment, including regulatory and fiscal mechanisms and investment processes. Raising understanding and building support for the ideas developed in this roadmap among policymakers can provide the foundations for realising green growth on a national scale.

Conclusion: The Way Forward to Green Growth

Decisions and actions taken in Indonesia over the next few years can lay the foundations for a greener, more sustainable economy. Long-lived infrastructure is being built up at a rapid rate and irreversible damage is currently happening to some ecosystems. To achieve a more desirable growth trajectory, action needs to be taken now to prevent lock-in of adverse patterns, which could limit Indonesia's long-term potential for inclusive and desirable forms of growth. [135]

The key to achieving green growth is high-level political commitment and leadership, both nationally and sub-nationally. There are many opportunities to promote green growth. All require active engagement by policy makers, who must act as champions of green growth.

Only by mainstreaming green growth throughout Indonesia's governmental institutions and agencies, as well as within the business community and civil society, can the full benefits of green growth be achieved. More systematic mainstreaming of a well-balanced, holistic green growth approach will require the right mix of policies and enablers, including integration of green growth into planning and investment decision-making.

CONTRIBUTORS

The following organizations and individuals contributed to the researching, writing, editing and reviewing of this roadmap.

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INTERNATIONAL ORGANIZATION, NGO, UNIVERSITIES, PARTNERSHIP PROGRAMS

ADB, ANU, CCROM – IPB, CDKN, CIFOR, Climate Policy Initiative, Conservation International (CI), CSIRO, DANIDA, Dutch Embassy, ESP3, FAO, FFI, Forest Carbon, Giz Paklim, HIVOS, ICLEI, ICRAF, IPB, Kemitraan, MCA-Indonesia, Mercy Corps Indonesia, OECD, PwC, Samdhana Institute, SCP Switch Asia, SNV, TNC, UN-ESCAP, UNDP, UNDSD, UNORCID, UNPAD, USAID - IFACS, Vivid Economics, World Bank, WWF, Kehati Foundation

PRIVATE SECTOR AND BUSINESS ASSOCIATION

APG2/RAPP, API – IMA, Indonesian Mining Association, Eforce, GAPKI, Geocycle Indonesia – Holcim Group, Indonesia Business Council for Sustainable Development (IBCSD), INPEX Indonesia, KADIN, PT AMC SCP Project, PT Daemeter Consulting, PT. AES Agriverde Ind., PT. Holcim Indonesia Tbk, PT. Prosympac, PT. Riau Andalas Pulp and Paper, Rimba Makmur Utama (RMU), Sinar Mas, Sintesa Group

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Government of Indonesia – GGGI Green Growth Program

The Government of Indonesia and Global Green Growth Institute (GGGI) have developed a program of activity that is aligned and wholly supportive of achieving Indonesia's existing vision for economic development planning.

The aim is to show, using real examples of Indonesia's development and investment plans at national, provincial and district levels, how economic growth can be maintained while reducing poverty and social inequality, maximizing the value of ecosystem services, reducing GHG emissions, and making communities, economies, and the environment resilient to economic and climate shocks.

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