MAINSTREAMING GREEN GROWTH IN INVESTMENT PLANNING

A HANDBOOK TO USE EXTENDED COST BENEFIT ANALYSIS

Published in:
2016

Prepared by:
Government of Indonesia - GGGI Green Growth Program

MAINSTREAMING GREEN GROWTH IN INVESTMENT PLANNING

A HANDBOOK TO USE EXTENDED COST BENEFIT ANALYSIS

CONTENTS

Acknowledgements to:

National Development Planning Agency (Bappenas):
Endah Murniningtyas

Coordinating Ministry for Economic Affairs / National Council for Special Economic Zones:
Luky Eko Wuryanto, Enoh Suharto Pranoto, Bambang Wijanarko, Ilham Fachriza, Edib Muslim

GGGI team (writing, editing, designing):
Kurnya Roesad, Florian Vernaz, Maria Ratnaningsih, Anna van Paddenburg, Farrah Soeharno, Primatmojo Djanoe

FOREWORD

Dr.Ir. Lukita Dinarsyah Tuwo, M.A
Secretary of Coordinating
Ministry of Economic Affairs

SUSTAINABLE development is an important guiding principle in our economic development. We need to grow the economy in a way that achieves the three pillars of sustainable development: human development, economic progress and environmental protection. In other words, we need to enter the path of green growth in order to meet our domestic Nawa Cita priorities and contribute to the global Sustainable Development Goals (SDGs) as well as the recent climate agreement at the UNFCCC COP21 in Paris.

Green growth objectives need to be adopted in key sectors of our economy. In the energy sector, we have already started to phase out fuel subsidies and are diversifying to include clean and renewable energy in the energy mix. In our efforts to improve connectivity, we need to increase the number of green infrastructure projects, especially in the maritime sector and urban mass transportation. In the forest and landuse sector, we need to improve spatial planning, best sustainable harvest practices, and law enforcement to guide land use activities.

Since 2013 the Government of Indonesia - GGGI Green Growth Program has engaged stakeholders to develop a systematic framework to integrate green growth objectives into economic planning in Indonesia. Through the Program, in collaboration with the Coordinating Ministry of Economic Affairs, the Green Growth Assessment Process (GGAP) and extended Cost Benefit Analysis (eCBA) were developed as analytical tools, to provide a qualitative and quantitative analysis of the economic, social and environmental impacts of projects. When applying these tools, national and subnational government as well as investors will have a better understanding of, not only the costs, but also the benefits associated with green growth-oriented policy and technological interventions.

This policy handbook provides recommendations to integrate green growth assessment tools into Indonesia's existing economic and environmental planning and regulatory processes. I hope it will be useful to policymakers, investors and the wider public when planning and shaping investment projects in Indonesia.

To minimize and avoid social and environmental impacts, I encourage all investment projects to systematically apply green and efficient technologies as well as best practices, in order to optimize the broader environmental and social benefits to the people of Indonesia and the global community. These tools will help us move in this direction.

Extended Cost Benefit Analysis: A QUICK GUIDE

What is an eCBA?

See Chapters 1 and 3

Extended cost benefit analysis (eCBA) is a variant of a conventional financial CBA but looks at the broader economic and social aspects of an investment decision:

- At the project level, an eCBA providesthe monetary values of social and environmental costs and benefits of a certain activity to help planners and investors make more informed decisions

Why do we need an eCBA?

See Chapter 1

An eCBA can help planners and investors to optimize project and policy design and show that green investment can be economically and financially feasible. It does so by:

- incorporating externalities
- recognizing the value of natural capital
- taking into account the long-term sustainability of an investment, primarily by applying a social discount rate set lower than market-based discount rates

What are the objectives of an eCBA?

See Chapter 2

eCBA can be used to drive green growth policy and planning to:

- justify changes in public policy;
- quantify existing or proposed policy incentives;
- prioritize green growth policy, technology and investment options;
- validate evidence before policies are implemented

Who should use an eCBA?

See Chapter 3

Government and business can use eCBA as an investment planning tool to:

- allocate resources to projects or policies with the highest green growth performance
- design or re-design and optimize public and private sector projects
- inform policymakers on barriers and enablers of green growth
- build a business case to attract private Investment.

When should planners use an eCBA?

See Chapters 2 and 6

Ideally, eCBAs should be conducted in the earliest planning stage, as part of a pre-feasibility analysis. However, they can also be used at later stages to re-evaluate existing projects. The eCBA can be used to strengthen existing regulations on

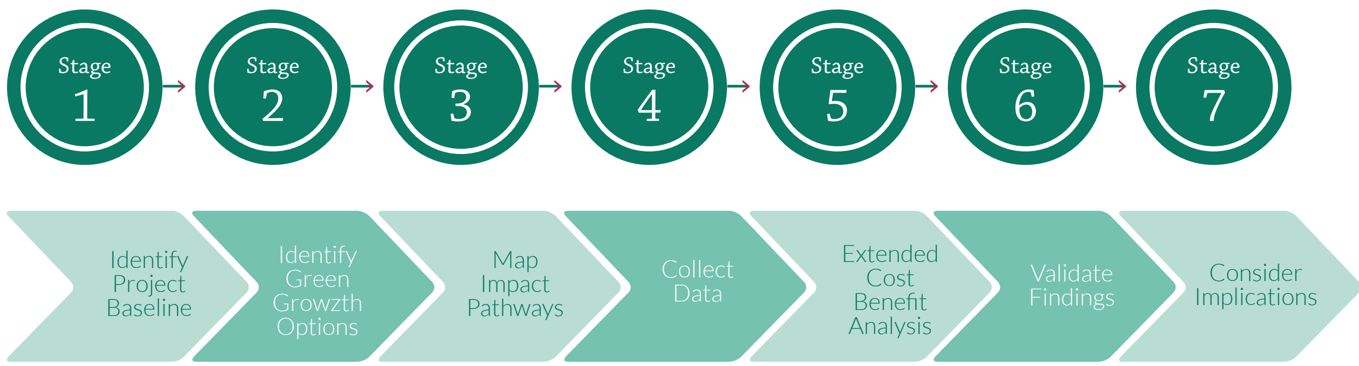
- Using social CBA to evaluate PPP projects
- EIA (AMDAL) process under Law 32/2009

How is an eCBA implemented?

See Chapters 3 - 5

The eCBA is a seven-stage process that is based on stakeholder-driven data collection, verification and validation.

THE eCBA PROCESS



Consult project stakeholders	Consult project stakeholders	Identity outputs, outcomes and impacts	Collect Data from documentation	Quantify cost and benefits of green growth interventions	Validate findings with stakeholders	Consider implications of results for policy
Review project stakeholders	Consult experts	Assess materiality	Collect local market data	Value cost and benefits to society	Validate findings with stakeholders	Consider implications for project re-design and invesment
	Literature review	Identify scope for CBA	Collect international technology data			

GLOSSARY

AMDAL	Environment Impact Assessment
BAPPENAS	National Planning and Development Agency
BAU	Business As Usual
BCR	Benefit-Cost ratio
BMP	Best Management Practices
c.i.f	Cost insured freight
CCBA	Climate, Community and Biodiversity Alliance
CER	Certified Emission Reduction
CO2	Carbon Dioxide
CPI	Consumer Price Index
CPO	Crude Palm Oil
eCBA	Extended Cost Benefit Analysis
ERC	Ecosystem Restoration Concession
f.o.b	Free on board
FFB	Fresh Fruit Bunch
GDP	Gross Domestic Product
GIMS	Green Industry Mapping Strategy
GGAP	Green Growth Assessment Process
GGF	Green Growth Framework
GGGI	Global Green Growth Institute
GHG	Green House Gas
GoI	Government of Indonesia
ha	Hectare
HCV	High Conservation Value
HP	Hutan Produksi Production Forest Concession
HPK	Hutan Produksi Conversi Production Forest Concession: Convertible
HTI	Hutan Tanaman Industri Production Forest Concession: Industrial Timber
HPH	Hak Pengusahaan Hutan Production Forest Concession: Selective Logging
IDR	Indonesian Rupiah
IPB	Bogor Agricultural University
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
IUP-PAN-KARBON	Business License for Carbon Sequestration and/or carbon storage
IUPHHK-RE	Ecosystem Restoration Concession
Kalteng	Central Kalimantan
KEK	Special Economic Zone
KFCP	Kalimantan Forest and Climate Partnership
KLH	Ministry of Environment
KSN	Strategic National Zone
kWh	Kilowatt hour
LCOE	Levelized Cost Of Electricity
LULUCF	Land Use, Land Use Change and Forestry
Menhut	Ministry of Forestry
MP3EI	Master Plan for the Acceleration of Economic Development
MSL	Mean Sea Level
Mt	Megatonne (1 million tonnes)
MtCO2	Megatonne Carbon Dioxide
MTHW	Mixed Tropical Hardwood
NPV	Net Present Value
NTFP	Non-Timber Forest Products
PDD	Project Design Document
PES	Program for Ecosystem Services
PKS	Palm Kernel Shells
PPP	Public Private Partnership
PT REKI	Ecosystem Conservation and Restoration Indonesia Ltd.
RAN/D-GRK	National/Regional Action Plan for Reducing Greenhouse Gas Emissions
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RMU	PT Rimba Makmur Utama
RPJMD	Region Medium Term Development Plan
RPJMN	National Medium Term Development Plan
RSPO	Roundtable on Sustainable Palm Oil
SDR	Social Discount Rate
SOC	Social Opportunity Cost
tCO2	Tons of Carbon Dioxide
TEV	Total Economic Value
TNC	The Nature Conservancy
TV	Terminal Value
UNORCID	UN Office for REDD+ Coordination in Indonesia
VAT	Value Added Tax
VCS	Verified Carbon Standard
WACC	Weighted Average Cost of Capital

INTRODUCTION

POLICYMAKERS in Indonesia know that sustainable development is a multi-dimensional creature. This is reflected in the 2015-19 RPJMN, which focuses on the priority targets set out under the Nawa Cita agenda. Indonesia is also committed to the recently announced Sustainable Development Goals (SDGs), which includes a commitment to urgent actions to combat climate change and its impacts. Moreover, Indonesia has submitted its Intended Nationally Determined Contribution (INDC) to the UN to support the global reduction of GHG emissions.

In order to achieve these targets, policymakers have to find a way to grow the economy in a way that achieves the three pillars of sustainable development: human development, economic progress and environmental protection. This requires a balancing act that simultaneously aims for traditional growth objectives - like increase the productivity and competitiveness of the economy - and committing to significant environmental protection and climate mitigation targets.

'Green Growth' is a means to achieve the multiple objectives of sustainable development. It means promoting growth that recognizes the value of natural capital, improves resilience, builds local economies and is inclusive and equitable. It encompasses policy reforms to speed up structural and technological innovation in order to enhance greater resource efficiency throughout the whole economy. In doing so, any green growth - oriented economic strategy places a premium on the design of policy incentives which safeguard the natural environment and its ecosystem services.

In short, reconciling environmental stewardship and economic growth objectives provide plenty of opportunities for innovative green investment.

But how can we ensure that green economic growth does not remain an abstract notion and is translated into concrete 'green' projects, there by building evidence from the ground? The Government of Indonesia and the Global Green Growth Institute (GGGI) have formed a partnership to address this question.

Since 2013 the Indonesian Green Growth Program has collaborated with the government - chief among them the National Planning and Development Agency (BAPPENAS), Coordinating Ministry of Economic Affairs (Menko Perekonomian), Ministry of Energy and Mineral Resources (KESDM), and the regional BAPPEDAs in Central and East Kalimantan, - to provide a practical approach to mainstream green growth into economic planning processes.

On the macro level, a Roadmap to Delivering Green Growth has been completed to provide a long -term vision for public policy. In consultation with stakeholders, five desired outcomes of green growth have been identified, and a pool of indicators is being developed to measure progress in moving the Indonesian economy towards these outcomes. On the micro level, the Green Growth Assessment Process (GGAP) and extended Cost Benefit Analysis (eCBA) are used as planning tools to help design policy interventions and encourage the use of green technologies and best practices to ensure green growth outcomes of investment projects.

This handbook is an introductory guide for policymakers to apply the GGAP and eCBA in the planning process. Both tools provide an integrated framework to provide a qualitative and quantitative analysis of the economic, social and environmental impacts of projects. Using results and empirical evidence from four technical studies undertaken by the Green Growth Program, this handbook illustrates the basic concepts underlying and the process of undertaking an eCBA of projects.

In particular, the eCBA is a very useful quantitative tool to provide concrete monetary values attached to social and environmental externalities. These costs are often hidden, as they are often not addressed in conventional financial cost benefit analysis when investors plan their projects. By filling this 'quantitative gap', policymakers will be able to use the eCBA as a tool to demonstrate to the public that investing in green infrastructure projects will yield significant economic and social benefits.

Who will benefit from this handbook? Senior staff and policy makers in government involved in investment decision making, with no or little knowledge about green growth issues and planning tools will find this book useful as an overview and introduction. Technical staff with some or extensive knowledge can use this handbook as a quick and accessible guide to decide whether they want to use eCBA as planning tool in assessing projects, potentially complementing other evaluation tools. In cases where planners have commissioned projects that use eCBA, this guide can help to develop terms of references, monitor progress and validate findings of technical studies carried out by consultants.

This handbook will also be useful for non-government stakeholders, especially the private sector interested in investing in green infrastructure projects. Ultimately, this book will be also of interest for the wider public and communities affected by infrastructure projects, as it will contribute to an understanding of the dimension of not only the costs but also the benefits associated with green growth-oriented policy interventions.

At this stage the GGAP and the eCBA are only demonstration tools, but we hope that this handbook will showcase the usefulness of GGAP and eCBA as analytical methods and show policymakers the relevance of these tools as an integrated part of Indonesia's economic and environmental planning process.

CHAPTER1:

THE RATIONALE: VALUING THE ENVIRONMENT TO DESIGN BETTER PROJECTS, DELIVER GREEN GROWTH OUTCOMES AND CONTRIBUTE TO SUSTAINABLE DEVELOPMENT GOALS (SDGs)

This chapter lays out the rationale for systematically undertaking an extended Cost Benefit Analysis (eCBA) when designing projects and formulating economic policies. Recognizing the value of natural capital lies at the heart of this.

Highlighting the monetized costs and benefits associated to poor project design and poor policies creates awareness of the often 'hidden' costs commonly paid by the public. These hidden costs include, for example health and hospital costs due to air pollution, poor harvesting of crops due to excessive erosion, decreased freshwater due to deforestation and forest degradation and the like.

With such awareness, planners, policy-makers and investors will then take a more systematic approach to identify opportunities for innovative 'green' investments that might become new engines of economic growth.

Green economic growth can be delivered when decision makers include hidden or external costs in economic production. These costs can be significant and need to be monetized to identify potential bottlenecks to long-term sustainable growth. Applying green growth planning tools like extended Cost benefit Analysis (eCBA) helps planners, policy makers and investors to integrate these externalities associated with many capital and infrastructure projects into their overall cost benefit calculations.

It is important to note that the eCBA methodology is part of a wider framework which

- Aims to deliver green growth outcomes
- Develops indicators against which can measure progress toward these outcomes
- Explains the importance of externalities and other market imperfections

Defining green growth

Green growth promotes growth that recognizes the value of natural capital, improves resilience, builds local economies and is inclusive and equitable.

A fundamental objective of the Government of Indonesia – Global Green Growth Institute (GoI-GGGI) Program is to mainstream green growth within Indonesia's economic planning process. To this end, the Green Growth Program is developing a framework that can be used by government agencies to assess planning and investment appraisal activities. This framework was developed with stakeholders in 2013 and 2014. An essential element of this framework is to make green growth measurable in terms of five desired outcomes of green growth (see **Figure 1.1**), using a series of national, regional and project-level indicators.

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 definition of green growth is still evolving; it is the experience of countries testing what works - and what does not that will further develop and refine this definition.

Figure 1.2. is an attempt to conceptualize the links between measuring green growth outcomes towards the multiple objectives of sustainable development across various levels. The key idea here is to measure the contribution of natural capital, including ecosystem services to human welfare and sustainable development (see **Figure 1.6**).

Sustained economic growth highlights *the importance of Indonesia's economic growth being sufficiently robust and diverse to support broad-based people-centered development.*

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*

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.*

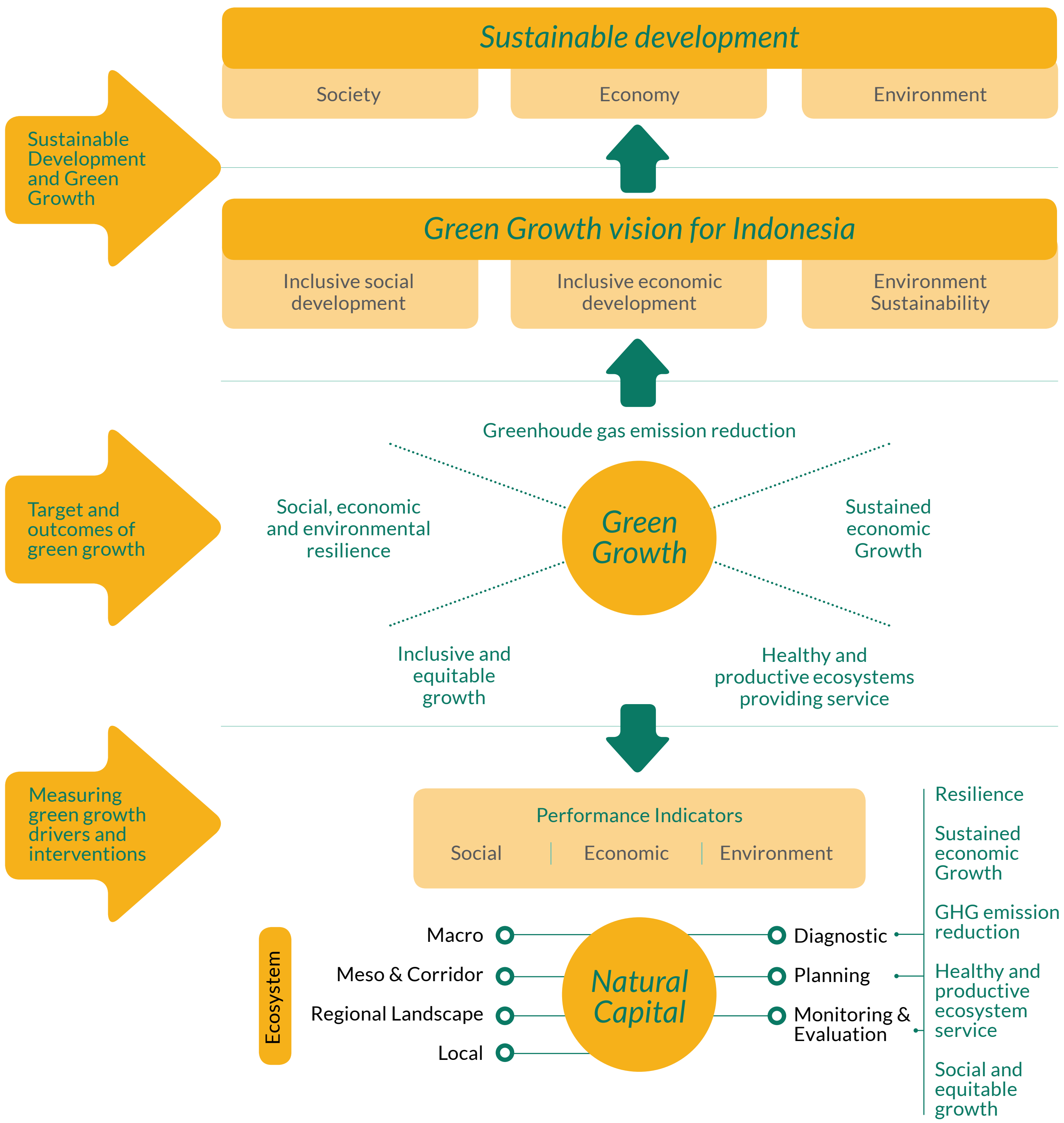
Healthy and productive ecosystems providing services *highlights growth which sustains natural capital, that is, the stocks of natural resources which normally supply a continuous flow of benefits in the form of ecosystem services.*

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.*

__Figure 1.1:__ The five desired outcomes of green growth

It is very important to understand that achieving green growth in Indonesia will take time and green growth planning cannot be done all at once. There are multiple definitions and uncertainty in building the best framework of green growth planning and assessment. A coherent conceptual framework is necessary to guide a complex process of identifying green growth priorities, the right sources for data capture and analysis, selecting appropriate performance indicators, and adopting the best available economic modelling tools.

Figure 1.2.: Measuring progress towards green growth and how it contributes to achieving the SDG goals and INDC targets



Measuring green growth

A database of targets and indicators is being developed to measure progress towards each of these five outcomes. These indicators come from a variety of domestic and international sources.

The goal is for policymakers to be able to draw from a complete database of indicators to measure green growth outcomes at the national, sub-national (province, district, sectoral) and project level.

In developing and selecting these indicators, it is important to be mindful of which aspects of green growth outcomes are measured. Indicators can measure how economic activities affect resource stocks and natural capital, the efficient use of natural resources and the quality of life and the natural environment (see **Figure 1.3.**).

Indicators can measure progress on the macro or micro level. Macro indicators might be used at national, provincial or sectoral levels by a government trying to measure its country-wide progress against the five green growth outcomes. Good examples are aggregated indicators such as GDP or national greenhouse gas emissions.

Micro level indicators may help a project developer understand the green growth impacts of a project at the micro (local) level. An example would be water extracted from the surrounding region.

However, indicators might also be developed to capture green growth outcomes between these two extreme levels. Data can be generated to measure progress at meso, regional or landscape levels.

Moreover, indicators must also capture the distinction between resource stocksand the flows of services provided by the ecosystem. Stocks and flows can be measured in absolute terms or in relative terms to provide comparisons.

It is also necessary to distinguish between absolute and intensity indicators. An absolute measure shows the total quantity of an asset in an economy, for example population. These help measure total magnitude and impact.

Table 1.1: Sources of Indicators

Indonesian sources	International sources
Central Bureau of Statistics (BPS)	OECD
Ministry of Environment (KLH)	UNDP
Ministry of Finance (DEPKEU)	IEA
Agency for the Assessment and	UNEP
Application of Technology (BPPT)	World Bank
Indonesian Sustainable Palm Oil (ISPO)	RSPO
Local expertise	FAO

Figure 1.3.: A framework for developing and selecting indicators

Inputs and Natural Assets	• Water (volume and quality of freshwater) • Forest and marine resources (ha forest, tonnes of fish) • Mineral/energy resources (e.g. gas reserves) • Biodiversity (protected areas, species)
Production and productivity	• Energy intensity (kWh per unit of GDP • Material intensity (tonnes per unit of GDP) • Waste (percent collected and recycled) • Innovation (R&D, labour productivity)
Outputs and well-being	• Health (death / illesses from air pollution) • Risk (exposure to natural disasters) • Water (availability of clean drinking water, freshwater quality) • Ecosystem services (recreation, aesthetic value)

Source: Green Growth Knowledge Platform: Moving Towards a Common Approach on Green Growth Indicators

CHAPTER 1 :

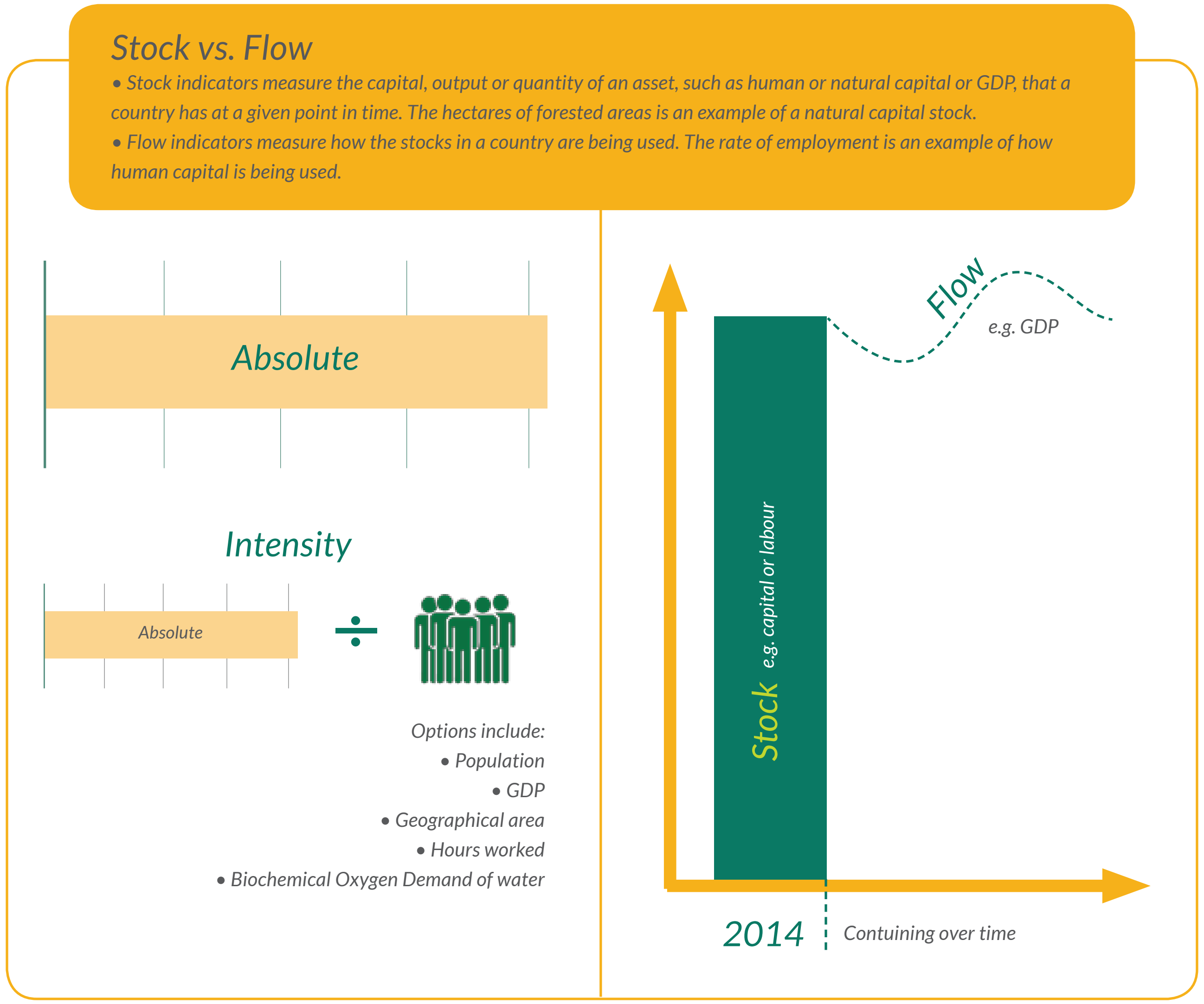


Figure 1.4: Intensity, Stock and Flows

Sustainable development pillar	Economic	Social	Environmental	
Normative green growth outcome	*Sustainable Ecomonic Growth*	*Equitable and Inclusive Growth*	*Healthy Natural Capital Providing Ecosystem Service*	GHG Reduction
Stock	• Gross capital formation/ GDP • FDI/ GDP Working • Population/ GDP R Debt/ GDP	• Poverty headcount/ Population R Population living in land area where elevation is below 5 meters/ Population	• Forested area/ Geographical area R Water pollution/ Biochemical Oxygen Demand emissions	• Forested area/ Geographical area
Flow	• GDP/ Population • GDP/ hour worked (labour productivity) • Sector GDP/ GDP (e.g, Agriculture GDP/ GDP) • RGDP/ GDP • Formal employment/ Population • Informal employment/ Population • Unemployment/ Population • Underemployment/ Population	• Goverment social spending/ GDP R Literate population/ Population R Access to electricity/ Population R Access to electricity to public health clinics/ Population R Access to internet/ Population	• Goverment environmental spending/ GDP • Population/ Geographical area R Energy consumption/ Population R Energy consumption/ GDP R Water use/ Population	• GHG/ GDP • GHG/ Population

Notes: R= Indicator that is an element of the resilience outcome

Table 1.2: Intensity indicators of green growth

An intensity measure normalizes or converts into comparable units an absolute measure to help interpretation or comparison across datasets, such as countries or regions, which have different stocks. These help understand the efficiency of use of the stocks.

Lastly, it is important to note that indicators might capture various green growth outcomes. This is particularly true for indicators which measure progress toward green growth outcomes associated with social, economic and environmental resilience. **Table 1.2** groups examples of indicators in relative/ intensity terms across the various categories discussed in the previous sections and indicates which indicators under four desired outcomes can also be used to measure the fifth outcome, resilience.

For example, debt/GDP is usually a good indicator to measure the sustainability of economic growth over the longer run. At the same time it can also be used as an economic resilience indicator, as a high ratio reduces the capacity of an economy to adapt to external shocks and government's public finance capacity to fund essential services. Similarly, water pollution shows the (bad) state of health of a particular natural capital, but can also serve to show the longer - term costs associated with the reduced resilience and capacity of an ecosystem to provide steady environmental services.

Making hidden external costs and benefits visible

An Extended Cost Benefit Analysis (eCBA) is a variant of a conventional CBA and looks beyond purely financial values. It looks at the wider economic, social and environmental impacts of a project and seeks to monetize these hidden and external costs not normally accounted for in decision making processes.

Left to its own devices, the private sector will typically invest in opportunities that maximize financial returns to the investor. the public sector has an obligation to take account of the wider political economy while ensuring investments are affordable.

Conventional cost benefit analysis (CBA) employed in project implementation does not clearly reflect how an economic activity results in the loss of natural capital stocks (e.g. forest, water, soil, air, etc.) which provide ecosystem services.

An extended Cost Benefit Analysis is an economic appraisal tool that takes a broader view of benefits and costs accruing to all stakeholders, whether social, economic or environmental. This is essential in a world where externalities, public goods and other market

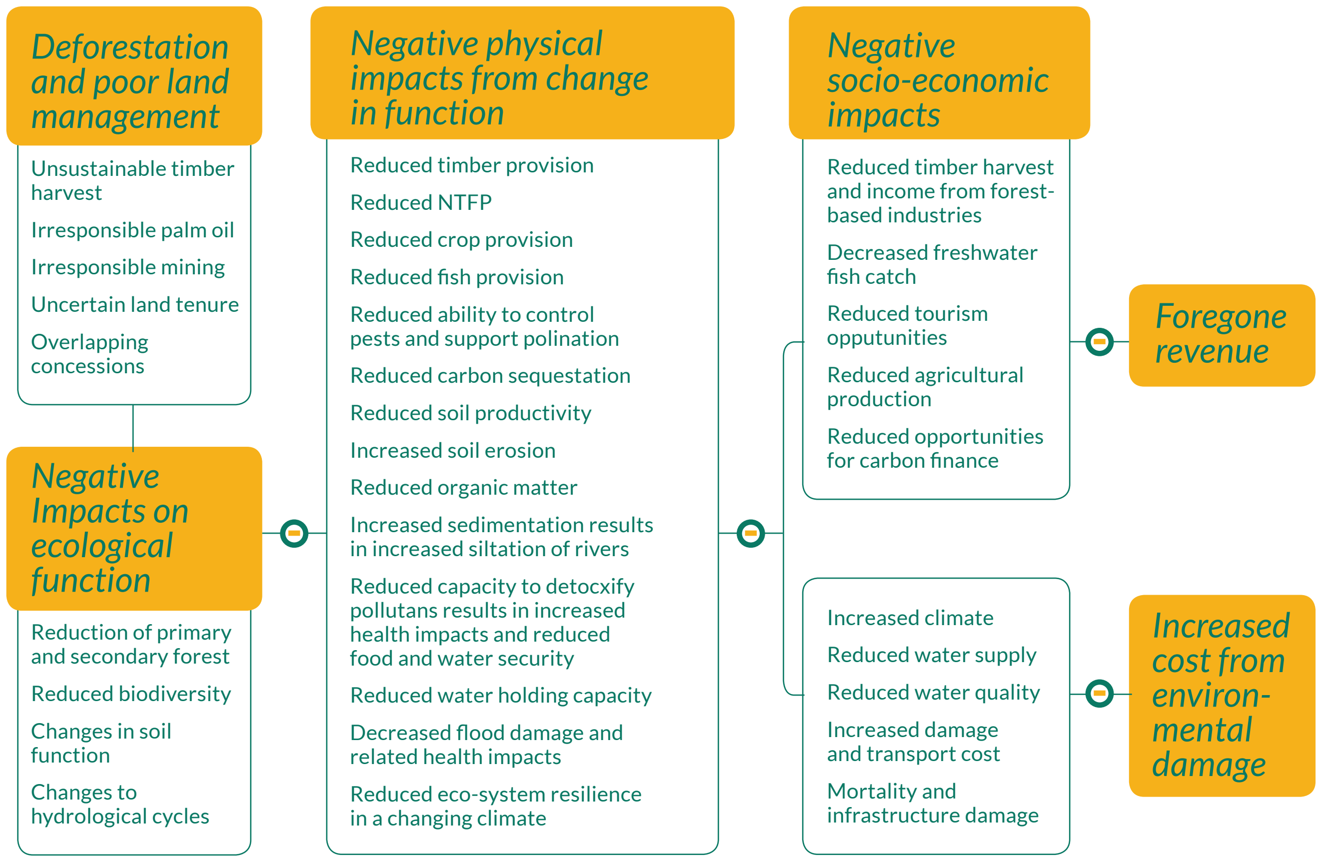


Figure 1.5 : Impact pathway of an economy that does not value natural capital

failures are often not taken into account. Using eCBA helps both public and private sector in being better informed when making decisions. Decision makers will more clearly see the real costs of projects but also the benefits of doing something to avoid these costs.

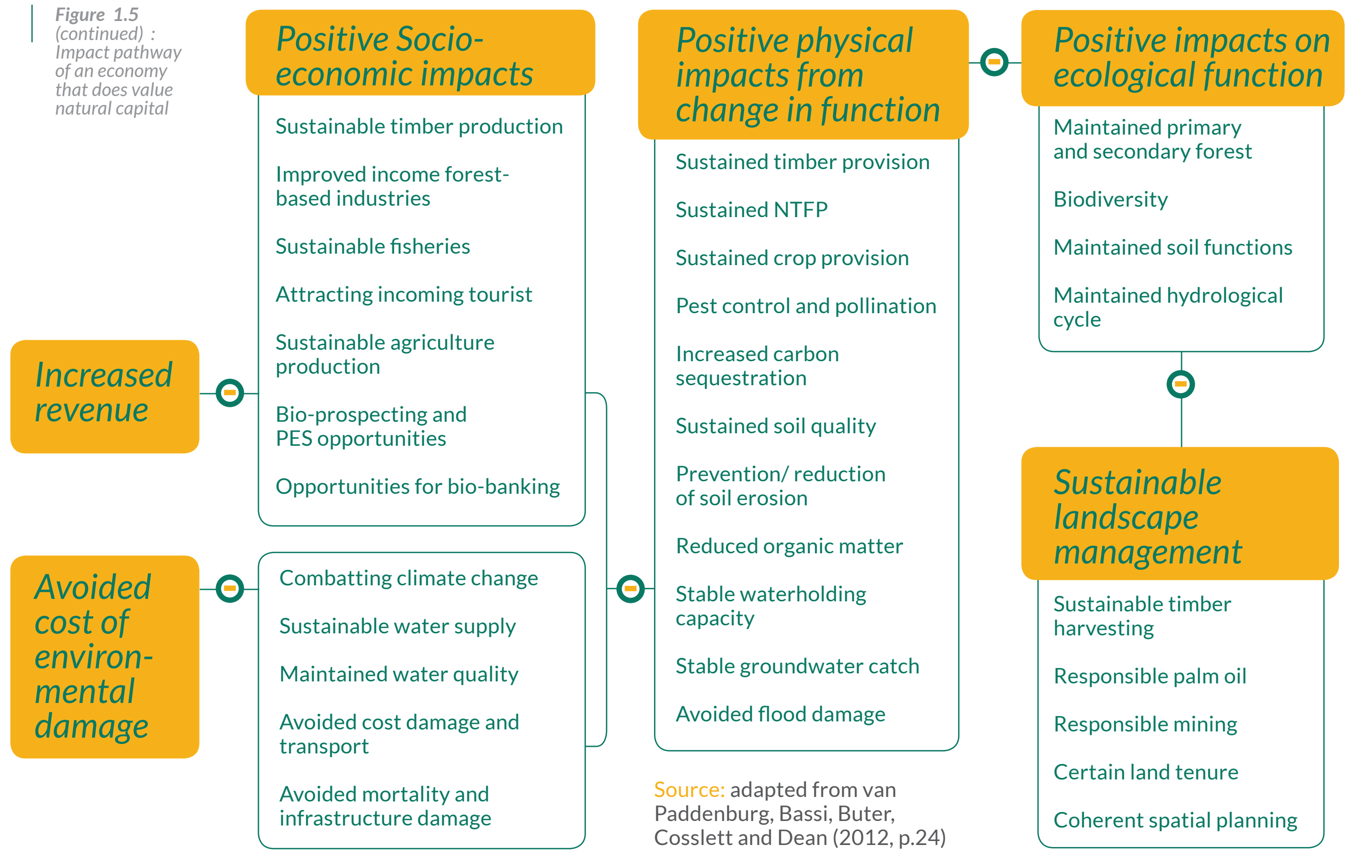
Externalities are aplenty in Indonesia. Air, water and land-based pollution are already having negative impacts on Indonesia's economic and broader social objectives, such as health and equity. In particular, they often lead to lost or damaged ecosystem services. This reduces the capacity of the environment to provide the services underpinning human activity and the economy.

An economy that does not value natural capital properly usually ends up with negative ecological and socio-economic impacts that reverberate along a causation chain or an impact pathway (see **Figure 1.5a**). Deforestation and poor land management are frequently cited examples. Normally, when investment decisions are made, only capital expenditures, O&M and revenues are accounted for. But land use changes have also bio-physical effects and impact the quality of ecosystem services. These impacts, in turn, affect the values of the services that various stakeholders use. These values are frequently neglected in investment plans and project appraisals

Overharvesting of timber linked to unsustainable palm oil and mining practices and coupled with poor regulatory oversight such as insecure land tenure and overlapping of concessions, set off a chain of negative impacts, changing important ecological functions, which in turn result in further bio-physical changes. In the end, social and economic impacts arise, as humans have to face a loss of resources and services that nature provides. For example, damaged ecosystems can be in the form of unproductive soils, loss of protection from flooding, reduced water supply, reduction in species diversity, and any other impacts that undermine food and water security.

On the other hand, addressing these externalities clearly provides a rationale for public policy intervention (**see Figure 1.5a**). Sustainable land use policies do anticipate and address these externalities at the very beginning of the investment and project

Figure 1.5 (continued) : Impact pathway of an economy that does value natural capital



Source: adapted from van Paddenburg, Bassi, Buter, Cosslett and Dean (2012, p.24)

implementation cycle. This will result in benefits that consist not only of revenues from sustainable production and resource extraction, but also of avoided costs.

Currently, many projects, regardless of being implemented by state-owned or private companies, do not face strong regulatory incentives and sanctions to rigorously think about integrating environmental costs into project planning. As a result, unaccounted external costs in the production of goods show up later as clean-up costs accrued to society. If these costs are known and quantifiable, then governments have an evidence-based platform on which to design policies and regulations to impose costs on polluters. In other words, these hidden costs need to be internalized, that is identified and monetized.

The remainder of this handbook describes the Green Growth Framework and the extended Cost Benefit Analysis as useful planning tools for cost internalization and designing of green investment projects.

- Externalities do arise when a resource is non-exclusive or exhibits public goods features. A good or a resource is non-exclusive because its consumption is non rival and must be consumed jointly with other user. The classical case is a plant discharging wastewater into a river, thus harming downstream users of the water. The plant owners cause external costs, as others - usually the government - has to pay the bill for cleaning up the polluted river.
- The externality arises, because the social cost of the extraction or consumption of a resource differs from the private cost. The market price, determined solely by private costs and benefits, will not reflect the true social opportunity cost (SOC) of the resource or activity. In the case of pollution caused by a private firm, we face a negative externality, as the social cost is larger than the private cost.
- A positive externality arises when the social benefits arising from the action of a private actor is larger than the private benefits. The commonly cited examples is that of a property owner who invests heavily in the beautification of her property, say the garden, and thus raises the property value of the neighboring houses.
- Typical public goods a reclean air and water. These are non-rivalrous' or 'non-excludable' goods, meaning that if an individual consumes that good, it does not reduce the availability of the good to and exclude other individuals.

Key concept and reference

Concept	*Explanation*	*Further Reference*
Natural Capital & Ecosystem Services	Natural capital is the stock of natural assets that provide society with flow of environmental goods and services. Sustaining natural capital is integral to the concept of sustainability. A strong performance of sustainability requires maintenance of the stock of natural capital to avoid decrease or destruction of the natural capital stock. Natural capital includes both the non-renewable (i.e. fossil fuels, minerals) and renewable natural assets. Renewable natural capital include the abiotic/non-living assets that are (i.e. the geothermal reservoir) and biotic/living assets (i.e. flora, fauna). The interactions of biotic and abiotic assets shape the ecosystem.  While natural capital also includes non-renewable capital, natural capital is often used to signify the importance and value of ecosystems which provide services that contribute to human wellbeing and welfare. Ecosystem services are essential for society and its development. Ecosystem services includes the provisioning, regulation, and maintenance services of essential natural production factors (i.e. soil, waters). Ecosystem might also provide cultural services for its close relations with history and identity of a particular community.	• Robert Costanza & Herman E. Daly, 1992, Natural Capital and Sustainable Development, Conservation Biology, Vol. 6, No. 1. (Mar., 1992), pp. 37-46. http://www.life.illinois.edu/ib/451/Costanza%20(1992).pdf • Natural Capital Committee, 2014, Towards a Framework for Defining and Measuring Changes in Natural Capital, http://nebula.wsimg.com/efc0de70bf88dea33ef3fe26747f7b76?AccessKeyId=68F83A8E994328D64D3D&disposition=0&alloworigin=1 • International Institute for Sustainable Development, 2008, The Natural Capital Approach: A Concept Paper, https://www.iisd.org/pdf/2008/natural_capital_approach.pdf • European Commission, 2013, Mapping and Assessment of Ecosystems and their Services, http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/MAESWorkingPaper2013.pdf • World Resource Institute, 2008, Ecosystem Services: A Guide for Decision Makers, http://www.wri.org/sites/default/files/pdf/ecosystem_services_guide_for_decisionmakers.pdf • Anna van Paddenburg, Andrea M.Bassi, Eveline Buter, Chris Cosslett and Andy Dean (2012). Heart of Borneo: Investing in Nature For A Green Economy. WWF HoB Global Initiative, http://hobgreeneconomy.org/

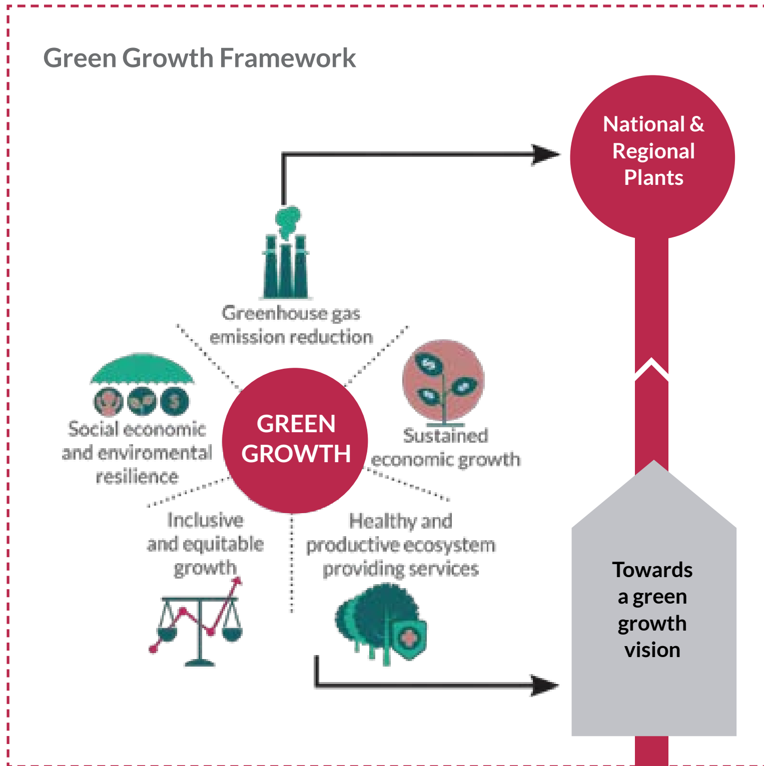
CHAPTER 2:

THE GREEN GROWTH FRAMEWORK

The previous chapter provided the rationale for doing an extended cost benefit analysis on projects;this chapter explains the overall framework into which the eCBA tool is embedded.

The Green Growth Framework (GGF) assesses the environmental and social impacts of existing policies and designs interventions to enable investment into concrete bankable projects that come with innovative resource efficient technologies and best management practices in light of environmental and social sustainability. The framework is designed to make investments real by providing the empirical and quantitative evidence to show that such a pattern of growth where externalities are fully internalized yields concrete benefits and less costs for all. The GGF consists of two main elements.

- The Green Growth Assessment Process (GGAP), explained in this chapter, analyses specific projects or policies and screens them to identify ways to maximise their potential to yield green growth outcomes.
- Extended Cost Benefit Analysis (eCBA), which will be explained in the next chapter, provides the quantitative tool to provide the empirical evidence and the monetary values attached to hidden and external costs that might be caused by projects.



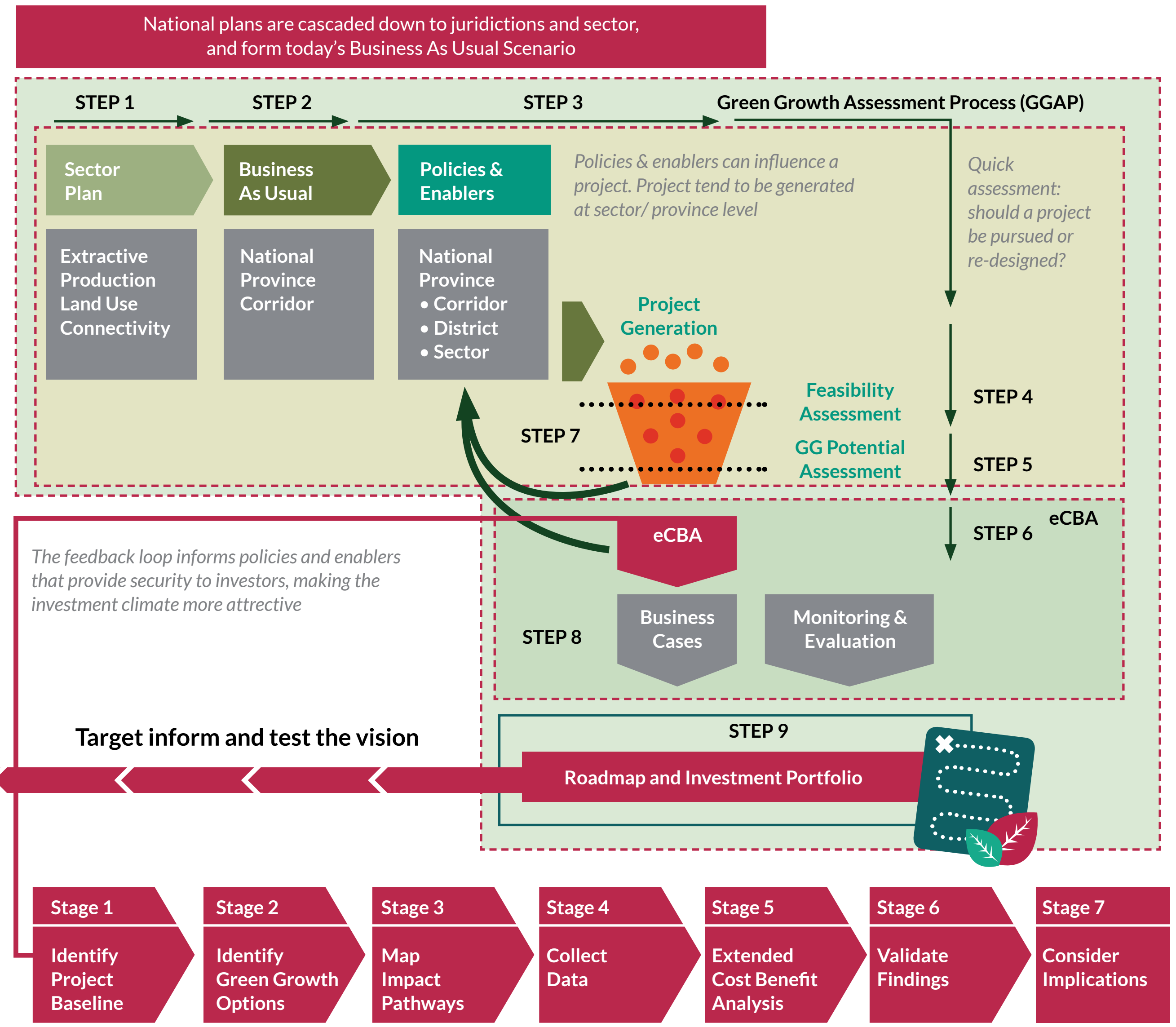
The GGAP (Green Growth Assessment Process) is a tool designed by the Global Green Growth Institute to screen policies and prioritize projects for their potential to achieve green growth outcomes. The GGAP is a nine-step process through which various tools are used to help identify and promote green growth outcomes.

Assessing Green Growth Opportunities of Plans and Projects

Green growth outcomes are determined by the interaction between economic policy incentives provided at the macro level and investment behavior on the ground. The bulk of green investments - that is investments which are resource efficient and use technologies which are environmentally and socially sustainable - is expected to come from the private sector. Therefore, government plans and policies need to take account of what drives—or inhibits—private investment. Planners and policy makers also need to set standards of project design and execution. Assessing the performance of projects and policies at an early stage provides an opportunity to (re-)design these investments, thereby improving the quality of their impacts and ensure these projects contribute to deliver green growth, contributing to sustainable development.

The GGAP was developed to prioritize and assess projects or policies to achieve green growth in a consistent manner.The prioritization is based on economic, social and environmental data expected to be available at the project inception phase. In particular, GGAP emphasises the robust assessment of the performance of projects and policies and measure whether they actually deliver green growth outcomes. GGAP also helps planners, policy makers and investment decision makers to improve both the design of planning processes at the macro level and the quality of project investments coming in. It provides a systematic approach fundamental to achieving Indonesia's desired green growth outcomes and meeting sustainable development goals.

Figure 2.1: The Green Growth Assessment Process (GGAP)



Each step of the GGAP is explained briefly below.

Step 1: Visioning
The process needs to be vision-led and build upon the existing strategies and priorities of Indonesia and key stakeholders as expressed through key national and regional planning documents. These visions will provide the context for assessing BAU for each sector.

Step 2: Business as Usual (BAU)
BAU scenarios provide data that will be used in the analysis of projects and provide the background situation to which project impacts can be compared and allow us to assess the difference where resource efficient technologies, renewable resources and environmental and social sustainable practices are implemented.

Step 3: Project Identification
Step 3 identifies projects which apply innovative resource efficient technologies, uses renewable resources and implement environmental and social best management practices which have the potential to achieve existing visions in a greener way.

Step 4: Feasibility Assessment
Projects will be initially filtered against a set of feasibility criteria to determine any immediately insurmountable barriers to project implementation.

Step 5: Green Growth Potential Assessment
Green growth potential will be assessed to identify which projects will perform well against the green growth framework, and whether or not alternatives are available that achieve the outcomes of the existing design and therefore overarching vision. The first step of this assessment is to map all of the performance of each of the projects, and then consider options for adjustments or (re-)designs to achieve greener outcomes.

Step 6: Extended Cost Benefit Analysis (eCBA)
A seven stage extended Cost Benefit Analysis is undertaken on projects identified in Steps 4 and 5. The extended CBA attempts to quantify, where possible, the contribution of the project to achieving green growth outcomes.

The eCBA will reveal whether the project in question can be improved in terms of achieving better green growth outcomes or is good to further develop a business case.

If it needs improvement, go to step 7. If it is good, skip Step 7 and go straight to Step 8.

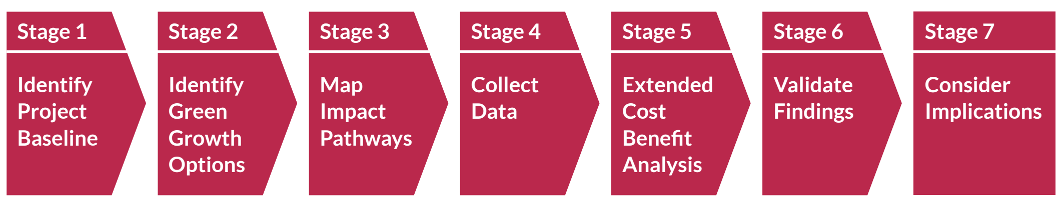
Step 7: Redesign of Enabling Conditions
Specific policy interventions are identified by the eCBA to support a re-design of the project to achieve 'greener' outcomes. Typical policy interventions aim to alter the enabling environment and improve the investment climate for project developers. These policy measures could be broad -based such as reforming energy pricing and subsidy systems for renewable energy projects or better coordinated spatial planning and forest concession mechanisms for projects in the land use/forestry sector.

Policy interventions can also be very specific and targeted to the sector within which the project is operating. Examples include the adoption of certain fiscal instruments such as tax deductions - and exemptions for renewable energy or energy efficient technologies, designing feed-in-tariffs or user fees to make green projects financially feasible, or simplifying licensing procedures to speed up investment approvals.

The key point here is that at this stage of the GGAP policy makers and project developers have the opportunity to re-visit Step 3 (Project Identification) and identify concrete policy measures to re-design the project to improve the green growth outcomes and find the best ways to financially de-risk the project. This process is demonstrated by the feedback arrow after the Extended CBA in **Figure 2.1.**

Step 8: Business Case Development
Business cases go beyond recommending priority interventions and target individual decision makers and processes within government to encourage their uptake. A monitoring and evaluation process is necessary to periodically evaluate the costs and benefits of projects to see if these contribute to agreed targets and indicators and contribute to deliver green growth outcomes.

The practical implementation of this extended cost benefit analysis involved 7 steps



Step 9: Roadmap and Investment Portfolio
This GGAP helps to frame green growth planning at two levels. At the macro level, a Roadmap provides the guiding document for planners to build green growth targets and milestones into national and regional planning documents. On the micro level, the GGAP helps to systematically collate all projects with high green growth performance in a coherent and logical way into an Investment Portfolio which will then need to be incorporated into the local and national economic and development plans. These pipeline of green projects will help deliver the vision and targets of the province and nation.

GGAP and eCBA in the Current Planning Context

Where does the GGAP fit into the current planning context? Major investment projects in Indonesia and many other countries will typically undergo an appraisal process in 3-4 stages before construction starts.

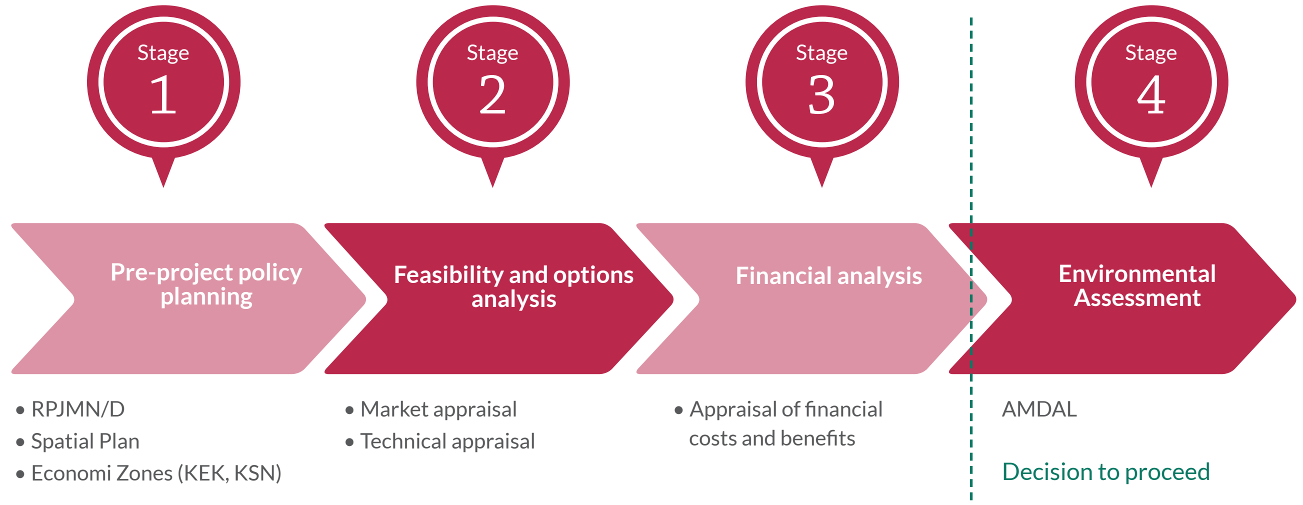
Firstly, before the project is conceived, there will be a high-level planning framework set by government. This includes planning priorities set in the long and medium term development plans (RPJPN/D and RPJMN/D), the national and regional spatial plans (RTRWN/P), and localized spatial plans for economic zones (KEK, KSN). These collectively provide guidance on the type of activities that should take place in each geographical area.

Secondly, private or government-led feasibility assessments take place to confirm that there is a market for produced goods and services and whether the project is technically feasible from an engineering and practical point of view.

Thirdly, following the detailed engineering design, a detailed financial appraisal is undertaken to understand if the project is profitable (or fiscally neutral), and how it can be financed. After this stage, the broad decision to proceed with the project is commonly taken and planning applications finalized.

Fourthly and lastly, before construction begins, an Environmental Impact Assessment takes place. In general, the AMDAL involves identifying impacts from the work plan, detailing the environmental aspects of impact, predicting and prioritizing impacts, and evaluating important impacts in order to compose the Working Plan and Monitoring Plan.

Figure 2.2: Stylized overview of the project appraisal process in Indonesia



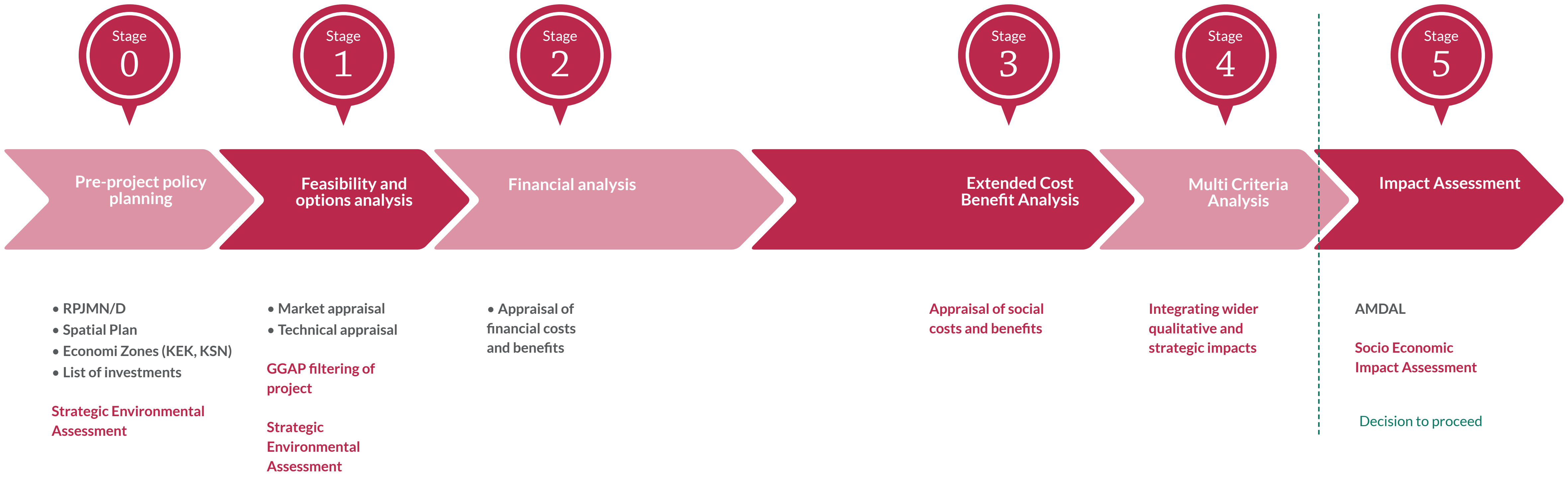
AMDAL was mandated by Government Regulation 29/1986, and regulated again by Regulation 27/2012. It is supported by Law No 32/2009 as an instrument for prevention of environmental contamination and/or damage.

These four steps are illustrated in **Figure 2.2** above. It is important to note that the decision to proceed is taken between stages 2 and 3. The AMDAL is primarily a risk mitigation measure for a pre-determined project, but not a tool to fundamentally re-design the project and achieve the project objectives in a more sustainable manner.

GGAP can be applied in Stage 1 of the project appraisal process as a first "green filter mechanism" for projects. The extended Cost Benefit Analysis has role in Stage 3 providing a second, more rigorous screening device to show concrete monetary benefits associated with addressing social and environmental externalities. The EIA (AMDAL) process in Stage 5 —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 in the first two steps is designed to be an iterative, interactive process running throughout policy or program development (see **Figure 2.3.**).

The eCBA process (explained in the next chapter) contributes 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. Currently, EIA is required by law, whereas eCBA and similar assessments of social costs and benefits are not.

Figure2.3. presents a stylized overview of the current planning process. Itshows the entry points where GGAP and the eCBA tool can help bring a green growth perspective into mainstream planning of investments.



CHAPTER3:

THE eCBA TOOL

The previous chapter described GGAP as a broad conceptual framework to mainstream green growth into Indonesia's economic and investment planning process. This chapter describes the utility of the eCBA as a project-based tool that provides a comprehensive, integrated assessment of impacts in monetary terms across the five desired outcomes of green growth.

Scope of an eCBA

In Chapter 2 we learned that the eCBA is a variant of financial cost benefit analysis (CBA) that looks beyond financial costs and benefits to include also the monetary values of social and environmental impacts. These are the hidden and external costs not usually accounted for in conventional CBAs used in investment decision-making processes.

The eCBA 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. Different users can also apply the project-level eCBA across different sectors.

As **Table 3.1** shows,the GoI - GGGI Green Growth Program has undertaken four eCBA studies on an experimental basis. The scope of analysis varies across these studies. Two eCBAs were applied in economic zones, with selected individual project interventions analysed in terms of their potential green growth outcomes. A third eCBA looked at one particular project operating under an Ecosystem Restoration License. The fourth eCBA calculated the net benefits of four renewable energy projects in Central and East Kalimantan. It then used these estimates to extrapolate the total benefits associated with renewables across the whole of Kalimantan.

These examples demonstrate the versatility of project-level eCBAs in terms of scope and their power as tools for examining greener alternatives to baseline, business-as-usual (BAU) scenarios.

Scope/ Sector	Benefits (NPV)	Policy barriers and enablers: examples	
		Regulatory issues	Fiscal and financial incentives
KEK Maloy • Natural resource processing industrie • Infrastructure: energy, road, transport, port	USD 3.8 Billion or 10% of regional GDP	• Reform of energy pricing system and feed in tariff • Clarification of palm oil certification process and legal status	• Support adequate feed in tariff for renewable energy (biomass) • Tax exemptions for renewable energy capital equipment
KSN Mamminasata • Fishery • Reforestation/ Clean Water • Waste Management • Renewable Energy	USD 355 Million or 6% of regional GDP	• Clearer regulation an waste management • Matching spatial and land use plans	• Ecosystem services levies Subsidy for waste reduction • Tax relief for investment in waste to energy equipment Financial support for local fish meal industry
ERC Project Katingan • Ecosystem Restoration and convervation	USD 9.9 Billion	• Streamlining and improving transparency of ERC licensing • Clear spatial plan under One Map Initiative	• Support of stable national carbon price • Fiscal incentives for local goverments to support ERC
Renewable Energy Options in Kalimantan • Assesing 4 individual RE projects	USD 1-9 Billion or 3-16% of regional GDP (Benefits of projects scaled up to kalimantan corridor)	• Transparency in grid expansion plans • Reform of energy pricing system and feed in tariff	• Debt guarantees and capital grants to renewable energy developers • Capacity building for projects design expertise

Table 3.1: Overview of eCBA studies undertaken by GGGI in Indonesia

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:

1. As a justification for change in public policy;
2. As a tool for quantification of existing or proposed policy incentives;
3. As a tool for prioritization of green growth policies; and
4. 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;

CHAPTER 3 :

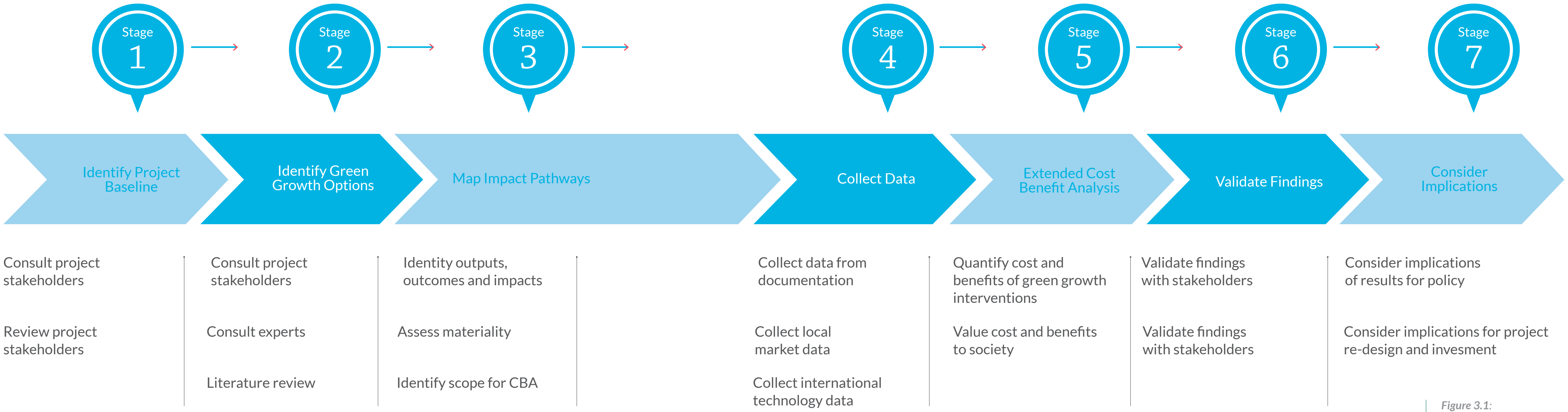


Figure 3.1: The eCBA process

Seven stages of conducting an eCBA

Full eCBA analysis aims to provide evidence-based value estimates of all costs and benefits, including social and environmental ones. As a result, this process requires considerable data, time and skills. It therefore is important to note that conducting an eCBA is as much a stakeholder engagement process as it is a quantitative tool consisting of data collection and calculation.

The quality of an eCBA depends very much on data availability. If firm- and project - level data are available and disclosed, the analysis will be more accurate and estimated monetary values of green growth benefits more credible. 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.

Figure 3.1.illustrates the steps in an eCBA process and makes it clear that the technical component of the eCBA is only one part of a long process.

Stage 1: Identify the baseline
The first step is to get an accurate picture of the project as it is currently planned. This is the Business-As-Usual (BAU) scenario. In this phase, researchers carrying out an eCBA assess all the available information and preliminary data about the project. This might include the review of the following documents:

- Financial appraisal documents
- Engineering documents (DED)
- Spatial Plans
- Master Plans

Stage 2: Identify the green growth options
Once the BAU has been identified, planners need to identify interventions and policies that can make the project contribute to greener outcomes. The following questions provide a good starting point:

- Are there opportunities to re-design the existing project or policy to enhance green growth performance?
- Does the project intervention offer net positive benefits and should it proceed?
- What are the synergies and trade-offs in re-designing a project?
- How much capital investment is needed to achieve the improved performance?
- Are there policies that might drive better outcomes for this and other projects?
- What specific policy instruments and financing options are needed to drive green investment and behavioural change?

Figure 3.2.: Measuring BAU against Green Growth

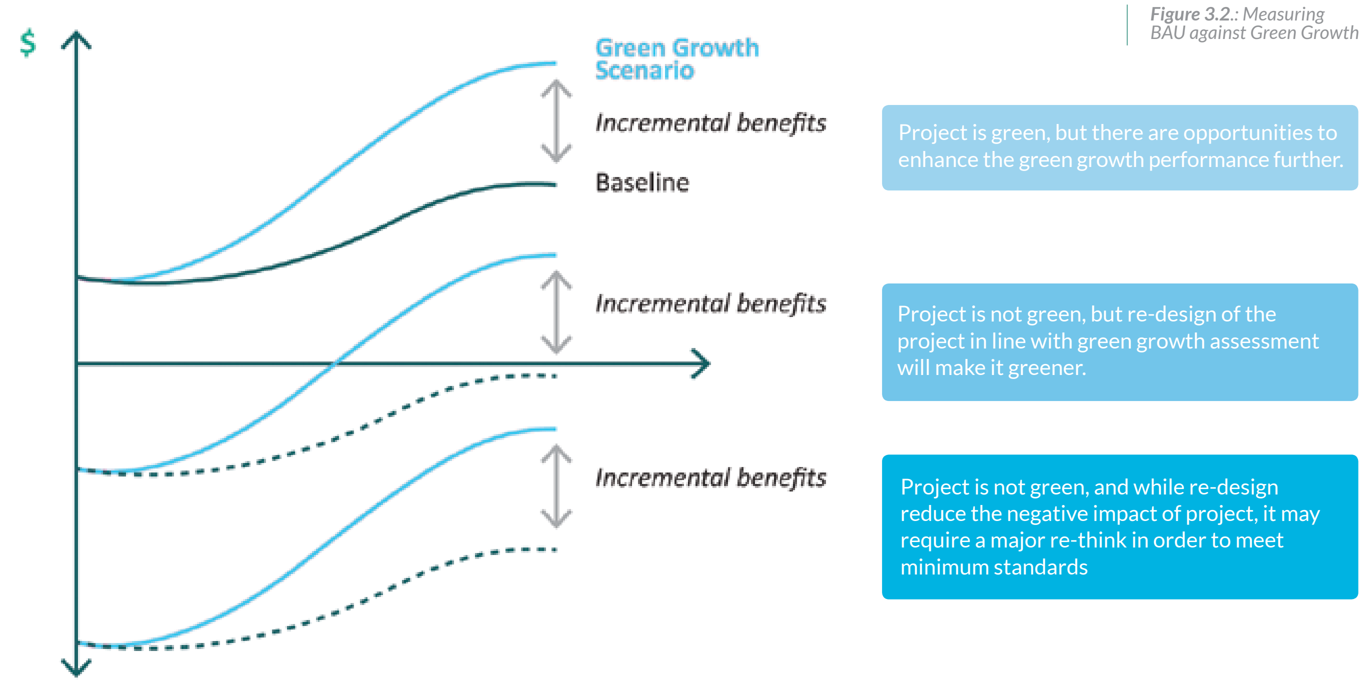


Figure 3.2 presents a stylized example of how a project-level eCBA can be used to estimate the difference between current plans and green growth scenarios. The horizontal line represents the minimum threshold at which a project can be considered to be contributing to a green economy. Key activities to determine the green growth options include:

- Local/national and international literature review
- Speaking to sector experts about technologies and econ/environmental impacts and possible mitigation measures
- Speaking to communities, community representatives and NGOs about potential social and environmental impacts and possible mitigation measures
- Speaking to national/regional planners and industry/industry associations about wider economic development opportunities.

Input	Output	Outcome	Impact
Financial and natural resources committed • Mangrove areas • Fertilizer • Fish seeds	Quantitative measure of change • Increase fish pond production • Reduce mangrove areas	Which stakeholders are affected? What is the outcome for them, in monetary (Rupiah) terms? Positive • Revenue for fish farmers • Food resilience for local community • Local job creation Negative • Local climate change risk • Coastal pollution • Erosion	Would these have happened anyway? What is the baseline? Compared to before: • More revenue than normal fishing • More food than normal fishing • Same number of fisherman • More unfiltered pollution • More erosion

Figure 3.3.: The impact pathway of fish ponds in mangrove areas

Impact Pathway: Map out the physical and social effects of the project in a consistent and rigorous way to prioritise the most material impacts and understand how to value impacts on different stakeholders across the region or landscape.

Stage 3: Map the impact pathways
Once a green growth scenario with specific policy has been identified, we need to anticipate the potential impacts these interventions might have on the environment, the economy and society as a whole.

We use impact pathways to describe the linkages between interventions (activities), the expected outputs from those activities, and the positive and negative outcomes that are generated in both the short and longer term.

Impact pathways need to be mapped for both BAU and Green Growth Scenarios. The total impact of such a policy can be evaluated along a chain of potential impacts. Figure 3.3. gives the example of creating fishponds in mangrove areas.

When designing impact pathways, eCBA consultants anticipate a 'value chain' of impacts a project can generate. They need to look at the kind of financial and material inputs - i.e. resources - needed to build these ponds. Then they need to think about what physical output will be produced and how it can be measured as accurately in quantitative terms as possible. A major outcome of the project is the social effect on stakeholders. Finally, the total impacts of the project intervention are then evaluated when compared to the BAU scenario.

Stage 4: Collect data
The next step is to collect the data to value the impact pathways. This will be done via an extensive literature review and engagement with national and local stakeholders. The use of local primary data would be preferable, but often these are lacking. Thus, international data are used to fill in the gaps, but adjusted to local contexts. Examples of data sources can be seen in **Table 3.2.**

Stage 5: Extended cost benefit analysis
The extended cost benefit analysis attempts to apply a total economic value framework. In this way, project planners ensure the inclusion of social and environmental externalities, expressed as monetary terms in feasibility studies.

However, the basic principles and methodology of conventional cost benefit analysis are still used in the eCBA. The objective is to value negative (costs) and positive (benefits) impacts on stakeholders, expressed in monetary terms across regions and time periods. The following questions are relevant:
- Is this project net positive?
- What is the balance of social, economic and environmental benefits?
- What is the distribution of private versus public benefits?

Category	*Data*	*Potential Data Sources*	
		Indonesia Specific Sources	*International Sources*
Technology	• Input requirements (materials, land, labour, fuels) • Investment and running costs • Levels of output per $ input (tonnes of production etc.)	• BPS • BPPT	• GGGI • IEA
Social	• Willingness-to-Pay surveys • Income/health/education/unemployment levels • Healthcare costs/costs of disease • Social return on education	• BPS • Ministry of Manpower, Health, Social Affairs	• UNDP • ILO
Economic	• Product prices and transport costs • Multiplier effects	• BPS • ISPO • Bank Indonesia • Ministry of Finance	• World Bank • ADB
Environmental	• Pollutant output ratios (tCO2, SOx, BOD etc. per tonne of production) • Local environmental characteristics (population, weather, hydrology) • Ecosystem services affected and their value	• Environmental Quality Index (Ministry of Environment)	• WWF • RSPO • FAO • UNEP

Table 3.2.: Examples of data sources used in eCBA

Financial cost	*Financial benefits*
Up-front investment	New product revenue
Maintenance	Higher product price
Labour	Fuel and other efficiency savings
Land	
Fuel cost	
Other operating cost	

Table 3.3.: Typical project cost and benefit items

DEFINING COSTS AND BENEFITS OF A PROJECT
A first step is to identify benefits and costs of a project. Typical costs and benefits are in **Table 3.3**

USING OPPORTUNITY COST AND SHADOW PRICING
In order to account for wider economic and social factors, it is important that all resources must be used and valued at their full opportunity cost to the economy. In an economy, many distortions do exist such as taxes, wages or subsidies. This means that the resource is being traded not at its market price, and thus can be either under- or over-valued. When using eCBA to assess projects, planners need to account for these distortions by using shadow prices. This means that they value the resource at a price they assume to be undistorted of reflect the true market price.

Discounting is used to compare costs and benefits that occur in different time periods. Projects incur costs and benefits over a long time period. Project analysts apply measures like the net present value (NPV) and internal rate of return (IRR) to decide whether a projects' benefit stream is bigger than its cost stream over a certain period. If benefits in net present value terms are sufficiently large or at least greater than zero, then the project is feasible.

A framework to address externalities
In order to put concrete monetary values on externalities, we first must know what kind of values we attach to the various functions of ecosystem services. The Total Economic Value framework rigorously categorizes and quantifies the economic value of natural capital based on the use and non-use value to the public (see **Figure 3.4**).

Box 3.1.: Examples of distorted prices

- Taxes and subsidies: If there are significant taxes or subsidies present, then market prices will not represent the social opportunity cost of capital (SOC) of a resource. The reason for this is that taxes or subsidies are simply a transfer payment to/from government.

- Shadow wages: Labor is also a highly taxed item, and also one where market distortions such as unemployment (or in the Indonesian case, under-employment) mean that the opportunity cost is less than the market wage. If a project uses workers who would otherwise be idle, then the true economic cost of their employment is lower than their wages.

- Tradable goods and Exchange Rates: Tradable goods should be valued as if there are no impediments to trade (i.e., no quantitative restrictions, no import/export tariffs or subsidies). For exported products, the use of free-on-board (f.o.b.) prices will generally exclude tariffs and subsidies. For non-traded goods, the appropriate price is the long-run marginal cost of production.

- Costs relating to finance: The payment of interest and repayment of principal is often a key part of a financial appraisal. This is excluded from eCBA since the project is being assessed on its social costs and benefits, and its impact on resource use. Debt service represents a transfer from payer to payee, and does not affect use of resources or output. Also, the eCBA discounting process takes account of the opportunity cost of the project's capital and operational expenditure incurred (so to count financial costs would be double-counting). The same argument applies to interest capitalized during construction.

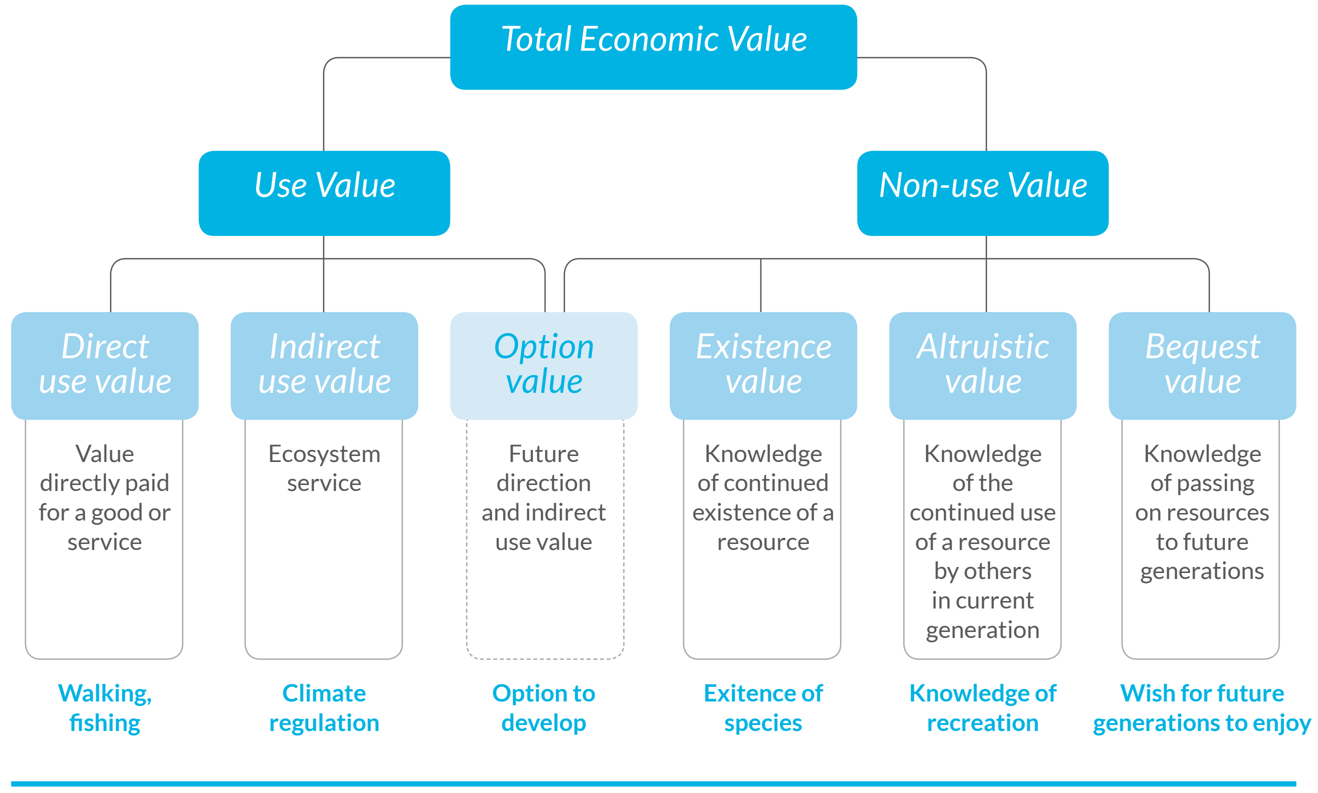


Figure 3.4: Total Economic Value framework used in eCBA

Use values denote all natural capital and ecosystem services that have some biophysical functions to humans. Those functions and resources are directly accessed and used by humans. While some of those functions have market prices attached to them, many do not. Well-managed ecosystem services would account for these external costs, resulting in increased revenue flows and avoided costs of environmental damage and poorly managed, this results in foregone revenue and increased costs from environmental damage (**Figure 1.5**).

Moving further right along the continuum, it becomes progressively more difficult to obtain monetary expressions for the use values of natural resources that are not traded in the market. Indirect use valuesdo not have market prices and provide hidden but important functions to society. These values become only visible once their functions are destroyed. For example excessive forest land conversion can result in the frequent incidence of floods or erosion. The cost of repairing the resulting damages to human livelihood is then a very visible monetary value. Thus, use values are indirectly estimated by using the costs incurred due to the loss of important ecosystem functions.

People put option values on resources because they do not want to use a particular resource now, but want to have the choice to use resource in the future. For example, people are willing to pay money for the preservation of a unique site like a natural reservation park, to have the option to use it in the future.

Non-use values are even more difficult to monetize, as they are subject to differing views of how individuals and communities see the intrinsic value of particular natural assets.

The existence value of certain species such as elephants has a certain value to local communities but might differ from the valuation of the national or the global public.

Similar to option values, bequest value refers to the satisfaction many people derive from the knowledge that a certain stock of natural resources and wildlife species is being preserved for future generations.

Non-use values are to a large extent determined by altruistic behaviour, meaning that many economic actors show selfless concern for the wellness of others. By sacrificing the current consumption of certain natural resources, the current generation is willing to pay a certain price or an insurance premium for ensuring that future generations do have the same level of access to the natural environment.

Thus, the total economic value of natural capital and their services consists not only of use values but also of non-use values determined by the willingness to pay of various actors. If non-use values are ignored by project planners, then this could lead to an under-estimation of the benefits that ecosystem services can provide and in turn to continued over-use of natural resources.

The eCBA process tries to capture the total economic value that a project generates. In practice, project planners employing the eCBA method make mostly use of readily available secondary data on direct and indirect use values. However, in many cases, non-use values are very difficult to obtain due to the lack of primary research applying total economic valuation techniques.

Ideally, eCBA studies could generate primary data to quantify non-use values by using techniques like contingent valuation, travel cost or hedonic pricing and the like. These are survey methods that directly ask affected communities the amount of money they are willing to pay for certain environmental services. But in practice conducting these surveys are very time - and resource intensive processes and depend very much on budget availability of a project. Realistically, planners and consultants using eCBA have to make do with existing research and secondary data. Thus, in order to take account of the uncertainty regarding the quality of data, the stakeholder process to validate assumptions and data sources underlying the generation of monetary values is a vital element in the eCBA process.

USING NET PRESENT VALUE (NPV) AND APPLYING THE RIGHT SOCIAL DISCOUNT RATE

The discount rate is the interest rate used to value and compare the stream of benefits and costs of a project, the cash flow, across time. The rate reflects the time value of money: Society generally prefers one dollar now to one dollar next year. This is partly due to intrinsic impatience in human nature, but also takes account of the risk and uncertainty of future cash flows. Thus, the greater the uncertainty on the side of investors over future cash flows, the higher the discount factor used or the higher the opportunity cost of capital across time (**See Box 3.2.**).

Box 3.2. : *Net Present Value and Internal Rate of Return*

The net present value of a project is the present value (PV) of its benefit stream. It is obtained by discounting the stream of net benefits produced by the project's lifetime, back to its value in the chosen base period, usually the present.

$$NPV\,(i, N) = \frac{(B_t - C_t)}{(1+i)^t}$$

Where : B = Benefits, C = Costs , i = financial or economic discount rate
t = number of years for which project will operate

If the NPV is positive, then the project is feasible. Or more accurately: if discounted net benefits minus the investment cost are greater than zero, we say that the project has a positive Net Present Value (NPV).

The Internal Rate of Return (IRR) is the discount rate needed to make sure the NPV is at least zero. Private investors typically want at least 10% IRR on a project since they could make this by investing in other assets such as the stock market, government debt, or other projects.

Note: When adjusting for inflation the NPV needs to use a real discount rate:

$r = [\,(1+i) / (1+\pi)] - 1$ where π = inflation rate

CHAPTER 3 :

However, from a public policy perspective, planners might prefer to take a lower discount rate. The rationale for this is that dollars invested now, create new assets and income tomorrow. In general, the Social Discount Rate (SDR) will be significantly lower than a private sector discount rate used in financial appraisal. Since society can afford to take a longer term view of assets, risks are spread across entire populations and not just over one project, and there are no taxes to consider.

Since the costs and benefits of green growth interventions can stretch across decades and even centuries, discounted net benefits are often extremely sensitive to the choice of discount rate . One key point to make is that long-term environmental impacts are often discounted using a lower discount rate than might be used for 20-50 year infrastructure projects; this is due to factors such as inter-generational equity, the mathematical nature of exponential discounting in the long-term, and inherent uncertainty over such a long time-frame (this captures the idea of 'irreversible impacts' as well).

Stage 6: Validate findings

Once the results of the eCBA are calculated, discussions with key stakeholders are needed to confirm the accuracy and reliability of the results. The more open and transparent the model and the findings are, the greater is the credibility of the eCBA study. The following steps are usually carried out to validate findings:

- Establish degree of accuracy required (±x %). The key question here is: Is this a high-level analysis to prompt further analysis and strategic project re-design or is this a detailed analysis on which fundamental policy and engineering decisions might be made?
- Conduct sensitivity analysis to see if changes in assumptions of basic parameters such as discount rates, input costs, etc. take us outside the ±x % band.
- Disclose assumptions (in order of sensitivity) to key stakeholders and sector experts to check validity. Highlight where international or other data was used in proxy of local data.

Stage 7: Consider the policy implications

In the final stage, project planners need to provide recommendations on how best to design policies to maximise the green growth performance of this project and across the economy.

The main objective is to attract investment that will support the implementation of the identified green growth interventions. The recommendations should identify enabling, incentive-based, and investment policies that might be needed to attract investment.

Ideally, the eCBA could provide the foundation for a business case for the government to showcase to potential investors.

Category	*Key issues and question*	*Specific policy types*
Enablers	Identify practical barriers to implementation. How can policy/ planning help?	• Spatial planning to overcome land/ terrain constraints • Education to improve quantity and skill-levels of labour • Finance for SMEs and other credit-starved businesses • Transport infrastructure to privide route to market • Forex loans to import capital equipment
Incentives for private sector	Identify ways that policy can improve investability through higher revenue, lower cost, decreased risk	• Subsidies and other incentives (Feed in tariffs, Carbon price. R&D subsidy) • Tax breaks and accelerated deprecation • Subsidised loans and loan guarantees • Guaranteed price of volume (e.g. commitment to public sector procerement)
Direct goverment investment	Check fiscal sustainability, capital requirements and which goverment agency should fund	• Clear fiscal arrangements between national and sub-national and across departments on revenue and cost sharing • Clear financing agreement with Ministry of Finance

Key Concept and References

Concept	Explanation	Further Reference
Cost Benefit Analysis (CBA)	Cost-benefit Analysis (CBA) is a method to evaluate net economic impact of a project. CBA can be applied for both private and public projects. CBA aims to determine whether a project is desirable from a financial point of view. In principle CBA measures the net value of the project in its present value. Value is defined as the difference between benefit and cost. The CBA calculates the value as the sum of the time-discounted costs and benefits of the project. In the context of a public project, economic cost and benefit is generally used instead of purely financial costs, This means that that economic externalities, price distortions, and opportunity cost might be included in the calculation. CBA can be calculated before the project commences or during and after the project is implemented as a tool for monitoring and evaluation. CBA is also useful to measure the impact of intervention or changes in the project. Nevertheless, CBA is not normally used to evaluate programmes and policies, even though in principle it could be used to study the effect of changes in specific political parameters. The steps of implementing CBA involves four main activities. The first activities is clarifying the specification of the project (i.e. the boundary, technical specification). Afterward, financial (or economic) cost and benefit data is gathered. Subsequently, value is calculated using the NPV formula. Lastly, the result is validated and analysed to arrive at a decision about the project.	• Asian Development Bank, 2013, Cost-Benefit Analysis for Development: A Practical Guide, http://www.adb.org/sites/default/files/institutional-document/33788/files/cost-benefit-analysis-development.pdf • OECD, 2006, Cost-Benefit Analysis And The Environment: Recent Developments, http://www.oecd.org/environment/tools-evaluation/36190261.pdf • European Union, 2008, Guide to Cost Benefit Analysis of Investment Projects, http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide2008_en.pdf • Belli, P., Anderson, J. R., Barnum, H.N, Dixon, J. A., Tan, J-P, 2001, Economic Analysis of Investment Operations. Analytical Tools and Practical Applications, World Bank Institute, http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2006/01/27/000160016_20060127112546/Rendered/PDF/298210REPLACEMENT.pdf
Social Discount Rate	Discounting is used to compare costs and benefits that occur in different time periods. The rate at which costs and benefits are compared across time ('discounted') is called the Social Discount Rate (SDR).The SDR used in an eCBA is usually lower than the discount rate used in afinancial appraisal or financial cost-benefit analysis, which only consider market costs and benefits from the perspective of a private investor. We use a (real) SDR of 5% in our analysis, which is slightly below the standard range for developing countries (8-15%). This reflects the dominance of climate change and long-term environmental impacts in the analysis. Private sector developers or state companies normally factor in a Weighted Average Cost of Capital (WACC) of 10% or more when undertaking a feasibility study. This reflects risk perceptions of undertaking an investment and consists of a weighted average of some assumed cost of debt and equity, corporate/project risk, access to finance, investor characteristics and the like.	For a full discussion on the importance of the social discount rate, see Stern (2006) The Economics of Climate Change.

Concept	Example
Opportunity Cost	(see below)

Opportunity Cost

Example: How would one value the benefits of investing in a new fuel-efficient car?

In assessing an intervention that conserves gasoline, it is important to value the savings at the full cost on the international market, not the domestic retail price that also includes a government subsidy. This is because saving one unit of gasoline saves the consumer the retail price and saves Ministry of Finance the subsidy; in total these savings are equal to the international price or the true undistorted market price.

	Fuel usage (liter/year)	Domestic fuel price IDR/liter	International Price
Old car	500	6500	10,000
New car	300	6500	10,000

Financial benefit	Benefit to individual	Benefit to government	Total opportunity cost
Fuel saving domestic fuel price	Fuel saving x domestic fuel price	Subsidy saving	Fuel x saving x international price
200x6,500= 1,300,000 IDR/year	200x6,500= 1,300,000 IDR/year	200x3,500= 700,000 IDR/year	200 x 10,000 = 2,000,000 IDR/year

Net Present Value (NPV)

Example for calculating the NPV of a project

A small project has estimated their cost and benefit as follows:
Length of the project: 6 years
Interest rate: 10 %
Cost in year 1 and year 2 : IDR 500 million and IDR 400 million
Benefit received after year 3 to year 6: IDR 200 m, IDR 300 m, IDR 400 m, and IDR500 m respectively.

Tahun (1)	Tahun (2)	Benefit (IDR) (3)	Net Benefit (4)=(3-2)	DF 10% (5)=1/(1+r)^t	PV 10% (6)=(4-5)
1	500		(500)	0,909	(454,5
2	400		(400)	0,826	(330,4)
3		200	200	0,751	150,2
4		300	300	0,683	204,9
5		400	400	0,620	248
6		500	500	0,564	282,0
total	NPV				100,2

Feasible investment since NPV > 0 at discount of 10%
• Value pf PV of benefits = IDR 885,5, value of PV of costs = (IDR 784,9)
• Net B/C = (885,5/ 784,9) = 1,13... every unit cost provides a net benefit of 1.13

CHAPTER4:

TWO CASE STUDIES IN THE APPLICATION OF THE ECBA METHODOLOGY

Introduction

The eCBA methodology is useful in helping us to understandand value the externalized costs of a wide range of projects, from infrastructure and industrial development to ecosystem preservation and/or restoration projects. The eCBA methodology helps to value the marginal impacts of potential mitigation and re-design strategies on green growth indicators for those projects. Inother words, an eCBA can be conducted to either improve the social and environmental performance of "brown projects", or to quantify the total economic benefits of "green"ones.

This chapter applies the eCBA methodology presented in the previous chapter to two concrete examples, and illustrates the technical processes followed to develop an eCBA. The first example is the **Maloy Special Economic Zone** (Kawasan Industri dan Pelabuhan Internasional, or KIPI) in East Kalimantan, which aims to boost the development of a competitive industry cluster focused on palm oil and coal processing.The second example is the Katingan Peatland Ecosystem Restoration Project in Central Kalimantan, which aims to prevent the conversion of peat forests into palm oil and logging concessions through the commercialization of voluntary carbon credits and other ecosystem services.

The two case studies display significant differences in term of their local contexts and the planned integration of social and environmental objectives. These specificities will drive the focus of the analysis. The KIPI Maloy project was not developed with a particular focus on Green Growth, and while the baseline scenario was already well defined and documented, the Green Growth scenario and nine potential Green Growth interventions had to be devised around the existing project plans. The Katingan Ecosystem Restoration project, by contrast, was designed as a green project, and constitutes the Green Growth scenario in itself. The KIPI Maloy case study focuses more on the process leading to the identification and valuation of Green Growth interventions, while the Katingan case study focuses on the added value of the eCBA to the existing project, i.e. the identification and articulation of policy issues and recommendations.

Both case studies provide a solid analytical framework to promote the optimization of Green Growth performance in both industry-based and ecosystem-based project planning. Both are particularly relevant to Indonesia's efforts to boost sustainable economic growth through the development of Special Economic Zones, based on natural resources processing, manufacture, and ecosystem services (ecotourism).

Case Study 1: KIPI Maloy

As the first case study, the Maloy Special Economic Zone (Kawan Industri dan Pelabuhan Internasional, or KIPI) in East Kalimantanis presented. This assessment was carried out at the request of the East Kalimantan planning agency (Bappeda). The scope of analysis considers the incremental green growth benefits of the KIPI Maloy project, relative to the existing baseline scenario for the project as set out in the Project Masterplan and Design Engineering Document (DED) documents. The baseline itself has not been subjected to an eCBA as it is largely committed and certain construction activities have already broken ground. The assessment presented here does not as certain whether the entire KIPI Maloy project is overall positive or negative for Green Growth, only that Green Growth benefits can be improved through investment in a range of green growth interventions. While the handbook provides recommendations on "greening" the project, it is ultimately a policy decision whether a project is "green enough".

DESIGN OF KIPI MALOY: REGIONAL CONNECTIVITY AND IMPACT

In accordance with East Kalimantan's 2030 economic transformation strategy, the development of KIPI Maloy aims to support the development of a competitive industry cluster generating increased value-added economic activities from natural resource-based industries, in particular palm oil and coal. KIPI Maloy should therefore not be seen in insulation from the wider regional economic and spatial landscape, as its development is likely to impact the overall economic and land-use strategies of the entire region.

KIPI Maloy is located in the district of East Kutai, East Kalimantan, a little over 200km North East of the provincial capital of Samarinda. The project lies within the Trans-Kalimantan Economic Zone (TKEZ), and supports the development of East Kalimantan as an Oleo-chemical Industrial Cluster, and as a hub for agro-industry and energy. The port expansion extends to five terminals in total, of which there are three particularly significant port developments:

1. Crude Palm Oil port (on the Western-facing side of the peninsula)
2. Cargo and Container port (on the Eastern-facing side of the peninsula)
3. Coal port (on the southern tip of the peninsula to connect with Miang Island coal-processing facility)

The KIPI Maloy project is underpinned by infrastructure development in the surrounding area:

1. A Freight railway is being developed to transport coal from inland coal mines to Maloy.
2. A Toll Road is under construction to provide greater connectivity to Samarinda and the stretch of ports along the East Coast of Kalimantan between Kota Bontang and Maloy.
3. The existing inland roads often used for Palm Oil transport will be widened and strengthened.
4. Infrastructure development will facilitate the integration of natural resource exploitation and downstream industry development; therefore KIPI Maloy is expected to have a significant impact on regional production and trade of palm oil and coal.

The TKEZ is a multi-annual development and in varying stages of development. Some of the infrastructure developments are already financed and have broken ground, whereas others remain in the conceptual or planning stage. For this report we have concentrated on the aspects of the project for which we are able to obtain information, i.e. KIPI Maloy and supporting infrastructure. These "core" aspects are outlined in **Table 4.1 below.**

Project aspect	Description	Risks and Opportunities
Power Generation	A 1.4GW coal plant is planned, to be powered from locally-sourced Bituminous and Sub-Bituminous coal.	-Air pollution from coal combustion - Availability of alternative fuel sources
Coal Processing	The coal brought to Maloy is expected to undergo basic processing such as washing in line with Indonesian export regulations. In the nearby PT Batuta Chemical Industrial Park (BCIP) in Sangatta, a coal-to-liquid and ammonia / ammonium nitrate plant is also planned.	- Fertilizer is a vital input for East Kalimantan's economy, and is highly relying on supply of natural gas, whose reserves are depleting -Coal gasification is an alternative solution to secure supply
Palm Oil Plantation and Processing	Around 2.9 Mt of CPO (70% of total) is expected to supply Maloy-based industries. Around 1.9 Mt of CPO (the remaining 30%) will pass through the Port of Maloy each year for international export.[1]	- Risk of accelerating deforestation and conversion to palm oil in response to increased regional demand from Maloy-based industries
Road	A 254 km Toll Road is being constructed between Maloy, Sangatta and Samarinda (and then onwards to Balikpapan).	- Risk of environmental degradation as the road would go through Kutai National Park[2]
Rail	A 135 km freight rail is being developed to run between Maloy, Sangatta and coal mines in East Kutia and other districts in East Kalimantan.	- Land clearing for the construction of the railway - The Railway is planned for coal transport only, and will not benefit other economic activities
Shipping	A CPO storage and export terminal is being constructed on the Western side of Maloy to ship around 1.9 Mt of CPO each year to the international market.	- Oil spills, ballast water discharge and increased air pollution threatening to damage rich mangrove ecosystem

Table 4.1: *Key aspects of the KIPI Maloy Development Plan*

KIPI Maloy Baseline Scenario

A clearly understood and articulated baseline scenario is indispensable to the development of an eCBA. The baseline scenario in eCBAs often refers to a "do nothing" or Business as Usual (BAU) scenario. Considering that the development of KIPI Maloy is already committed, the "do nothing" option, under which existing land use and activities would be maintained, is irrelevant.
However, most activities have still not been undertaken at the time of the analysis, providing valuable opportunities for re-design.

Our baseline of the KIPI Maloy project's BAU refers to the implementation of the KIPI Maloy estate as is currently planned. The analysis of the baseline allows for the identification of negative green growth impacts/costs or lost opportunities/revenue, in order to develop or re-design interventions which would contribute to Green Growth outcomes. KIPI Maloy has already been integrated into local and national development plans. Key planning documents such as the Project Masterplan and DED can therefore be used to understand the design of the project, planned land-use change, and development activities. An Environmental Impact Assessment (EIA) has already been conducted and can be used to picture the existing landscape and environmental baseline.

[1] *There is some discrepancy between reported total production and land-use, and the assumptions in the Maloy DED. This is due to the assumed yield in the DED, 4.2t/ha, deviating from the implied yield in the East Kalimantan Annual Statistics of 5.9t/ha.*
[2] *Further discussions with local government established that settlements had already been developed within the national park, leading government authorities to acknowledge administratively human activities in the park through the creation of villages. The issue then becomes how to better integrate such communities into the regional economy to ensure minimal degradation of the local ecosystem; ecotourism was therefore suggested as a potential economic strategy to preserve existing landscapes through the development of ecosystem-based income generating activities.*

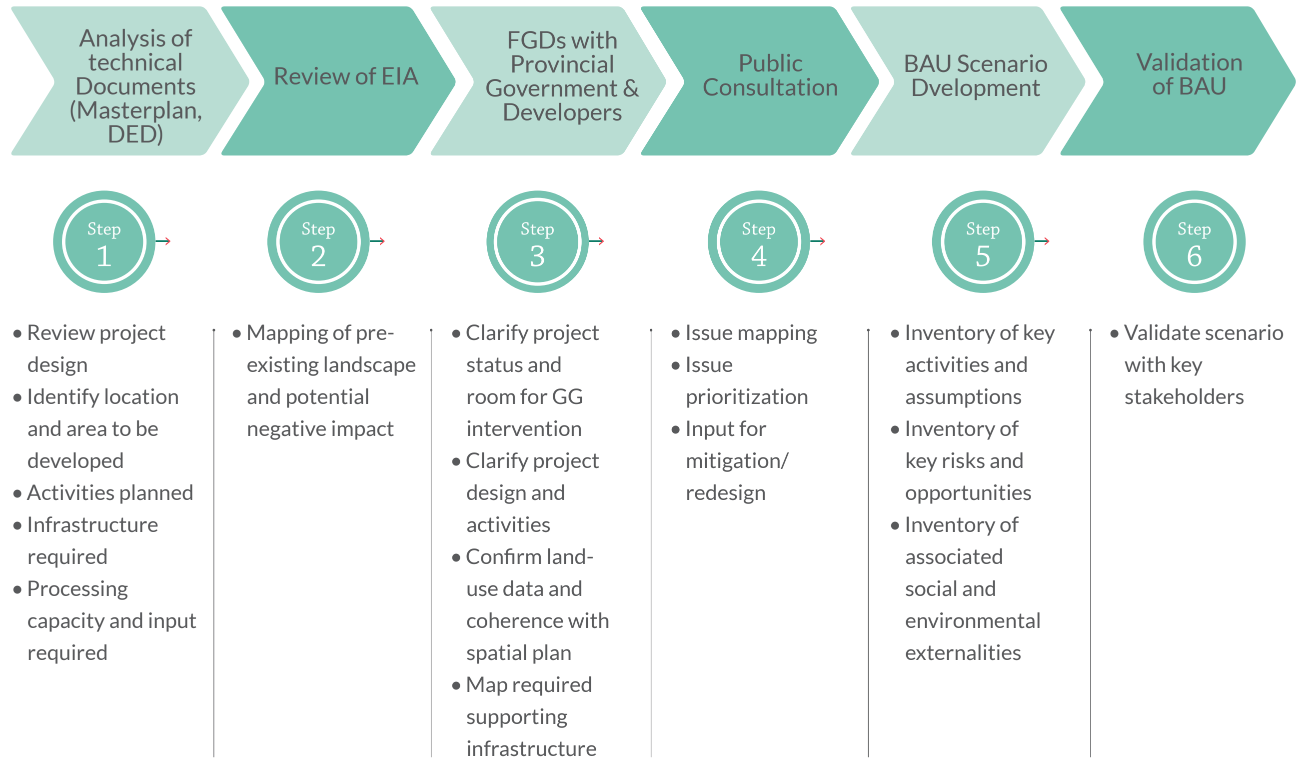


Figure 4.1
Development of the KIPI Maloy Baseline Scenario

Development of Green Growth Scenarios for KIPI Maloy

Following a study of the project documents including the Masterplan, the AMDAL, the DED, further literature review, and an initial stakeholder workshop held in Samarinda in October 2013, this sub-section presents a "Green Growth scenario" focused around nine "green growth interventions" for KIPI Maloy. The scenarios developed in this sub-section should be considered against the Baseline established in the sub-section above. It is worth noting that the baseline scenario with KIPI Maloy may not align with an optimal development path for Indonesia; even if the project is in full compliance with existing environmental regulations, there can be a range of externalities and governance, policy and institutional factors that may prevent KIPI Maloy from attaining its optimum "green growth" performance.

A series of Focus Group Discussions (FGDs) were held with participants from relevant agencies of the East Kalimantan Provincial Government as well as project developers. The objectives of the FGDs were to better understand the design of KIPI Maloy and how the project integrates into wider regional economic and spatial planning. Such discussions were also needed to explore issues related to supporting infrastructure and the supply of raw material into the industrial estate. Separate discussions with Civil Society Organizations (CSOs) were also held in order to identify concerns about the potential environmental and social impacts of KIPI Maloy. Those discussions allowed for the identification of specific risks and missed opportunities related the BAU implementation. Those risks include:

- Risk of accelerated deforestation for conversion to palm oil plantations in order to supply KIPI Maloy's CPO downstream industry;
- Risk of increased air pollution related to Coal power production;
- Risk of water pollution and destruction of Maloy's rich mangrove ecosystem

The interventions proposed in order that KIPI Maloy moves towards a "Green Growth Scenario" are summarized in **Table 4.2** below. These interventions are hypothesized to have a net positive effect on relevant stakeholders in the development of KIPI Maloy. It is worth noting that this is not an exhaustive list of impacts, but rather a selection of high-impact interventions as well as those explicitly suggested by project stakeholders. Each of the interventions has been included in a quantitative, monetized scenario within the eCBA. The details on which stakeholders are affected and what impacts are considered for each of the proposed interventions are included in the Impact Pathway and eCBA modeling sections below.

Identifying Impact Pathways for KIPI Maloy

The Impact Pathway framework helps to define the scope of the eCBA analysis and identifies the key indicators and outcomes that this handbook includes in its approach. The last column in RVLW 4.3 identifies which Green Growth Outcomesthe intervention contributes to. It is critically important that the Impact Pathway identifies clear quantitative indicators for outcomes, which will allow this analysis to derive the associated economic value of the desired change in outcome.The impact pathway analysis was designed as a logical, practical framework to be used by policy makers asa guide to mainstream stakeholder inputs and feedback, identify risks and opportunities, and map out key stakeholder concerns.

The impact pathway represents the architecture of the eCBA and drives all the subsequent steps leading to the valuation of costs and benefits. Although it is important to clearly understand the mechanisms in motion and methodology behind the valuation of costs and benefits, it is the process leading to the development of the impact pathway, which will drive the analysis and future strategic decisions. It is therefore critically important that government agencies in charge of project development lead this process. Steps 1 to 3 in **Figure 4.2** below do not require specific economics or modelling skills from practitioners. Steps 4 and 5 are much more time consuming and technically challenging. In countries where eCBAs are being used, government agencies tend to contract external consultants to conduct data collection, analysis, and economic modelling.

A clearly outlined impact pathway will guarantee consistency and coherence between the government agency's vision and the outcome of the analysis. Once the outputs and outcomes projected under the impact pathways are valued in quantitative and monetary terms, government agencies can prioritize interventions and investment, and proceed with strategic planning decisions.

Table 1.1: *Sources of Indicators*

Project aspect	Green Growth Intervention
Power Generation	1. Partial substitution of coal for biomass in power generation
Coal Processing	2. Gasification of coal for power generation
Palm Oil Plantation	3. Implementation of Best Management Practices (BMP)
Road	4. Extension of the road to develop tourist resort
Rail	5. Railway re-routed to follow existing road's route 6. Railway converted to accommodate CPO freight
Shipping	7. Cold-ironing (on-shore power) 8. Replacement of anti-fouling paint 9. Ballast Water Treatment Program

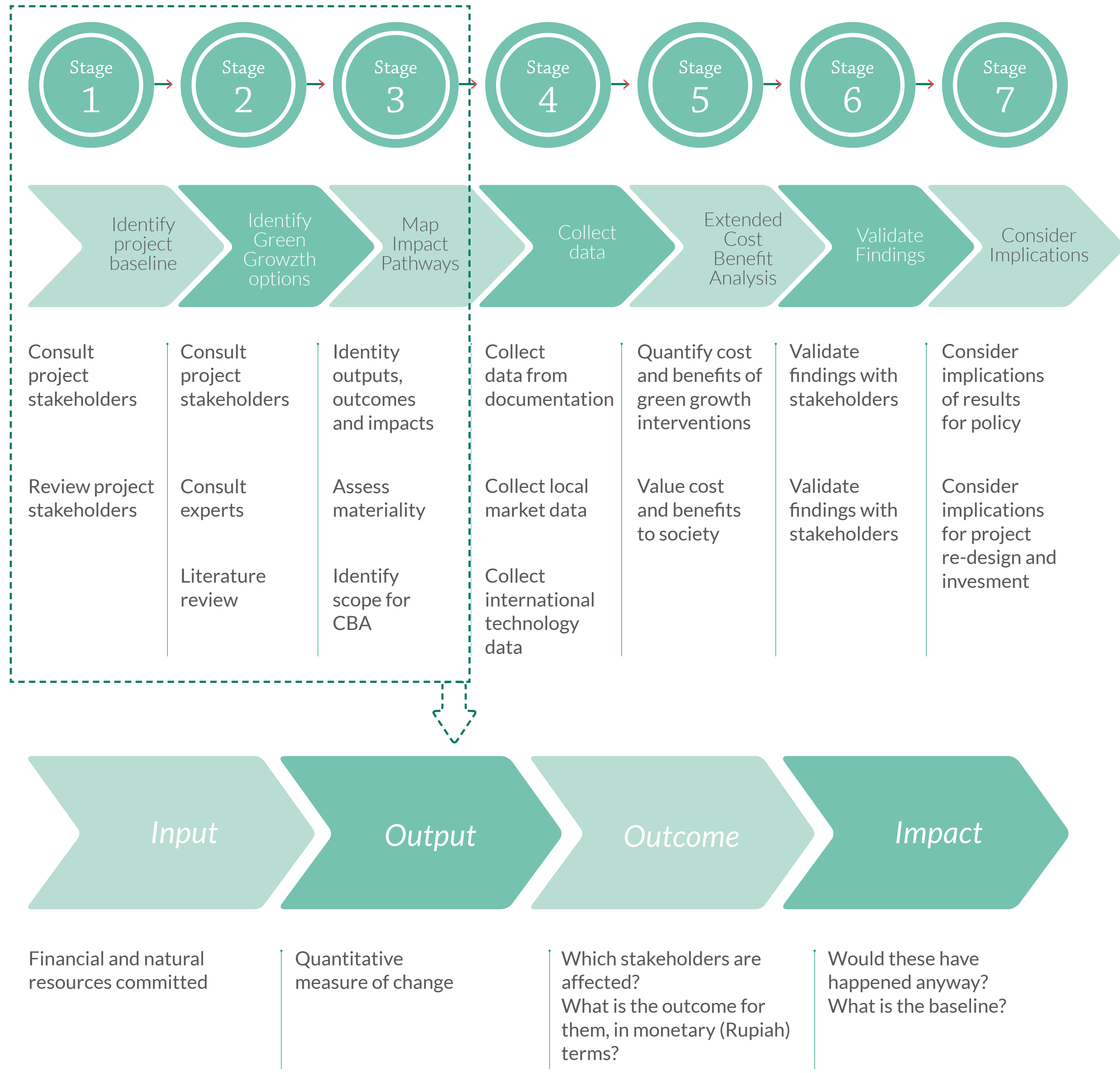


Figure 4.2
Strategic role for government agencies in eCBA development

Table 4.3: Impact Pathways of One Key Green Growth Intervention: Substitution of Biomass for Coal-Fired Power Generation

Activity	Gg Intervention	Monetised in CBA?	Output	Impacted Stakeholders	Negative Outcome/ Cost	Positive Outcome/ Benefit	Green Growth Outcomes
POWER	Substitution from coal to biomass Power	✓	Change in CO_2 emissions	Global impact		Climate change mitigated	GHG Emissions
		✓	Change in other air pollutants (SOx, NOx, PM)	Downwind/Local Communities and Workers		Health and quality of life impacts avoided	Social development
		✓	Change in financial performance of power plant	Power generating companies and/ or companies working in the estate	Cost of technological adaptation, change in fuel costs and other operating expenses	(fuel costs may be lower depending on fuel prices)	Economic Growth
		×	Establishment of renewables supply chain for PKS	Palm Oil Plantations, Power industry, Local and National Government		New green industries	Economic Growth
		×	Increase in renewables production			Climate change mitigated	GHG Emissions
		×	Increased diversity of fuel supply	PLN and/or companies working in KIPI Maloy	Potentially increased exposure to volatility of PKS prices	Probably reduced exposure to fuel price changes as coal and PKS prices are not strongly correlated	Resilience
		×	Reduced GHG intensity for Kalimantan	Local and National Government		Climate change mitigated	GHG Emissions
		×	Increased coal available for export	Local and National Government		Improved Balance of Payments	Economic Growth
		☒	Change in other air pollutants (SOx, NOx, PM)	Downwind/Local Communities and Workers		Health and quality of life impacts avoided	Social development
		☒	Change in financial performance of power plant	Power generating companies and/ or companies working in the estate	Cost of technological adaptation, change in fuel costs and other operating expenses	(fuel costs may be lower depending on fuel prices)	Economic Growth
	Other renewable technologies - Solar PV	×					

CHAPTER 4 :

Table 4.3 illustrates the impact pathways constructed for one of the nine Green Growth interventions, i.e. the partial substitution to biomass for power generation. Those impacts that are included in the eCBA (marked with a "✓") are defined very strictly with respect to impacts and stakeholders as these have to be absolutely clear for the valuation to be robust. Those quantitative impacts not included in the eCBA, or those activities that were considered as part of the qualitative Green Growth Aspirational scenario not the Green Growth Scenario, are defined more flexibly (and marked with a "×" - see also the key below).

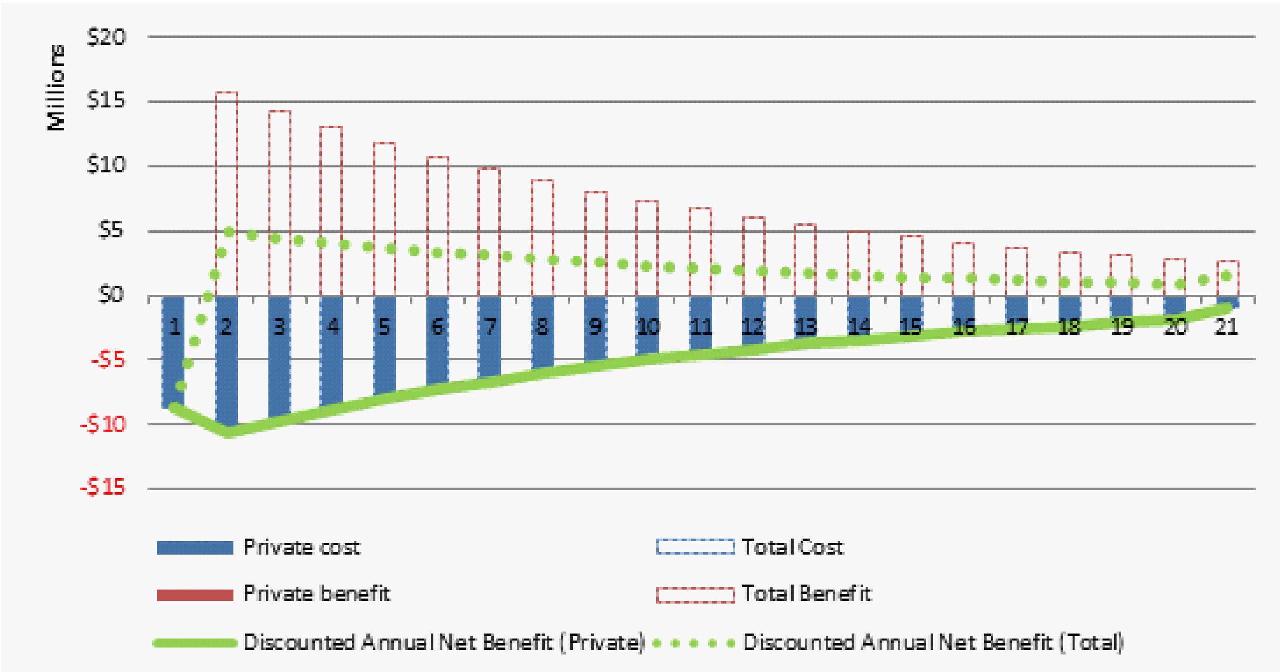
Understanding the results of an eCBA analysis and the policy implications

Based on a process of identifying assumptions, conducting a cost-benefit analysis, valuing different outcomes, and financial modelling (all contained in Annex 1), we estimate that the illustrative green growth intervention of partially substituting biomass for coal-fired power generation– replacing 2% of the planned coal combusted- would generate $32m in net societal benefits.This net figure is composed of strong positive GHG emissions and social development benefits (improved human health from air pollution reductions), offset by economic costs.The gross benefits are driven by reduced coal consumption of 115,000 tonnes/year. This leads in turn to lower emissions of CO2e by 183,000 tonnes/ year, SO2 by 900 tonnes/year, NOx by 300 tonnes/ year and PM by 35 tonnes/year.

Biomass is assumed to have a zero-carbon footprint but a small air emissions footprint (on the grounds that Palm Kernel Shells (PKS), a by-product from the palm oil industry,is a waste product and not a driver of reduced deforestation at this scale). Reduced carbon emissions are valued using the Social Cost of Carbon ($78/tCO2), an estimate of the future global economic damage from climate change attributable to each tonne emitted today. Air emissions are valued using the cost of increased mortality, morbidity and visibility for a semi-densely populated area in Indonesia. We assume that PKS is a pure waste product and thus there is no incremental impact of land-use and ecosystems.

The gross costs are entirely economic, with an up-front capital requirement of $9m to retrofit the coal plant, and increased fuel bills of $11.5m/year as coal is substituted for more expensive PKS (PKS is expensive due to transport and pulverization costs; at the farm-gate it is a waste product). These costs are based on data from the IEA and IRENA, and local market prices.

From a business perspective, this intervention would almost certainly lead to a reduction in profits. Indeed, the economic growth indicator is negative, meaning that the investment required to implement the above proposed intervention, i.e. retrofitting plus increased operational and fuel costs, is not compensated by sufficient incremental financial returns, and therefore is not financially viable.



By way of illustration[5] , using a corporate discount rate of 15%, the investor benefits would only exceed investor costs if coal prices were to double to $90/tonne, and PKS half from $106 to $50/tonne. This does not mean that the intervention is not a good investment from the government's perspective, as it will provide a 62% ERR.This means that for the developer to take the decision to invest in retrofitting – and therefore for the government to enjoy the economic benefits associated with the intervention, additional incentives will need to be provided for the project to become bankable.

This provides a clear case for Public Private Partnership. The government therefore needs to decide whether the expected benefits would justify allocation of public funding or other form of incentives. The eCBA will make the decision easier by allowing to compare ERR across all available intervention options.Considering that the bulk of the intervention impact, namely GHG emission reduction will have a global impact, financial support from the international community, under Indonesia's RAN-GRK framework, could also be considered.

VALIDATION OF FINDINGS AND POLICY RECOMMENDATIONS

The last step in the eCBA process consists of reviewing and validating all key assumptions and findings with key stakeholders, and discussing potential policy recommendations and enabling conditions, which are captured in **Table. 4.10** below.

Table 4.10: Policy Enablers to Support Green Growth Interventions

Activity	Net Benefits	Potential Policy/ Enabler
POWER	USD 32m	• Full implementation of Feed-in Tariff (MEMR Regulation 4/2012 FiT for Biomass) • Reform of energy pricing system (e.g. reform of fossil fuel subsidies/ carbon tax/trading scheme) • Bilateral Offset Crediting Mechanism (supporting RAN-GRK)
COAL GASIFICATION (IGCC)	USD 2,829m	• Subsidized finance/guaranteed loans until case proven. Concessional repayment terms • Seek subsidized inputs under fertilizer subsidy program • Tax/carbon credit incentive • Use of innovative financing arrangements at national level for provincial deployment including PPP
PALM OIL	USD 347m	• Government loans (potentially under MoF Regulation 79/2007 • Acceleration of ISPo certification including BMP guidelines • Government loans (potentially under MoF Regulation 79/2007) • Acceleration of ISPo certification including BMP guidelines and clarification of legal status • Inter-departmental co-operation on resolution of mining/ forestry palm oil concession disputes • Awareness raising for BMP Implementation
SHIPPING	USD 40,000	• Subsidy per unit pollution reduced from ships in-port • Subsidized electricity rates for ships in-port • Port-side infrastructure government funded • Compensation/Payment for Ecosystem Services charged on tourism industry and government representative local fishery interests • Resilience levy: KIPI Maloy charged for coastal protection value of mangroves and coral
ROAD	USD 209m	• Government finances infrastructure, potentially financing from future tax revenues from resort • Inter-departmental co-operation on resolution of mining/forestry/ palm oil concession disputes • Access simplification

[3] The following example cannot be considered a financial appraisal suitable for decision making and does not consider, inter alia, the role of taxes and subsidies on input and output prices, the mode of financing, construction timeframes and capital escalation costs.

Case Study 2: Katingan Peatland Ecosystem Restoration Project

As the second case study, the handbook presents the Katingan Peatland Restoration and Conservation Project (the "RMU" project named after the project developers, PT Rimba Makmur Utama), asessed at the request of the Central Kalimantan planning agency (Bappeda). Katingan refers to the development of an Ecosystem Restoration Concession in a peat forest area of around 200,000 Ha in Central Kalimantan.

As is detailed in greater depth below, the RMU project aims to generate carbon storage and sequestration credits under the international Verified Carbon Standard (VCS) offset scheme, with Climate Carbon Biodiversity Alliance (CCBA) certification to reflect the wider social, environmental and biodiversity benefits of the project. The RMU project constitutes our "Green Growth" scenario, against a baseline scenario referring to land use change under the implementation of the area's land-use zoning for forestry and plantation activities. The scope of the analysis considers the green growth performance of the two competing land-use alternatives for the RMU project area, defined as the baseline and green growth scenarios listed in the following sub-sections.

The eCBA aims to answer the following questions:

- What is the green growth performance of the Ecosystem Restoration project compared to the Business As Usual scenario?
- What is the value to the economy, society and the environment of this performance?
- How much capital investment is required to achieve this improved performance?
- What policy instruments are needed to drive investment and behavioural change?

The eCBA is designed as an analytical tool that governments can use to identify the monetary values of public goods, environmental externalities and social returns associated with two land-use scenarios. In this sense, the results of an eCBA can be used as a base of evidence to determine optimal land-use strategies, and the size of public and private investment flows needed to maximize public goods values over time.

DESIGN OF THE KATINGAN PEATLAND ECOSYSTEM RESTORATIONPROJECT

PT Rimba Makmur Utama (PT RMU) has obtained a License for the Commercial Use of Forest Products – Ecosystem Restoration - IUPHHK-RE (Ecosystem Restoration Concession (ERC) from the Ministry of Forestry of the Government of Indonesia[4] . The area considered in the analysis is limited by the boundaries of the concession, i.e. around 203,570 Ha of peat forest.

ERCs are granted to private corporations seeking to conserve and restore Production Forests in Indonesia. By law, the ERC prevents the use of the project area for activities such as Palm Oil plantations, Industrial Timber plantations, selective logging etc. and obliges the developer to restore ecosystems through measures such as canal blocking, peat rewetting, reforestation and species reintroduction.

The RMU project is located in the Katingan and Kotawaringin Timur Districts of Central Kalimantan, and covers a total area of 203,570ha of peatland forest area – including 154,892 ha of peat swamp forest, home to large populations of endangered species including the Bornean orangutan and proboscis monkeys. The entire project area is located in convertible and non-convertible Production Forest split between two functions: commercial logging; and palm oil production.

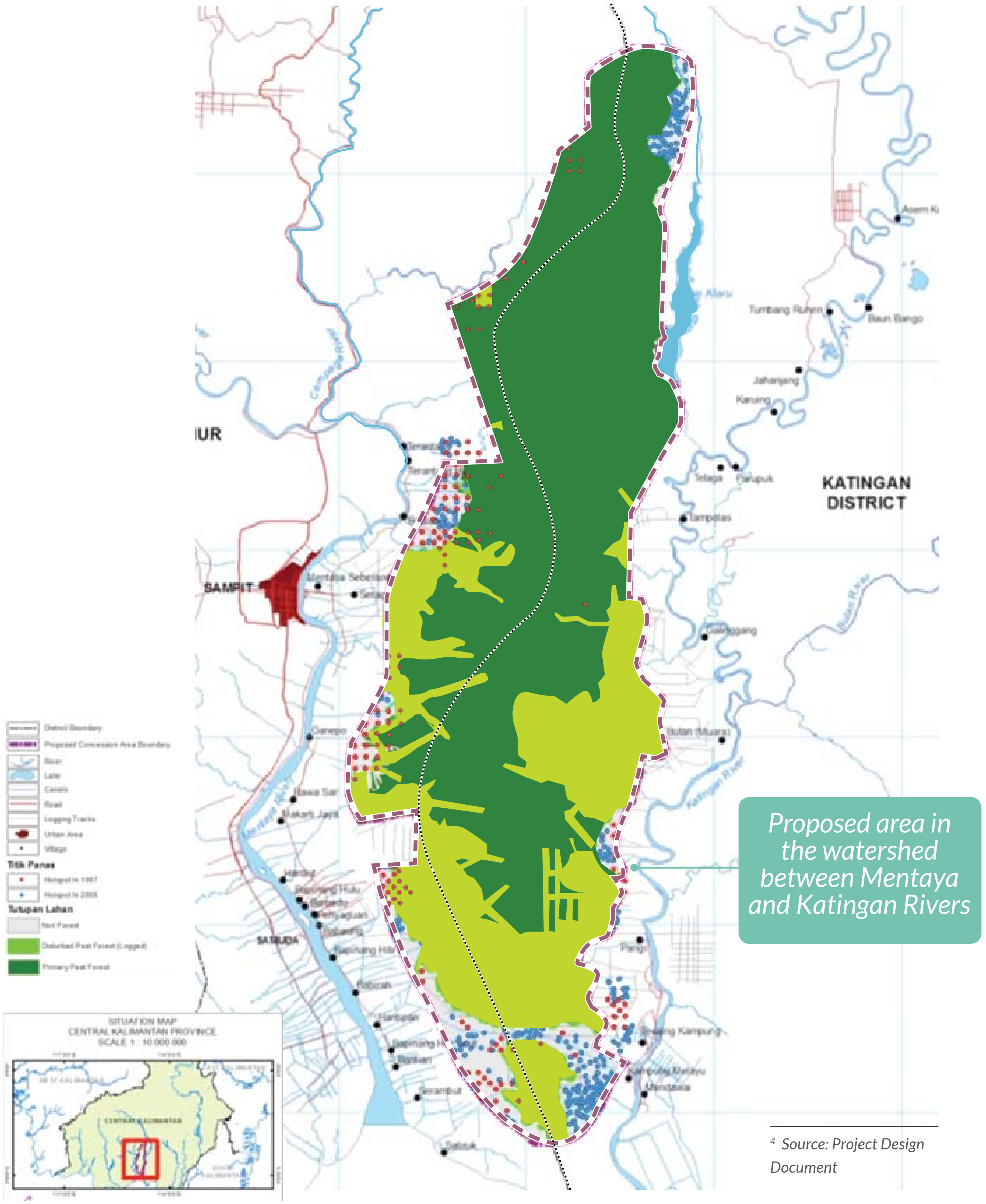
Table 4.11: Forest land-use zones in Indonesia

Acronym	Bahasa Indonesia	English
HP	Hutan Produksi	Production Forest Concession
HPK	Hutan Produksi Konversi	Production Forest Concession: Convertible
HTI	Hutan Tanaman Industri	Production Forest Concession: Industrial Timber
HPH	Hak Pengusahaan Hutan	Production Forest Concession: Selective Logging

CHAPTER 4 :

Figure 4.4
Overview of the Katingan Peatland Ecosystem Restoration ProjectArea

Around 12% of the project area (24,428 hectares) is classified as Hutan Produksi Konversi and are legally eligible for conversion to an oil palm plantation. The remaining 88% of the project area (179,142 hectares) is legally eligible for selective logging, and, for those areas covered with peat less than 3 meters deep, to become HTI plantations.



[4] *Source: Project Design Document*

Numerous HTI licenses and HPH permits have been issued in the project reference region, suggesting that the project areas classified under HP would be highly likely to be commercially developed. Recalling that 33 large palm oil plantations have already been developed in the vicinity of the project area, covering around 278,000 ha in areas with similar biophysical characteristics to the project area, it is reasonable to assume that the project areas classified as HPK would undergo conversion into palm oil plantations.

Conversion to an oil palm plantation would entail the drainage of the peat areas and clearance of the above-ground biomass to enable the planting of oil palms. Peat drainage results in the oxidation of carbonic matter, which releases large amounts of GHG into the atmosphere. Moreover, "peatland drainage leads to subsidence, which in turn leads to reduced drainability [increased flooding], declining productivity and in lowland areas often eventually results in abandonment of land for agricultural production"[5]. According to existing literature, subsidence on drained peatland may exceed two meters within a few decades, supporting the case that areas with peat over 2 metres in thickness are unsuitable for conversion to agriculture[6].

In other words, palm oil development and drainage on peatland may permanently impair the agricultural potential of the land. In the short term, it will increase risks of flash floods during the rainy season, and water scarcity during the dry season, affecting plantation yields and production costs and increase the risk of peat fires.

The creation of industrial timber plantation (HTI) for pulpwood would entail very similar activities with the same results[7]. Selective logging (the harvesting of select tress for sale as timber) would also require canals for wood transport, as is already evident at the site[8].

BASELINE SCENARIO FOR THE KATINGAN PEATLAND ECOSYSTEM RESTORATIONPROJECT

Of the total project area (203,570 ha), 12% (24,428 ha) is classified as HPK and is legally eligible for conversion to oil palm plantation and 88% of the project area (179,142 ha) is classified as HTI/HPH and legally eligible for industrial timber plantation and selective logging.

This implies that without the Conservation and Restoration project, there is a strong chance that 100% of the project area (203,570 ha) would be converted into oil palm or pulpwood plantations and/or logged[9]. Both conversion into plantation and logging are likely to result in peat drainage.

The project area has already been subject to degradation resulting from fires and previous logging by companies and local communities. Actions by local communities such as land clearing for settlements, agriculture, logging, gold mining, smallholder plantation, and peat fires have also contributed to the deforestation in the surrounding area.

To simplify our analysis and focus on key policy questions, we modeled a Business As Usual (BAU) scenario consisting of three main activities and applied the eCBAs on these activities and the planned activities under the ERC as the Green Growth Scenario, as outlined in below.

Table 4.12: Assumed land use in BAU scenario

Former Legal Land Use Zoning	Assumed Land Use in the BAU scenario	Area (hectares)
HPK	Palm Oil	24,428
HP	Selective logging (HP)	89,571
HTI	Industrial Timber Plantations (HTI)	89,571

[5] *Deltares, 2012, Subsidence in drained coastal peatlands in SE Asia: implications for sustainability*
[6] *Deltares, 2012, Subsidence in drained coastal peatlands in SE Asia: implications for sustainability*
[7] *Source: Project Design Document. See also IPCC (2013)Supplement to the 2006 IPCC Guidelines for National GHG Inventories: Wetlands for further details on the GHG emissions process, as well as FAO (2014) Towards Climate-responsible Peatlands Management*
[8] *Source: Project Design Document*
[9] *This is confirmed by the findings from the community interviews that verify oil palm companies' activities in promoting the development of palm oil plantation in the area as well as the presence of a total 28 privately owned oil palm plantations in an area of 207,000 ha near the border of Kotawaringin Timur District.*

Table 4.13 below outlines what the hypothetical impacts of such a scenario might be, based on qualitative team expectations without reference to the quantitative analysis later in this report.

Activities under the BAU scenario	*Description of expected impact on project area*	*Expected Green Growth Impacts*
Conversion to palm oil plantations	Total clearing of forest cover and drainage of the peat. Loss of biodiversity.	**Green House Gas Emissions:** Forest clearance and peat drainage would release significant quantities of GHG in the atmosphere, increasing climate change risks such as extreme weather events. **Sustained Economic Growth:**Significant revenues generated by palm oil, logging and pulpwood plantation activities, although it is unclear how long these can be sustained for. **Healthy and productive ecosystems:** HPH will contribute to partial loss of forest cover and significant loss of biodiversity. HTI/Palm Oil will cause greater losses of natural forest cover and even greater loss of biodiversity. Drainage of peat generally leads to on-site and downstream flooding. **Inclusive and equitable growth:** the development of palm oil and timber activities would generate economic opportunities for local communities but deprive them of ecosystem services upon which their livelihoods were historically built. **Social, economic and environmental resilience:** Local communities will be affected by the loss of biodiversity and ecosystem services. They had been relying on such servicesto provide livelihoods and subsistence opportunities, as well as resilience to climate and socio-economic shocks. However, this may be significantly offset if substantial CSR programs are run by plantation owners.
Conversion to timber plantations	Total clearing of forest cover and drainage of the peat. Loss of biodiversity.	
Logging (HPH)	Partial loss of forest cover and (likely) drainage of the peat. Loss of biodiversity.	

Key: Red = *Negative impact expected* Orange = *Unknown or mild positive / negative impact expected* Green= *Positive impact expected*

Table 4.13: Key Aspects of the BAU Scenario and Identification of the Impacts

DEVELOPMENT OF GREEN GROWTH SCENARIOS FOR THE KATINGAN PEATLAND ECOSYSTEM RESTORATION PROJECT

Contrary to the KIPI Maloy eCBA where the handbook identified a series of green growth interventions, the Green Growth Scenario for RMU is already given, considering that PT RMU already started investing in the Katingan Ecosystem Restoration Concession Development. The Green Growth scenario considered in this analysis refers to the implementation of the Katingan Ecosystem Restoration and Conservation Project. The Project will be managed and implemented within the 203,570 hectare project area, under the Ecosystem Restoration Concession (ERC) business model. ERC permit holders are expected to invest in returning degraded or damaged production forests to their biological equilibrium, and preventing deforestation and degradation within their concession area[10]. **Table 4.14.** shows which Katingan Restoration and Conservation activities were assessed in the context of an eCBA showing their impacts on each of the five outcomes of Green Growth.

CHAPTER 4 :

Project activities	*GHG*	*Social Development*	*Biodiversity & ecosystem*	*Economic Growth*	*Resilience*
	Directly relevant to...				
i. Ecosystem restoration					
1. Water system management	•	•	•	•	•
2. Monitoring and measurement of sampling plots	•	•	•	•	
3. Reforestation in non-forest areas	•	•	•	•	•
4. Enrichment planting in disturbed areas	•	•	•	•	•
ii. Forest resources conservation					
5. Protection and enforcement	•	•	•	•	
6. Forest fire preventation and control	•	•	•	•	•
7. Habitat conservation and management	•	•	•	•	•
iii. Research and development					
8. Knowledge management	•	•			
iv. Livelihood development					
9. Non-timber forest product		•		•	
10. Agroforestry		•	•	•	
11. Ecotourism		•	•	•	
12. Salvaged wood production	•	•	•	•	•
13. Aquaculture and sustainable fisheries		•	•	•	
v. Community resilience					
14. Microfinance institutions and enterprises		•		•	•
15. Efficient energy use and production	•	•	•		•
16. Mother and child health care		•			•
17. Clean water and sanitation		•			•
18. Basic education suport		•			•

Grouping these activities into 5 themes, **Table 4.15** below outlines what the hypothetical impacts of the Green Growth scenario might be. Again, this is based on qualitative team expectations without reference to the quantitative analysis later in this report.

Table 4.14. shows which Katingan Restoration and Conservation activitieswere assessed in the context of an eCBA showing their impacts on each of the five outcomes of Green Growth.

[10]*ERCs are regulated by Ministerial Decree 159/Menhut-II/2004 and Ministerial Regulation No 61/2008*

Activities under Green Growth Scenario	Description of expected impact on project area	Expected Green Growth Outcomes
Ecosystem Restoration	Maintenance of hydrological regulation functions, reforestation and enrichment in degraded areas	**Green House Gas Emissions:**The project implementation will avoid support climate change mitigation as it avoids furtherforest clearance and peat drainage, and associated GHG emissions discussed in the BAU scenario. Better forest management will also increase biomass and carbon storage. **Sustained Economic Growth:** In the short-term the Green Growth scenario may not contribute significantly to GDP. However, the project is expected to generate revenues from the sale of carbon credits and create income from other social and environmental activities. **Healthy and productive ecosystems:**Maintenance of forest cover and soil integrity will ensure hydrological balance in the project and surrounding area; it will also preserve local species' habitat . **Inclusive and equitable growth:** Local communities will be playing a central role in the Green Growth scenario, and benefit from a wide range of economic empowerment initiatives. **Social, economic and environmental resilience:** Local communities will enjoy decreased vulnerability to climate shocks, potentially better access to public services, less volatile incomes, and more resilient ecosystem services providing products for local communities.
Forest Resource Conservation	Avoidance of biodiversity and ecosystem services losses	
Research and Development	Enhancing knowledge and capacity on ecosystem restoration	
Livelihood Development	Access to economic opportunities	
Community resilience	Decreased vulnerability to climate and socio-economic shocks	

Key: *Red = Negative impact expected Orange = Unknown or mild positive / negative impact expected Green= Positive impact expected*

Table 4.15: Summary of the Green Growth scenario implementation, and identification of expected green growth outcomes

Pulling the expected or hypothetical impacts for the two scenarios together, we are therefore testing the hypothesis in this report that Green Growth will provide a broader range of positive social, economic and environmental outcomes, whereas Business As Usual will generate only short-run financial gain. This hypothesis is illustrated below in **Figure 4.5**

IDENTIFYING IMPACT PATHWAYS FOR THE KATINGAN RMU PROJECT

Figure 4.6 illustrates the (simplified) impact pathways constructed for the Green Growth Scenario, mapping inputs, outputs, and outcomes related to the implementation of activities in **Table 5.5.**

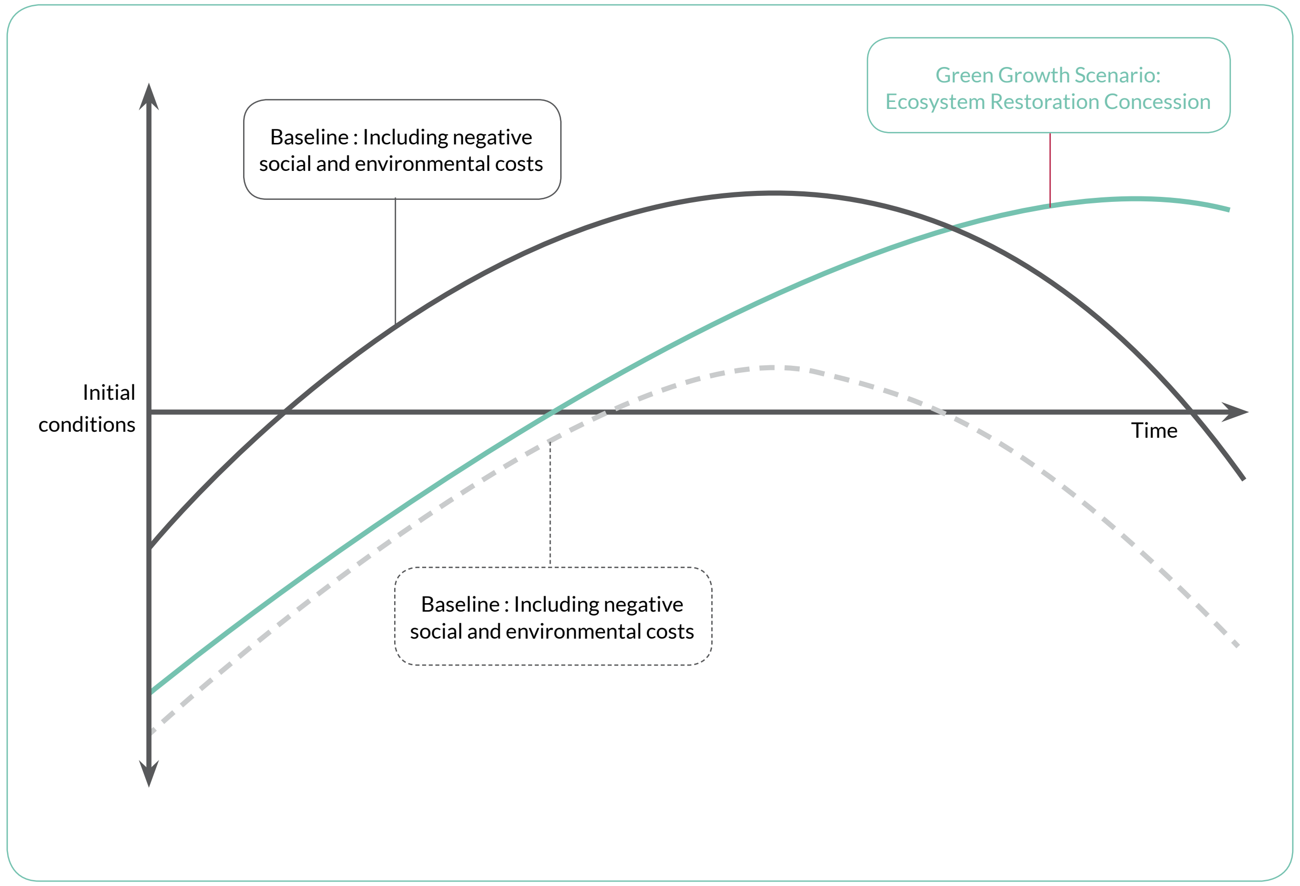


Figure 4.5: Hypothesis tested by this report

UNDERSTANDING THE RESULTS OF AN ECBA ANALYSIS AND POLICY IMPLICATIONS

An eCBA created for the PT RMU project (contained in full in Annex 1 of this document) presents a clear rationale for public policy intervention. There are two major conclusions:

1. From a societal perspective, ERC is an optimal use of land at this (and similar) site(s)
2. Under current market conditions, the incentive to invest in ERC is limited

Input
- Implementation of PT RMU project activities

Output
- Avoided GHG emissions
- Restoration of hydrological balance
- Preservation of biodiversity
- NTFP produced
- Tourism potensial
- Increased access to clean water

Outcome
- Implementation costs of PT RMU project (restoration and preservation)
- Opportunity cost from timber and palm oil

Impact
- Avoided GHG from peatland drainage
- Sustained and equitable economic growth
- Preservation of healthy and productive ecosystems
- Strenghthen economic, social, and enviromental resilience

Figure 4.6.: Impact Pathways for RMU

	Key Issue	Proposed Policy Intervention	Expected Outcome
Policy for Investors	Addressing Regulatory Issues		
	Uncertainty regarding licensing and permits (time and cost)	Streamlining and increasing the transparency of the ERC licensing process Public Private Partnership: the local government acquires the land and permits against participation in the project	Decreased legal uncertainty and implementation delays Reallocation of regulatory risks to local government and de-risking of the investment
	Addressing Business/Financial Risks		
	Absence of proven business model	Additional one-off support for early stage projects such as tax holidays	Increased in investor confidence that ERC projects are practical
	Financial risks (uncertainty regarding CER/VCS prices / volumes)	National Carbon Market and stabilization fund (minimum price at which GoI would buy a guaranteed volume of credits)	Decreased financial risks
	Improving financial performance		
	Low returns on investment relative to commodities	Land swap (land suitable for palm oil expansion vs. HCV land) Application of Polluter Pays Principle through carbon pricing	Decreased (legal) opportunity cost of investing in ERC in degraded peat swap forest
		Mandate a government agency to monitor leakages or absorb risk of monitoring costs spiraling	Decreased operation costs and improved financial performance
	Low absolute returns on investment	Allow concession fee / permit cost to be paid in installment	Lower capital costs and higher financial performance
		Provide preferential long-term funding to ERC developers through REDD+ Fund	Reduced cost of capital and improved financial performance
Policy for Government	Incentivizing Government		
	Perceived attractiveness of commodity revenues and fiscal opportunity cost of ERC (national/provincial)	Clear spatial plan, including zoning of HCV areas (validation of "one map")	Increase in CPO output without further deforestation
	Fiscal opportunity cost of land swaps (esp. kabupaten level)	Redirect revenue flows from project developers from national to local government Intergovernmental fiscal transfers	Compensate eventual losses in fiscal revenues for local governments
	Costs and benefits (including future fiscal liabilities) not included in decision making	Include Green Growth tools and methodologies in project and planning appraisal	Internalization of ecosystem service values into planning and investment decisions
Policy for Communities	Addressing Social Risks		
	Absence of socio-economic opportunity means land clearance activities are not avoided (or simply displaced; leakage)	Clarify benefit sharing and social investment mechanisms Establish guidelines to assist developers include livelihood development project design	Viable alternative to land clearance activities and sustainable long-term livelihoods Greater buy-in for project and reduced monitoring and enforcement costs

Table 4.16: Matrix on Policy Barriers and Enablers of Green Growth Interventions

Based on our quantitative analysis, a literature review, stakeholder consultation and interviews with PT RMU, this handbook identifies a number of supporting policy interventions that would be helpful to support ERC projects and drive investment across suitable degraded land sites across Indonesia. Individually, these are not new recommendations, but do need to be addressed in a novel and systematic way if ERC projects are to get off the ground:

- Addressing regulatory issues; streamlining the licensing cost and process.
- Reducing business and financial risks; ensuring a stable CO2 price with the help of Indonesian and international funds.
- Improving financial performance; ensuring a reasonable CO2 price supported by multi-commodity strategies including Non-Timber Forest Products and Biodiversity monetization, as well as opening access to low-cost debt finance.
- Improving land use governance; in the long-run, appropriately zoning potential ERC areas to avoid competition with commodity extraction activities and ensuring enforcement of the law.
- Incentivizing local government to support ERC; compensating local government for land swap costs, and ensuring sufficient fiscal incentives exist to support ERC projects. This policy objective needs to be a priority.

VALIDATION OF FINDINGS AND POLICY RECOMMENDATIONS

The last step in the eCBA process consistsof reviewing and validating all key assumptions and findings with key stakeholders, including policy recommendations.

The policy matrix in **Table 4.16** below explains in more detail the identified barriers to the success of ERC projects and the potential policy remedies. These have been categorized according to whether they are for the benefit of (or incentivize) primarily investors, government or communities.

CHAPTER5:

POLICY IMPLICATIONS: MAINSTREAMING eCBA IN ECONOMIC PLANNING

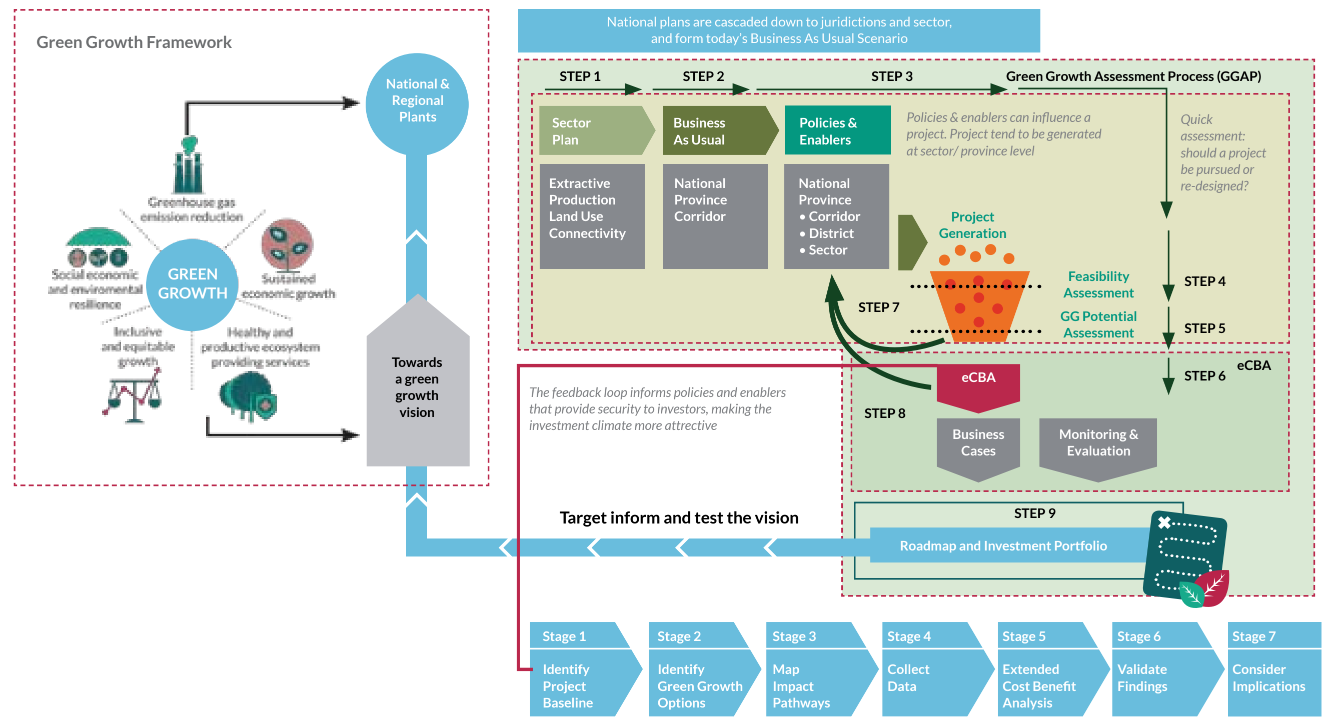


Figure 5. 1: Overview of the Green Growth planning process

Introduction

A wealth of impact assessment tools is available for and used by decision-makers in Indonesia to capture the economic, social, and environmental impacts of policies and projects. However, most tools do not go far enough in providing analysis that is meaningful, rigorous, and easily accessible by a wider range of stakeholders. eCBAs create a meaningful impact analysis that provides decision-makers with easily interpretable and comparable metrics across impacts and options. By translating a wide range of output metrics into a single monetized outcome – economic returns – eCBAs help decision makers to better compare a wide range of output metrics and make better-informed and more analytically rigorous decisions.

The previous chapters demonstrated the value of the eCBA methodology in valuing social and environmental outcomes to capture the total economic value of investment decisions. This chapter examines how to use existing impact assessment tools to better guide development planning towards Green Growth pathways. More specifically, this chapter identifies opportunities to integrate eCBAs into existing impact assessment processes. Specifically, the chapter also discusses how eCBA scan strengthen and complement three existing tools:linking impact assessments and decision-making in (i)Environmental Impact Assessments (EIA) and (ii) Strategic Environmental Assessments (SEA); and how to use eCBAs in the Public-Private-Partnership (PPP) mechanism.

Mainstreaming Green Growth through the integration of Green Growth Assessment Tools

The mainstreaming ofgreen growth into economic and development planning requires the integration of green growth indicators, targets, and metrics into sectoral strategies and macro-level development plans. It also requires a systematic approach thatlinks macro-level strategic planning and policy development with micro-level project implementation.

Recalling the GGAP, as illustrated in Figure 5. 1 above, green growth Assessment tools play a central role in mainstreaming Green Growth into development planning. Green Growth Assessment Tools help to promote:

- Consistency between vision and implementation and then between plans and projects. Although project development is driven by an overarching national development policy, projects tend to be generated at sector and/or provincial levels. Therefore, gaps can appear between overall strategic objectives and project development. It is therefore critically important to assess projects' contribution and performance against green growth indicators in order to identify gaps and eventually re-design individual projects.
- Optimization of resource allocation through project prioritisation: Green Growth Assessment Tools help to assess the total economic value of specific projects, their performance against specific indicators, or their contribution towards specific green growth outcomes. Assessment across a large pool of potential projects will facilitate comparisons of performance and eventually show how decision-makers can prioritise resource allocation towards projects that deliver the highest green growth performance.
- Feedback and continuous policy improvement: eCBAs aim to develop business cases for investments which contribute to green growth outcomes. They provide valuable feedback on policies and enablers that allow the transformation of green intervention alternatives into bankable projects. eCBAs create valuable insight on removing policy bottlenecks and required incentive schemes, which contribute to the continuous improvement of sectoral policies.

Green growth assessment tools also provide a point of reference to integrate social, economic, and environmental components into holistic and trans-sectoral planning, particularlyat thepolicy and project design and planning stages.

OVERVIEW OF THE IMPACT ASSESSMENT PROCESS IN INDONESIA

EIAs and SEAs are widely accepted impact assessment tools that provide valuable inputs for the development planning process and investment decision-making. They help to mitigate and identify potential negative environmental and social impacts, though their objectives tend to differ. SEAs primarily focus on the higher-level policy decision process, while EIAs are mainly targeted towards project level decisions. Both tools have evolved throughout time and across countries, and they cover varying scopes in terms of the considered impact and the level/complexity of analysis. Thus, the scope of EIA and SEA can be limited to environmental aspects or be extended to include economic, social, and public health components. Similarly, the level of complexity will vary from an analysis of regulatory compliance in its simplest form to mitigation and environmental management planning. For both EIAs and SEAs, the scope and level of complexity will depend on the legal definitions and guidelines provided by relevant national and sub-national policy frameworks.

In Indonesia, both EIAs and SEAsare legally mandated and both are implemented with pre-defined scopes and follow detailed guidelines. The Environmental Protection and Management Act (Law 32/2009) wasa major breakthrough that provides opportunities to mainstream Green Growth principles into development planning. The law defines the environment as a whole, regrouping all living things and including as part of its scope of purview environmental, social, and economic components. The law also points out that environmental preservation and sustainable development are to be at the core of policy and development planning, starting from ecosystem inventorization and the delineation of eco-regions to the development of environmental protection and management plans as a basis for development planning.

Law 32/2009 provides a comprehensive assessment framework to ensure the mainstreaming and realization of green growth principles into national and sub-national development planning in Indonesia. Article 15 of the law introduces the obligation for national and local governments to undertake SEAsthat"ensure that sustainable development principles are integrated into policy and development planning". At the project level, the law introduces the obligation to not only assess environmental impact (through AMDALs), but to develop Environmental Management Plans to prevent and/or mitigate adverse environmental and social impacts. Finally, the law introduces an obligation for national and sub-national governments to develop economic instrumentsthat promote "green growth" investment.

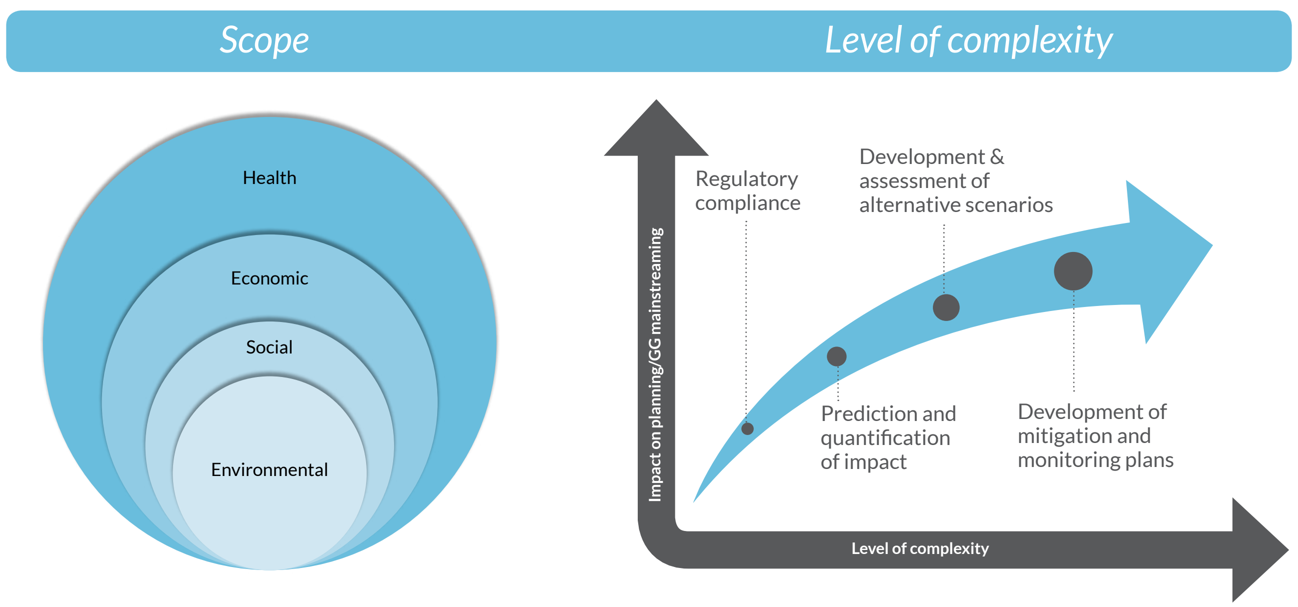


Figure 5.2: Variation in scope and level of complexity of EIAs and SEAs

Tool	*Scope*	*Legal Basis*
Strategic Environmental Assessment (SEA)	• Policy, regulations, programmes, and plans • Environmental, social, economic, public health impacts	• Law No. 32 of 2009 on Environmental Protection and Management • Ministry of Environment regulation no. 9 of 2011 on general guidelines for SEA implementation • Ministry of Environment Regulation no 27 of 2012 on Environmental Licenses • Ministry of Home Affairs Regulation No. 67 of 2012 on guidelines for the implementation of Strategic Environmental Assessment (SEA) in the development or evaluation of Regional Development plans
Environmental Impact Assessment (EIA)	• Physical projects • Environmental, social, economic, public health impacts	• Law No. 32 of 2009 on Environmental Protection and Management • Government Regulation No. 27 of 2012 on Environmental Licenses • Ministry of Environment Regulation no. 16 of 2012 on Guidelines for Environmental Document Development • Ministry of Environment Regulation no. 8 of 2013 on Appraisal and Examination of Environmental Documents and Environmental License Granting • Ministry of Environment Regulation no. 17 of 2012 on Guidance of Community Involvement in Environmental Impact Analysis and Environmental Licensing Process • Ministry of Environment Regulation no. 05 of 2012 on Types of Businesses and/or Activities That Require Environmental Impact Analysis

Table 5.1: Reviewof Environmental and Social Impact Assessment Tools In Indonesia

Figure 5.3: Integration of green growth approach through Law 32/2009

SEA and eCBA:
Integration of eCBA into extended SEA methodology

OVERVIEW OF THE SEA FRAMEWORK IN INDONESIA

Law 32/2009 stipulates that SEAs constitute an iterative process that helps national and sub-national decision-makers to:

- assess the impact of policies, plans, and programs (PPPs) related to the environment
- develop alternative scenarios and improve targeted PPPs
- provide clear recommendations for the improvement of the considered PPPs

The law also provides detailed guidance for the implementation of SEAs in relation to sub-national development planning.

Further analysis of the SEA's methodological guidelines highlights several opportunities improved synergy with an eCBA methodology.

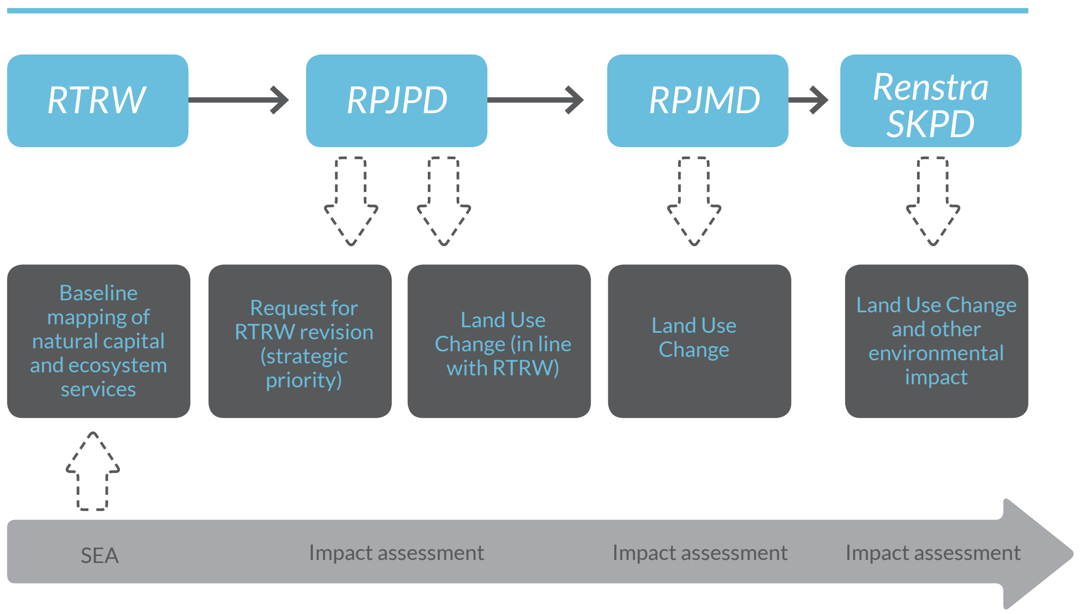


Figure 5.4: SEA implementation in regional development planning

The SEA process follows the same logical framework as the eCBA: it starts with ascoping of the issues; develops a baseline scenario and then one or several alternative scenarios as needed; then proposes recommendations for improved green growth performance.The eCBA methodology provides more robust inputs for decision making by introducing economic valuations in its recommendations, facilitating a more informed and rigorousdecision-making process. Through the utilization of the eCBA methodology, the green growth contribution of all alternative scenarios canbe valued in SEAs.

OVERVIEW OF EIA FRAMEWORK IN INDONESIA

Law 32/2009 defines EIAs(AMDAL) as an integrated and holistic environmental tool used to identify, anticipate, and mitigate environmental risks associated with specific projects, and leading to the development of Environmental Management and Monitoring plans.EIAs are used to determine the environmental feasibility and consequent attribution of environmental licenses, and is therefore a powerful, binding environmental assessment tool. Continuity and consistency with spatial planning and SEA is guaranteed by article 4 of the implementing regulation PP 27/2012. **Figures 5.6** and **5.7** demonstrate the integration of EIAs into a broader project cycle as well as the finer details of creating an EIA.

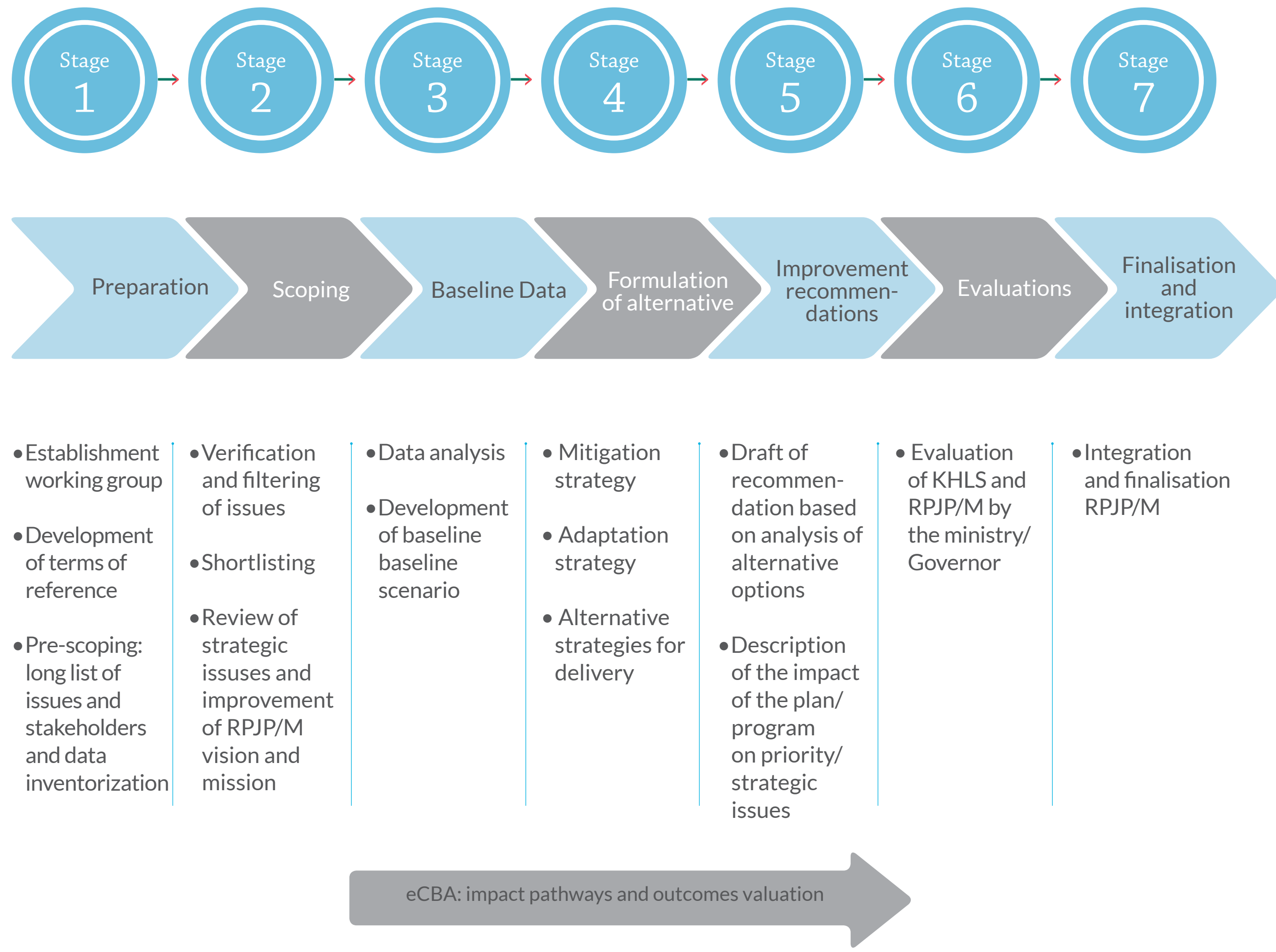
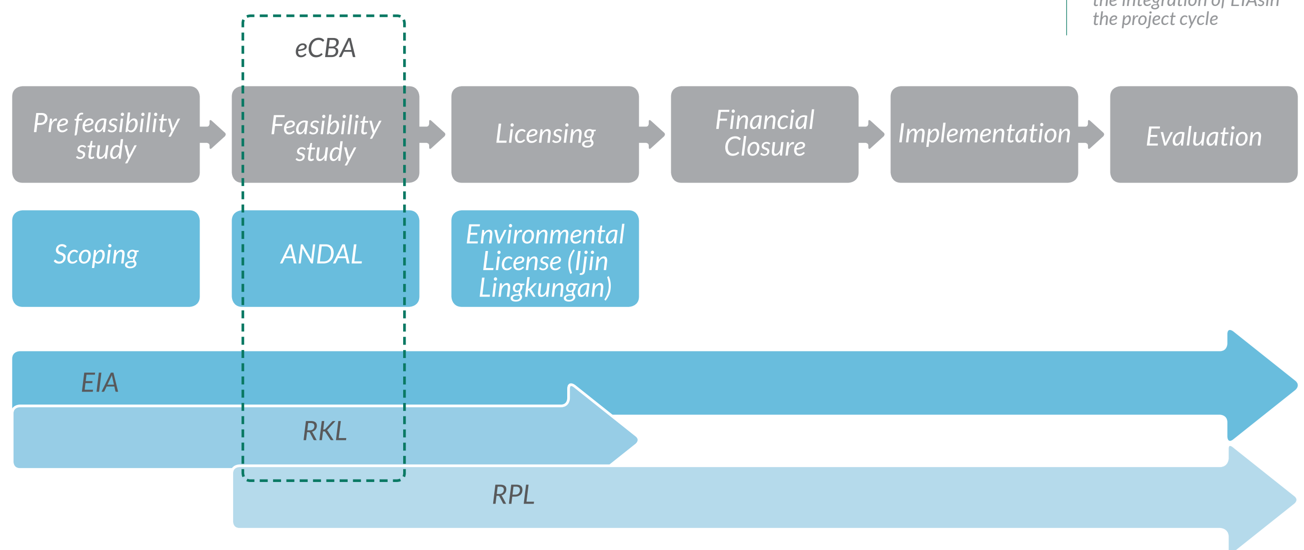


Figure 5.5: Overview of the SEA methodological process in regional planning assessment

Figure 5.6: Overview of the integration of EIAsin the project cycle



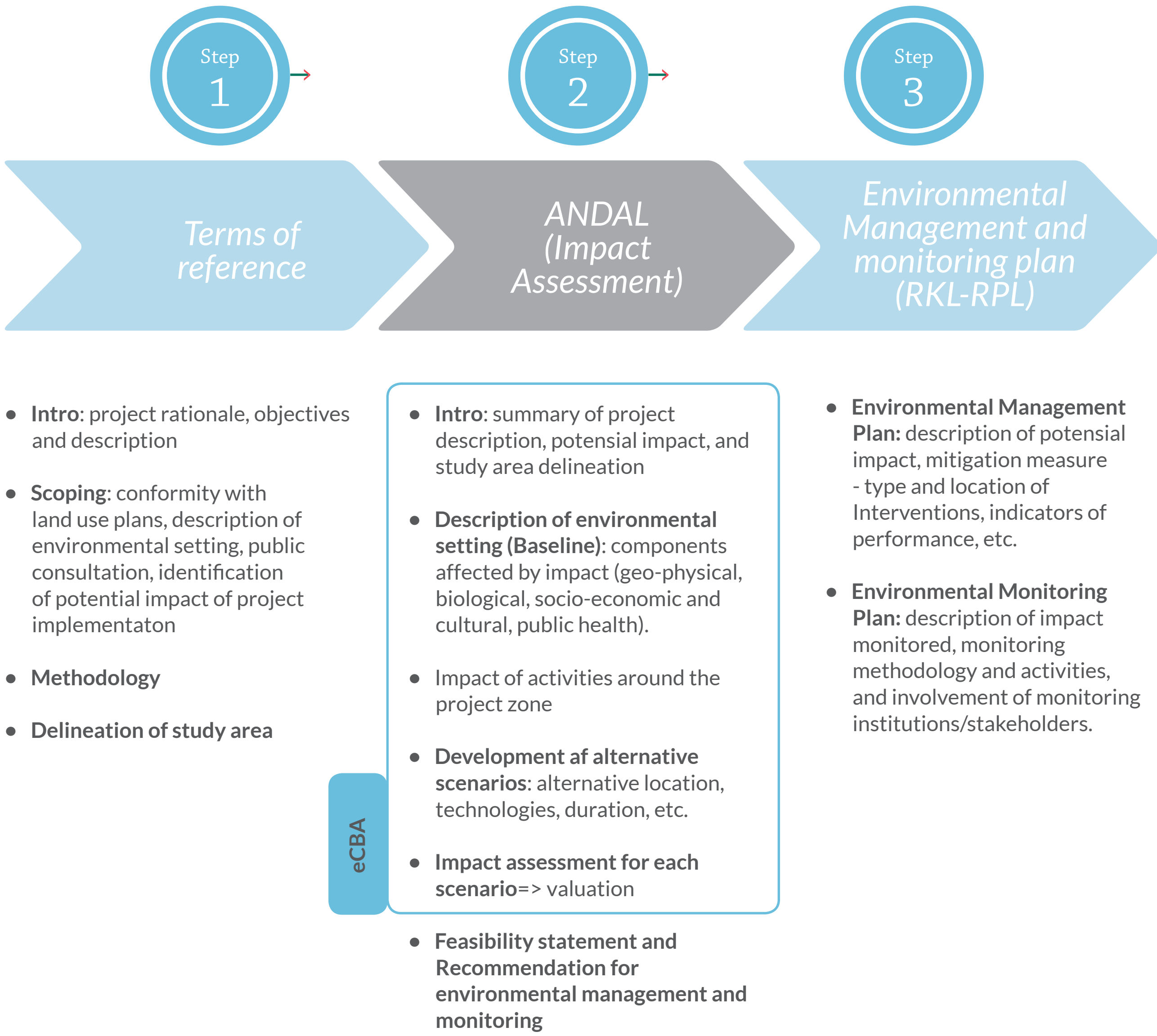


Figure 5.7: Overview of EIA methodology and process

There is a high level of overlap between the scope of the eCBA and the scope of the impact assessment component of the EIA (the ANDAL). Like the eCBA, the ANDAL aims to define a clear baseline scenario, identify and quantify impacts, to develop and assess alternative scenarios, and ultimately provide recommendations for improving the green growth performance of the project.

Integration of eCBA methodology in the EIA process allows for the strengthening of the ANDALprocess by integrating economic valuationsas well as proposing then assessing alternative development scenarios' costs and benefits. The eCBA methodology makes decision making for project initiators and policy makers more transparent and efficient by helping them to assess different alternative scenarios and value the total economic costs and benefits of implementing the Environmental Management and Monitoring Plans.

As developed in previous chapters, eCBAs also result in concrete policy recommendations to improve the financial feasibility of green growth interventions, developing a strong business case for targeted incentives or policy adjustment. Therefore, the integration of eCBAs into EIAs allows decision-makers to go a step further and promote a greater integration of economic instruments to support environmental management plans, as stated in article 42 of the Environmental Protection and Management Act.

Practical steps for integrating eCBA into impact assessment processes

As described above, there is a strong rationale to integrate eCBA methodology into existing impact assessment tools, namely SEAs and EIAs, in order to mainstream economic valuation and business case development in the design of environmental management plans. While it is still early to critically assess SEA implementation in Indonesia, widespread concerns remain in regards the quality of EIA implementation. Integration remains largely theoretical and EIAs tend to bea formal validation exercise that is conducted at the endrather than the beginning of the project development cycle. Moreover, the captured impact assessments of ten are too vague and imprecise to provide valuable inputs for decision-making. EIAs are often criticized by environmental organizations for lacking objectivity and being heavily biased towards the interest of the project initiator, who is responsible for conducting and funding the EIA.

These issueshighlight the need to strengthen monitoring and evaluation mechanisms, before adding to the complexity of EIA by integrating the eCBA methodology. Existing regulations provide a strong mandate to the EIA Evaluation Commission, which intervenes throughout the process to assess and improve the scope and methodology of the study, and to validate the final findings and recommendations. Depending on the area and scope of the project, the Commission is established at the national, regional, or district/city level, and is composed ofrepresentatives from:

- Relevant technical institutions
- Experts in the sector related to the project
- Experts in issues related to the environmental impacts considered
- Representatives of local communities potentially impacted by the project
- Environmental organisations/civil society

The Ministry of Environment and Forestry providesad hoc support to EIA evaluation commissions, through capacity building, development of norm and guidance etc. Therefore in the long run, efforts should focus on strengthening the capacity of the Ministry of Environment and Forestry to guide EIA evaluations and ensure high standards of implementation.

Several challenges remain for the full integration of eCBAs into formal impact assessment tools in Indonesia. eCBAs and economic valuation exercisesare relatively complex and technically challenging. They can be costly to implement and are frequently seen as surplus to the legal requirements of creating an EIA. To overcome these challenges Indonesia may consider the lessons learned from other countries. In the European Union, social cost-benefit analyses in impact assessments (SEA and EIA) are implemented for strategic policy and projects above a Euro 50 million threshold value.[11] Indonesia can develop similar filtering policies to ensure that strategic policies and projects (such as the development of Special Economic Zones) are being thoroughly assessed and that all possible relevant information on green growth outcomes is available to policy makers and civil society.

eCBA integration in PPP planning. The World Bank defines PPPs as "medium to long term arrangements between the public and private sectors whereby some of the service obligations of the public sector are provided by the private sector, with clear agreement on shared objectives for delivery of public infrastructure and/ or public services"[12].PPP development is driven both by the opportunity to attract new sources of financing for funding public infrastructure, and to bring in specific private sector technology or expertise resulting in more efficient and effective public services. High technical, social, and environmental standards are therefore expected from PPP projects, in compliance with international standards.

In order to accelerate infrastructure development, the Government of Indonesia has made considerable progress in developing a PPP policy framework, under the leadership and supervision of the Policy Committee for Accelerating the Provision of Infrastructure (KKPPI) in the Coordinating Ministry for Economic Affairs. The current regulatory framework outlines the PPP development process, and in particular impact assessment processes and methodologies.

[11] *EU CBA guide: http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/cba_guide.pdf*
[12] *Worldbank definition: http://ppp.worldbank.org/public-private-partnership/overview/what-are-public-private-partnerships*

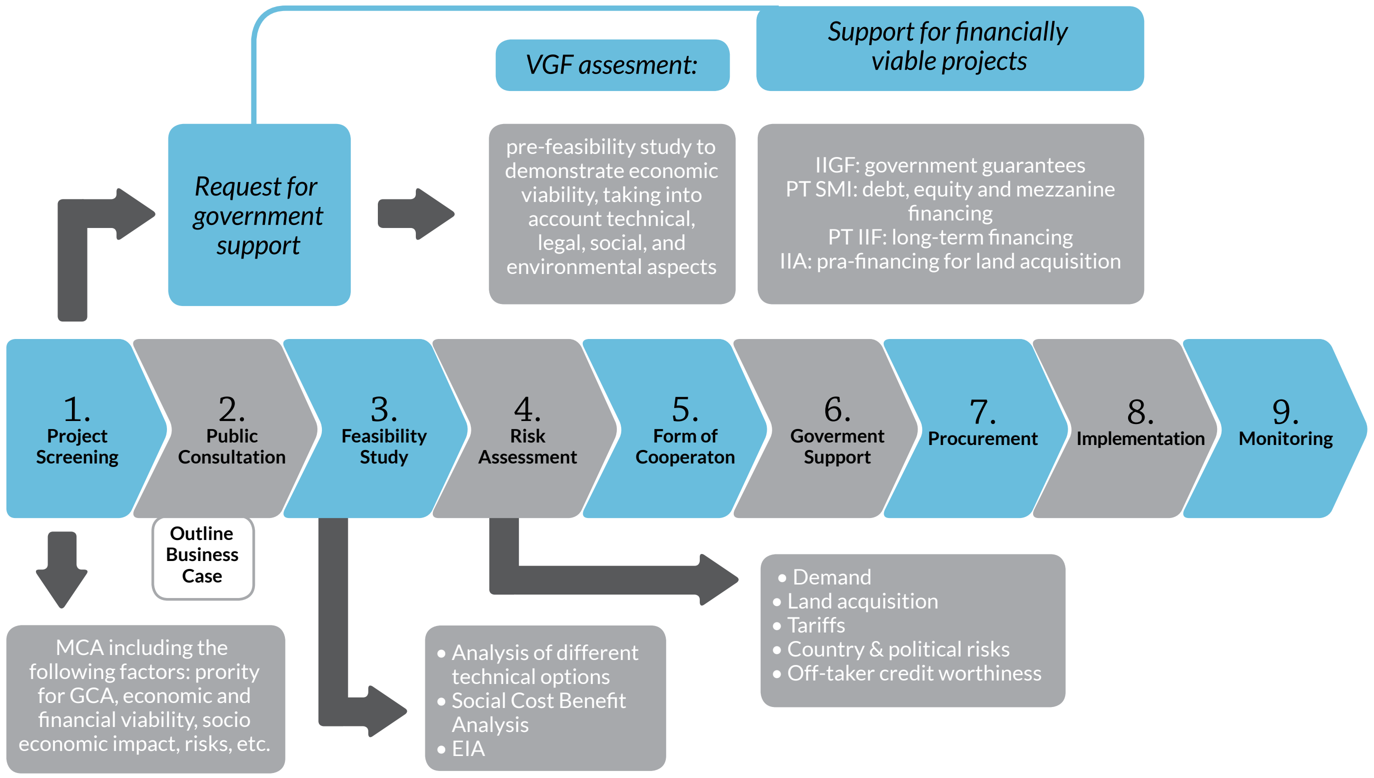


Figure 5.8: Overview of the PPP project development process &impact assessment process[13]

As illustrated in Figure 5.8 above, feasibility studies are required in the PPP framework to create an analysis of potential environmental and social impacts. This analysis leads to an assessment of potential alternative delivery solutions based on Environmental Impact Assessment and Social Cost Benefit Analysis[14]. Social Cost Benefit Analysis is particularly important in the context of PPPs, as they allow for an improved assessment of the total economic value of infrastructure projects in order to justify government support, through incentives, guarantees, or financing.

Although the guidelines and methodologies for EIAs are well developed and regulated in Indonesia, similar guidelines have not been developed for Social Cost Benefit Analysis in the PPP framework. The existing PPP regulatory framework does not provide detailed guidelines for Social Cost Benefit Analysis either. In practice, as most priority PPP projects in development until now have been partially sponsored by institutional donor agencies, Social Cost Benefit Analyses conducted so far have referred to existing guidelines in force within those organizations. The World Bank and JICA for example have their own SCBA guidelines, which have been used in projects they support. However, different methodologies make comparative assessment and prioritization challenging. Considering that the KKPPI, P3CU, and MoF are mandated to assess prospective PPP projects based on such analyses, the standardization of Feasibility Studies and SCBA would contribute to improve and facilitate project assessment and prioritization. The eCBA methodology presented in this handbook would provide a strong foundation for such standardization.

Indeed, the previous section outlined the opportunity and benefits of integrating eCBA methodology into an extended EIA process including economic valuation. The progressive scaling up of eEIA, supported by adequate capacity building, would allow to progressively widen the reach of impact assessment, for example to Special Economic Zone development, and ultimately – as it is the case in the EU – to all EIAs conducted for projects above a certain value threshold.

Conclusion

This chapter has looked at ways on how to integrate eCBAs into existing project planning and environmental and social impact assessment processes. Three possible entry points for the integration of eCBA in the planning process were explored:

[13]Source: Public Private Partnership: Investor's Guide, Coordinating Ministry of Economic Affairs

[14]Social Cost Benefit Analysis and eCBA impact assessment methodologies are very similar in nature and can be used interchangeably for the purpose our policy discussion

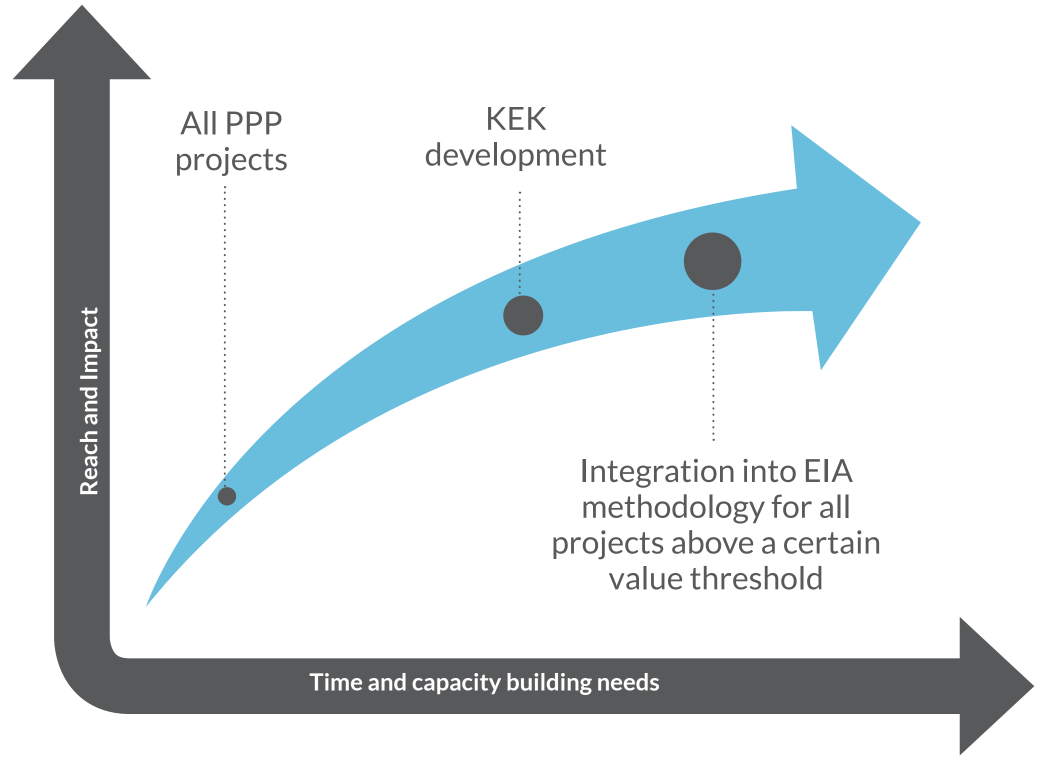


Figure 5.9: Progressive Integration Of eCBA In Project Planning And Impact Assessment

- On the broader, macro policy level, the eCBA can play a role in evaluating baseline and identifying alternative scenarios in the SEA process by using the impact pathway framework. Moreover, the use of eCBA also introduces economic valuation aspects into the process, making it easier for policy makers to evaluate recommendations coming out of an SEA.

- On the project level, integrating eCBA into EIA process would make those documents more rigorous, and compliant with the 2009 Environmental Protection and Management Act which mandates regional and national governments to develop economic instruments to promote 'green' investment, the application eCBA would provide the quantitative base for policymakers to select projects and design policies.

- Lastly, the eCBA can be a viable tool to complement the project planning process required for projects using the Public-Private-Partnership (PPP) mechanism. The current PPP framework mandates project developer to undertake a social cost benefit analysis of projects in order to be eligible for government funding support. However, no exact criteria exist on how to conduct a social CBA, which canprovide an appropriateentry point for eCBAs to be included in the future.

The successful integration of GGAP and eCBA into policy and project planning and environmental and social impact assessment processes will help decision-makers to obtain more easily interpretable and comparable metrics across impacts and options. For each of the above – developing alternative scenarios in the SEA process; supporting the improved rigorousness of the EIA process; and complementing the PPP planning process – the eCBAs help to define and provide the analytically rigorous metric of economic returns that is invaluable for decision-makers. In doing so, the GGAP and eCBA tools support the integration of 'green growth'– as well as the associated indicators, targets, and metrics – into national and sub-national economic and development plans.

ANNEX 1

DATA GATHERING AND ASSUMPTIONS FOR eCBA CASE STUDIES

Case Study 1: KIPI Maloy

KEY DATA AND ASSUMPTIONS FOR THIS PROJECT

The eCBA relies on a wide range of physical and monetary data. It is not always clear as to what value to use in a particular calculation due to the constant evolution of markets, uncertainty about the future, missing or inaccessible data, unknown project operational details and so on.

As a general rule, preference was given to data in the following order:

1) Project-specific data (e.g. from the DED, Masterplan, or local stakeholder engagement)
2) Province-specific data (e.g. coal prices from similar ports in East Kalimantan, other experience from local stakeholder engagement)
3) Indonesia-specific data (e.g. coral valuations from Lombok)
4) South East Asia-specific data (e.g. the price of Marine Diesel Oil in Singapore)
5) Other comparable international technology or market data

Primary data of type (1) above was not always available, and expert judgment was used in deciding whether data types (2) – (5) were appropriate and whether any major adjustments or caveats were required. Where we feel there are particular issues for consideration, we have included them in the write-up of results in the eCBA report.

Table A.1 below outlines the key "top-level" assumptions used across multiple areas of analysis, while **Table 4.5** outlines assumptions specific to the green growth interventions considered.

COST BENEFIT ANALYSIS

The CBA is the key methodology used to value – in monetary term - social, economic and environmental costs and benefits, and underlies the results presented in the report. This economic impact analysis allows to assess the incremental impact of green growth interventions, and to weigh additional investment against the total economic value or returns of the Green Growth Intervention, in order to capture the net benefit to society. Such valuation of returns on Green Growth investments can inform decision making on the most effective allocation of public/private resources across a wide range of options.

The impact pathway has identified clear quantifiable outcome indicators. Data gathering, as developed in the previous section, as allowed to determine investment costs, and economic value of non-financial indicators, i.e. the unit cost/value of specific externalities. The first step in the development of the CBA model is to translate the impact pathway into a financial model integrating input, output, and outcome indicators.

Parameter		Value	Source
Social discount rate		10%	ADB
Social cost of carbon		80 USD/tCO2e	Tol (2009) assuming 0% Pure Rate of Time Preference
GDP growth rate in Kaltim (from 2015 onwards)		5%	World Bank / IMF.
Emissions to air	SOx health impact	0.95 USD/kg	PwC Environmental Valuation Guidelines (2011)
	NOx health impact	0.82 USD/kg	
	PM health impact	7.75 USD/kg	
Forest ecosystem valuation (low value is secondary forest, high value is primary forest)	Direct		Guideline Economic Valuation Forest Ecosystem, KLH (2011) Note: Except, Carbon sequestration based on Social Cost of Carbon above and value for carbon stock in Table below.
	- Timber	820 - 932 USD/ha	
	- Non-timber forest products	592 - 736 USD/ha	
	- Firewood	2 USD/ha	
	- Water supply regulation	6 USD/ha	
	Indirect		
	- Erosion control	613 – 635 USD/ha	
	- Carbon sequestration	15,600 USD/ha	
	- Flood protection	375 – 394 USD/ha	
	- Water transport	89 USD/ha	
	- Biodiversity	71 – 158 USD/ha	
	Non-use		
	- Intangible: option & bequest	45 - 52 USD/ha	
	- Social cost: conflict & safety	71 - 95 USD/ha	

Table A.1: Key assumptions applied across all aspects of analysis

Activity	Intervention	Parameter	Value	Source
Power Generation	• Substitution of coal for biomass in power generation	Coal price (f.o.b, 4,000 kcal/kg)	45 USD/tonne	Coalspot.com 2013 average
		PKS[15] price	106 USD/tonne	Estimate based on transport costs and pulverization costs
		Coal plant capacity factor	85%	IEA
		Target share of biomass in power plant fuel mix	2%	Assumption based on PKS availability in East Kutai

Table A.2: Specific assumptions applied for intervention in power sector

[15] PKS refers to palm kernel shells

Illustration for the power generation intervention

The intervention aimed to use Palm Kernel Shells (by-product of CPO extraction) produced in neighbouring districts' plantations as a substitute for coal in order to reduce GHG emissions and air pollution. Preliminary data analysis established that plantations operating in the surrounding area of Maloy could potentially provide enough biomass to cover around 4% of the planned capacity of the power plant, i.e. 56 MW out of a total 1,500 MW capacity. The model therefore aims to value the impact of a powerplant retrofitting accommodating 4% of the total capacity. The first step in developing a financial model is to inventorize inputs and outcomes, sources of costs and benefits.

Table A.3: Inventory of costs and income items

Cost	Cost indicator	Benefit	Benefit indicator
• Cost of retrofitting	• Investment cost	• Fuel savings	• Market value of coal saved
• Additional operational costs	• Change in operational cost	• GHG savings	• Social cost of carbon
• Additional Fuel cost	• Change in fuel cost	• Pollution savings	• Social cost of Sulfur

After the inventory is created, data needs to be inputted into a financial model, based on key data points and assumptions.

Table A.4: Key data points and assumptions

Indicator	Value	Unit	Data source
Total capacity	1,400	MW	Masterplan/ DED
Total Generation	10,400,000	MWh/year	Masterplan/ DED
Proportion of biomass substituted for coal	4%	%	Projection based on land use data
Amount of coal capacity substituted with biomass	56	MW	Calculation
Amount of coal generation substituted with biomass	416,000	MWh/year	Calculation
Tonnes of coal burnt per MWh	0.38	tonne/MWh	Literature review
Coal price (5,900kcal/kg)	67	$/tonne	Market price
GHG emissions per tonne of coal	2.3	tCO2/tonne	Literature review
Social Cost of Carbon	78	$/tonne	PwC database/ literature review
Sulfur emissions per tonne of coal	11.6	kg/tonne coal	Literature review
Cost of sulfur emissions	0.98	USD/kg	Literature review
Cost of retro-fitting coal power plant for biomass co-firing	300000	$/MW	Literature review/ international benchmark
Assumed operational costs (% of capital cost)	3%	%	Literature review
Tonnes of PKS burnt per MWh	0.76	tonne/MWh	Literature review
Cost of PKS	75	$/tonne	Market price

The data collected allows for the quantification of outputs and value outcomes, as illustrated in **Table A.5.**

Positive outcome	Indicator	Negative outcome	Indicator
BENEFITS		**COSTS**	
Fuel savings		**Capital cost**	
158,080	tonnes of coal saved per year	56	capacity
67	price of coal	300000	cost of capacity
$10,591,360	Total benefit per year	$16,800,000	Total cost
Capital cost			**Fuel cost (PKS)**
363,584	tonnes of CO2 saved per year	316,160	PKS needed
78	value of CO2	75	Cost of PKS
$28,359,552	Total benefit per year	$23,712,000	Total cost per year
Capital cost		**Operational cost**	
1,830,400	kilogram of SOx saved	$504,000	Total cost per year
0.98	Value of SOx		
$1,793,792	Total benefit		

Table A.5: Simplified illustration of outcome valuation

Table A.6: Financial modelling

Costs and benefits can then be valued across the project period by applying the discount rate, in order to determine the net present value of the intervention.

Net Benefit	2014	2015	2034
Capital cost	-16,800,000		
Fuel cost (PKS)	-23,712,000	-23,712,000	-23,712,000
Operational cost	-504,000	-504,000	-504,000
Fuel savings	10,591,360	10,591,360	10,591,360
GHG savings	28,359,552	28,359,552	28,359,552
Air Pollution savings	1,793,792	1,793,792	1,793,792
Discount rate	10%		
Discount factor	1.0	0.9	0.1
Net disc. benefits	-271,296	15,026,095	2,456,887
Net Present Value	$140,446,879		

Case Study 2: PT RMU

KEY DATA AND ASSUMPTIONS

The project-level eCBA relies on a wide range of physical and monetary data. It is not always clear cut as to which value to use in a particular calculation due to the constant evolution of markets, uncertainty about the future, missing or inaccessible data, unknown project operational details and so on.

As a general rule, and all other considerations being equal (e.g. data quality), preference was given to data in the following order:

1) Project-specific data (e.g. from PT RMU financial model and Project Design Document)
2) Province-specific data (e.g. FFB prices from Kalteng, ecosystem products from Kalteng)
3) Indonesia-specific data (e.g. timber plantation operating costs from Sumatera)
4) South East Asia-specific data
5) Other comparable international technology or market data

Table A.7: Key assumptions applied across the analysis16

Parameter		Value	Source
Weighted Average Cost of Capital ("WACC")		10%	
Corporate Income Tax		25%	
Social discount rate		5%	Team Assumption
Social cost of carbon		$80/tCO2	Tol (2009) assuming 0% Pure Rate of Time Preference
Forest Area		203,570 ha	RMU project
Percentage of forest area used for palm oil (HPK)		12%	
Percentage of forest area used for HTI plantations		44%	
Percentage of forest area used for selective logging		44%	
HTI Development following clearing	**Phase 1: Logging/clearing (clear cutting)**		
	Number of years	10 years	
	Average logging yield	31.7 m3/ ha	International Tropical Timber Council (2004)
	Average price of logged timber	$104/m3	Klassen (2010) Domestic Demand: the black hole in Indonesia's forest policy
	Log production cost	$51/m3	Klassen (2010) Domestic Demand: the black hole in Indonesia's forest policy
	Phase 2: HTI Development		
	Land preparation/planting	2 years	International Finance Corporation. Note: Not on peatland.
	Years to harvest after planting	6 years	International Finance Corporation. Note: Not on peatland.
	Average pulpwood yield	100 m3/ha	International Finance Corporation. Note: Not on peatland.
	Net revenue	$25/m3	Using Climate Change Revenues to Grow More Wood and Reduce Net Carbon Emissions: Dual-Purpose Forest Plantations
	Land preparation/planting cost	$1200/ha	International Finance Corporation. Note: Not on peatland.
Selective Logging	**Selective Logging: As above (Phase 1 only**		
Palm Oil Area	Cycle	25 years	
	Average price of FFB	$150/tonne	http://www.bappebti.go.id/en/topdf/create/2040.html
	Average production yield	21 tonne/ha	Reducing agricultural expansion into forests in Central Kalimantan Indonesia: Analysis of implementation and financing gap. Note: includes adjustment for costs of planting on peat.
	Capital expenditure	$9,006/ha/25 years	
	Operating expense (years 1 – 3)	$315/ha/yr	
	Operating expense (years 4 - 25)	$1,565/ha/yr	Rizaldi Boer, Dodik Ridho Nurrochmat, M. Ardiansyah, Hariyadi, Handian Purwawangsa, and Gito Ginting
	Hydrology Impacts starting year	Year 1	
	Wider watershed area – Area between Katingan and Mentaya river, bounded by Northern concession limit	200,000 ha	Approximation based on Google Map distance tool
	Wider watershed area –NPV of agricultural land	$3,424/ha	TNC Project Note: Not on peatland.
	Wider watershed area – NPV of sustainable forest management	$398/ha	TNC Project Note: Not on peatland.

[16]*Note: In this table and the following table, units are generally quoted in their source year currency units. In the actual CBA calculations, all values were automatically adjusted for inflation using the US GDP deflator as published by the World Bank World Development Indicators.*

ANNEX 1

	Parameter	*Value*	*Source*
PT RMU Project Area	Estimated Emissions Reductions	233 $MtCO_2$/25 years	Calculated using IPCC (2013) emissions factors below
	Net emissions reduction factor for Timber Plantation (HTI)	73 tCO_2/ha/yr	Source: IPCC (2013) Note 95% Confidence Interval of 59 – 98 tCO_2/ha/yr
	Net emissions reduction factor for Oil Palm Plantation	40 tCO_2/ha/yr	Source: IPCC (2013) Note 95% Confidence Interval of 21 – 62 tCO_2/ha/yr
	Net emissions reduction factor for Selective Logging	19 tCO_2/ha/yr	Source: IPCC (2013) Note 95% Confidence Interval of 14 – 25 tCO_2/ha/yr
	Marketable Emissions Reductions	140 $MtCO_2$/25 years	PT RMU Financial Model
	Carbon price	$2 - $8/$tCO_2$	
	Economic value for forestry	$5.6/ha/year	Peraturan Menteri Negara Lingkungan Hidup Republik Indonesia Nomor 14 Tahun 2012 tentang Panduan Valuasi Ekonomi Ekosistem Gambut (Ministerial Regulation)
	Economic value for agriculture	$7.0/ha/year	
	Economic value for fisheries	$17.6/ha/year	
	Economic value for hydrology	$1.1/ha/year	
	Economic value for social cultural	$1.1/ha/year	
	Biodiversity and tourism	$27/ha/year	WWF Heart of Borneo: Investing in Nature for a Green Economy
	Marketing commission – from carbon sold revenue Sales commission – from carbon sold revenue	2.5% of carbon revenue (each)	PT RMU Financial Model

COST BENEFIT ANALYSIS

Our analysis concludes that the conversion of the project area of 203,570 hectares into Palm Oil plantations, logging concessions and Industrial Timber Plantations (HTI), would bring financial gains at the expense of broader socio-economic success and natural capital preservation. This conclusion is based on the modelling of relevant historic data, as well as current market conditions, but is robust to reasonable changes in the assumptions.

Based on purely financial criteria and a narrow or short-sighted view of peatland hydrology28, an Ecosystem Restoration Concession (ERC) on the project zone is less profitable than a Business As Usual scenario of land conversion to Palm Oil and Timber, by USD 43 million (at 10% cost of capital). And, without existing climate change policy in the form of monetized CO_2 credits, would be fundamentally unprofitable. Natural Resource exploitation makes more sense for the typical investor.

However, extending the analysis to consider the wider economic costs and externalities generated during land conversion suggests that an ERC scenario generates value $9.5 billion higher than the BAU scenario (at 5% social discount rate and $80/$tCO_2$).

The benefits of the Green Growth scenario above can be broken down as follows:

- Economic Growth benefits of $35m; value of 224 $MtCO_2$ of avoided emissions credit sales at around $6.9/$tCO_2$, $49m of sustainable timber revenues once PT RMU has finished the ecosystem restoration, and $24m of agriculturally productive land bequeathed to the next generation. Minus capital and operational costs.
- Social benefits of $4m; Socio-cultural value of the standing forest to local communities.
- Ecosystem benefits of $232m; the value of standing forest to local communities including fuelwood, agricultural use, fisheries, and local and global biodiversity value (which in turn could drive eco-tourism).
- GHG emission benefits of $9,702m; avoided climate change damages of rising sea levels, agricultural productivity loss, more frequent extreme weather events etc. (at $80/$tCO_2$, minus credit monetized value above). This is the largest benefit category.
- In addition there are hidden costs included in the net value of the BAU scenario, including:
- Peat soil drainage issues causing significant yield deteriorations over time (a net present cost of around $297m)
- Negative knock-on impacts to surrounding agricultural landscapes within the same watershed (a net present cost of around $295m)

In short, Green Growth generates sustainable, stable benefits if measured properly, while Business As Usual generates uncertain, short-term cash and generates a number of hidden costs for investors as well as the wider economy. TablesA.7 and A.8 below summarize these findings

Note: Resilience is a cross-cutting theme, impacted by the other 4 outcomes of green growth; for example communities are less vulnerable to commodity price shocks or flooding from climate change, which are "economic" and "ecosystem" impacts in their own right.

*** This will be higher in practice, as there are benefit sharing obligations on private developers. However, the regulation is currently not fully clear; this is discussed further in the following chapter. As per the PT RMU financial model, all rates of return are therefore expressed pre-benefits distribution (but post-taxes and fees)*

Table A.7: Summary of results (USD million)

	Business As Usual	*Green Growth*	*Difference*
Financial Net Present Value	$182m	$139m	-$43m
Extended Net Present Value	$485m	$9,974m	+$9,489m
of which			
- Economic Growth	$485m	$35m	-$450m
- Social Development	$0m**	$4m	+$4m
- Ecosystems	$0m	$232m	+$232m
- GHG emissions	$0m	$9,702m	+$9,702m

Figure A.8: Illustration of Net Present Value results