ENOUGH

EUROPEAN FOOD CHAIN SUPPLY TO REDUCE GHG EMISSIONS BY 2050

INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION

International initiatives to quantify carbon emissions

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Decarbonising the food chain, challenges and opportunities for the food industry

Workshop (August 13, 2025):

How are GHG emissions quantified, and why?

There are various approaches, methods and entities. Depends mainly on the purpose and use of the results.

National Inventories to UNFCCC

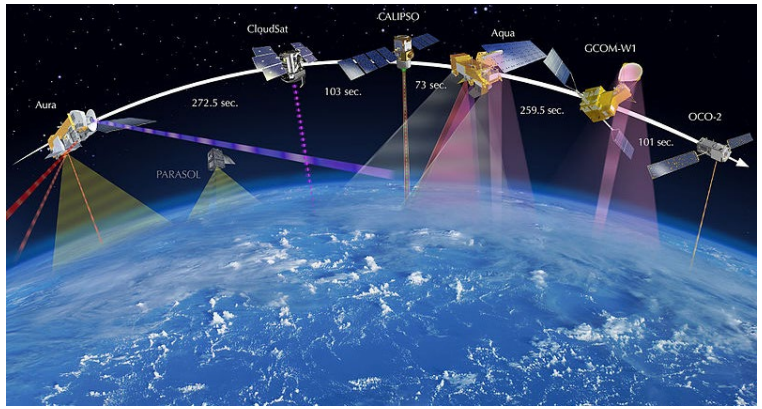
For policy and Paris agreement compliance

Tier 1. Basic
Tier 2. Intermediate
Tier 3. Advanced

- Countries report their emissions through what is known as a ‘bottom up’ approach, where national emissions are estimated by combining data on types of activity with the emissions typically produced by those activities
- For international climate reporting and negotiations (e.g. under the Paris Agreement), the **official values are those submitted by countries** to the **UNFCCC** using the **IPCC Guidelines**.

Other monitoring sources

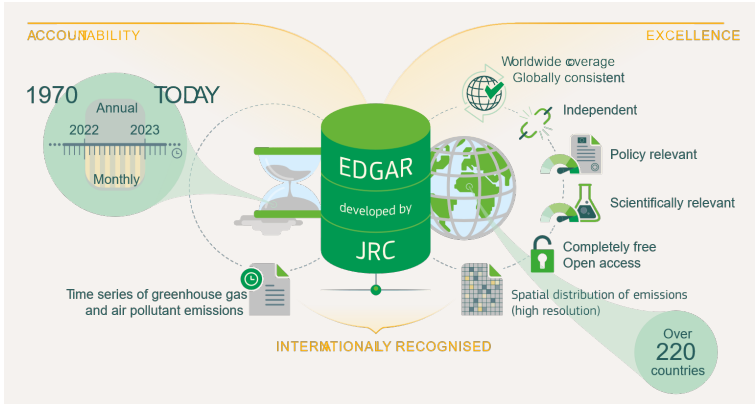
Government lead or independent bodies



Atmospheric Measurements

e.g. NOAA/NASA & ESA to monitor atmospheric concentrations of CO_2, CH_4, and other gases.

Provide open-access data for scientific and policy use.



This image was sourced from https://edgar.jrc.ec.europa.eu/

Independent Scientific Sources (e.g. EDGAR, Carbon Monitor)

Platforms like EDGAR and Carbon Monitor model with multiple data sources to estimate emissions by sector and region.

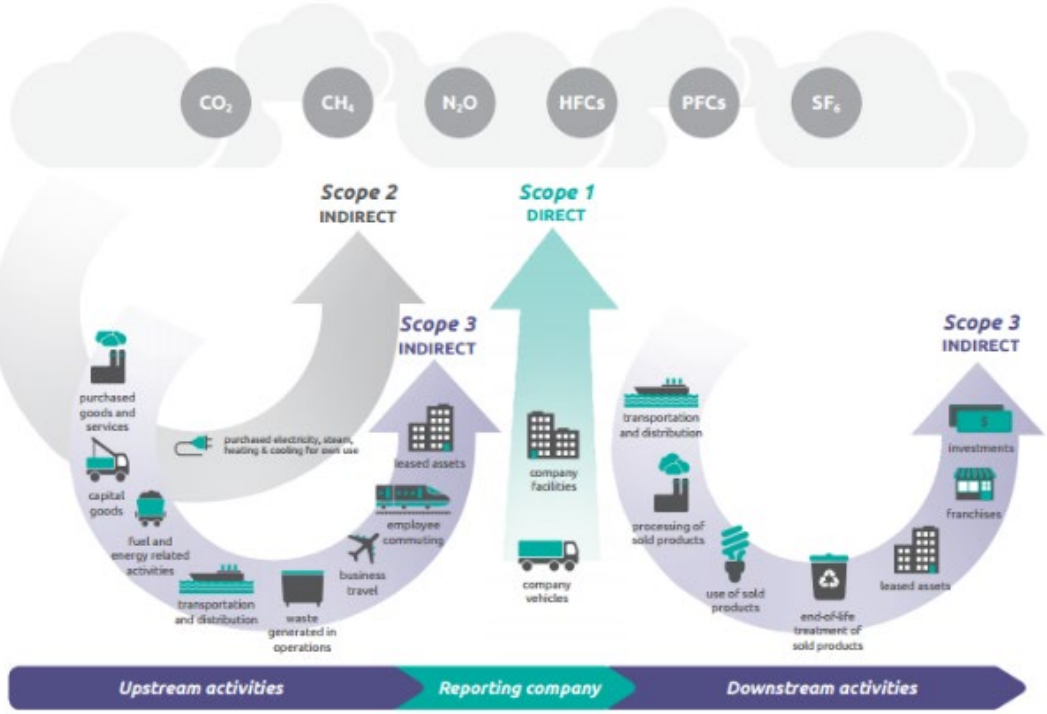
Emissions for Corporate/organisational accounting

Carbon Disclosure Project (CDP)

Non-profit organisation founded in 2000 that runs the world's leading environmental disclosure system

Companies representing two-thirds of global market capitalization – from 130 countries – disclose critical environmental data through CDP

In most cases using the **GHG Protocol** standards to measure and manage emission



GHG emissions - Food

FAOSTAT Food and agriculture emissions

Food and Agriculture Organization of the United Nations

FAOSTAT provides free access to food and agriculture data for over 245 countries and territories and covers all FAO regional groupings from 1961 to the most recent year available.

This database compiles emissions of methane **(CH_4)**, nitrous oxide **(N_2O)**, and carbon dioxide **(CO_2)** related to agricultural production, land-use change, and forestry activities.

FAOSTAT

Food and Agriculture Organization of the United Nations

They use internationally recognised **methodologies*** to calculate emissions (supplemented with estimates when data are missing).

The FAOSTAT database is developed based on:

- **National data reported** by countries on:
  - Agricultural production (crops, livestock, fisheries)
  - Land use and land-use change (cropland, pasture, forest)
  - Fertilizer use
- **IPCC** Tier 1 (default) or Tier 2 (more detailed) emission factors
- Model outputs from **GLEAM** (livestock supply chain) and other **FAO-developed tools**
- Additional inputs from international datasets and **satellite** observations when national data are unavailable.

** https://openknowledge.fao.org/items/bb7c3174-e81a-4353-81a7-d43285b19a5c*

GHG emissions - Refrigeration Sector

Cooling Refrigeration Emissions and Energy Data WG

Aim – To work together to identify and evaluate gaps, existing resources, assumptions to enable countries to evaluate their cooling emissions and energy consumption

Objectives

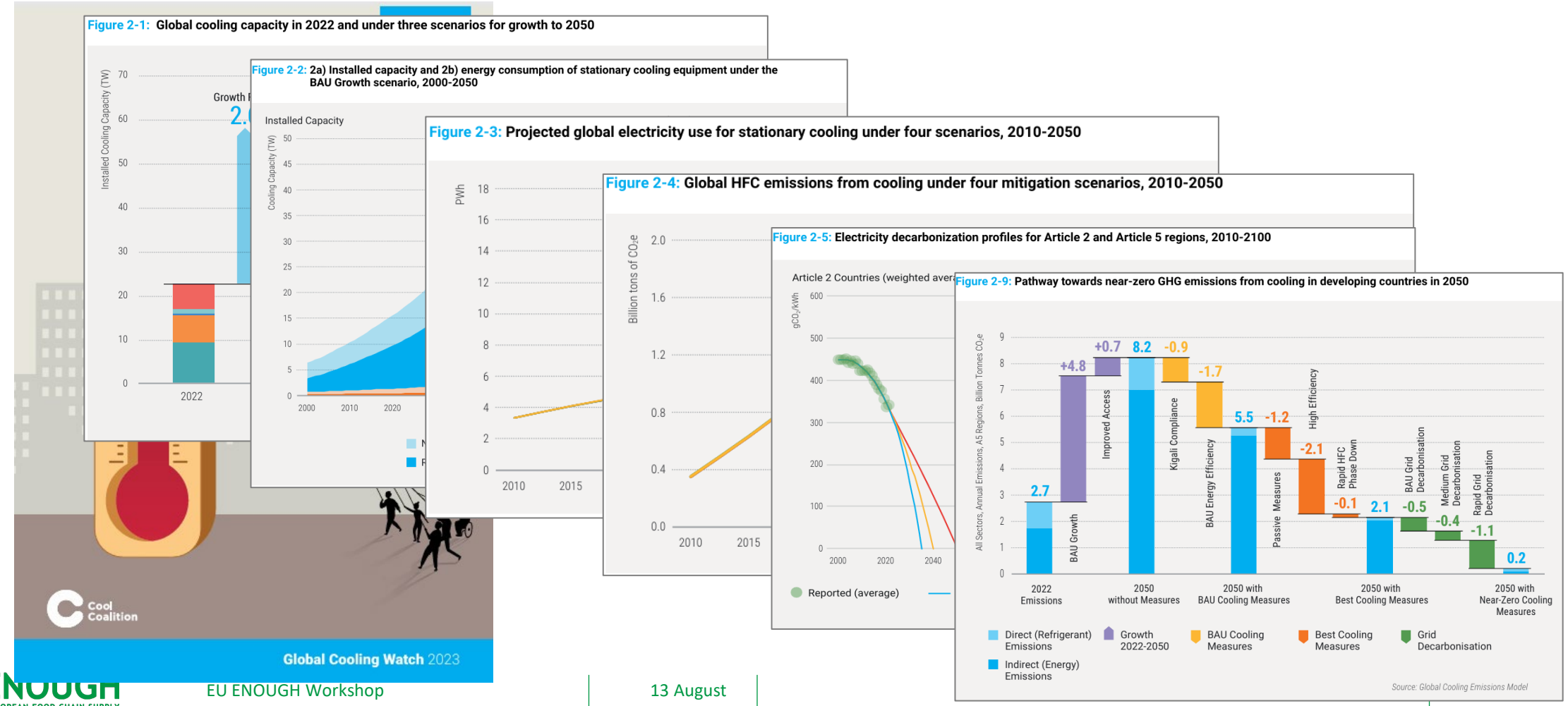
- Bring together those working in this area
- Assimilate methodologies, terminology/nomenclature
- Collate/access/ mapping assumptions/ datasets
- Work on alignment, indicators and metrics for data that can be used to measure progress in near-zero emissions from cooling by 2050

HFC Outlook

- Model to forecast the total GHG emissions from cooling applications (refrigeration, air-conditioning and heat pumps)
- Also covers f-gas emissions from other applications (e.g. foams, aerosols, FPS)
- Direct and indirect emissions, from f-gases and energy respectively
- Forecasts:
  - Refrigerant banks, consumption and emissions
  - Energy consumption and emissions
- Refrigerant emissions expressed in: tonnes, ODP tonnes, tCO2e, and tTFA
- Provides insights into alternative pathways, for example: BAU, “Just Compliant” and “Faster Action”
- National models – used to assess compliance with national regulations and Kigali Amendment
- Global model – used by UNEP to support the Global Cooling Watch and Global Cooling Pledge
- Developed by Gluckman Consulting

Gluckman Consulting
specialists in refrigeration and climate change

HFC Outlook
UN Global Cooling Watch and Pledge

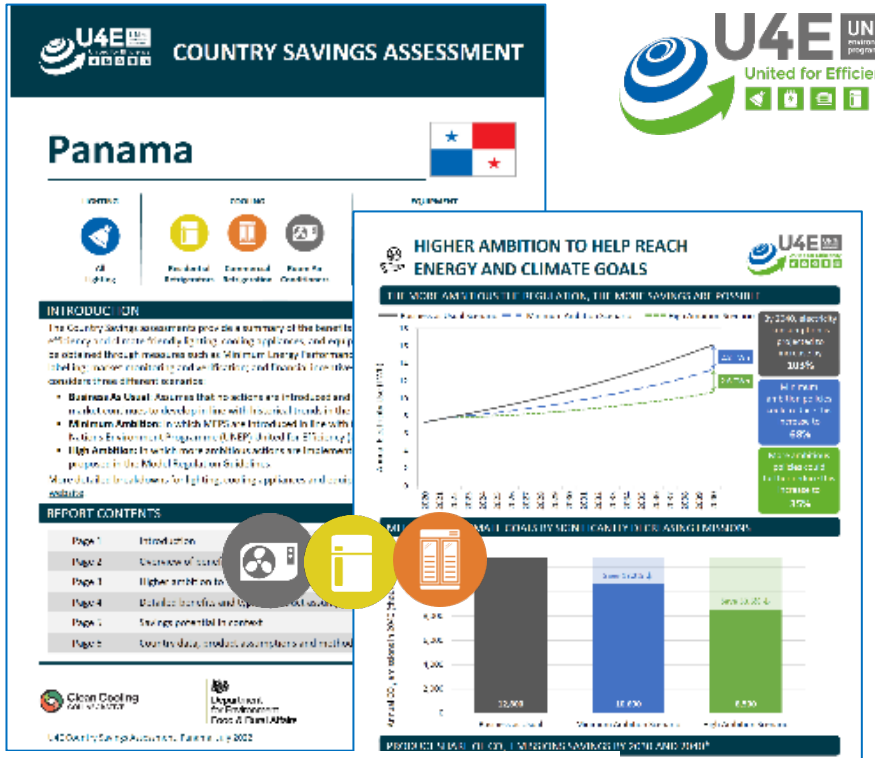


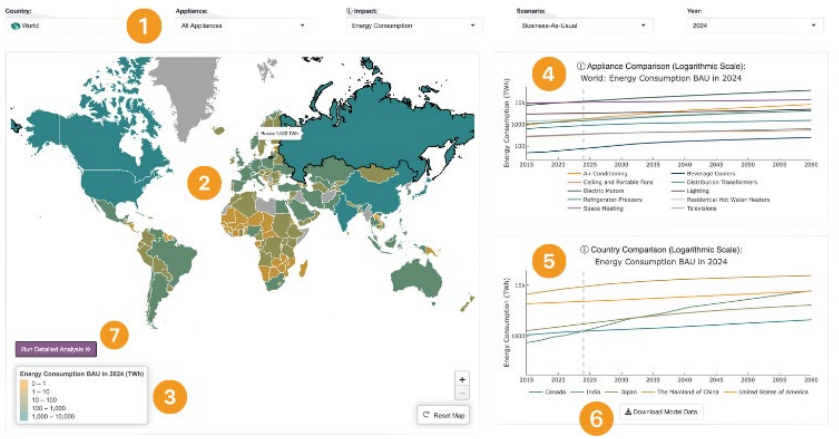
GHG emissions - Refrigeration Sector

Refrigeration/Cooling Appliances

- **U4E Country Savings Assessments**
  Analysis of the potential impact of adopting guidelines for a regulatory model concerning individual air conditioners, residential refrigerators, and commercial refrigeration equipment.

- **MEPSY:** Tool that enables modelling the impacts of energy policies and carbon emission reductions. Designed for researchers and policymakers





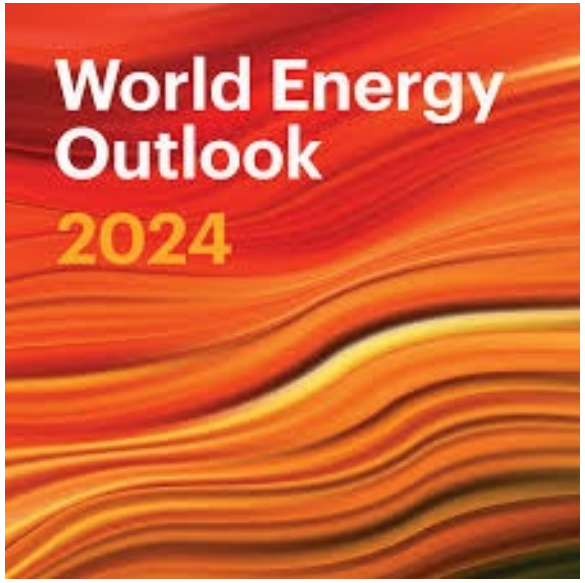
https://united4efficiency.org/countries/country-assessments/

GHG emissions - Energy
IEA's World Energy Outlook (WEO)

The IEA collects, assesses and disseminates energy statistics on supply and demand, compiled into energy balances, managed by the Energy Data Centre

IEA's World Energy Outlook (WEO) provides detailed energy data and projections, including insights into CO2 emissions

Accessible here WEO Free Dataset and WEO Extended Dataset



Join our upcoming conferences!

9th IIR Conference on Sustainability and the Cold Chain
ICCC 2026
ISTANBUL - TÜRKIYE
APRIL 12-14

17th IIR-Gustav Lorentzen Conference on Natural Refrigerants
GL 2026
HAMILTON – NEW ZEALAND
AUGUST 23-26

15th IIR Conference on Phase-Change Materials and Slurries for Refrigeration and Air Conditioning
PCM 2026
XI'AN - CHINA
SEPTEMBER 16-18

27th IIR International Congress of Refrigeration

Seoul, Korea

Start date : August 21, 2027
End date : August 27, 2027

https://www.icr2027.org

Thank you!

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HFC Outlook
National model example