

Extensive Modelling Training Workshop

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Extensive Modelling Training Workshop

Initiative for Climate Action Transparency – ICAT

Deliverable #1

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Introduction and overview

Extensive modelling training workshop was held on January 26-29, 2026 at Agency of Hydrometeorology, Dushanbe, Tajikistan.

This workshop is an integral component of the project "Development and Enhancement of Modelling and Impact Assessment Capacity in Tajikistan to inform the NDC preparation process". It aims to strengthen national capacities in the preparation of GHG projections, focusing on trend analysis, demand drivers' selection, and model structure development.

This four-day workshop was designed to provide participants with an understanding and hands-on training on the various components and processes involved in preparation of GHG projections. It addressed methodology and tool development for all sectors considered (energy industries, manufacturing industries, product uses, transport, buildings, agriculture, waste and LULUCF).

The primary objectives of the workshop were:

- To enhance participants' understanding of modelling methodologies in various sectors for preparing GHG projections.
- For each sub-sector, select main demand drivers and develop other crucial assumption for WEM scenario.
- Discuss the level of data collected up to date and make decision about any data gaps.
- For each sector to develop the model structures and populate with data.
- Start developing the model structures for each sector and populate with data.

Training was conducted by Anna Sikharulidze, Tajikistan country lead, GHGMI. The workshop was attended by 5 representatives of local modelling team. The representatives of Agency of statistics joined on Day 3 to discuss the data and trends in statistical data use for the projections.

Brief summary of workshop content

A four-day technical workshop was conducted to strengthen national capacity for the development of greenhouse gas (GHG) emissions projections across key sectors. The workshop combined technical presentations, practical modeling exercises, and in-depth sectoral discussions to advance the country's projections work.

On Day 1, the workshop commenced with a technical presentation delivered by Anna Sikharulidze (GHGMI) on requirements for developing GHG projections, including scenario design, methodological expectations, and reporting considerations. Progress achieved under the ongoing project was reviewed and discussed with participants.

Subsequently, participants were re-introduced to the Global Abatement Cost Model (GACMO) tool, including its structure and practical applications. A hands-on session enabled participants to work directly with the GACMO tool and populate it with data. Participants entered Tajikistan's data into the following tabs: Assumptions, Energy Balance, GHG Balance, Growth. Then the BAU projected Energy balance and results sheets were used to review the results. Two ways of projecting GHG emissions were shown on the example of waste sector:

1. Using historical trends
2. Using socio-economic drivers, such as population growth and GDP growth.

Figure 1 below shows the tab of GACMO tool populated by the Participants for Tajikistan for GHG emissions in 2022 and Figure 2 shows the growth rates entered for waste sector based on historical growth .

Emissions by sectors and gases				
Unit : ktCO ₂ -equivalent	CO ₂	CH ₄	N ₂ O	Total GHG emissions
1. Energy	7 482	701	55	8 239
1.A. Fuel combustion	7 481	455.32	55.30	7 992
1.B. Fugitive emissions from fuels	1.22	245.95		247
2. Industrial processes and product use	2 329	0	0	2 329
2.A. Mineral industry	2 210.45			2 210
2.B. Chemical industry	NO			0
2.C. Metal industry	109.12			109
2.F. Product uses as ODS substitutes				0
Other (2.D, 2.E, 2.G, 2.H)	9.55			10
3. Agriculture	0	4 814	2 203	7 017
3.A. Enteric fermentation		4 652.70		4 653
3.B. Manure management		102.74	579.56	682
3.D. Agricultural soils			1 623.35	1 623
Other (3.C, 3.E-3.J)		58.73		59
4. Land use, land-use change and forestry	-868	0	144	-724
4.A. Forest land	-1 678.38	0.00	0.00	-1 678
4.B. Cropland	122.93		12.69	136
4.C. Grassland	-1 046.20		0.00	-1 046
4.G. Harvested wood products				0
Other (4.D, 4.E, 4.F, 4.H)	1 733.60		131.26	1 865
5. Waste	151	1 853	190	2 193
5.A. Solid waste disposal		582.13		582
5.B. Biological treatment of solid waste		16.14	9.17	25
5.D. Waste water treatment and discharge		1 071.17	140.53	1 212
Other (5.C, 5.E)	150.51	183.08	39.99	374
Total (including LULUCF)	9 094	7 368	2 592	19 054
Total (excluding LULUCF)	9 962	7 368	2 448	19 778

Figure 1. Screenshot from GACMO “GHG Balance” sheet where data is entered for Tajikistan’s 2022 GHG inventory

Growth from the start year - Tajikistan												
Growth and multiplication factors	Annual % increase in the period						% increase from start year values					
	2022 to 2025	2025 to 2030	2030 to 2035	2035 to 2040	2040 to 2045	2045 to 2050	2025	2030	2035	2040	2045	2050
Population growth	2.30%	2.20%	2.00%	2.00%	2.00%	2.00%	7%	19%	32%	46%	61%	77%
GDP growth	14.40%	12.60%	12.60%	12.60%	12.60%	12.60%	50%	171%	391%	788%	1507%	2809%
5. Waste												
5.A. Solid waste disposal	2.15%	2.15%	2.15%	2.15%	2.15%	2.15%	7%	19%	32%	47%	63%	81%
5.B. Biological treatment of solid waste	2.49%	2.49%	2.49%	2.49%	2.49%	2.49%	8%	22%	38%	56%	76%	99%
5.D. Waste water treatment and discharge	2.32%	2.32%	2.32%	2.32%	2.32%	2.32%	7%	20%	35%	51%	69%	90%
Other (5.C, 5.E)	2.22%	2.22%	2.22%	2.22%	2.22%	2.22%	7%	19%	33%	49%	66%	85%

Figure 2. Screenshot from GACMO “Growth” sheet where data is entered waste sectors projected growth based on historical growth rates

A presentation and practical exercise on the Low Emissions Analysis Platform (LEAP) model followed, focusing on its functionality and application for emissions projections. The practical exercise included the replication of the projections developed with GACMO model for the waste sector, but with the LEAP model.

Figure 3 shows the example Waste sector projections in LEAP that matches the similar one in GACMO.



Figure 3. Developing projections for waste sector using historical growth rates in LEAP model

Both with GACMO and LEAP, it was demonstrated that the analysis of past trends and drivers of growth is important to project the GHG emissions in the future. Other factors were also discussed, such as socio-economic driver and policy level assumptions. It was also discussed that for more detailed projections, it may be more appropriate to use other tools, such as for example IPCC First Order Decay Model for solid waste, because it allows to project emissions more accurately taking into account other policy related assumptions.

Day 2 began with a recap of the previous day's discussions. Local projections team members presented preliminary results of their analytical work for the energy and industry sectors. Presentations included trends analysis and proposed lists of policies and measures (PaMs) to be incorporated into different scenarios. Sectoral coverage included energy (power industries, transport, commercial, residential and other) and industry (fuel combustion in industries, industrial processes and product use, and F-gases).

In the afternoon, participants reviewed the GACMO tool structure for the energy and industry sectors and identified key data needs for developing projections and assessing mitigation measures. Practical work continued with discussion of the minimum data requirements that are needed to make projections in these sectors and assess impact of mitigation actions included in various scenarios. The specific implication of the Policies and Measures in the energy generation sector were also discussed. The differences in modeling electricity and heat generation GACMO and LEAP were discussed and illustrated by practical exercise.

Day 3 commenced with a recap of Day 2 activities. Participants continued working on identification of demand drivers and development of the assumptions for Policies and Measures included in "With Measures" Scenario. Discussions were held to clarify methodological approaches and agree on next steps for further development of projections in these sectors.

In the afternoon, local team members presented progress on projections for the agriculture, forestry and land use (LULUCF), and waste sectors. The presentations covered historical trends analysis and proposed policies and measures for inclusion in projection scenarios.

Day 4 opened with a recap of Day 3. Participants reviewed the GACMO tool structure for the agriculture and LULUCF sectors and identified additional data requirements to support the assessment of further mitigation measures. They then discussed supporting Excel files for agriculture, LULUCF, and waste sectors, populating them with available data.

The workshop concluded with continued work on identification of demand drivers and development of the assumptions for Policies and Measures included in "With Measures" Scenario, including the preparation of presentations for the next day's stakeholder consultation workshop. The day concluded with the discussions on

agreed next steps and priorities to advance the national GHG emissions projections work.

Annex 1: Workshop Agenda

Day 1 Agenda

Time	Activity
11:00 AM - 11:05 AM	Registration and Welcome
11:05 AM - 12:00 PM	<p>Session 1: GHG projections – requirements and scenarios Anna Sikharulidze, GHGMI The presentation will refresh participants knowledge for requirements on GHG projections development, scenarios to be developed and expectations from the analysis. The project work and progress up to date will be also discussed.</p>
12:00 PM – 1:00 PM	<p>Session 2a: Using GACMO tool Anna Sikharulidze, GHGMI The presentation will show the GACMO tool and discuss its use.</p>
1:00 PM - 2:00 PM	Break
2:00 PM - 3:00 PM	<p>Session 2a continues The Participants will work on existing GACMO tool for Tajikistan to develop projections module.</p>
3:00 PM – 5:00 PM	<p>Session 2b: Using LEAP model Anna Sikharulidze, GHGMI The presentation will show the LEAP model and discuss its use, following by practical exercise.</p>

Day 2 Agenda

Time	Activity
9:00 AM - 9:30 AM	Recap of Day 1
9:30 AM – 1:00 PM	<p>Session 3: GHG emissions projections in Energy and Industry Sectors Presentations: <i>Local projections team members will show the results of the analysis that they have performed so far. The presentations will cover trends analysis and the list of Policies and Measures to be included in individual scenarios.</i> <i>The following sectors will be covered:</i></p> <ul style="list-style-type: none"> • <i>Energy (power industries, transport, commercial, residential and fugitives) - Vohidjon Hamidov</i> • <i>Industry (fuel combustion in industries, Industrial processes and product use, f-gases) - Sattor Saidov.</i> <p><i>The presentations will cover trends analysis and the list of Policies and Measures to be included in individual scenarios.</i></p>
1:00 PM - 2:00 PM	Lunch Break
2:00 PM - 5:00 PM	<p>Session 3: GHG emissions projections in Energy and Industry Sectors The Participants will review model structures for energy and</p>

Time	Activity
	industry sectors, and identify data needs for assessing additional measures. Further, the participants will work on detailed assumptions for projections for energy sector and industrial processes.

Day 3 Agenda

Time	Activity
9:00 AM - 9:30 AM	Recap of Day 2
9:30 AM – 1:00 PM	Session 3: GHG emissions projections in Energy and Industry Sectors The Participants will continue working on model structures and scenario set-up for energy and industrial processes. The next steps for these sectors will be also discussed.
1:00 PM - 2:00 PM	Lunch Break
2:00 PM - 5:00 PM	Session 4: GHG emissions projections in agriculture, LULUCF and waste Sectors Presentations: <i>Local projections team members will show the results of the analysis that they have performed so far. The presentations will cover trends analysis and the list of Policies and Measures to be included in individual scenarios.</i> <i>The following sectors will be covered:</i> <ul style="list-style-type: none"> • <i>Agriculture - Naimjon Shokirov</i> • <i>Forestry and Land use - Naimjon Shokirov</i> • <i>Waste - Stanislav Makhmudov</i>

Day 4 Agenda

Time	Activity
9:00 AM - 9:30 AM	Recap of Day 3
9:30 AM – 1:00 PM	Session 4: GHG emissions projections in agriculture, LULUCF and waste Sectors The Participants will discuss the model structures for agriculture and LULUCF sectors, and identify data needs for assessing additional measures. The Participants will develop assumptions and supporting excel files for agriculture, LULUCF and waste Sectors and populate them with data.
1:00 PM - 2:00 PM	Lunch Break
2:00 PM - 5:00 PM	Session 4: GHG emissions projections in agriculture, LULUCF and waste Sectors The Participants will continue working on model structures and scenario set-up for agriculture, LULUCF and waste Sectors. The next steps for these sectors will be also discussed.

Annex 3. Photos of the workshop

