**INVITATION TO SUBMIT A TENDER**

Oslo, 8. September 2022

***SENT ELECTRONICALLY ONLY***

**End of life treatment of Hydrofluoroolefins (HFOs)**

This document is an invitation to submit a tender to carry out a Nordic survey on current regulations and practices for end-of-life treatment of Hydrofluoroolefins, HFOs, which are synthetic substitutes to HFC refrigerants with high global warming potentials, and to propose options for the safe recovery, collection and treatment of HFOs in the Nordic countries. A contracting partner will be chosen according to the criteria outlined in this document. Tenders will be evaluated against the relevant criteria described in this document.

**1 Background**

Hydrofluorocarbons (HFCs) are a group of man-made synthetic gases with high Global Warming Potential (GWP) and are primarily being used in refrigeration equipment, air conditioning and heat pumps. The production and use of HFCs are now being phased down globally, and Europe is at the forefront of this phase-down.

The alternatives to HFCs are either "natural refrigerants" (e.g. CO2, ammonia and hydrocarbons) or the 4th generation of man-made synthetic gases called HFOs. HFOs have much lower GWP than the HFCs, but some of them have other characteristics which make them hazardous to the environment.

The most commonly used HFO, HFO-1234yf, is widely used as a refrigerant in air-conditioning systems in vehicles. For example, HFO-1234yf produces a 100 % molar yield of trifluoroacetic acid (TFA) after atmospheric degradation. Gaseous TFA is rapidly partitioned into water droplets in the atmosphere and deposited on land and surface waters via wet precipitation (rain, snow, and fog). Due to TFA being a strong acid, it readily forms trifluoroacetate salts (CF3COO-) with minerals in soil and surface waters. TFA is a substance of concern due to its persistence in the environment.

Other transformation products from HFO degradation are HF, HCl, formic acid and CO2. There may also be toxicological issues with halogenated ethylene impurities in HFOs which may have carcinogenic or other toxic properties.

As the import and use of HFCs is decreasing, the import of HFOs in Europe are increasing rapidly. Imports of HFCs to EU Member states fell by about 30 % since 2017, while imports of unsaturated HFCs/HCFCs increased by 40 %. Unsaturated HFCs (which are mainly HFOs) have risen to a share of 23 % of total supply of F-gases in Europe.

HFCs are classified as hazardous waste under the EU waste regulations, and there are requirements in the F-gas regulations for safe recovery of HFCs. Thus, most European countries have a well-established system for end-of-life treatment of these gases to avoid them being emitted into the atmosphere, since the obligation to ensure no emissions by end-of-life treatment is regulated in the relevant EU-regulations. This is not the case for HFOs. HFOs also have different characteristics than HFCs, which makes them more challenging to collect and treat, since some of them are for example flammable.

**2 Objective of the project**

The objective of the project is to avoid emissions of HFOs into the atmosphere, of which we do not know all future environmental effects of, and to contribute to more cost-effective measures for the safe recovery, collection and treatment in the Nordic countries.

The project will support the objectives of the Programme for Nordic Co-operation on the Environment and Climate 2019-2024 under circular economy, climate change and air quality as well as chemicals – environment and health.

**3 Purpose of the project**

This project will map existing systems to secure safe recovery, collection, and treatment of HFOs that are no longer used in equipment. Furthermore, it will explore and propose measures and options for effective systems for collecting and treating the gases in the Nordic countries, when they are no longer needed.

**4 Project organization and Steering group**

The project is supported by the Nordic working group for Chemicals, Environment and Health (NKE[[1]](#footnote-2)).

The project leader is Torgrim Asphjell, Norwegian Environment Agency, Norway.

The steering group consists of the members of the Nordic Ozone and F-gas Group (NOFG), a NKE project group:

Nufar Finel, Finnish Environment Institute SYKE (leader of NOFG)

Alice Gaustad, Norwegian Environment Agency

Maria Ujfalusi, Swedish Environmental Protection Agency

Ísak Sigurjón Bragason, the Environment Agency of Iceland

Maria Gunnleivsdóttir Hansen, Environment Agency, the Faroe Islands

Helle Simon Elbro, Danish Environmental Protection Agency

**5 Invitation to tender**

We invite you to submit a tender for the following tasks as described in more detail under the heading *Project description* and *Deliverables* below:

* Mapping existing systems to secure safe recovery, collection, and treatment of HFOs in different countries
* Proposals for measures to safely recover, collect and treat HFOs in the Nordic countries
* Final report (containing parts 1 and 2) published and distributed

**6 Project description**

**6.1 Target group**

The target group of the project is comprised of:

* Authorities in Nordic countries and other counties (e.g. the EU)
* Companies using HFOs, undertakings delivering and installing, servicing or decommissioning equipment with HFOs and companies carrying out waste treatment
* Montreal Protocol parties and advisory bodies

**6.2 Survey**

The selected consultant will carry out a survey on existing EU and national regulations, systems and practices to recover, collect and treat used or surplus HFOs in different countries, including in Finland, Sweden, Denmark, Faroe Islands, Iceland, Norway and one or two relevant European countries outside the Nordic Region. The survey will be based on literature, webpages and interviews / correspondence with experts and authorities in the countries. The Steering group will support the consultant with gathering relevant literature and possible contacts.

Based on information gathered and information on waste treatment regulations and practices in Nordic countries, prepare an overview of existing regulations, systems, and practices.

**6.3 Options for recovery, collection, and treatment**

Based on the survey in 6.2, assess existing situations and propose options for measures for effective systems for the recovery, collection, and treatment of HFOs when they are no longer in use in equipment. These should include options based on local or national circumstances, but also explore whether there could be effective systems at Nordic level or across particular group(s) of Nordic countries.

**7 Deliverables**

The consultant should prepare the following deliverables during the course of the project:

* Approved project plan
* Part 1 of report – mapping existing systems for recovery, collection, and treatment of HFOs in the different countries and an assessment
* Part 2 of report – options for improved systems to safely collect and treat HFOs in the Nordic countries, and recommendations for further actions
* A Power Point presentation of maximum 20 slides summarizing the project including its findings

**7.1 Report**

The report, including part 1 and 2 shall be written in English with a summary in one of the Nordic languages.

It is expected that the report will be disseminated to the environmental authorities in the Nordic countries and in other European countries.

**The content**

At least the following headings/subheadings and representative text should be included in the reports:

* Foreword
* Background (F-gases and Global warming, Montreal Protocol Kigali amendment, EU-legislation and national Nordic legislations and policies related to F-gases and waste or surplus, HFOs and their properties)
* Overview of use of HFOs in different sectors and appliances in Nordic countries. Subdivision large cooling or freezing installations, large heat pumps, supermarkets, vehicle’s AC, vehicle’s refrigeration, home appliances, domestic heat pumps (for heating or air conditioning), blowing agent in foam or other relevant categorization should be used. Additionally, it should be specified whether the HFOs used are "pure" (one substance only), or whether they appear in mixtures, for instance with HFCs.
* Assessment of recovery of HFOs in Nordic countries by gas retailers, gas collection companies, EE-waste handling companies, vehicle scrapping companies, other waste collection companies, vehicle repair shops and other relevant entities.
* Assessment of recovery, recycling, regeneration, destruction, or other end-of-life treatment of HFOs.
* Description of interlinkages between current systems for recovery and end-of -life handling of Ozone Depleting Substances and HFCs and current and possible future handling of HFOs.
* Options for – and recommendations for measures and practical arrangement to safely collect and treat HFOs in the Nordic countries
* Summary
* References
* Annexes

The Steering group will comment on the draft reports and give further advice during the process at specific checkpoints.

**Requirements for publication**

The report will be published under TemaNord and should therefore be written using the latest Nordic Council of Ministers report template to facilitate publishing. The template, along with information on install and use, can be found on the web at:

[Nordisk Ministerråd - TemaNord Author's Guide (norden.org)](https://pub.norden.org/temanord-authors-guide/#22647)

**8 Timeframe**

The timeframe for the project is as follows (dates are indicative):

08.09.22: Invitation for the submission of tenders is published on norden.org and sent to consultants

07.10.22: Deadline for consultants to submit tender.

21.10.22: The contracting partner is chosen.

28.10.22: Approved project plan

Mid-November 2022: Checkpoint on progress of work. Teams-meeting consultant and NOFG.

Mid-January 2023: Checkpoint on progress of work. Teams-meeting consultant and NOFG.

06.03.23: Consultant to send draft report (mainly Part 1) to NOFG.

Mid-March 2023: NOFG Teams-meeting to discuss the first draft report (mainly Part 1).

15.03.23: The consultant has received comments on the draft report.

Mid-April 2023: Checkpoint on progress of work. Teams-meeting consultant and NOFG.

10.05.23: Consultant to send draft final report to NOFG.

Mid-May 2023: NOFG Teams-meeting to discuss the draft final report.

24.05.23: The consultant has received all comments from NOFG.

09.06.23: Consultant to send final proofread report to NOFG.

June 2022 – July 2022: Publication process and dissemination of report.

**9 Budget**

The focus is on the professional quality of the project and the steering group retains the power to accept or deny any tenders based on such merits. Tenders should be written with regard to the fact that the total available budget for the contracted work is limited to 450 000 DKK, including publication. Publication is estimated to approximately 25 000 DKK.

The draft contract is attached as an Annex.

**10 Submission of a tender**

The deadline for submitting a tender is 7. October 2022 and the offer must be valid for 60 days after the stated submission deadline. The tender should be written in English and submitted electronically to torgrim.asphjell@miljodir.no with cc to nufar.finel@syke.fi.

To be considered valid for selection the tender **shall** include the following:

* Name and address of the responsible consultancy as well as sub-contractors if applicable.
* The name and CV of the person responsible for the project at the consultancy.
* A list of key persons to be involved in the project work and their CVs.
* Information on a single person at the consultancy to handle contact with the steering group.
* A description of the consultancy’s relevant expertise/experience:
	+ Regarding handling and policy on EE-waste and waste refrigerants from scrapping of vehicles and from other products and installations.
	+ Regarding safe recovery and end-of-life treatment of refrigerants.
	+ Regarding Refrigeration, Air-Conditioning and Heat Pump sectors (RACHP) in general and, in particular, the latest generations of refrigerants.
	+ Regarding similar types of assignments.
	+ Environmental regulations in the Nordic countries.
* A project plan describing, inter alia, the schedule of tasks to be carried out.

A tender which does not contain all the required information listed above will not be considered further.

**11 Consultancy qualifications and criteria for the selection of a consultancy**

A contracting partner may be chosen by the steering group from among those who have, by the set deadline, submitted a valid tender as described above. The steering group will evaluate the submitted information and, provided that acceptable offers are available, select as contracting partner the one who is found most favourable based on the criteria outlined below.

Please note that if interested consultancies do not have the capacity to handle the proposed project on their own the steering group would like to encourage the formation of a consortium. In that situation, one of the involved consultancies must be responsible for the project and the contract.

The main criteria for selecting a consultancy are the following:

* The project plan.
* Expertise on regulations, policy, and practical handling of refrigerants in EE-waste, vehicles and other equipment as regards recovery, collection and end-of-life treatment is required.
* Expertise in Refrigeration, Air-Conditioning, and Heat Pump sectors (RACHP), especially in HFOs in general and latest generations of refrigerants, in particular.
* Experience in similar types of assignments (both the company/companies and experts).

We expect that the final choice of the contracting partner will be made by 21. October 2022.

On behalf of the steering group,

Sincerely

Torgrim Asphjell

1. Nordisk arbeidsgruppe for kemikalier, miljö och hälsa [↑](#footnote-ref-2)