REPORT ON ICAT VALIDATION WORKSHOP

Crystal Palm Hotel

30th January 2025

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1.0 Introduction

1.1 Background

Ghana has been actively involved in the Initiative for Climate Action Transparency (ICAT) since 2017, a global initiative aimed at strengthening the domestic transparency arrangements of developing countries, including Ghana. The overall goal of the initiative is to strengthen national systems for climate transparency in line with the Enhanced Transparency Framework under the Paris Agreement.

The initiative during this period provided Ghana with both technical and institutional support to enhance the monitoring, reporting, and verification (MRV) framework for its climate actions and greenhouse gas (GHG) emissions. The first ICAT project that Ghana participated in focused on strengthening the MRV framework for the energy sector, including the identification of key stakeholders and the definition of roles and respective institutional arrangements. The project also considered an assessment of sustainable development in the energy sector.

As part of the second phase of the project (ICAT 2), Ghana undertook a review of the mitigation measures outlined in its initial NDC. This process involved applying the GACMO model to refine and strengthen existing strategies while identifying and incorporating new mitigation opportunities. ICAT worked with Ghana to analyse the broader sustainable development impacts associated with the revised NDC, including a quantitative assessment of selected non-climate effects, particularly those linked to efforts to decarbonise the urban transport sector.

Tools such as **TRACE** (Tool for Rapid Assessment of City Energy) were introduced to support this analysis. The ICAT Phase II project in Ghana was implemented over a 23-month period, spanning from May 2023 to March 2025. The initiative was a collaborative effort between the Government of Ghana, through the Environmental Protection Authority (EPA) as the national implementing body, and the United Nations Office for Project Services (UNOPS), serving as the international implementing partner.

The aim of the ICAT 2 project was to strengthen Ghana's transparency system for climate action and support Ghana in enhancing its ability to track and report on its GHG emissions, evaluate the effectiveness of mitigation policies and measures, and assess the broader sustainable development impacts of its climate policies. This aligns with Ghana's efforts to meet Article 13 of the Paris Agreement and improve the implementation and monitoring of its NDC. The project facilitated training for national experts and promoted multi-stakeholder engagement.

2.0 Objectives

The objectives of the workshop were:

- to ascertain the progress of ICAT 2 in Ghana and the way forward
- to disseminate the sustainable development assessment of the selected NDC policy actions results
- to disseminate TRACE tool results for the transport sector

3.0 Agenda Overview

The workshop commenced with participants' registration, followed by introductory remarks and an overview of the net-zero pathways for Ghana. The Director of Environmental Assessment and Management delivered the introductory remarks on behalf of the Deputy Chief Executive Officer of EPA. After the welcome statements, a representative from UNEP-CCC made a statement, followed by an update on the progress of ICAT 2 so far and the way forward. The workshop progressed into a series of technical sessions. These sessions included presentations on a variety of critical topics, encompassing the dissemination of sustainable development Assessment results for the selected NDC policy actions, the dissemination of TRACE tool results for the transport sector, as well as extended discussions. Ample time was also allocated for networking and in-depth discussions on the project's findings.

4.0 Participation

Table 1: Participant Analysis

Participants	Males	Females
	26	7
Total		**33**

Fig 1: Participants at the validation workshop

4.1 Opening and overview of the workshop; Progress of ICAT 2

The ICAT Validation Workshop, held on January 30th at the Crystal Palm Hotel in Accra, marked the culmination of a significant initiative aimed at enhancing climate transparency and sustainable development in Ghana. In the opening remarks, Dr Daniel Tutu Benefoh indicated that the workshop is to provide a platform to assess the effectiveness of the ICAT project, review key findings, and validate its impact in supporting national climate policies. Dr Daniel Tutu Benefoh also highlighted progress made under the ICAT 2 project, with a focus on validating results and drawing conclusions. Discussions emphasised the critical need for improved data availability and strengthened stakeholder collaboration to support effective implementation, long-term sustainability, and alignment with Ghana's national climate transparency goals. Dr. Benefoh highlighted the relevance of applying the TRACE tool as part of Ghana's efforts to assess and implement its NDCs. He referenced a significant footnote in the NDC document that calls for systematic evaluation of the proposed mitigation measures.

4.2 Statement by UNEP-CCC

In his brief remarks, Dr. Subash provided an overview of the ICAT initiative, emphasizing its alignment with the global objective of limiting temperature rise to 1.5°C under the Paris Agreement. He highlighted ICAT's role in supporting countries like Ghana to enhance climate transparency and strengthen the implementation of their climate commitments. He noted that the project is multi-agency funded and has been operational since 2020, providing technical support to over 50 countries around the world in strengthening their climate transparency systems. He also elaborated on the two key assessments within the ICAT 2 project:

1. Assessing the Sustainable Development Impact (SDI) of Ghana's NDC actions to guide policy design and implementation.
2. Identifying opportunities for climate resilience and addressing potential trade-offs between climate action and NDC priorities.

5.0 Technical Presentations

5.1 Sustainable development assessment of the selected NDC policy actions

The first technical presentation, titled "Assessing the Sustainable Development Impacts of Ghana's NDC Actions," focused on generating insights to inform policy design and implementation. The presentation highlighted the importance of evaluating non-climate benefits of mitigation measures to ensure that climate actions contribute to broader national development goals.

Ms. Gifty Owusu, speaking on behalf of Dr. Bob Robert Manteaw, delivered a presentation emphasizing the intersection between the Paris Agreement and the Sustainable Development Goals (SDGs). She highlighted the significant potential this alignment holds for driving positive change at both the global and national levels. Ms. Owusu explained that countries can align the SDGs with national development priorities by setting context-specific targets and integrating them into strategic planning frameworks. She further noted that Nationally Determined Contributions (NDCs) are often derived from these national development plans, presenting a key opportunity to synchronize climate action with sustainable development efforts. To fully realize the benefits of this convergence, she emphasized the importance of policymakers systematically assessing both the climate and development impacts of NDC implementation.

Ms. Owusu indicated that, the assessment further seeks to identify opportunities for climate-resilient development and address potential trade-offs between climate action and NDC priorities. Ms. Gifty Owusu provided a comprehensive overview of Ghana's NDCs, highlighting it to include 34 mitigation and 13 adaptation policies. She emphasized that the overarching target is to achieve a 64 $MtCO_2e$ reduction in greenhouse gas emissions by 2030.

Additionally, she outlined key socio-economic outcomes of the NDC, including building the climate resilience of 38 million people, creating over one million jobs, and preventing approximately 2,900 deaths through improved air quality. She further noted that 79% of the mitigation measures are focused on the energy sector, underscoring the importance of prioritizing energy-related actions for the assessments.

The methodology of the assessment employed the ICAT Sustainable Development Methodology, using both ex-post and ex-ante evaluations, depending on the implementation status of each policy. Gifty explained that the assessment focused on three key dimensions: environmental (climate, air quality, soil health, biodiversity), economic (employment, energy access), and social (health, education) impacts. The policy actions and programmes evaluated included scaling up LPG adoption, deployment of solar mini-grids, promotion of efficient cookstoves, and green cooling technologies in appliances and expanding access to two million efficient cookstoves by 2030, with all selected actions being project-based policies. The impact evaluation process involved a literature review, prioritization of policies, stakeholder consultations, and final assessments.

Ms. Owusu noted that while the assessment was designed to evaluate both the qualitative and quantitative impacts of Ghana's NDC actions, only the qualitative aspect was achieved. This limitation was due to challenges in data acquisition and difficulties in engaging stakeholders, which constrained the ability to conduct a comprehensive quantitative analysis. Future assessments she said will aim to address these challenges to provide a more robust evaluation of the impacts.

The selection criteria for the assessment took into consideration Ex-post and Ex-ante Analysis: Based on the status of policy actions (implemented or planned) and focused on 4 policy actions and 8 Programmes of Action (PoAs) that have begun implementation or undergone feasibility studies. She further gave an overview of the results *(Attached as Annex 1: Assessing the Sustainable Development Impacts of Ghana's NDC Actions).*

Ms. Gifty Owusu highlighted key challenges encountered during the assessment process, notably issues related to data acquisition and stakeholder engagement. She also presented a set of recommendations to address these challenges and enhance the overall effectiveness of NDC implementation. These included: integrating SDG indicators into NDC reporting frameworks, developing a unified monitoring framework, strengthening stakeholder engagement and capacity building, improving reporting and transparency through digital platforms, and incorporating quantitative metrics to enable comprehensive impact assessments.

5.1.1 Discussions from findings (comments, Suggestions, question and answer session with participants)

Q1. Provide clarity on any potential negative impacts identified during the assessment. The presentation appeared to focus solely on the positive outcomes

Response: The assessment team acknowledges that while the primary emphasis was on identifying and quantifying the positive co-benefits of climate actions such as employment, improved health, and energy access, negative effects have been negligible.

Q2. If stakeholder engagement was a challenge, how did you obtain the data used for this work?

***Response*:** The assessment team was able to engage in some one-on-one interactions with stakeholders, which facilitated data collection. The team also leveraged existing national datasets, previous reports, and collaborated with key institutions.

Q3. Why was the presentation focused solely on the energy sector, given that there are other sectors involved in Ghana's NDC?

Response: The focus on the energy sector was deliberate due to its significant contribution to Ghana's mitigation commitments, accounting for approximately 79% of the total mitigation actions outlined in the NDC. Given its central role in achieving emission reductions and the availability of relatively robust data, the energy sector was selected as a starting point for the Sustainable Development (SD) assessment under ICAT Phase II. However, this does not exclude the relevance of other sectors; future assessments may expand to include additional sectors such as transport, waste, and agriculture, as data and capacity improve.

Q4. What impact does your presentation have?

Response: The presentation reflects the outcomes of the energy sector's contribution to the broader context of the next NDC and provides insights that can guide further decision-making.

5.1.2 Dissemination of TRACE Tool Results

Prof. Thomas Kolawale Ojo presented findings from the application of the TRACE tool within Ghana's transport sector. The primary objective of the study was to quantitatively assess the non-climate impacts of decarbonising the urban transport sector. Specifically, the study sought to develop a national methodological framework for measuring these impacts over the period 2020 to 2040. The TRACE tool was used to analyse non-climate impacts associated with the implementation of key actions. The project addressed issues related to congestion, fuel savings, air pollution and road traffic accidents. The study provided practical evidence to inform the implementation of transport-related actions under the NDCs.

Key issues highlighted in Prof Ojo's presentation included the limited availability of data on electric vehicles in Ghana, the need for recalibrating vehicle classifications within the TRACE tool, and the challenge of organising a dedicated workshop on the tool's application *(Attached as Annexe 2: Preliminary Result: Non-Climate Impact for the Transport Sector Using the TRACE-Tool).*

Prof. Ojo concluded his presentation with a set of lessons learned and recommendations, including the need to have access to relevant data on electric vehicles for Ghana, recalibration of the types of vehicles for the TRACE tool, modelling of impacts before and post mitigating measures, retooling and equipping data champions as elucidated in ICAT 1.

Prof. Thomas Kolawale Ojo concluded his presentation by highlighting the importance of integrating AIRPOLIM-T results into the TRACE tool to effectively estimate health impacts; specifically, Chronic Obstructive Pulmonary Disease (COPD), lung cancer (LC), ischemic heart disease (IHD), and stroke arising from ambient air pollution caused by urban transport. He noted that this integration presented a significant challenge. Additionally, he pointed out the inability to organise a dedicated workshop on the TRACE tool as another key limitation encountered during the study.

5.1.3 Discussions (comments, Suggestions, questions and answer session with participants)

Q1. Is the Trace tool available to the public?

Response: The Trace tool, developed and managed by the NCI and is publicly accessible. It can readily be found online.

Q2. How did you obtain your data on fuel consumption? Given that this requires detailed analysis, how was it achieved?

Response: Energy statistics provide data on fuel consumption across various sectors, which were utilized in the analysis.

Q3. How do you differentiate fuel consumption between transport and industrial use?

Response: The data from the DVLA is aggregated, and electric vehicles (EVs) span multiple categories, such as tricycles and buses, which complicates the differentiation

Q4. Is the DVLA able to disaggregate the cars it registers each year?

Response: The DVLA provides aggregated data, making it difficult to disaggregate car registrations.

6.0 Conclusion

The ICAT 2 project has made significant contributions to strengthening Ghana's climate transparency framework and supporting the implementation of its NDC. The validation workshop provided an important platform to review key achievements, share experiences, and engage stakeholders in assessing the project's outcomes.

While the project achieved notable progress particularly in the areas of sustainable development impact assessment of the selected NDC policy actions and the results from the TRACE tool for the Transport sector, the assessment revealed persistent challenges, including data gaps and the need for enhanced cross-sectoral coordination. These insights highlight the importance of sustained efforts to improve data systems, stakeholder collaboration, and institutional readiness.

Moving ahead, the lessons learned from ICAT 2 will inform future initiatives aimed at deepening Ghana's climate resilience and advancing its sustainable development agenda. The foundation laid by this project positions Ghana to continue balancing its international commitments with local realities while ensuring that transparency and accountability remain central to its climate actions.

Annex 1: Assessing the Sustainable Development Impacts of Ghana's NDC Actions

Assessing the Sustainable Development Impacts of Ghana's NDC Actions

Informing Policy Design and Implementation

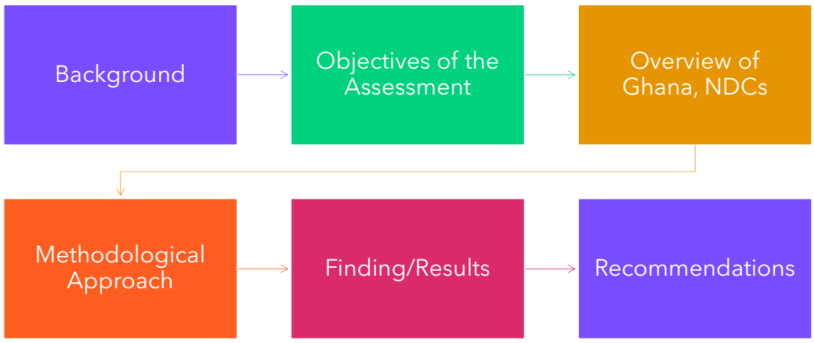
Bob Manteaw PhD

ICAT Initiative for Climate Action Transparency

epa

FORESIGHT PLANNERS africa

Outline



Background

- 2015 is historic year in forging a sustainable pathway for people and the planet
  - The Paris Agreement committed to limiting global warming to well below 2°C, and the Sustainable Development Goals (SDGs) aimed to address global challenges like poverty, hunger, and climate action.
  - The convergence of the Paris Agreement and SDGs has immense potential to drive positive changes on global and national scales.
- Countries align SDGs with national priorities by setting relevant targets and embedding them into development plans and strategies.
- Nationally Determined Contributions (NDCs) are derived from national plans, creating opportunities to align climate action with sustainable development goals.
- Policymakers must systematically assess the climate and development impacts of NDC actions to achieve the objectives of both frameworks.

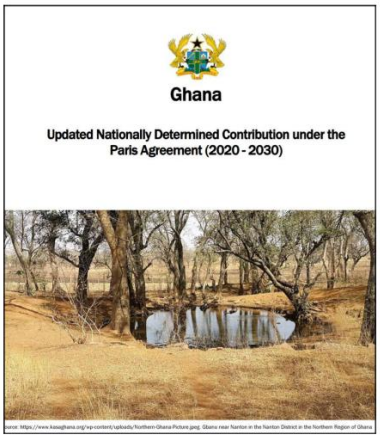
Objectives of the Assessment

The main objective of this work is to assess the sustainable development impacts of Ghana's NDC actions to inform policy design and implementation.

It seeks to identify opportunities for climate-resilient development and address potential trade-offs between climate action and NDC priorities

Overview of Ghana's NDCs

- 47 Programmes of Action (34 Mitigation, 13 Adaptation)
- Targeting 19 policy actions across 11 sectors
- Socioeconomic Outcomes:
  - Resilience for 38M people
  - GHG reduction of 64 MtCO2e by 2030
  - Creation of 1M+ jobs
  - Avoidance of 2,900 deaths through improved air quality
- 79% of mitigation actions target energy



Methodological Approach

Framework & Approach
ICAT Sustainable Development Methodology was applied with ex-post and ex-ante evaluations based on policy status.

Policy Actions & Programmes
Examples include scaling LPG adoption, solar mini-grids, efficient cookstoves, and green cooling in appliances..

Key Dimensions of Assessment
Focused on Environmental (climate, air, soil, biodiversity), Economic (jobs, energy), and Social (health, education) impacts.

Impact Evaluation Process
Steps included literature review, prioritization, stakeholder consultations, and final assessments.

Disclaimer

- While the assessment was designed to evaluate both the qualitative and quantitative impacts of Ghana's NDC actions, only the qualitative aspect was achieved.
- This limitation was due to challenges in data acquisition and difficulties in engaging stakeholders, which constrained the ability to conduct a comprehensive quantitative analysis. Future assessments will aim to address these challenges to provide a more robust evaluation of the impacts.

Selected Policy Actions (PA) and Programmes of Action (PoAs) and Section Criteria

- Ex-post and Ex-ante Analysis: Based on the status of policy actions (implemented or planned).
- Focused on 4 policy actions and 8 Programmes of Action (PoAs) that have begun implementation or undergone feasibility studies.

Policy Action (PA)	Programmes of action (PoA)
Green cooling in Applicance	Cooling measures in the RAC sector
Expand the adoption of market-based cleaner cooking solutions	Scale up adoption of LPG use from 5.5% to 50% peri-urban and rural households up to 2030.
	Scale up access and adoption of 2 million efficient cook stoves up to 2030
Promote clean rural households lighting	Increase solar lantern replacement in rural non-electrified households to 2 million.
Scale up renewable energy penetration by 10% by 2030	Scale up the 200,000 solar systems for lighting in residential and non-residential buildings (translates to 20MW)
	Establish solar 55 mini-grids with an average capacity of 100kW which translates to 10MW
	Attain utility-scale solar electricity installed capacity to 527.1MW
	Increase small-medium hydro installed capacity up to 150-300MW

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Scale up LPG adoption to 50% by 2030	- Reduction in deforestation and GHG emissions	- Improved health outcomes	- Job creation in LPG supply chain
	- Improved air quality	- Reduced indoor air pollution	- Increased income for LPG sector workers
		- Gender equality through reduced wood collection workload	- Reduction in energy costs

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Cooling measures in the RAC sector	- Reduced GHG emissions	- Enhanced indoor air quality	- Growth of the green cooling market
	- Energy efficiency	- Health benefits through reduced use of harmful refrigerants	- Job creation in manufacturing, installation, and maintenance
	-Ozone layer protection		

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Increase small-medium hydro capacity (150-300MW)	-Lower GHG emissions	- Improved access to electricity	- Job creation in construction, operation, and maintenance
	-Increased renewable energy generation	-Community development through energy access	- Economic benefits from tourism and local businesses

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Establish 55 solar mini-grids by 2025	-Increased renewable energy use	- Electrification of rural areas	- Local economic development
	-Reduced dependence on fossil fuels	- Improved quality of life for underserved communities	- Creation of green energy jobs

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Attain utility-scale solar capacity (527.1 MW)	- Reduction in carbon footprint	- Increased access to affordable clean energy	- Economic growth through green energy investments
	- Enhanced energy security	- Support for health and education services	- Job creation in the solar energy sector

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Scale up access to 2 million efficient cookstoves	- Reduced deforestation	- Improved household health	- Income generation for stove manufacturers
	- Lower emissions of harmful pollutants	- Reduction in time spent collecting firewood	- Reduced energy costs for households

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Increase solar lantern replacement in rural households (2 million units)	- Reduction in GHG emissions	- Enhanced lighting for education and safety	- Savings on energy costs for households
	- Reduction in kerosene use	- Improved air quality in homes	- Creation of market opportunities for solar businesses

Overview of Results

NDC Action	Environmental Impacts	Social Impacts	Economic Impacts
Scale up solar systems for lighting in residential/non-residential buildings (20MW)	- Reduction in fossil fuel consumption	- Improved energy access	- Growth of the solar industry
	- Increased renewable energy share	- Enhanced quality of life	- Job creation in installation and maintenance

Key Challenges Encountered

Data Acquisition:

- ❑Limited availability of reliable and up-to-date data constrained the ability to conduct comprehensive analyses.
- ❑Difficulty in accessing specific datasets, particularly for social and economic indicators like job creation and gender impacts.

Stakeholder Engagement:

- ❑Challenges in coordinating and meeting with key stakeholders, especially at the local level, impacted the depth and inclusiveness of the assessment.
- ❑Limited participation from certain stakeholder groups reduced the ability to capture diverse perspectives and unintended outcomes.

Recommendations

Integrate SDG Indicators into NDC Reporting Frameworks:

- ❑ Embed relevant SDG indicators into Ghana's Climate Ambition Reporting Program (CARP) and NDC accounting systems.
- ❑ Map specific NDC actions to SDG targets (e.g., renewable energy to SDG 7.2, clean cooking to SDG 3.9) to align climate actions with broader development goals.
- ❑ Use this integration to track and report dual progress on climate targets and SDG outcomes.

Recommendations

Develop a Unified Monitoring Framework:

- ❑ Create or adopt common metrics that address both climate and development outcomes, such as GHG reductions (SDG 13), energy access improvements (SDG 7), and job creation (SDG 8).
- ❑ Leverage existing data systems from Ghana's Statistical Service and Environmental Protection Agency to ensure consistency and avoid duplication.

Strengthen Stakeholder Engagement and Capacity Building:

- ❑ Engage local governments, NGOs, and community organizations in data collection and monitoring of SDG-relevant outcomes.
- ❑ Build capacity among stakeholders for accurate data collection and alignment with both GCARP and SDG frameworks.
- ❑ Foster comprehensive tracking of environmental, social, and economic impacts, such as reduced deforestation (SDG 15), improved health outcomes (SDG 3), and green job creation (SDG 8).

Recommendations

Enhance Reporting and Transparency through Digital Platforms:

- ❑ Align CARP and NDC reports with Ghana's Voluntary National Review (VNR) of the SDGs to ensure coherence in international reporting and demonstrate commitment to climate-resilient development.

Incorporate Quantitative Metrics for Comprehensive Impact Assessments:

- ❑ Complement qualitative assessments with quantitative metrics to better measure the scale and scope of SDG impacts.
- ❑ Showcase development co-benefits to attract climate finance and allocate funding to high-impact projects.

Annex 2: ***Preliminary Result: Non-Climate Impact for the Transport Sector Using the TRACE-Tool***

UNIVERSITY OF CAPE COAST

Preliminary Result: Non-Climate Impact for the Transport Sector Using the TRACE-Tool

Thomas Kolawole Ojo

Crystal Palm Hotel, Tessano, Accra,
January, 2024

THE WORLD UNIVERSITY RANKINGS 2022 TOP 350 0

Objective

- To quantitatively evaluate the non-climate impacts of decarbonizing the urban transport sector in Ghana
- Specifically to develop a national methodological framework for measuring these impacts from 2020-2040.

THE WORLD UNIVERSITY RANKINGS 2022 TOP 350

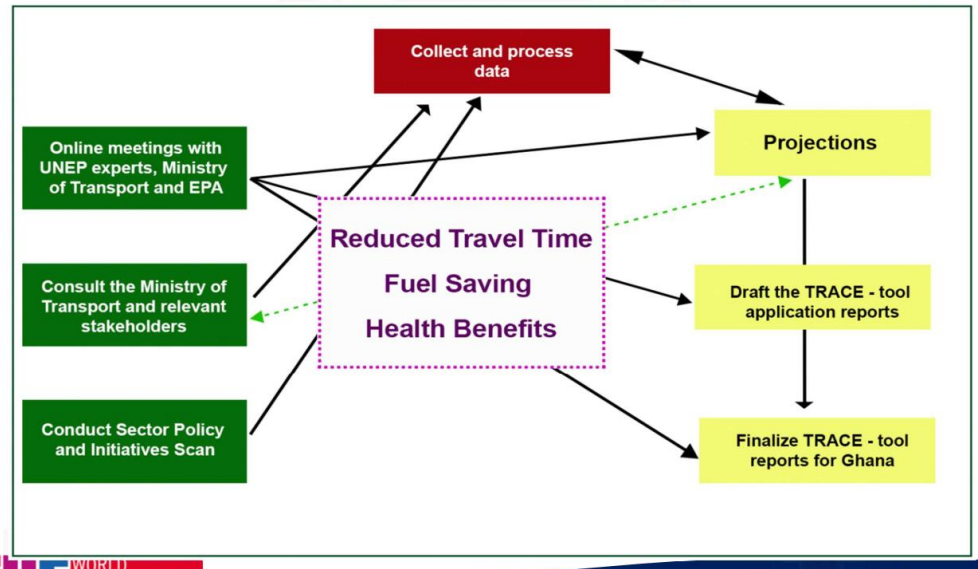
Project scope

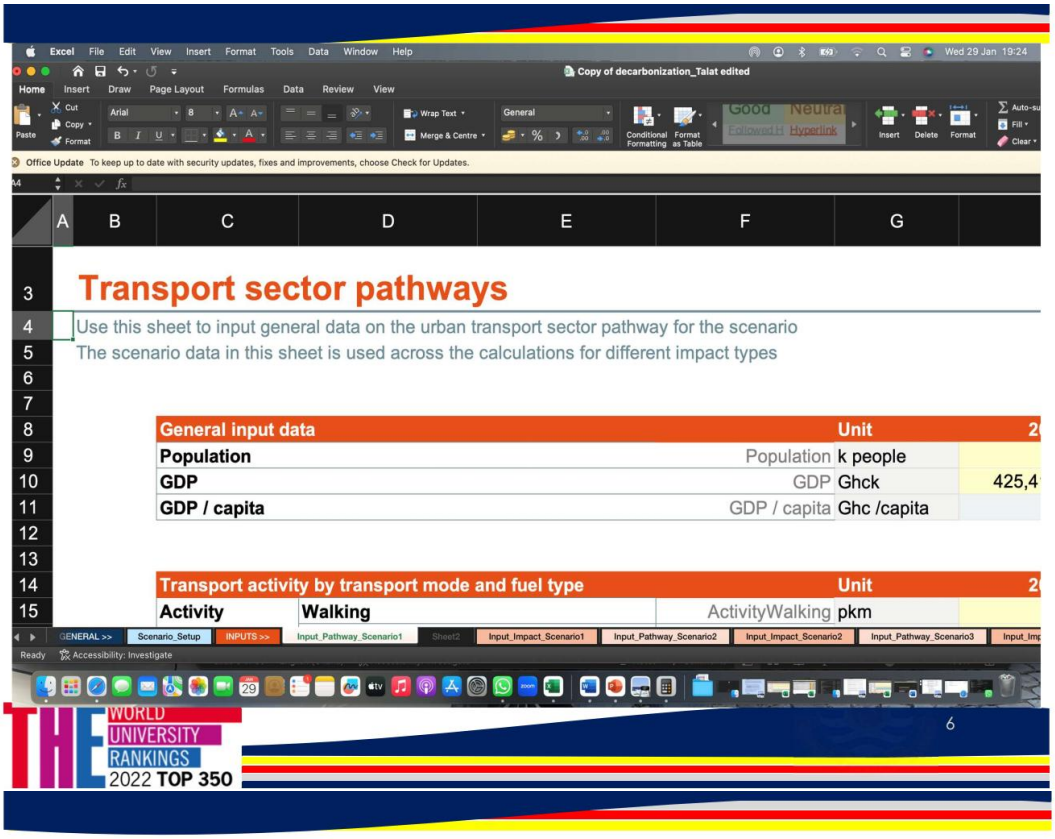
- TRACE-tool was used to analyse non-climate impacts associated with the implementations of key actions including,
- 1. Congestion,
- 2. Fuel savings,
- 3. Air pollution
- 4. Road traffic accidents

- Further modeling are used to beef up the TRACE-Tool

- **Further modeling are used to beef up the TRACE-Tool**

Methodological framework




Copy of decarbonization_Talat edited
Transport sector pathways
Use this sheet to input general data on the urban transport sector pathway for the scenario
The scenario data in this sheet is used across the calculations for different impact types
General input data
Unit
Population
Population
k people
GDP
GDP
Ghck
425,4
GDP / capita
GDP / capita
Ghc /capita
Transport activity by transport mode and fuel type
Unit
Activity
Walking
ActivityWalking
pkm
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Input_Pathway_Scenario2
Input_Impact_Scenario2
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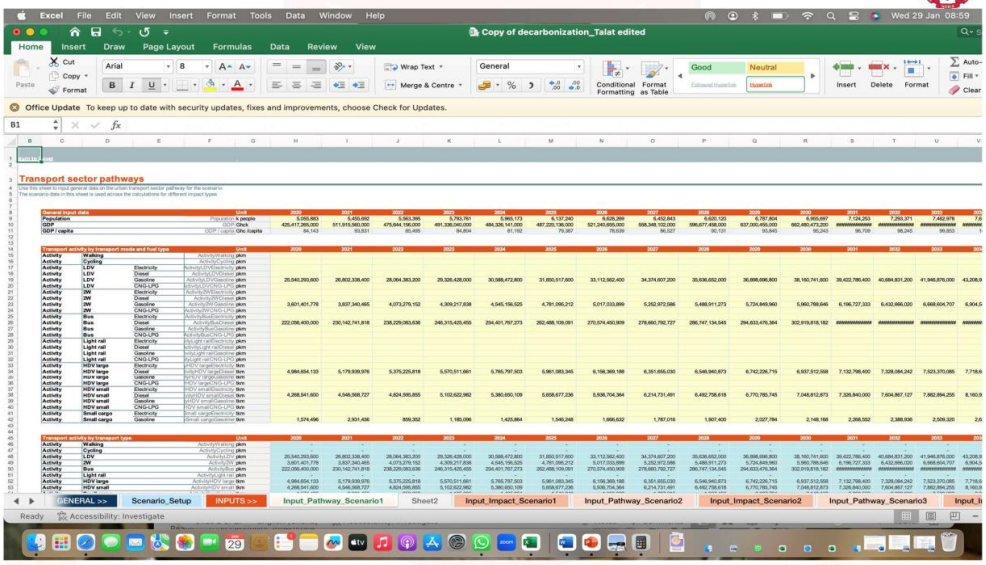
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Transport sector pathways
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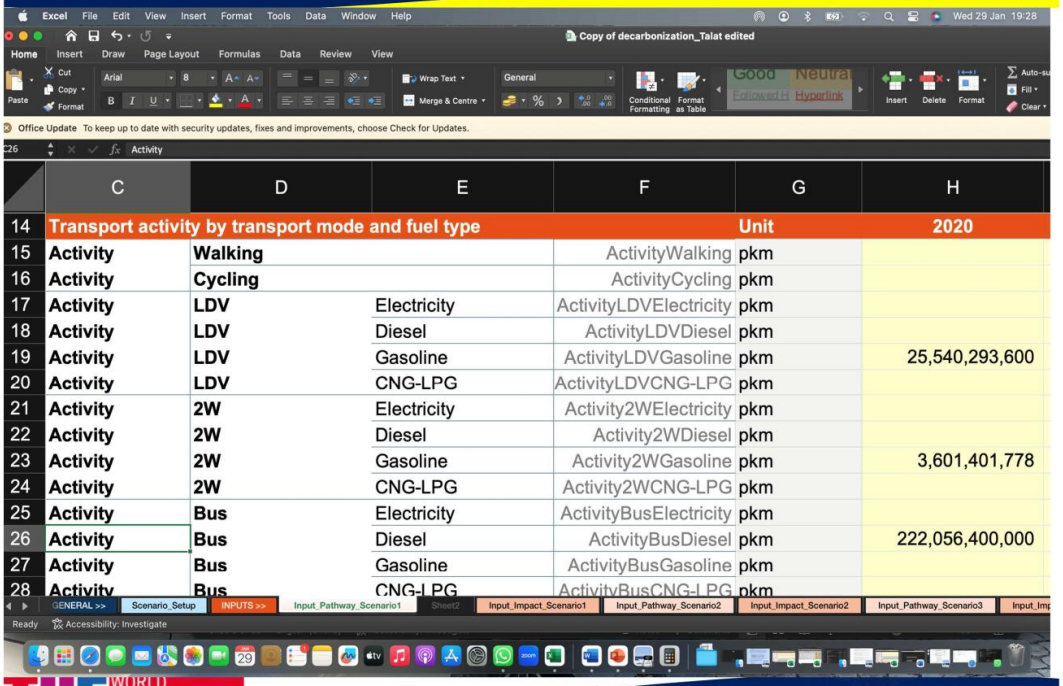
Input_Pathway_Scenario2
Input_Impact_Scenario2
Input_Pathway_Scenario3

General input data

	Unit	2020	2025	2030	2035	2040
Population	k people	31.585	34.672	37.985	41.298	44.611
GDP	Ghck	358535380	576120446,5	774753136,9	973385827,3	1172018518
GDP / capita	Ghc /capita	11.351	16.616	20.396	23.570	26.272



	C	D	E	F	G	H
14	Transport activity by transport mode and fuel type				Unit	2020
15	Activity	Walking		ActivityWalking	pkm	
16	Activity	Cycling		ActivityCycling	pkm	
17	Activity	LDV	Electricity	ActivityLDVElectricity	pkm	
18	Activity	LDV	Diesel	ActivityLDVDiesel	pkm	
19	Activity	LDV	Gasoline	ActivityLDVGasoline	pkm	25,540,293,600
20	Activity	LDV	CNG-LPG	ActivityLDVCNG-LPG	pkm	
21	Activity	2W	Electricity	Activity2WElectricity	pkm	
22	Activity	2W	Diesel	Activity2WDiesel	pkm	
23	Activity	2W	Gasoline	Activity2WGasoline	pkm	3,601,401,778
24	Activity	2W	CNG-LPG	Activity2WCNG-LPG	pkm	
25	Activity	Bus	Electricity	ActivityBusElectricity	pkm	
26	Activity	Bus	Diesel	ActivityBusDiesel	pkm	222,056,400,000
27	Activity	Bus	Gasoline	ActivityBusGasoline	pkm	
28	Activity	Bus	CNG-LPG	ActivityBusCNG-LPG	pkm	

Transport activity by mode type

Transport activity by	Unit	2020	2025	2030	2035	2040
LDV	pkm	25.540.293.600	31.850.517.600	38.160.741.600	44.470.965.600	50.781.189.600
2W	pkm	3.601.401.778	4.781.095.212	5.960.788.646	7.140.482.081	8.320.175.515
Bus	pkm	222.056.400.000	262.488.109.091	302.919.818.182	343.351.527.273	383.783.236.364
HDV large	tkm	4.984.654.133	5.961.083.345	6.937.512.558	7.913.941.770	8.890.370.982
HDV small	tkm	4.268.541.600	5.658.677.236	7.048.812.873	8.438.948.509	9.831.225.861
Small cargo	tkm	1.574.496	1.546.248	2.148.168	2.750.088	3.352.008

This data is derived from leap model for Ghana. The values were available to 2019. Trendline projection method was used

Vehicle occupancy

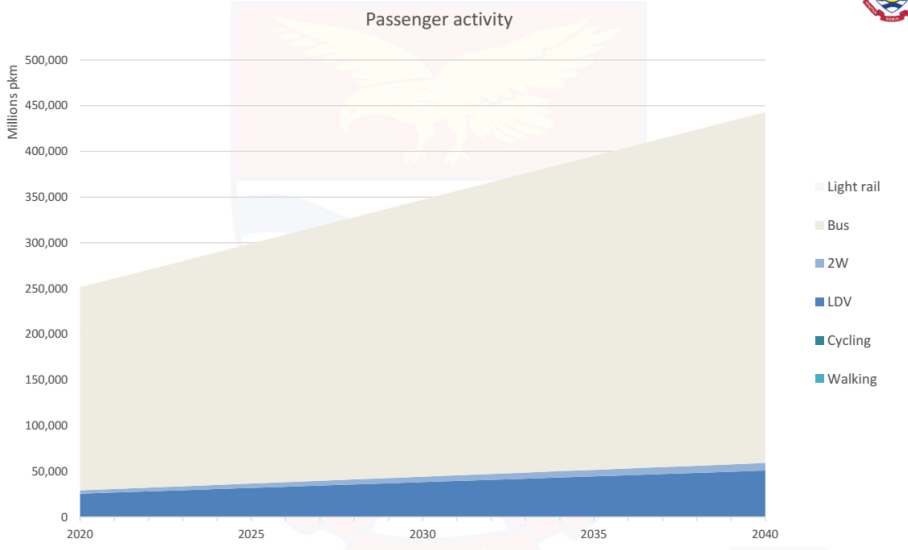
Vehicle occupancy		Unit	2020
Occupancy	LDV	person/vehicle	1,8
Occupancy	2W	person/vehicle	1,0
Occupancy	Bus	person/vehicle	50,0
Occupancy	Light rail	person/vehicle	-
Occupancy	HDV large	person/vehicle	1,0
Occupancy	HDV small	person/vehicle	1,0
Occupancy	Small cargo	person/vehicle	1,0

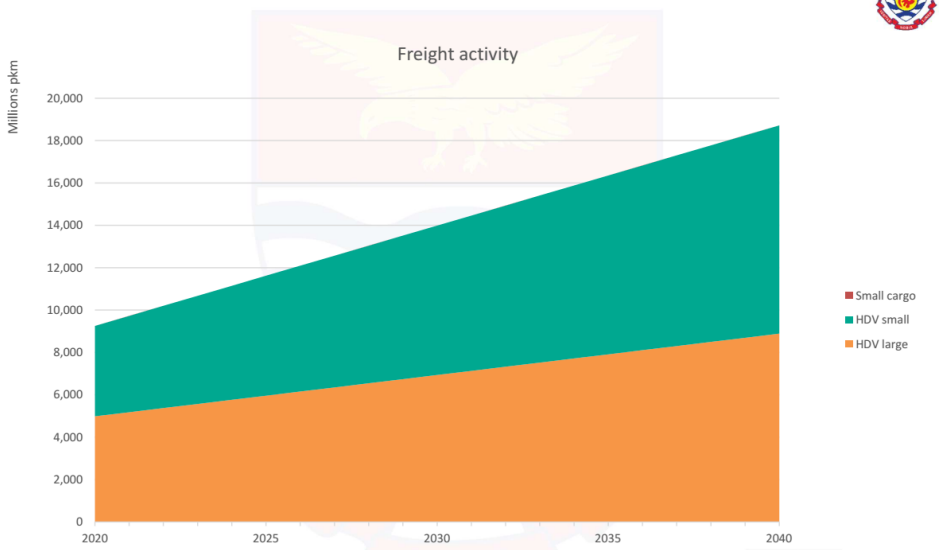
These values were derived after consulting EPA and from the data that used the Ghana Leap Model

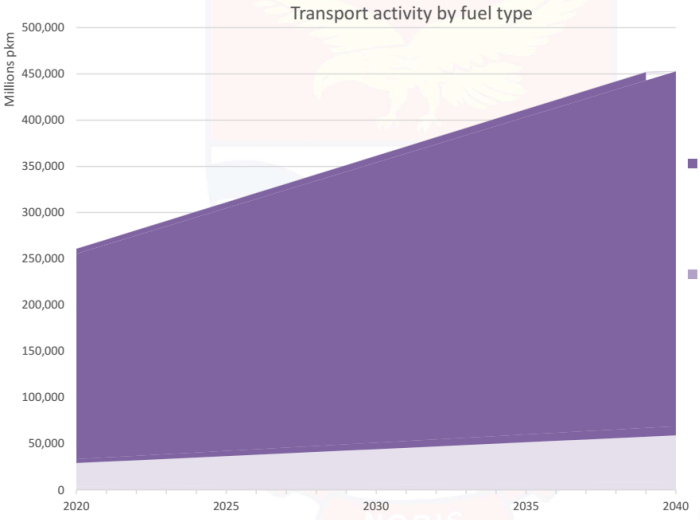
Average annual distance travelled

Average annual distance travelled		Unit	2020	2025	2030	2035	2040
Distance	LDV	vkm	51.000	51.000	51.000	51.000	51.000
Distance	2W	vkm	4.838	4.828	4.828	4.828	4.828
Distance	Bus	vkm	10.950	10.950	10.950	10.950	10.950
Distance	Light rail	vkm	-	-	-	-	-
Distance	HDV large	vkm	73.000	73.000	73.000	73.000	73.000
Distance	HDV small	vkm	36.500	36.500	36.500	36.500	36.500
Distance	Small cargo	vkm	2.372	2.372	2.372	2.372	2.372

Derived from the Ghana Leap model




Freight activity
Millions pkm
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2020
2025
2030
2035
2040
Small cargo
HDV small
HDV large


Transport activity by fuel type
Millions pkm
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2020
2025
2030
2035
2040
Diesel
Gasoline
CNG-LPG
Electricity

BAU Scenario: Impacts without mitigation

Road congestion

There are two parameters associated with congestion-time lost to congestion per hour and the cost of the congestion in Ghc

Annual delay by vehicle type (h)

Annual time lost in congestion (billion hours)

Type of impact: Road Traffic accident

Average annual cost of traffic accidents (thoundands Ghc) from 2020-2040

1. Property damaged cost
2. Medical costs
3. Non-fatal costs
4. Fatalities

Average annual cost of road traffic accidents (thousands Ghc)

Road Traffic accident costs (thousand Ghc) for the twenty year period (2020-2040)

Impact type: fuel savings

Annual fuel consumption for each of the years of the study and its cost

Annual fuel consumption (thousands of litres of diesel)

Benefits with mitigation measures (MIT scenario: modal shift to buses)

- This is similar to the BAU scenario but its predictive or curative

Annual delay by vehicle type(h)

Total cost of delay by year and vehicle type

Traffic accidents

	Unit	2020 - 2040
Fatalities	Ghck	244.565
Nonfatal injuries	Ghck	67.634
Property damage cost	Ghck	10.150
Medical costs	Ghck	6.282
Total	Ghck	328.630

Cost of road accidents by type of impact

Fuel savings

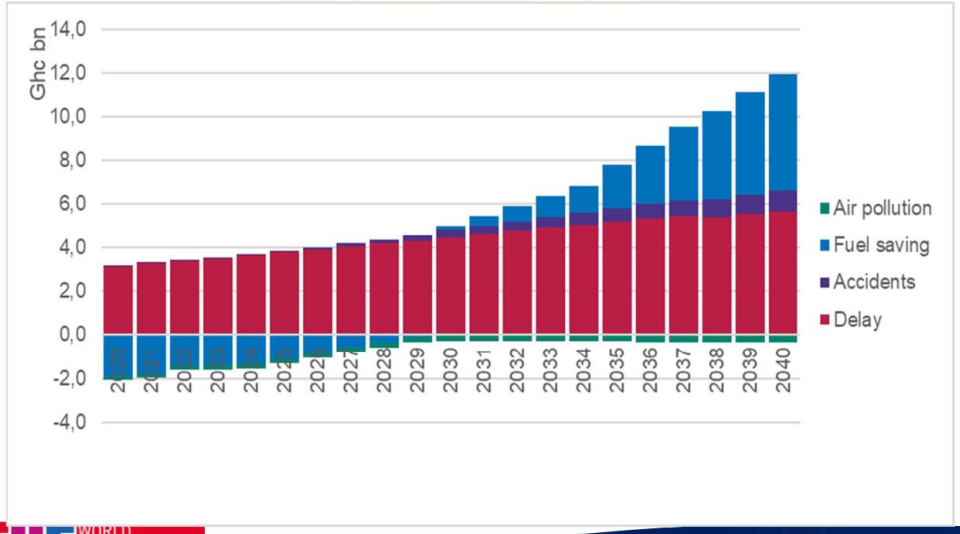
- The predominance of mass transportaion is observed.
- The introduction of Evs as a major mode of transportation

- The introduction and use of electricity, a fundamental characteristics of this scenario will surely show replacing the rest of the fuels towards the end of the study period

Air pollution

- We will be able to estimate the number premature deaths and years of life lost

Total annual avoided costs by type of impact



Lessons learned and recommendations

- Access to relevant data-electric vehicles in Ghana
- Recalibration of the types of vehicles for the TRACE-tool
- Inability to organize a workshop on TRACE-Tool.
- The use of AIRPOLIM-T results to feed the TRACE-tool to estimate the health impacts type (Chronic Obstructive Pulmonary Disease (COPD), lung cancer (LC), ischemic heart disease (ISD) and Stroke, from urban transport ambient air pollution was challenging
- Modelling of impacts before and post mitigating measures
- Retooling and equiping data champions as elucidated in ICAT 1

THANK YOU