HFC Emission Baseline Tool

Cool Contributions fighting Climate Change II

PROKLIMA
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Introduction

The *HFC Emission Baseline Tool* introduces a practical methodology that leverages existing consumption data to establish robust HFC emission baselines for inclusion in Nationally Determined Contributions (NDCs).

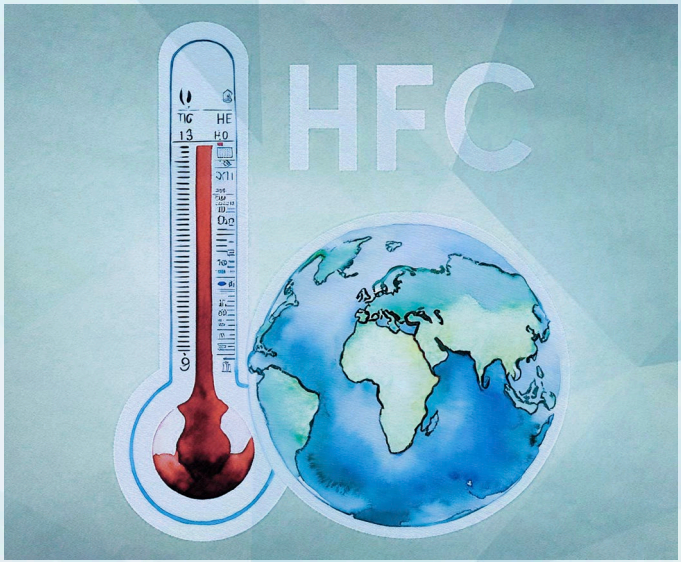
By utilizing readily available information (from Article 7 reporting to the Ozone Secretariat), this tool eliminates barriers to incorporating HFC emissions into national climate reporting frameworks, addressing a significant gap in comprehensive greenhouse gas accounting.

This approach enables countries to quantify and track the cumulative climate benefits of HFC consumption reductions following the phase-down schedule established under the Kigali Amendment to the Montreal Protocol. The tool translates consumption reduction targets into projected emission reductions, providing a clear and measurable pathway to assess progress over time as countries implement their commitments.

As global efforts to reduce carbon dioxide emissions advance, the relative importance of non-CO_2 greenhouse gases like HFCs in national emissions profiles will increase. The main source of HFC emissions are refrigeration and AC applications.

By highlighting cooling as a cross-cutting issue within both mitigation and adaptation strategies, the tool enhances the visibility and completeness of emissions reporting while supporting evidence-based policymaking.

Countries can use these baseline estimates to identify implementation gaps, inform National Cooling Action Plans, and demonstrate the climate impact of their Kigali Amendment compliance efforts within the broader context of their NDCs.



Methodology and Instructions to estimate the emission reduction resulting from the implementation of the Kigali Amendment (KA) and its integration into the NDC.

Aim

This method aims to enable a simple estimate of HFC emission reduction expected to be achieved by the implementation of the KA on HFC consumption reduction. The estimate is based on the overal HFC consumption of the RAC sector - as reported to the Ozone Secretariat and projected based on the KA reduction schedule, given in CO_2eq.
There is no differentiation for specific measures or phase-down of individual refrigerants.

The tool provides an indication on how the emission reduction achieved under the KA can be integrated into the NDC. This spreadsheet is based on the simple Tier 1 method for estimating emissions from refrigeration and air conditioning of substitutes for ozone depleting substances. For details of the method see the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 3, Chapter 7. It uses the GHG emission acounting method for estimating emissions and emission mitigation from the implementation of the Kigali Amendment.

Caution: not suitable for countries with high HFC consumption in other sectors than the RAC sector such as the foam sector. Consider separating the HFC consumption in the RAC sector, when other uses exceed 5% of the overal consumption.

Instructions

Data entry

All cells where the user can enter data are coloured yellow like in *Figure 1* below. Basic data entry is performed on the sheet **> Country Data Input.**

NDC coverage

Step 1 Confirm that HFCs are included in the NDCs scope of GHG. It this is not the case, emission reductions from HFCs cannot be included in the NDC scenarios. **Type of NDC mitigation target.**

Step 2 Select single year or multiple year target and enter timelines. Cells change colour depending on the selection and indicate where input is required. **Kigali Amendment Information.**

Step 3 Enter date of national ratification of the KA - this is necessary to determine the attribution to BAU or MIT scenario

Step 4 Enter KA baseline, separate for its HFC and HCFC part, in t CO_2eq. Select the Country Group. Most A5 Countries belong to Group 1, except Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, and the UAE.

Step 5 The applying mandatory reduction schedule is selected automatically. In case a more ambitous phase-down schedule was committed in the Kigali Implementiaton Plan (KIP), select "yes" and enter the schedule in the yellow line. The yellow line only appears, when "yes" is selected.

Step 6 Enter HFC consumption as reported to the Ozone Secretariat as totals in t CO2eq. Years with no data will be filled in the calculation sheet by simple projections.

Step 7 Enter country specific GDP growth forecasts and RACHP sector specific forecasts, if available.

Step 8 Enter a growth factor applying back to 2010, if available. By default, high growth is assumed, as HFC consumption was usually very low before 2010 and has increased quickly since then to the recently reported levels. 2010 is defined as start year for the calculation, based on the 10 year lifetime default. This means that a full reflection of emissions is achieved by 2021, even if consumption has started before 2010.

Some additional fine-tuning can be done in the sheet "Estimated Emissions". The defaults from the Tier 1 methodology are used. These can be changed if there is evidence for better values.

Fine -tuning steps (Optional)

This applies to the average equipment lifetime and the composite emission factor. In addition, a destruction factor, a recovery factor, and the percentage of recovered gas that is relaimed and put back on market can be determined on a year basis. The reclaimed gas is not part of the reduction schedule and is added to the projected KA consumption. By default, destruction and recovery are set to 0%. The percentage of recovered gas that is relaimed and put back on market is estimated by default at 80%. This only takes effect, if a recovery factor >0% is entered.

Calculations

Calculations are performed on the sheet **> Estimated Emissions** – see ***Figure 2*** on the right.

Results are provided in the box on top of the same sheet Calculations are based on the comparison of the emission scenarios BAU and KA.

The BAU scenario projects the continuous growth of the HFC consumption along the current GDP forecast. The KA scenario is limited by the consumption reduction schedule. The difference is the estimated emission reduction. Based on NDC target definition, the mitigation counts to BAU or the mitigation scenario. This indication is based on the user entry, using several if-clauses.

The three graphs illustrate consumption, emissions and banks, all in CO_2eq.

The projections are shown until 2050 - with increasing uncertainties for higher years.

Access to tool:
HFC Emissions Baseline Tool - Green Cooling Initiative

	A	B	C	D	E
1	**National NDC parameters**				
2					
3	**NDC coverage (Step 1)**				
4	HFCs included	yes/no	yes		
5					
6	**Ensure that HFC emissions are included in the National Inventory Report.**				
7					
8	**Type of NDC mitigation target (Step 2)**				
9					
10		Single year target	yes/no	yes	
11					
12		Baseline year		2015	
13		Target year		2030	
14					
15					
16					
17	**Kigali Amendment information**				
18	**Ratification of Kigali Amendment (Step 3)**		2021		
19					
20	**HFC baseline (Step 4)**	HFC	3.237.799	Mt CO2eq	
21		HCFC	1.200.000	Mt CO2eq	
22		Total	4.437.799	Mt CO2eq	
23					
24					
25	**Country Group (Step 5)**				2024
26	A5 Group 1		yes/no	yes	100%
27	A5 Group 2		yes/no	no	
28					
29	**Insert reduction schedule, if more ambituous than KA (Step 6)**				
30	Country specific reduction schedule			no	
31					
32					
33	**HFC consumption - insert data for available years (Step 7)**				
34			2018	2019	2020
35	Total HFC consumption t CO2eq			3.105.994	3.355.712
36					
37	**Enter GDP and RACHP growth (Step 8)**				
38	GDP forecast annual growth until 2030				3%
39	HFC consumption growth (if different from GDP growth)				4%
40	Final applying growth factor				4%
41					
42	**HFC consumption growth before baseline years (Step 8)**				40%

Figure 1: All cells where the user can enter data are coloured yellow

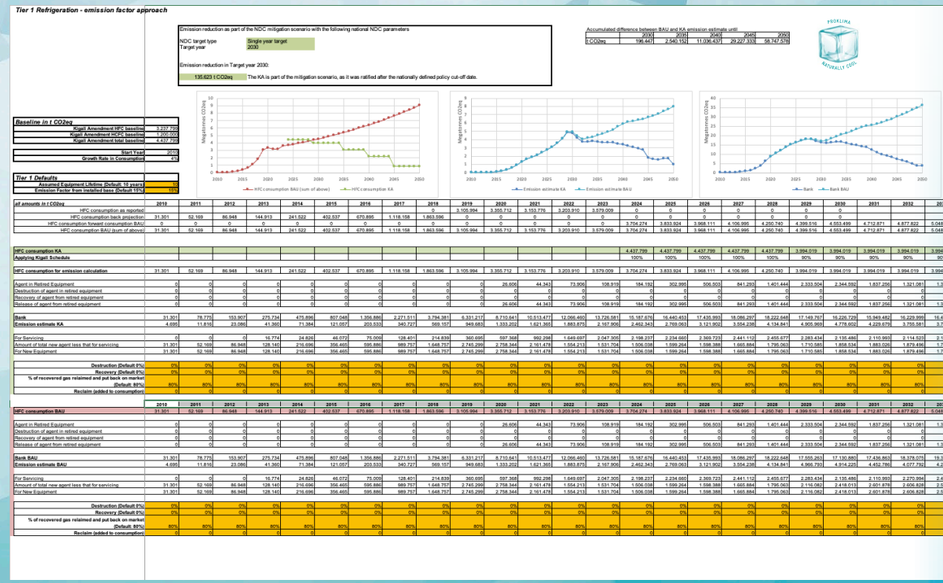


Figure 2: Calculations are performed on the sheet "Estimated Emissions". Results are provided in the box on top of ther sheet. Calculations are based on the comparison of the emission scenarios BAU and KA.

Cool Contributions fighting Climate Change II (C4 II)

Cool Contributions fighting Climate Change II (C4 II) is a global project implemented by the *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH* to foster sustainable development of the *Refrigeration and Air Conditioning (RAC)* by working towards more policy coherence between the Paris Agreement and the Montreal Protocol. The focus countries are Costa Rica, Grenada, and the Philippines.

C4 II is funded by the *German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV)* under the *International Climate Initiative (IKI)*. The overall objective of C4 II is to support partner countries in implementing more ambitious *Nationally Determined Contributions (NDCs)* measures in the RAC sector and additional countries in preparing GHG mitigation strategies for the RAC sector

The project adapts existing methodologies and develops new tools for replication in other countries, promoting the transformation towards sustainable cooling. C4 II is part of the *GIZ Proklima programme*, which provides technical support to developing countries to implement the provisions of the *Montreal Protocol* and the *Kigali Amendment* on substances that deplete the ozone layer and affect the global climate.

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