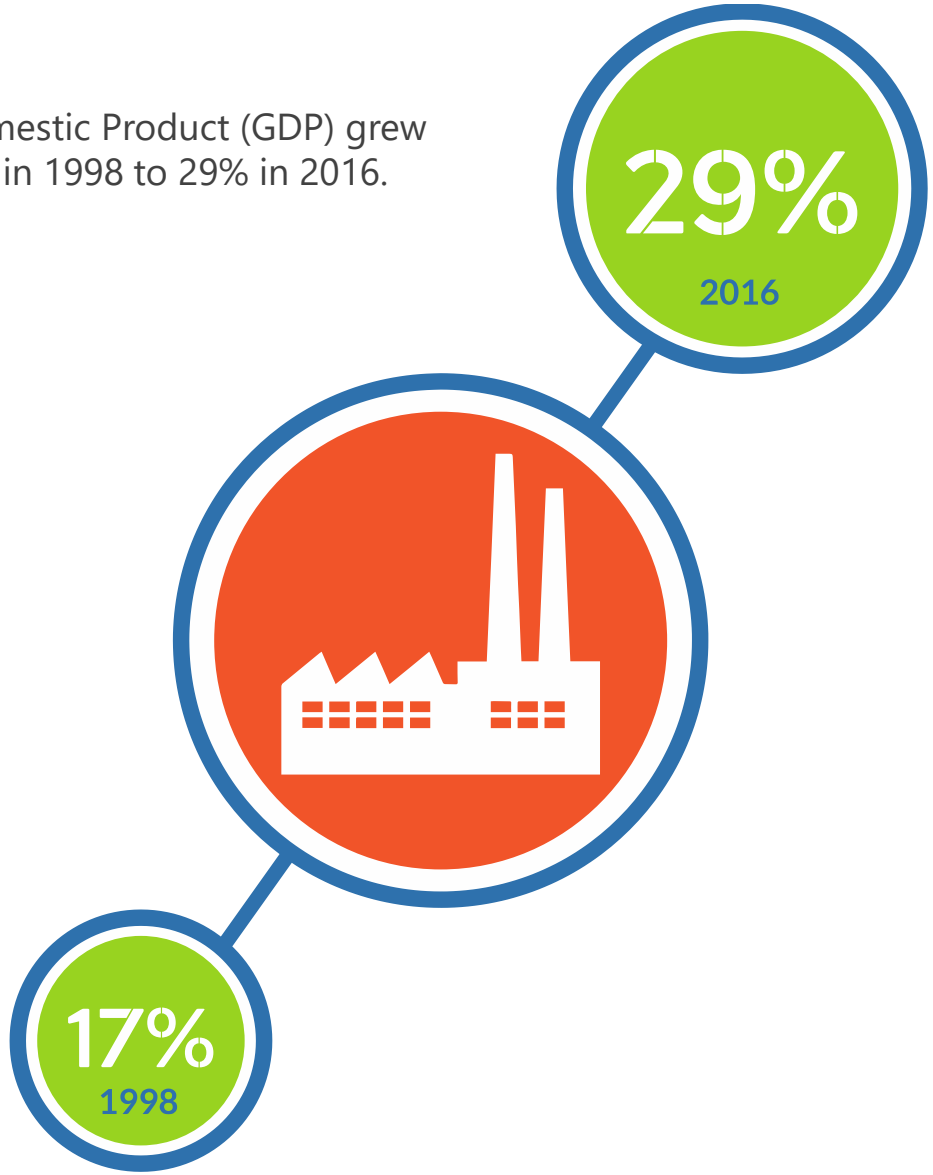
THE ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS OF GREENING THE INDUSTRIAL SECTOR IN CAMBODIA

Key findings of GGGI's green industry scenario

Global Green Growth Institute

Gross Domestic Product (GDP) grew from 17% in 1998 to 29% in 2016.



The industrial sector in Cambodia is a driver of economic growth, job creation, and poverty reduction.

Food, Beverages, and Tobacco	15%
Textile, Wearing Apparel, and Footwear	66%
Wood, Paper, and Publishing	3%
Rubber Manufacturing	3%
Other Manufacturing	
Non-Metallic Manufacturing	*3%*
Basic Metal and Metal Products	*2%*
Other manufacturing	*8%*

Cambodia's industries are losing competitive advantage within the region – cost of electricity is a significant factor in this.

For Cambodia to continue to diversify and expand its economy, new ways must be found to increase productivity and access more premium markets.

the Industrial Development Policy 2015-2025 envisages a modernization of Cambodia's industrial structure from a labor-intensive industry to a skill-based industry, integrating local businesses into global and regional supply chains.

GGGI's economic modelling asserts greening the industrial sector is a way of doing this:

investment in resource efficient technology can foster economic growth, in old and new sectors, while yielding social and environmental benefits.

GGGI analyzed the potential impact of resource efficient technology and production processes in four industrial subsectors: **food processing, bricks manufacturing, garment manufacturing, and electronics manufacturing** under a so-called 'Green Industry' scenario.

ELECTRONICS

35.5%

GARMENTS SECTOR

46%

FOOD PROCESSING

33%

BRICKS

14.7%

This scenario demonstrates that the introduction of greener production processes can lead to an increase in real GDP of USD 2.7 billion by 2030

+512.000 jobs

-3.37M tons GHG

Greening these industrial sub-sectors can create 512,000 additional jobs and reduce Greenhouse gas (GHG) emissions by 3.37 million tons, with 17% reduction in the garment sector and a 30% reduction in electronics.

Results show potential cost reductions in all four sub-sectors, particularly largest for food processing.

Resource efficient technology can significantly reduce production costs and increase profit.

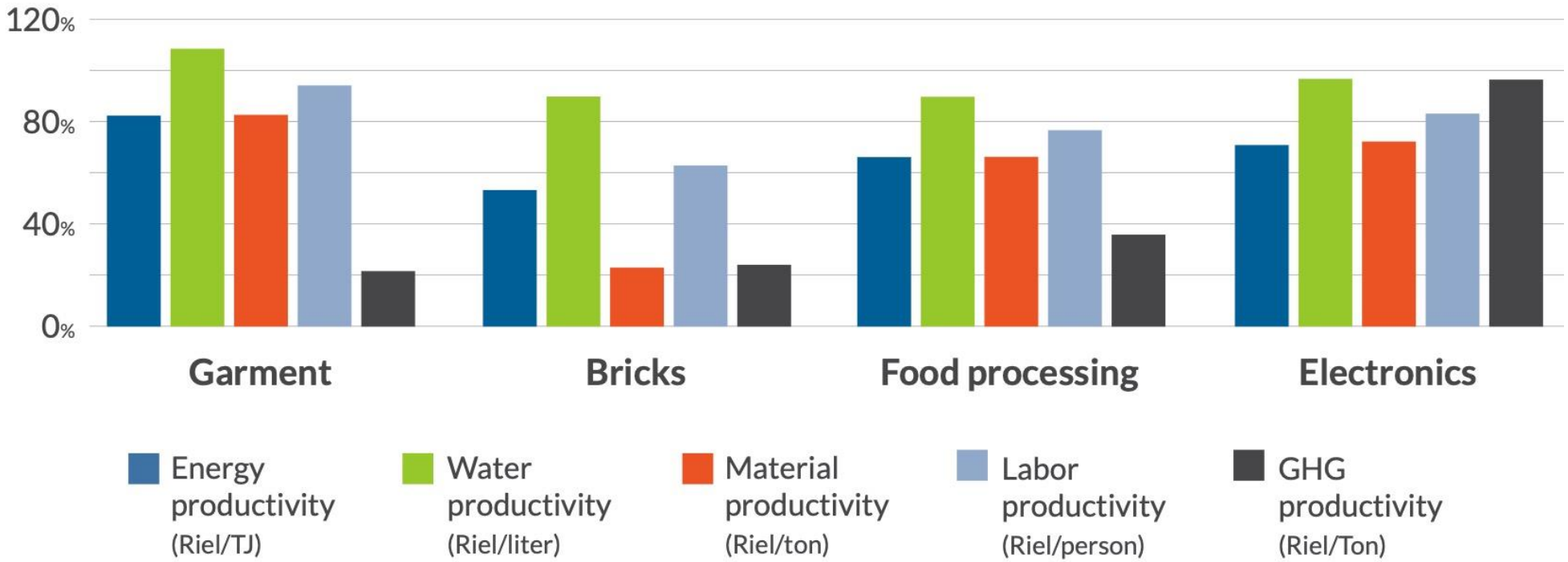
Greening Boosts productivity

The analysis shows that resource efficient technologies are an attractive investment for business owners, with a short payback time, significant avoided cost and a high return on investment.

With lower resource consumption, leading to reduced costs and higher sectoral GDP, productivity increases for all subsectors in the GI scenario.

1. Productivity in the model is estimated by dividing GDP by production inputs (materials, labor, energy, and water) and productivity is also calculated in relation to GHG emissions.

Productivity increase (GI vs BAU) by sub-sector



Avoided costs outweigh investment requirements

Comparing investments to avoided costs

USD (Billions)

GI scenario, benefits to investment ratio, year 2030, firm level and economy-wide.

Under the GI scenario, while the investment required totals USD 4.24 Bn by 2030 (or 2% of GDP over the next 10 years), the benefits reach USD 28.49 Bn.

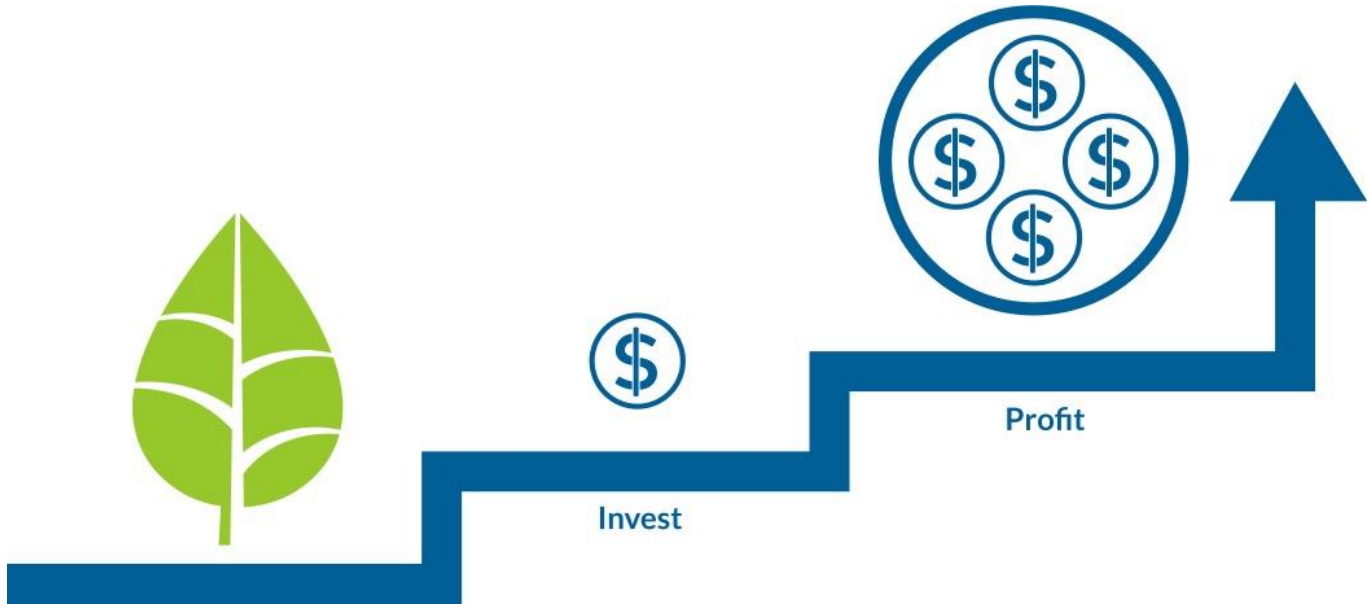
The benefits are 6.7 times larger than the investment required and generate positive returns.

Market barriers

- Awareness and understanding of productivity losses through inefficiencies
- Access to finance
- Perceived credit worthiness of the factories
- Supply of services

Potential solutions

- Audits, outreach and capacity development
- Targeted policy measures
- Risk reduced payment mechanism
- Demand aggregation and investment matchmaking



Policy options

Examples :

- ✓ Industry adoption of energy management protocols
- ✓ Minimum energy performance standards for most common industrial equipment
- ✓ Fiscal incentives for efficient technologies
- ✓ Standardization of M&V
- ✓ Awareness raising and skill development programs

Policy Intervention screening

Is reaching the target financially viable?

Targets (examples):

- Energy, water and resource efficiency improvement
- Water pollution reduction
- Renewable energy use
- …..

No major constraint

High upfront capital cost

Limited access (and affordability of) financing

Lack of awareness and knowledge

Unsustainable running costs

Policy Instrument

Mandates/Regulation

Awareness raising activities

Direct capital investment

Incentives (rebates, tax breaks)

Incentives (e.g. guarantees for loan collateral)

Establishment of ESCOs or similar companies

Awareness raising activities

Laws (enforcement)

Incentives (tax breaks)

Policy Provisions

Mandates/Regulation:
- Energy efficiency standards
- Energy generation and distribution
- Waste management

Incentives:
- Promotion of best practices
- Promotion of technologies
- Financial incentives
- Preferential loans
- Guarantees/collateral

Investment:
- Audits (e.g. energy, water, waste)
- Infrastructure (e.g. roads, rail)
- Renewable energy generation
- Grid integration
- Information system

Awareness:
- Training
- Compendium
- Public campaigns
- Awards/prices

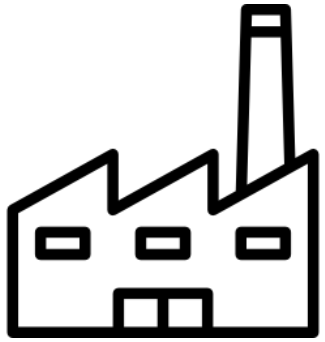
Action

GGGI projects

- Building an investment pipeline for energy efficiency in manufacturing
- Creating financial instrument to de-risk the market
- (tbc) Technical assistance to create policy incentives and M&V schemes

Others

- Capacity development of factories



Economic Modelling Methodology

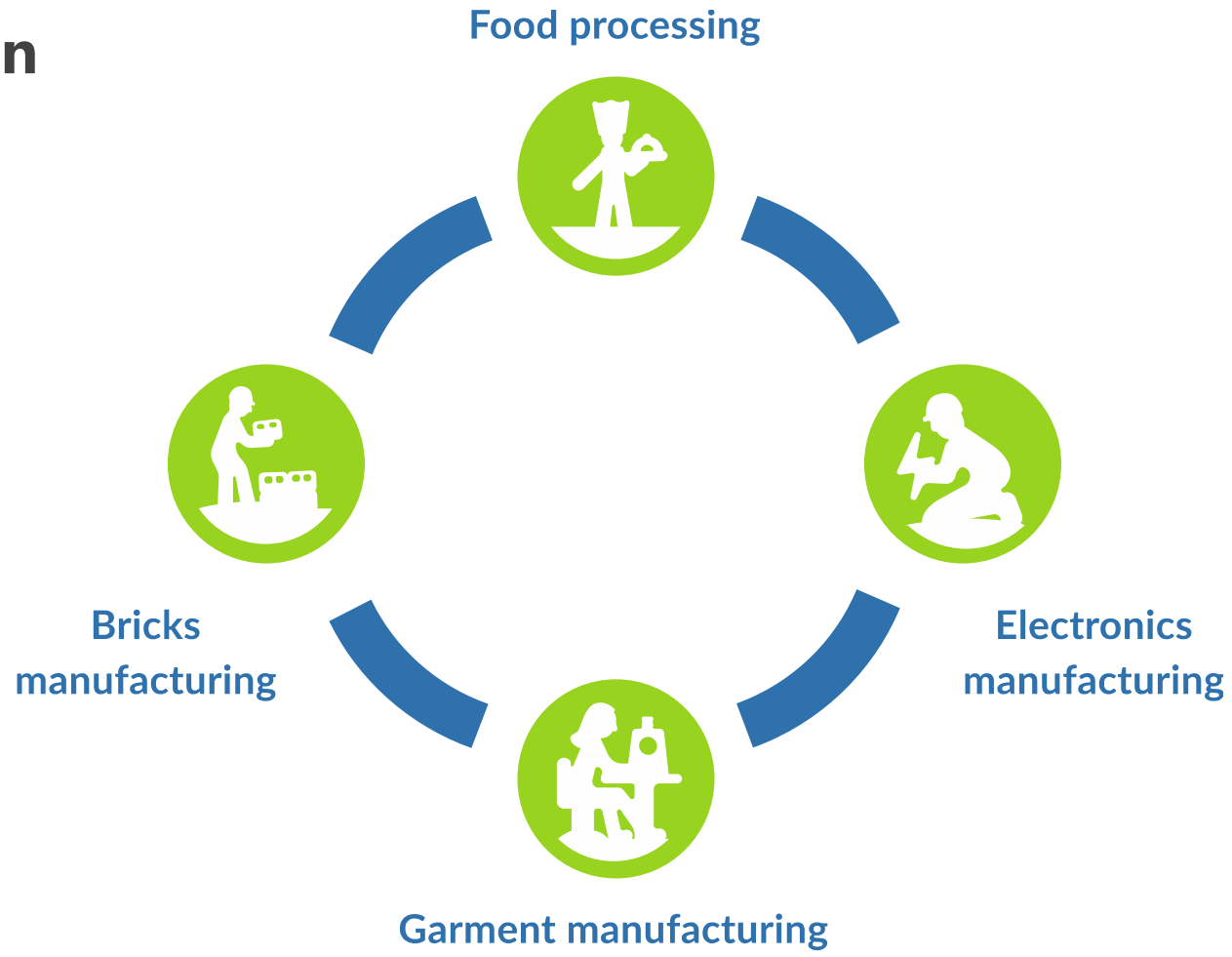
For the Cambodia Green Industry Scenario

The Green Industry scenario was created to quantify the potential outcomes of green investments in four subsectors.

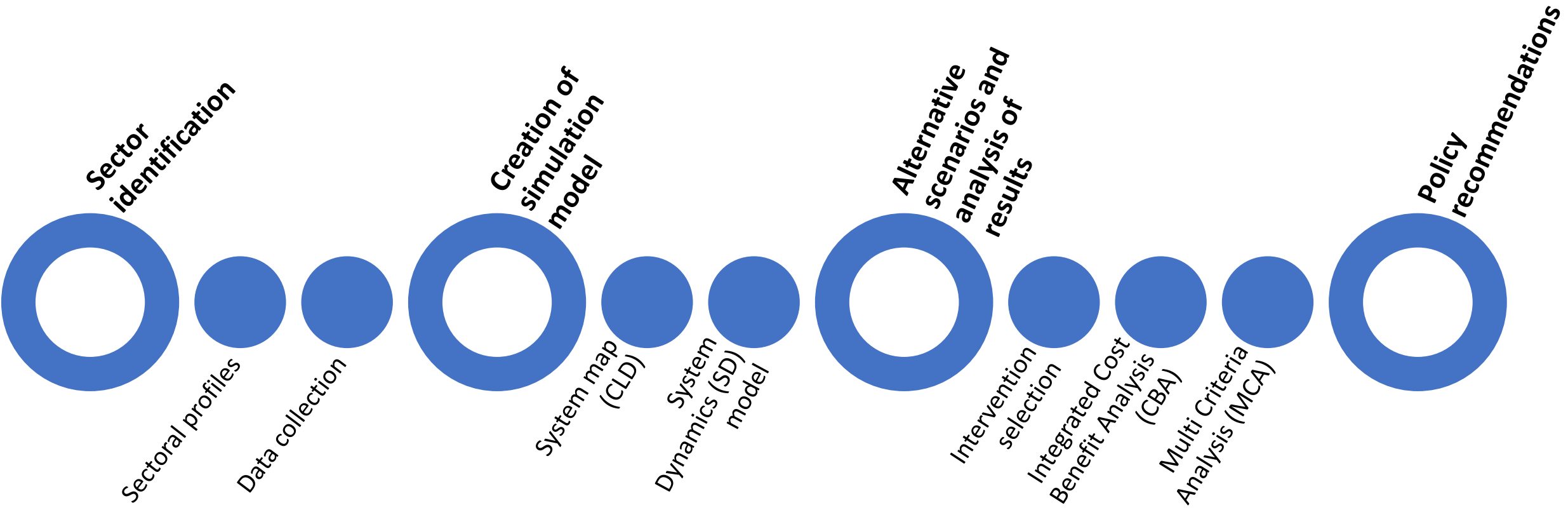
These subsectors were selected based on their economic significance, their reliance on natural resources and climate vulnerability, and their potential competitiveness.

Several scenarios were simulated to assess the possible contribution to economic growth, job creation, and GHG emissions reduction of a green transition in these four industrial sectors.

They were identified and defined with the support of local stakeholders, involving the private sector, government representatives, academia, and civil society.

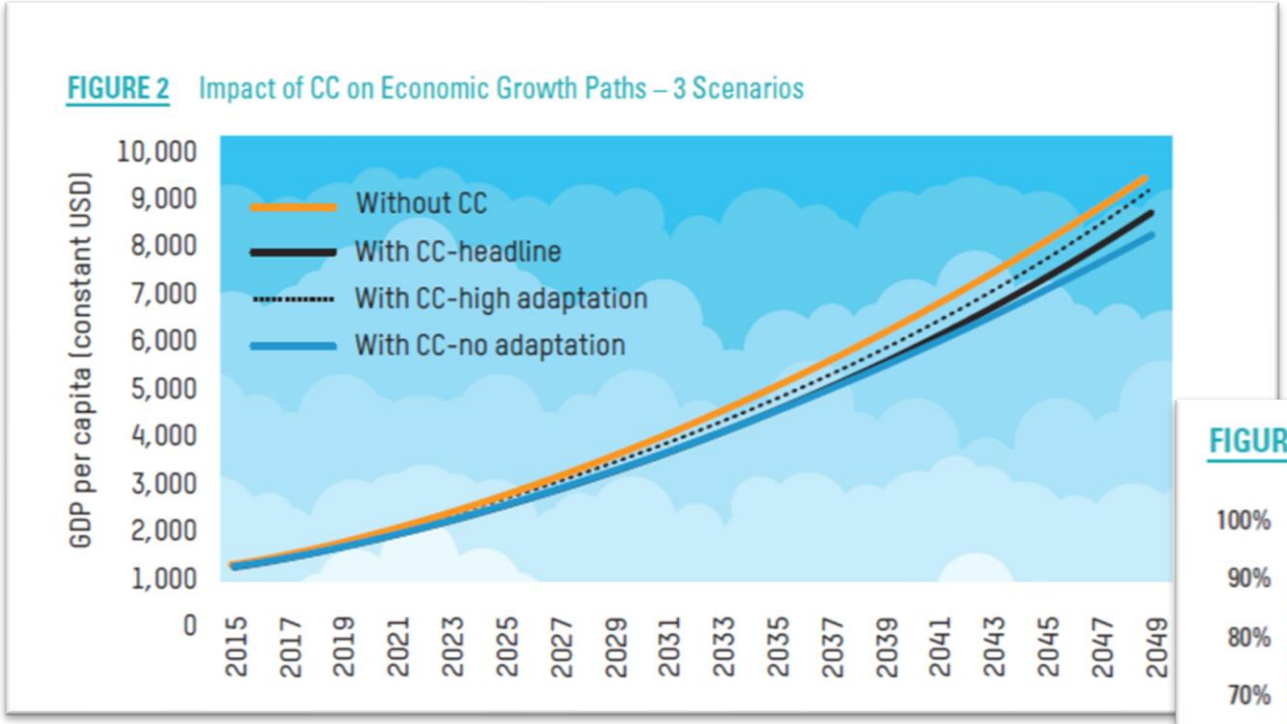


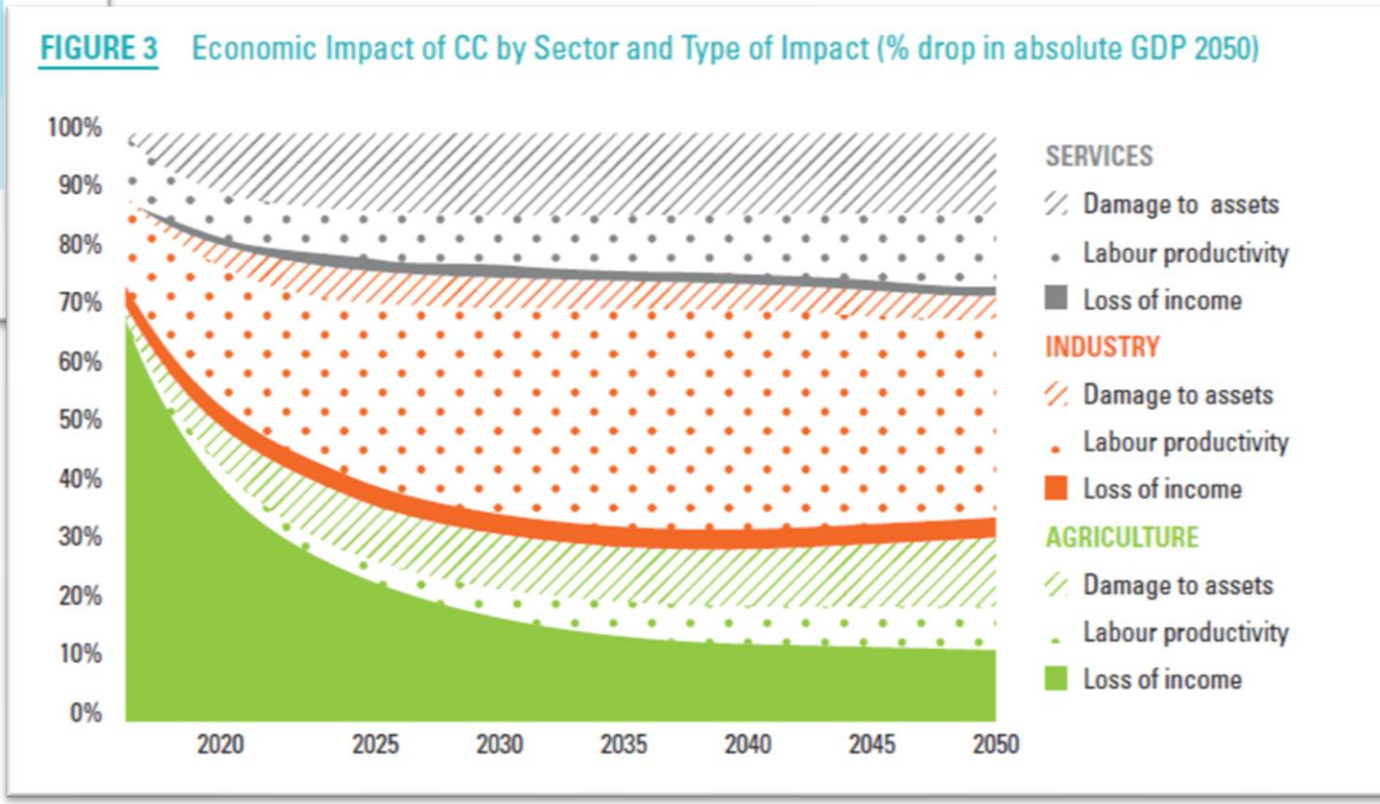
Steps

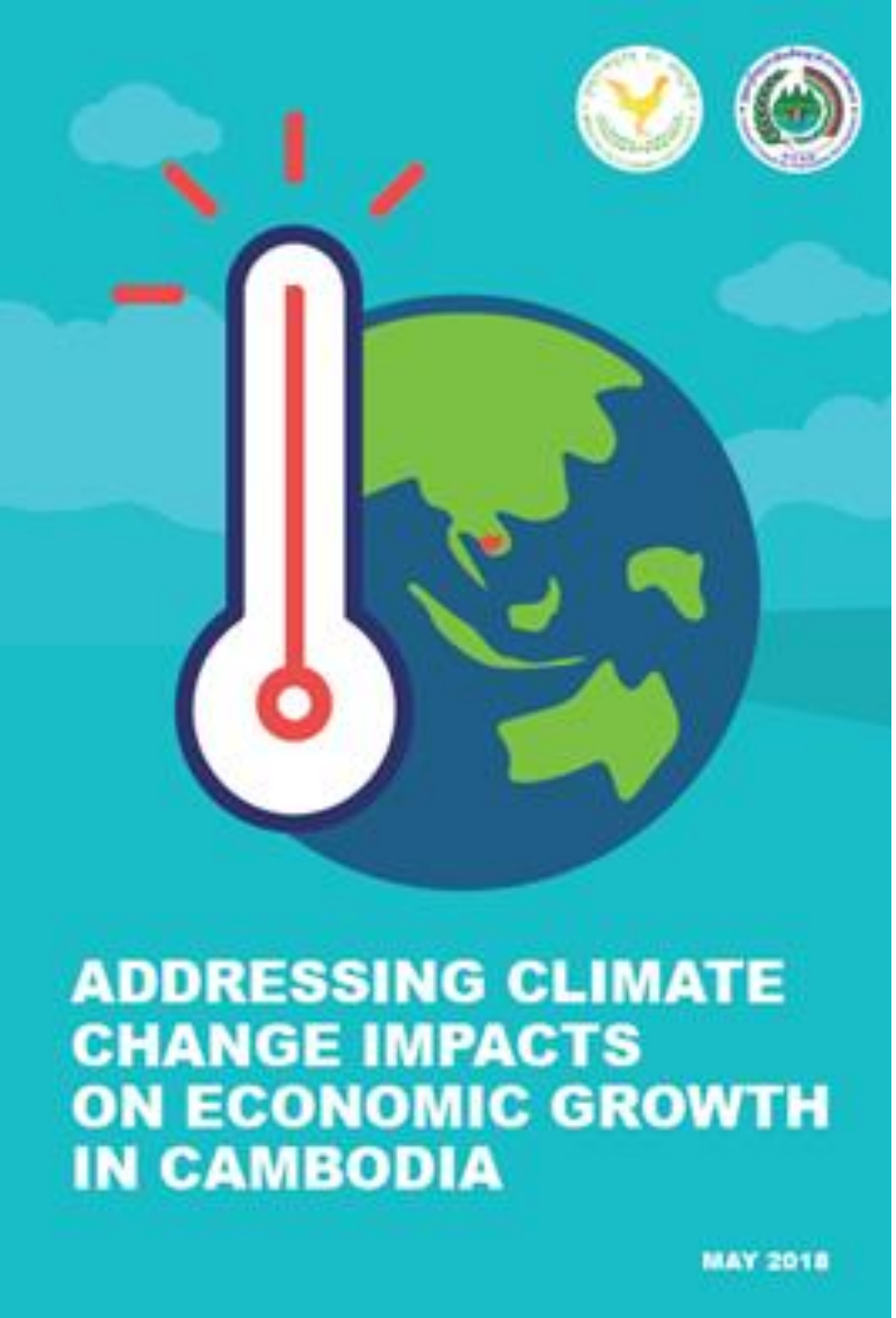

Sector identification
Sectoral profiles
Data collection
Creation of simulation model
System map (CLD)
System Dynamics (SD) model
Alternative scenarios and analysis of results
Intervention selection
Integrated Cost Benefit Analysis (CBA)
Multi Criteria Analysis (MCA)
Policy recommendations

Other examples - Understanding the impact of response measures

Addressing climate change impacts on economic growth in Cambodia – Climate Economic Growth Impact Model







Cambodia – Climate Economic Growth Impact Model:

Recommended action

- Priorities in INDC, CCAP and CCCSP extensively address loss in assets and in income
- Relatively low attention paid to protecting labour productivity from CC
- Analysis shows that policies to protect labour productivity from heat stress should feature amongst the highest priority adaptation actions.
  - reducing the need for heavy manual work to be done at periods of heat stress in agriculture, livestock, fisheries and forestry, e.g through the use of mechanisation, new techniques
  - changes to working practices on construction sites to plan work schedules
  - improved working conditions in factories and offices (eg ventilation, breaks for rest ...)
  - more flexibility in working hours during periods of extreme heat
  - improved weather forecasting and warning systems so that managers can plan work schedules
  - assistance with business planning to make supply chains and profitability more resilient to heat stress

- Under BAU scenario for 2050, there are 4,195 new green jobs with an additional net gain of 817 conventional jobs

- Under Very High Ambition Scenario, there is heavy investment in renewable electricity but none in petroleum-based energy, introduction of electric vehicles, and large-scale biomass planting for energy and afforestation. In 2050, there are 13,451 new green jobs with job losses of 1,742 for a **net employment gain of 11,709**.

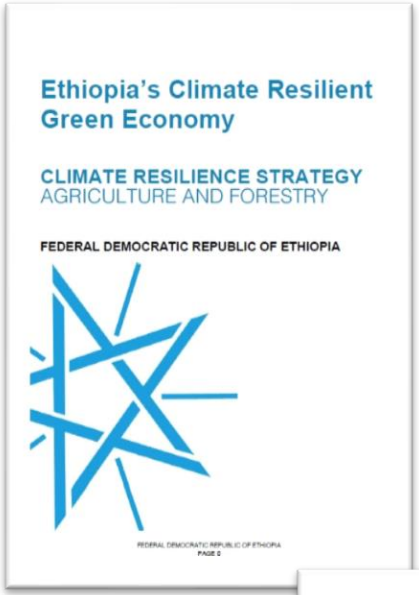
Fiji Green Jobs Assessment
A Preliminary Study of
Green Employment in Fiji

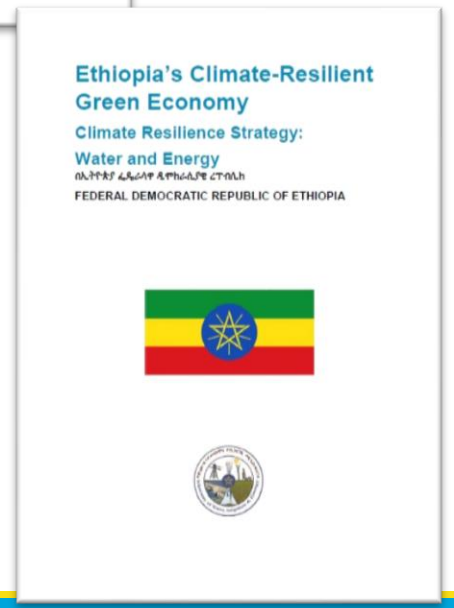
GGGI

GGGI & Ethiopia: the cost of inaction

Historic weather variability, extreme events and hazards have resulted in a substantial negative impact on economic growth in agriculture.

- Soil erosion has been estimated to reduce agricultural GDP by 2%-3% (around 1% of total GDP).
- In a hotter drier scenario, with increased incidences of droughts, the negative impact on GDP could be 10% or more by 2050.
- This is particularly worrying for the middle-income ambition but also because the impacts will fall on the most vulnerable in society.
- Our analysis has highlighted that climate change poses a particular threat to one of the key exports, Arabica coffee (worth $0.8 billion to our economy today but set to double under the GTP), as it can only be grown within tight temperature thresholds
- Ethiopia & GGGI responded with a Climate Resilient Green Economy Strategy and investment facility – based on project level CBA in agriculture, forestry, energy and water





References

Reports

- The Economic, Social and Environmental Impacts of Greening the Industrial Sector in Cambodia (GGGI &NCSD, 2018) available here, with a summary report here
- Addressing climate change impacts on economic growth in Cambodia (NSCD & CCCA, 2018) here
- Ethiopia's Climate Resilient Green Economy Strategy (2015) here
- A National Green Growth Plan for Jordan (2017) here
- Fiji Green Jobs Assessment (GGGI & Government of Fiji, 2019, draft)

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Karolien Casaer-Diez is GGGI's Country Representative in Cambodia, where she manages projects relating to waste management, waste-to-energy, sanitation and energy efficiency. She initially joined the organization in 2016, as the Senior Program Development Manager. In that capacity, she oversaw GGGI's expansion into new partner countries. She also led the development of GGGI's medium term country strategies. Karolien came to GGGI with a solid track record as an advisor to governments on public finance having worked with UNDP in Bangladesh, Somalia and South Africa. Before that, Karolien worked with the Belgian Foreign Ministry and served as a financial expert on the UNESCO Executive Board. Karolien speaks fluent English, French, Dutch and German. She holds a Masters degree in Philosophy from the University of Leuven and a Masters in Political Science from Sciences Po Paris.

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Andrea has over 15 years of experience working with governments and international organizations on the development of customized models for the assessment of outcomes of policy and investment across social, economic and environmental indicators.

Andrea has specific expertise in green economy strategies and scenarios, climate mitigation and adaptation, industrial competitiveness and, more generally, in sustainable development. He specializes in the use of System Dynamics, and in its coupling with other modelling techniques. Andrea has implemented various customized (problem-driven and context-dependent) modelling approaches in over 40 countries. In 2014 Andrea published a book titled Tackling Complexity with Gilbert Probst, professor at the University of Geneva and World Economic Forum.

Andrea holds a Ph.D. and M.Phil. in System Dynamics from the University of Bergen in Norway, a M.Sc. in Business and Economics from LIUC in Italy, and a postgraduate certificate in modelling the environment from the Universitad Politecnica de Catalunia in Spain.





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