Estimating the employment effects of climate policies using Just Transition Assessment Modelling (JTAM)

Nov 2025

International Labour Organization

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ILO’s Green jobs Assessment Institution Network (GAIN)

GAIN Objectives

- To build and improve knowledge on quantitative and analytical methodologies and tools relevant for the assessment of employment dimensions of greening policies.
- To share knowledge and build capacity for country assessments as well as regional and global assessments by involving partner institutions.

Products and services

- Enhanced capacity of research institutions participating in the Network,
- The elaboration of tools (a guide, for instance) for assessment of green jobs,
- Improved assessments and assessment methods,
- A series of high quality assessment reports,
- Extended outreach of research products by Network member

Network members

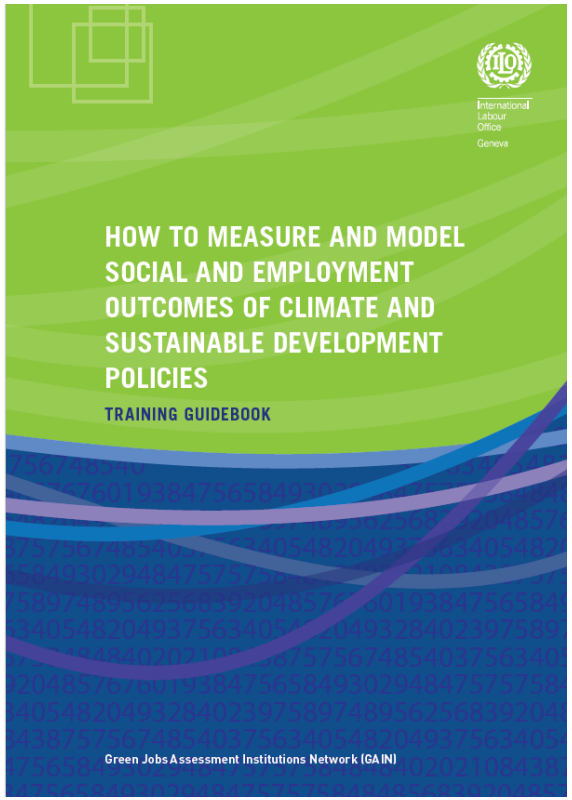
- Research Institutions
- International Organizations and Governmental Bodies
- Individual Researchers

Partnering institutions

- United Nations Framework Convention on Climate Change (UNFCCC)
- Inter-American Development Bank
- UNDP NDC Support Programme
- The World Bank
- UN Partnership for Action on a Green Economy (PAGE)

The Just Transition Assessment Models (JTAM) Projects

- Economic models based on input-output analysis
- Annual resolution going about 10-15 year into the future
- Not economic forecasting models, but "what-if" policy scenario analysis: **NDC climate policies**

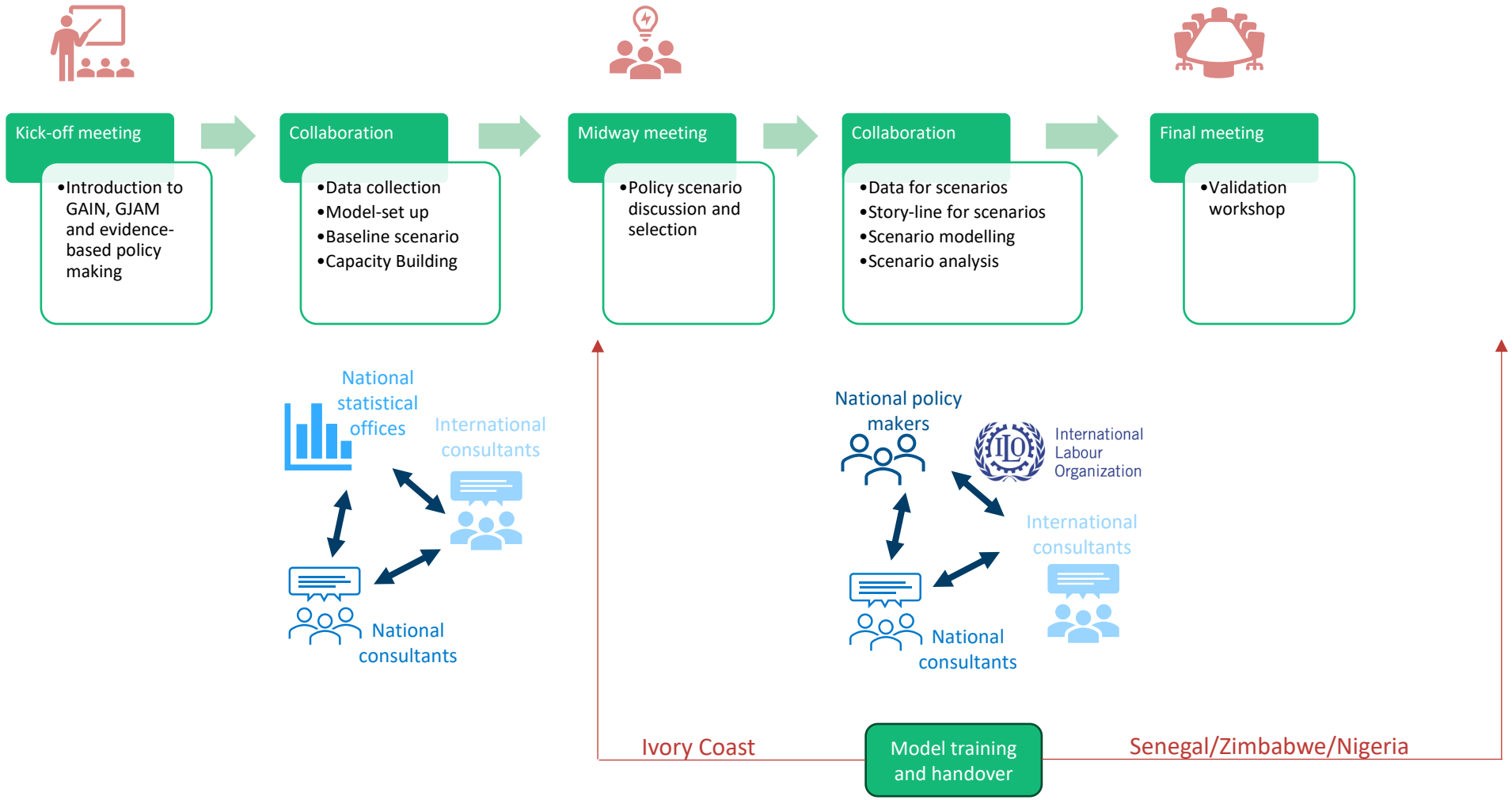


Project set-up

- **Funding institution**: UNDP, ILO, Inter-American Development Bank, …
- **Technical coordination**: ILO Just Transition and Green Jobs Programme, ILO country office
- **National policy team**: Ministry of Climate/ Environment/ Employment/ Finance/ Planning/ etc.
- **National Statistical Office**
- **National consultants**: research institutes or universities with economics and/or statistics background
- **International consultants**: SINTEF or other GAIN members e.g. University of Mauritius, GWS, Cambridge Econometrics, University of Pretoria, University of Sao Paulo, …

Nigeria, Zimbabwe, Turkey, Norway, Ghana, Burkina Faso, Ivory Coast, Madagascar, Senegal, Rwanda

Workflow and cooperation



GAIN Training workshops

Country specific

- Zimbabwe 2023
- Ivory Coast 2023
- Senegal 2025
- Nigeria 2025 (online)

Regional Training Sessions

- Geneva 2016 with researchers and institutions
- Bonn 2017 during UNFCCC meeting
- Cape Town 2018 with researchers and politicians
- **Pretoria 2019 focus on research and training**
- Santiago de Chile 2019 with researchers and politicians
- 2020 – 2025 online presentations in different regions and settings
  - e.g. UNFCCC Regional workshop for Asia Pacific on Assessing the impacts of the implementation of response measures and developing climate policies for just transition and economic diversification, Bangkok online, 2023, with researchers and politicians
- Bogota 2024 with researchers and politicians
  - Master student from Colombia

Training Workshop Agenda
Example Nigeria 2025

- Day 1: Understanding the national policy context
  - The link between climate, green growth, social, employment and economic development policies
- Day 2: Evaluating national policies with a model
  - Translating policies into model language and assess their social, job, economic, climate and development impacts
- Day 3: Utilizing the Just Transition Assessment Model (JTAM) Nigeria
  - Using software R to run JTAM
- Day 4: Policy making in Nigeria based on evidence from the model

1 Day	Understanding the National Policy context The link between climate, green growth, social, employment and economic development policies
8h30 – 9h15	**Welcoming, agenda and participants introduction** (Moderator: Marek Harsdorff) • Nigeria Government • Director ILO Country Office (5 min) • Director ILO AP/JT (5 min)
9h30 – 10h30	**The climate employment context** - An Introduction to the role of nationally owned assessment models in evidence-based development planning, including economic, employment and climate policies (NDCs) • The role of employment assessment tools in evidence-based development planning, Marek Harsdorff, ILO (10min) • The Climate Jobs Nexus in Nigeria, Marek Harsdorff, ILO (10min) • The role of the NCCC in supporting a just transition, Director NCCCS (10 min) Discussion (30min)
Coffee 10h30-11h	
11- 12h30	**Panel discussion on development policies and objectives:** Which are the development objectives and policies (climate, employment, economic, social, financial) that a policy maker wishes to analyze with a model or assessment tool? Introduction climate, employment and Just Transition policies in Latin America, ILO (15min) and IADB (15min) Panel discussion (60min) Moderator: ILO • Ministry of Finance/Economic Planning, Environment and Labour representative • Workers & Employers' representatives • NCCC • National Economic Research Institute
Lunch 12h30-13h30	
13h30 – 15h00	**Session 1: Definition of development policies** and their measurement indicators, data and statistics The archetype of climate and development policies and their social, employment, economic and climate indicators and measurement methods (System of National Accounts SNA, Environment Goods & Service Sector, International Standard Classification of Industries (ISIC) and System of Environmental Economic Accounting (SEEA), Decent Work) • Development Policies Nigeria, Ministry of Development Planning (20min) • Climate Policies Nigeria, NCCC (20min) • Just Transition Policies, Marek Harsdroff ILO (20min) Discussion (30min)
Coffee 15h-15h30	
15h30-17h00	**Session 2**: Introduction to the Just Transition Assessment Model (JTAM) Nigeria in Software R. • Marek Harsdorff, ILO and Meron Arega, SINTEF Installation of R and running the model

2 Day Assessment tools	Evaluating national policies with a model Translating policies into model language and assess their social, job, economic, climate and development impacts
8h30 – 9h00	**Recap Day 1 (Moderator, Marek Harsdorff, ILO)** • Which policies can be modelled? • What type of outcome indicators can be analysed? • Which are key requirements in terms of data, statistics and policy specification?
9h00 – 10h30	**Session 3: Coherence between environmental and employment policies, sectoral and skills, economic and development policies so that they align and promote a climate and green transition:** Basic structure of SUT, sectors and industries (including Green and Climate Industries) and economic meaning, satellite accounts for labour and environment. • Marek Harsdorff, ILO (20min) • Q&A (10min) and Exercice (60min)
Coffee 10h30-11h	
11- 12h30	**Session 4: Definitions: Just Transition, Employment, Decent Work, Green Jobs, GDP, Emissions, Industries, Green and Climate Industries (International References: SNA, ISIC, IPCC, SEEA, ILO).** • Marek Harsdorff, ILO (30min) Q&A and discussion of the the Nigerian context (60min)
Lunch 12h30-13h30	
13h30 – 15h00	**Session 5: Integrate data into coherent analytical frame in R to allow for the assessment of tradeoffs and coherence between policies:** How is the data visible and stored in EXCEL and R? How to translate climate policies into economic model language so that the model can read it? How can the model assess climate, green and development policies in R? • Marek Harsdorff, ILO and Meron Arega, SINTEF
Coffee 15h-15h30	
15h30-17h00	**Session 6:** Introduction to R (R will be used throughout the rest of training) • Meron Arega, SINTEF
Closing	

3 Day	Utilizing the Just Transition Assessment Model (JTAM) Nigeria Using software R to run JTAM
8h30 – 9h00	**Recap Day 2 (Moderator, Marek Harsdorff, ILO)** • Which type of policies can be evaluated by the model? • Which are archetype policies (climate, social, labour and economic)? • Which are key international references for definitions (GDP, Industries, Employment, Climate)?
9h00 – 10h30	**Session 7** Introduction to R • Meron Arega, SINTEF
Coffee 10h30-11h	
11- 12h30	**Session 8** National data, storage, access and modification of data in R • Meron Arega, SINTEF
Lunch 12h30-13h30	
13h30 – 15h00	**Session 9** Running baseline projections • Meron Arega, SINTEF
Coffee 15h-15h30	
15h30- 17h00	**10** Running policy scenarios • Meron Arega, SINTEF Q&A and exercise (45min)
Closing	

4 Day	Policy making in Nigeria based on evidence from the model
8h30 – 9h00	**Recap Day 3 (Moderator, Marek Harsdorff, ILO)** • How to set up R? • How to run the baseline? • How to run policy scenarios?
9h00 – 10h30	**Session 11** Using models for national development planning, climate policies and NDCs, Employment and Just Transition Policies. Models from country examples • Marek Harsdorff, ILO (20min) • Climate policies Nigeria, Ministry of Environment (20min) • Development policies Nigeria, Ministry of Planning (20min) Discussion and exercise (60min)
Coffee 10h30-11h	
11- 12h30	**Session 12** Turning the national climate and NDC policies into model language and applying them to the Just Transition Assessment Model • Marek Harsdorff, ILO and Meron Arega, SINTEF
Lunch 12h30-13h30	
13h30 – 15h00	**Session 13** Planning: Set up of national team with NCCCS and Ministries to utilize JTAM for national development, climate and NDC policy making and implementation Group Work
Coffee 15h-15h30	
15h30- 17h00	**Session 14** Official hand over of model, way forward and next steps Group Work
Closing	

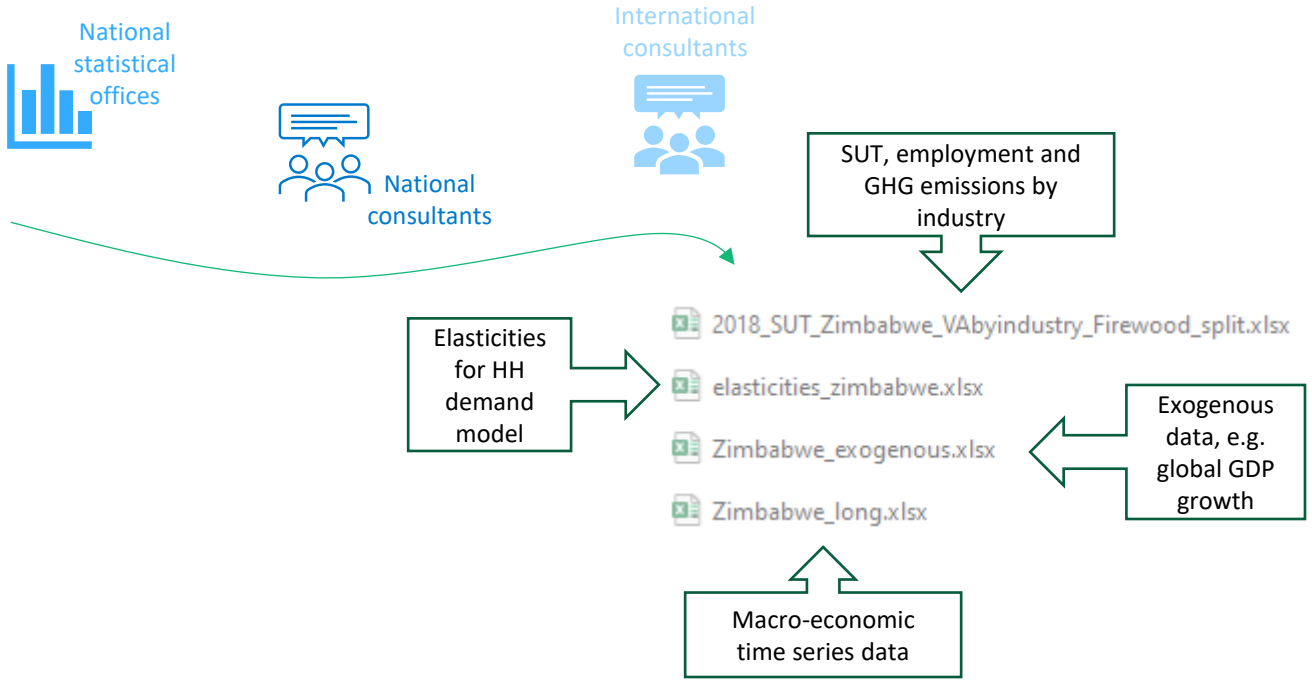
Just Transtion Assessment Model (JTAM)

An overview

1. JTAM data collection
2. JTAM model set-up
3. JTAM scenario design
4. JTAM scenario examples & results
5. Policy recommendation examples
6. Opportunities and challenges

1. JTAM data collection

- Empirical database
  - Supply-and-use tables for a recent year
  - Time series of System of National Accounts
  - Detailed emission and employment data by industry



- Example for employment data (Ghana)

Gender & Location & Education level
Male.rural.no.education
Male.rural.primary
Male.rural.secondary
Male.rural.tertiary
Male.urban.no.education
Male.urban.primary
Male.urban.secondary
Male.urban.tertiary
Female.rural.no.education
Female.rural.primary
Female.rural.secondary
Female.rural.tertiary
Female.urban.no.education
Female.urban.primary
Female.urban.secondary
Female.urban.tertiary

Gender & Job status
Male.paid.employee
Male.casual.worker
Male.non.ag.self.emp.with.employees
Male.non.ag.self.emp.without.employees
Male.non.ag.contributing.family.worker
Male.agric.self.emp.with.employees
Male.agric.self.emp.without.employees
Male.agric.contributing.family.worker
Male.other.worker
Female.paid.employee
Female.casual.worker
Female.non.ag.self.emp.with.employees
Female.non.ag.self.emp.without.employees
Female.non.ag.contributing.family.worker
Female.agric.self.emp.with.employees
Female.agric.self.emp.without.employees
Female.agric.contributing.family.worker
Female.other.worker

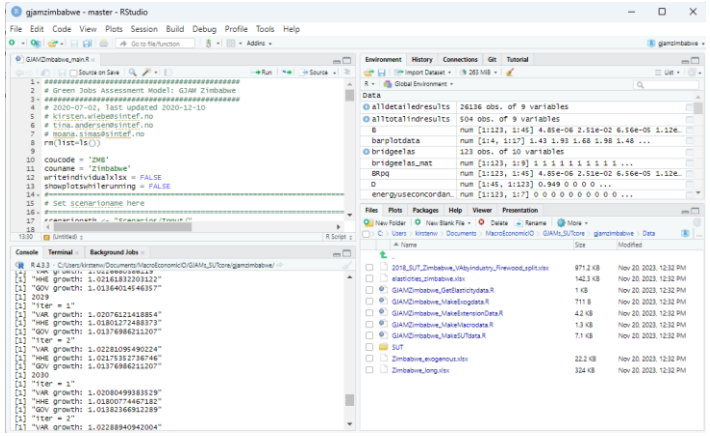
- From labour force survey, which only summed up to the sample size of the labour force survey
- Scaled up so that total matched total number of persons employed

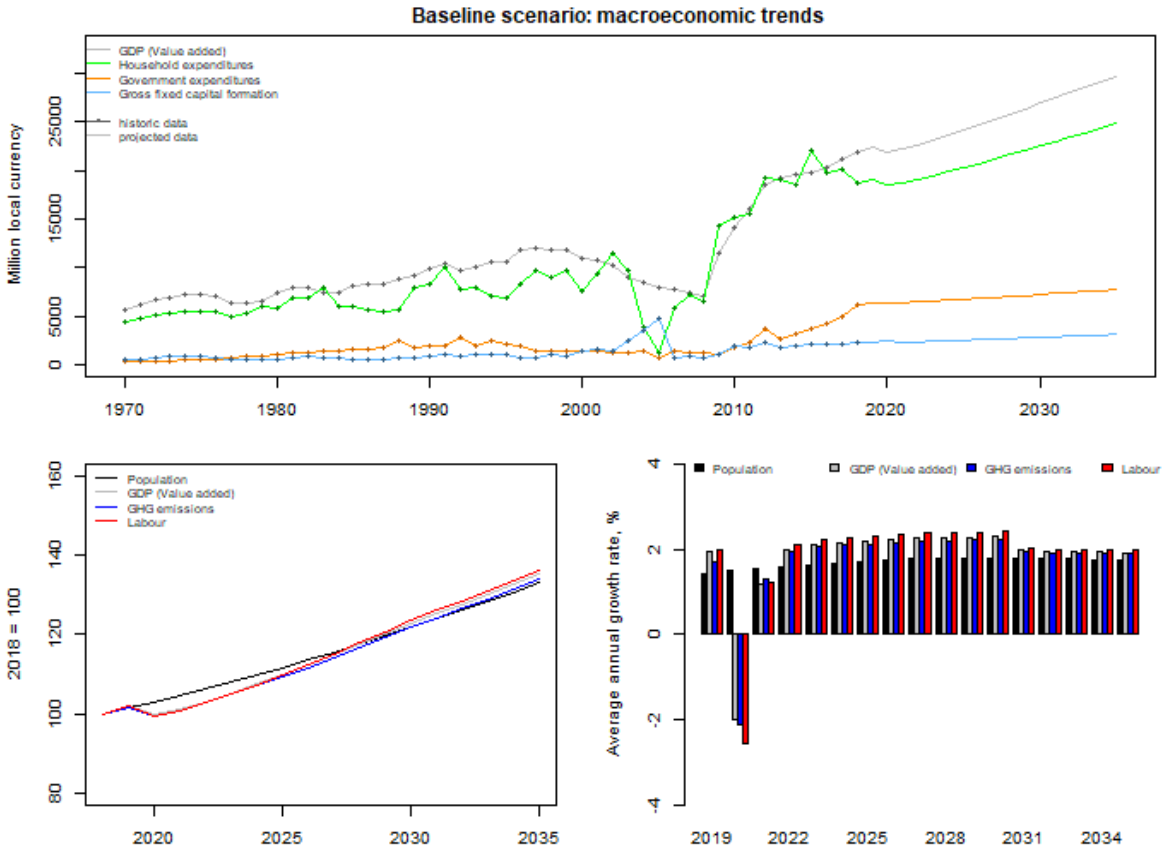
2. JTAM model set-up

Example
GJAM Zimbabwe

National consultants

International consultants





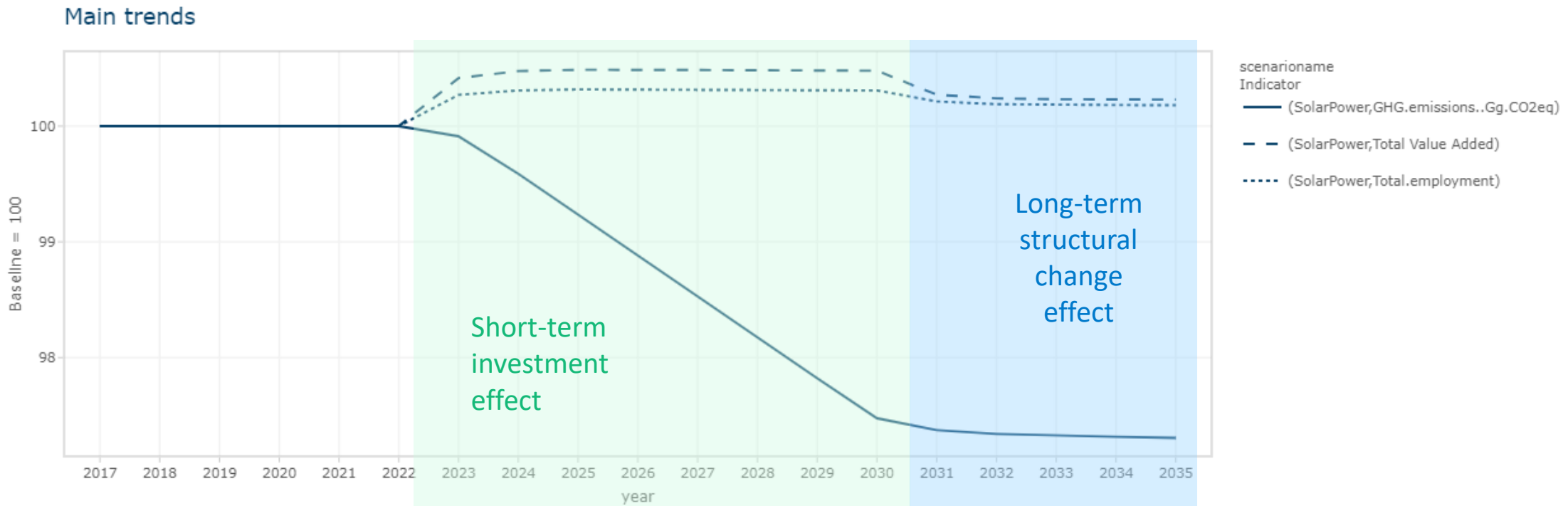
National statistical offices

3. JTAM scenario design

- NDC scenario design questions
  1. What is the **greenhouse gas emission reduction target**?
  2. Which type of **investments** into which industries/products are necessary?
  3. How does the **industrial structure** change in response to the policy?
  4. How does **demand by households and government** change in response to the policy?

4. GJAM scenario example and results
Short-term and long-term totals

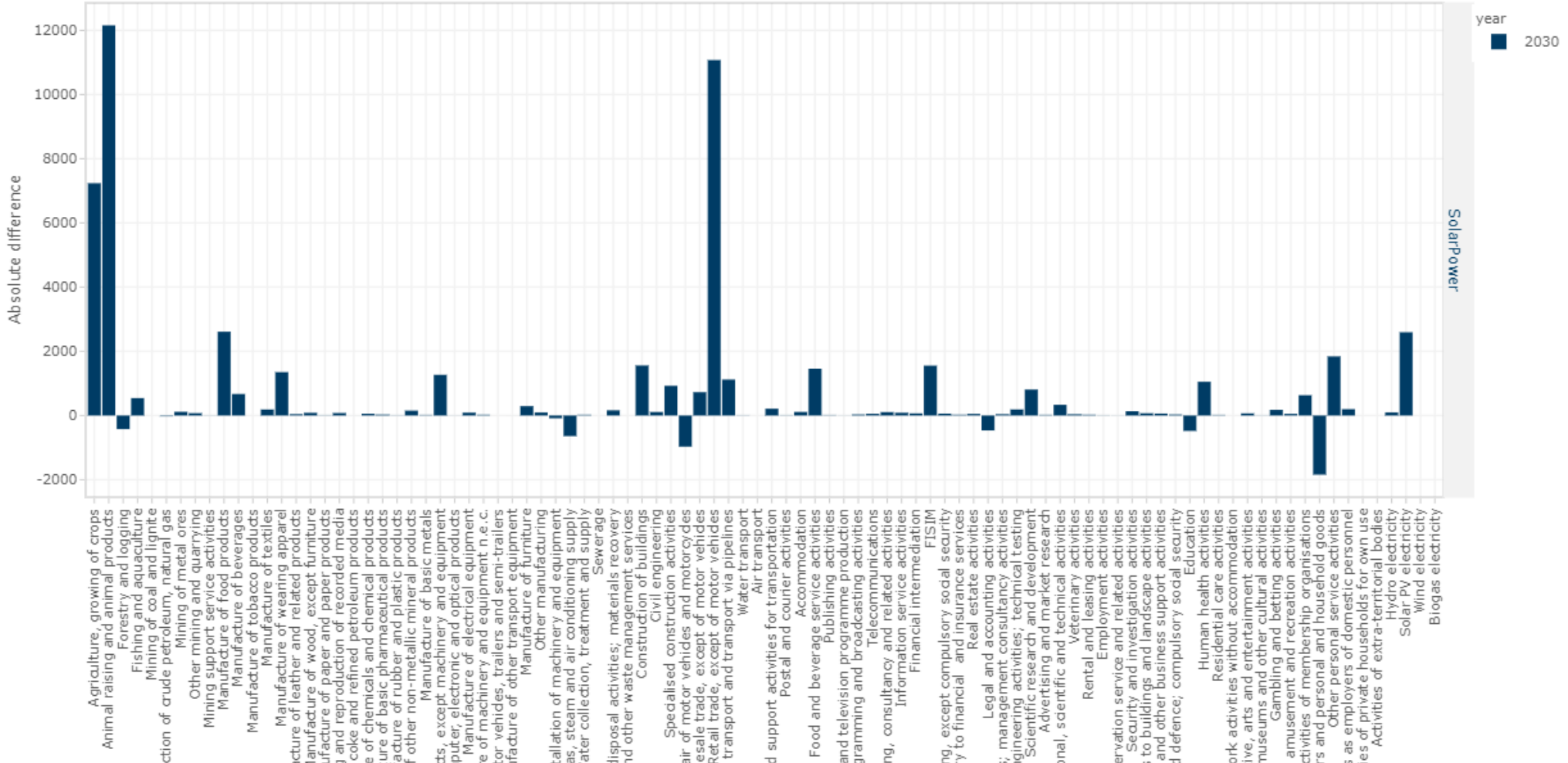
Solar PV in Ghana



4. GJAM scenario example and results By industry

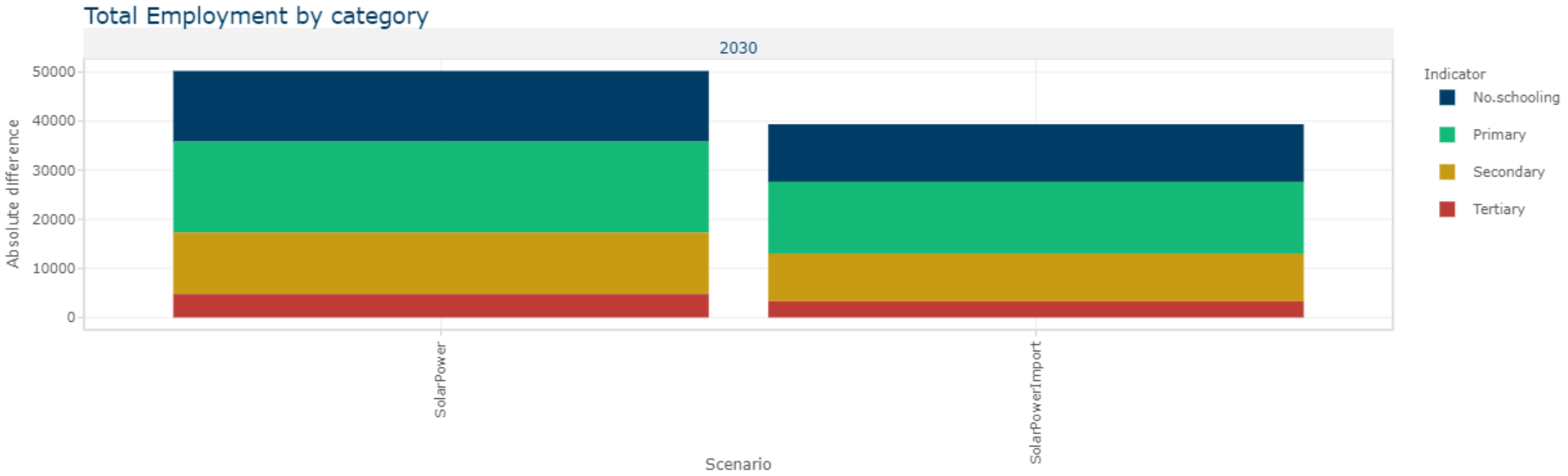
Solar PV in Ghana

Employment by industry compared to Baseline



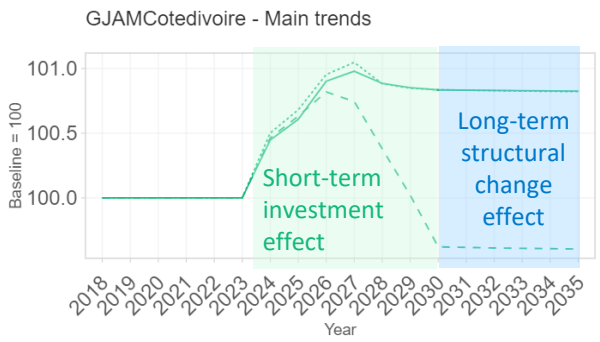
4. GJAM scenario example and results
By job category for different scenarios

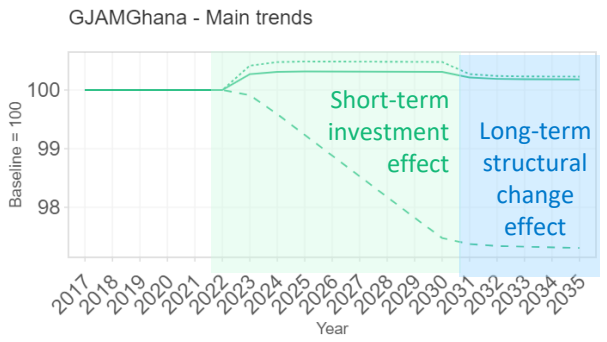
Solar PV in Ghana: Domestic production versus import of solar panels

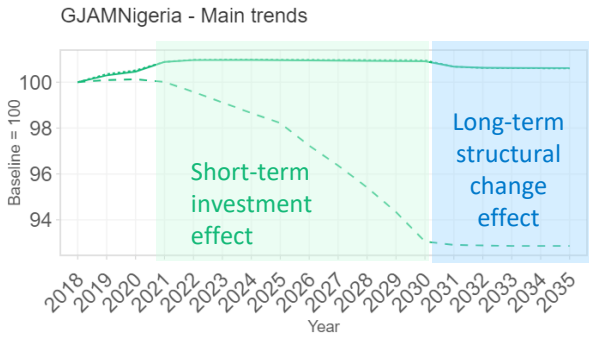


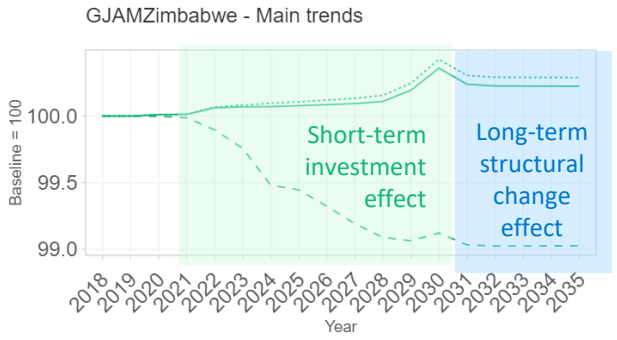
4. GJAM scenario example and results
Solar PV effects across countries

Increased Solar PV uptake







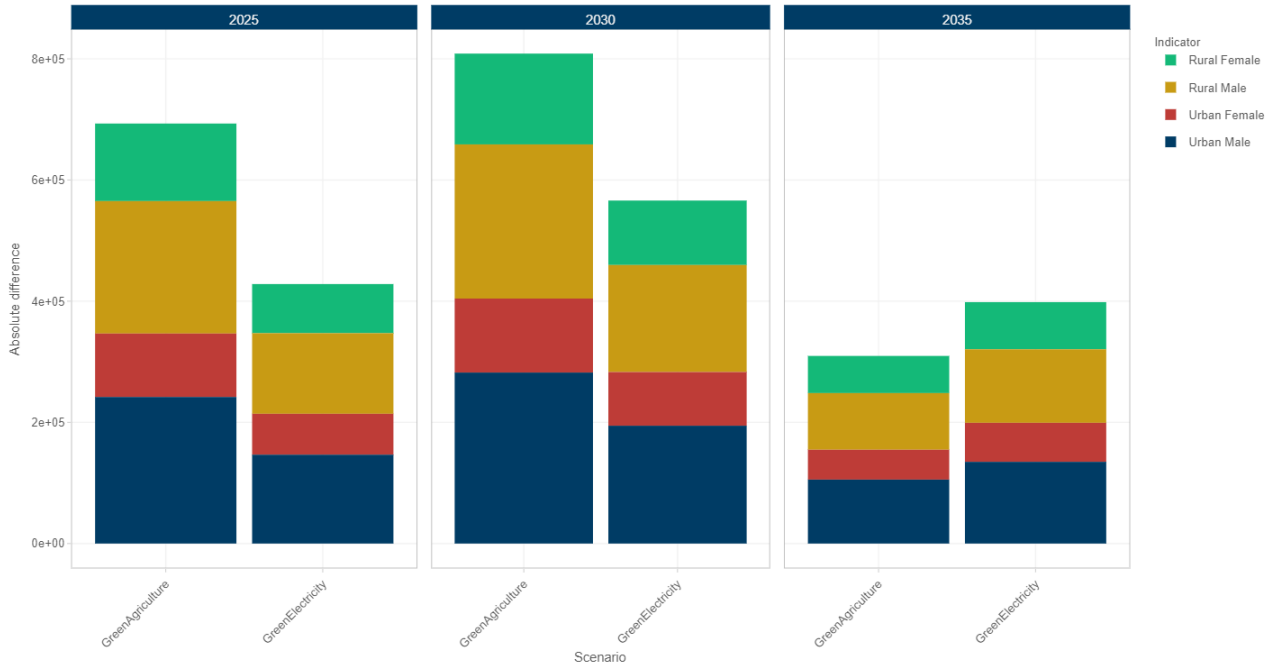


Employment Value Added GHG Emissions

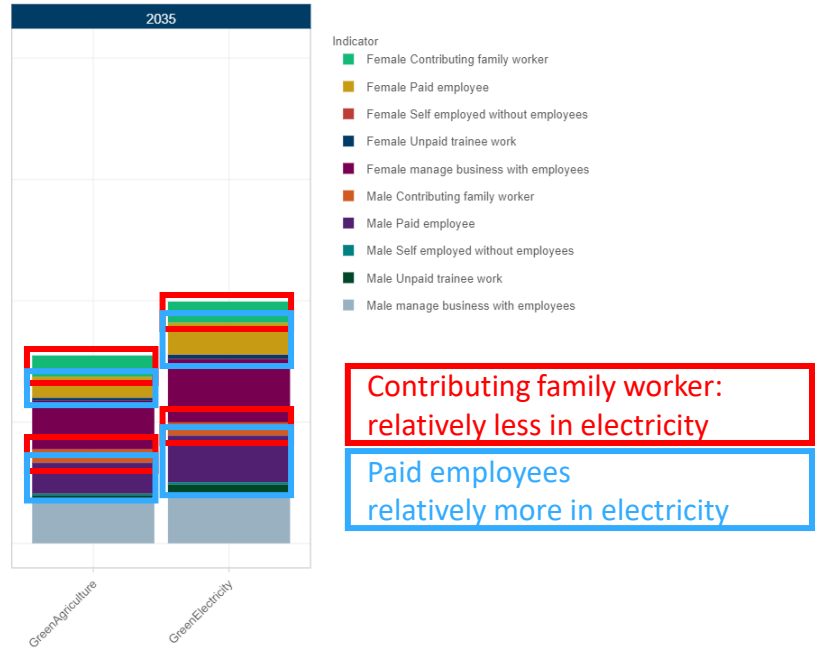
4. GJAM scenario example and results

Senegal: Green Agriculture and Green Electricity scenarios – by employment category

Gender and location



Gender and job status



Contributing family worker:
relatively less in electricity

Paid employees
relatively more in electricity

4. GJAM scenario example and results

	Burkina Faso	Cote d'Ivoire	Ghana	Mada-gascar	Nigeria	Senegal	Turkey	Zim-babwe
Agriculture		x			x	x		x
Aquaculture				x				
Biofuel			x		x			x
Biogas								x
Charcoal/firewood				x	x			x
Cooling			x					
Ecosystem	x			x				
ElectricityPush					x			
EnergyEfficiency					x			x
Fossil electricity					x		x	
HydroPower						x		x
Industry					x			x
Green electricity					x	x	x	
SolarPV		x	x		x			x
Sustainable Tourism	x							
Transport					x			
Trees					x			
Water	x				x			

5. Policy recommendation examples

- Short-term **investment effects** versus long-term **structural change effects**

- Solar PV scenarios in a large variety of countries
  - Positive employment effects
    - especially for manufacturing and repair & maintenance industries
    - enabling of business opportunities because of more and off-grid electricity

  → **To enable PV/structural energy shift, human capital (skills training) is necessary in addition to physical capital**

- Clean cooking solutions / AFULO / reduction of firewood and charcoal
  - Less (unsustainable) deforestation and significant reduction in emissions and local pollution
  - People need to spend less time on firewood collection, but need access to (more expensive) energy

  → **Social protection and income support for families is necessary to stop deforestation**!

Policies can be designed and implemented to **minimize the negative and maximize the positive consequences** in line with the aims of the **UNFCCC workstream** on the **'Impacts of the implementation of response measures'**

7. Opportunities and challenges

Design policies to **minimize the negative and maximize the positive consequences** in line with the aims of the **UNFCCC workstream** on the **'Impacts of the implementation of response measures'**

Limitations

are limited to detailed economic theory

- Based on historic relation between economic activity, income, and consumption and the production structure of the base year
- Econometric estimations → Lucas' critique
- No endogenous adjustment of production structure or investment based on price changes
- Investments exogenous to the current year (for making the model stable), but nonetheless path dependent for each scenario
- No dynamic labour market adjustments
- Import shares by product are based on the supply table from the base year, but can be changed exogenously in the scenarios

Strengths: simplicity and transparency

- The model depends on data that is usually available from official statistics at national statistical offices, and which can be combined into one consistent framework with few equations.
- The model is driven by empirical data and reflects country-specific characteristics.
- Scenarios are implemented using one Excel sheet and the model runs only a few seconds, making sensitivity analysis with many scenarios feasible.
- For every single result, we can find an explanation that is in the data, in one of the very few assumptions underlying the model, or in the scenario specifications.

Contact

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  - Meron Arega and Moana Simas

Resources for more information

- GAIN Training Guidebook: **How to measure and model social and employment outcomes of climate and sustainable development policies**
  https://www.ilo.org/global/topics/green-jobs/publications/WCMS_613934/lang--en/index.htm

- **GAIN reports** https://www.ilo.org/topics/just-transitions-towards-environmentally-sustainable-economies-and/areas-work/green-jobs-assessment-institutions-network-gain/gain-reports

- UN (2018) Handbook on Supply and Use Tables and Input-Output Tables with Extensions and Applications https://unstats.un.org/unsd/nationalaccount/docs/SUT_IOT_HB_Final_Cover.pdf