

Project idea · follow-up on HPT Project 64

Safe Use of Refrigerants in Heat Pumping Technologies

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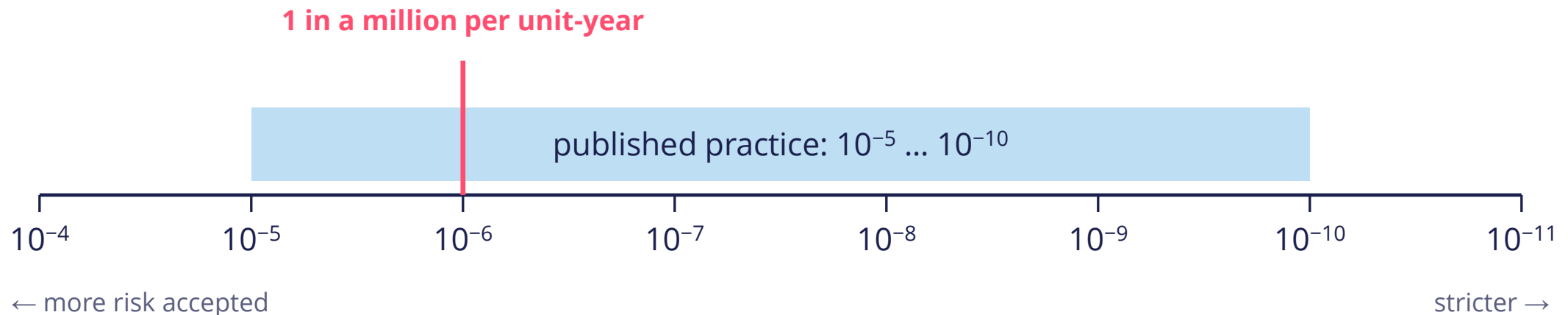
Why a successor to Project 64?

Project 64 (2023–2026) delivered technical safety measures. Three questions remain open:

- **Acceptable residual risk** – for the whole life-cycle or per phase?
- **Duty of care** – manufacturer, installer, service, operator or end-of-life contractor?
- **System size** – household unit (indoor/outdoor), apartment block (roof/terrace/garden) or machinery room?

One risk figure – different verdicts

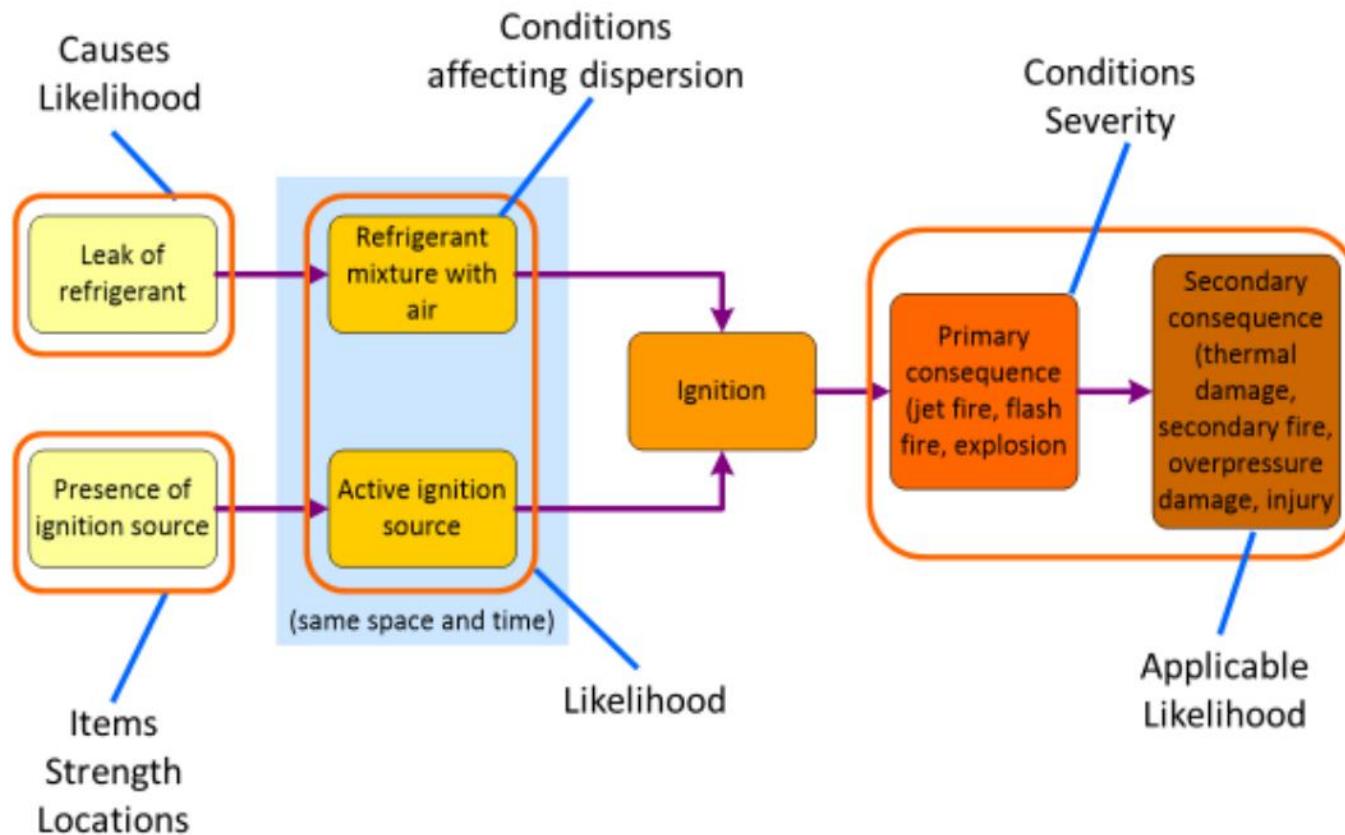
Acceptable residual risk used in published risk assessments, per unit and year



Japan, USA, Europe, China: solid risk programmes – but no common input conventions

The project does not set thresholds – it makes the inputs comparable.

What goes into a risk assessment



Likelihood – how often?

- Leak frequencies and leak rates
- Crack sizes
- Ignition sources
- Human error in installation, service, end-of-life

Severity – how bad?

- Heat flux and overpressure
- Harm to people and property

→ **Task 1: a public, versioned catalogue of these inputs**



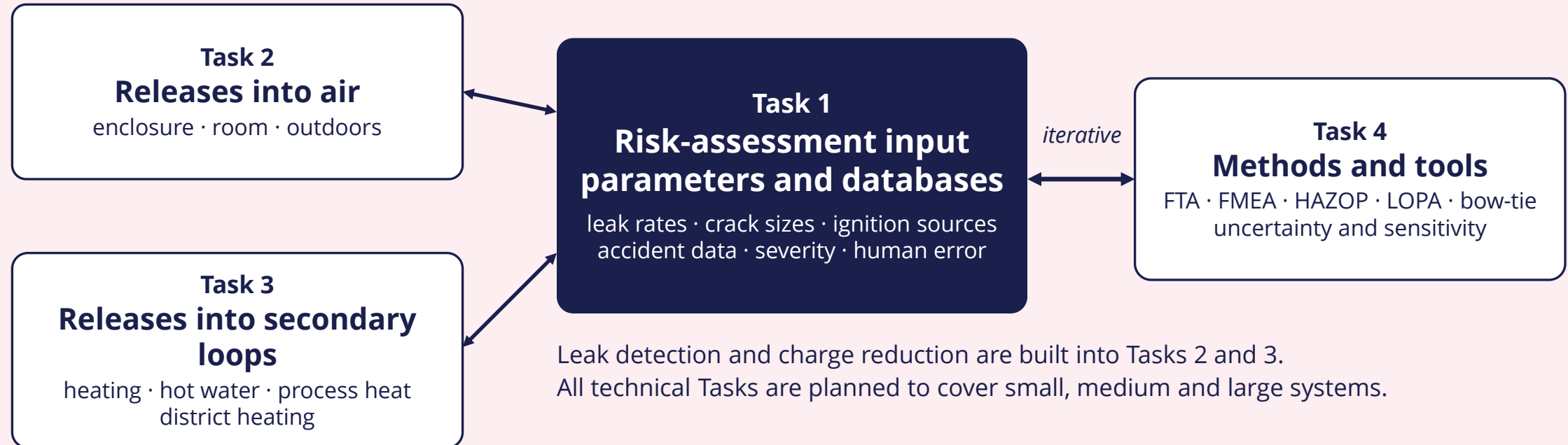
Refrigerant-neutral, close to reality

- **Refrigerants** – hydrocarbons, ammonia, CO₂, HFOs and blends
- **Hazards** – flammability, acute exposure, high pressure, low temperature, solid CO₂, reactivity
- **Releases** – oil aerosol, humid air, stratified rooms, delayed release via water loops
- **Evidence** – release tests on outdoor and indoor units, comparison to safety standards

Five Tasks around one catalogue

Task 5 · Communication and dissemination

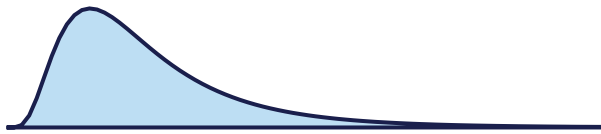
regional webinars · workshops at major conferences · notes to standards committees and associations



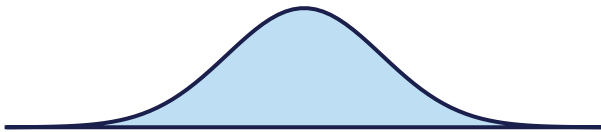
From single values to distributions

Inputs as ranges

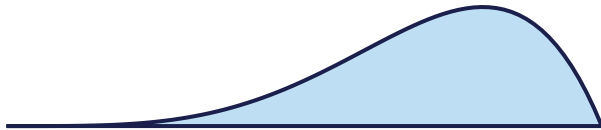
Leak frequency



Ignition probability



Human-error rate



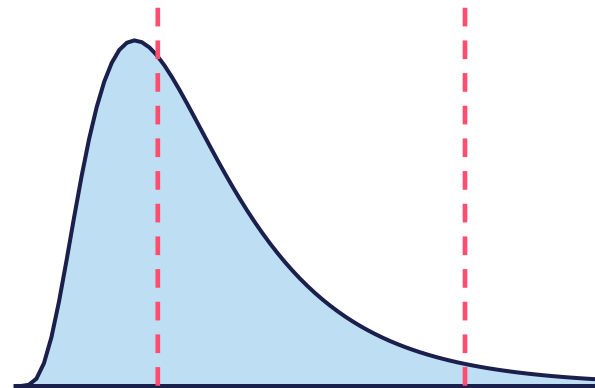
many runs



Result as a range

threshold A

threshold B



probability of harm per unit-year (log)



Which input matters?

Human-error rate



Leak frequency



Ignition probability

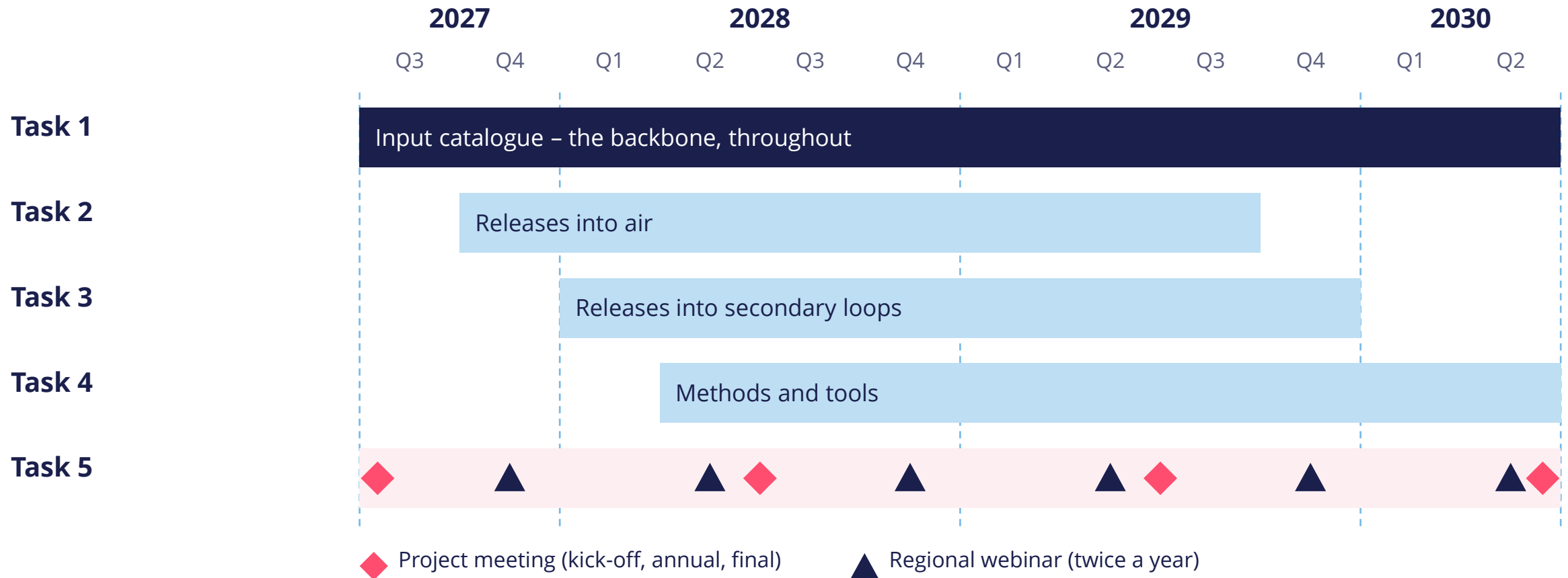


→ refine the inputs that drive the result (back to Task 1)

One calculation can be checked against any national threshold – and it shows which data are worth improving.

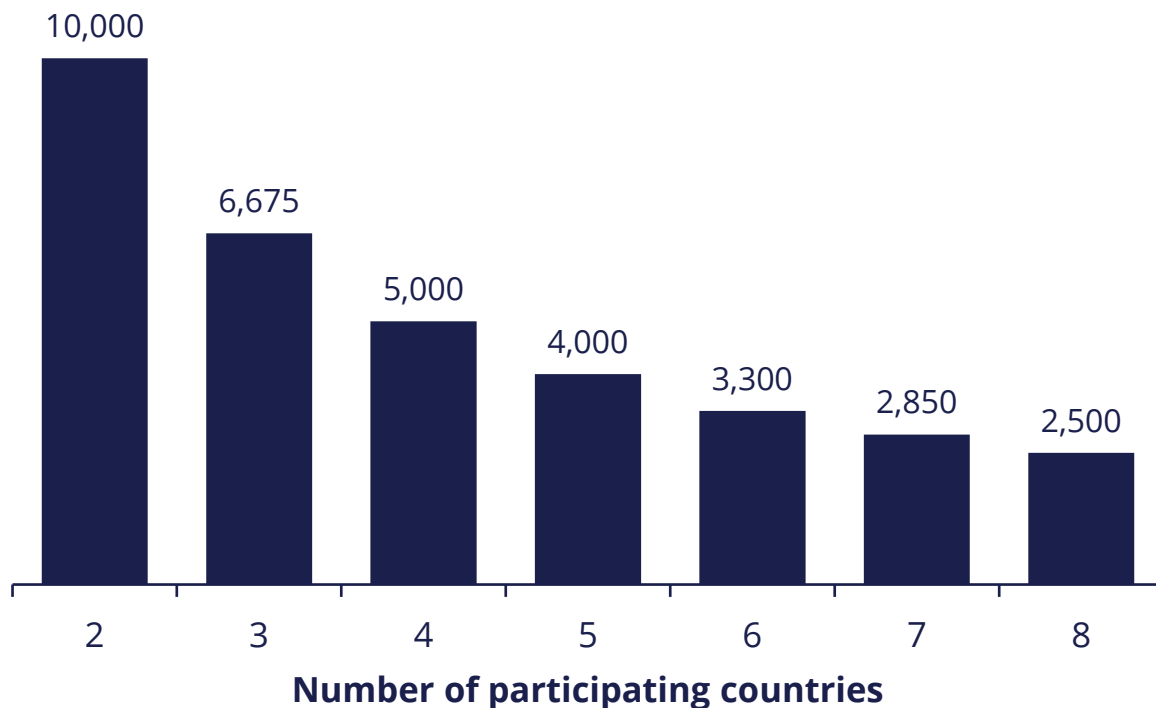
Illustration of the method – shapes and ranking are examples, not project results.

Three years: mid-2027 to mid-2030



How to join

Annual fee per country (EUR)



Task-shared

Each country funds its own national work and partners.

Small annual fee

About 20,000 € per year in total, shared by all participating countries.

15 countries invited

Seven have signalled interest so far. Your country is welcome.

Next steps

Expression of interest → proposal to the ExCo → start mid-2027

Thank you

Questions and expressions of interest are welcome

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Backup: deliverables

Task 1 – methodology report and the public reference catalogue, kept as a versioned electronic resource

Task 2 – state of the art on releases into air; note on a test method for outdoor monobloc units; note on the IP code for refrigerant enclosures; detector placement

Task 3 – state of the art on secondary loops; passive vs. active measures; note on the interface between refrigerant circuit and water loop; instrumentation

Task 4 – state of the art on methods incl. automation, uncertainty and sensitivity; tool comparison; method choice by system size and actor

Task 5 – regional webinars, annual workshops, journal papers, technical notes to committees and associations

HPT TCP – annual and final reports, project website, magazine articles, two-page summary

Backup: scope

In scope

- Refrigerants with safety-relevant properties: hydrocarbons, ammonia, CO₂, HFOs (propene- and ethene-based) and blends
- Heating, cooling, hot water, process heat, district heating (possibly automotive) – small, medium, large
- Releases into compartments/rooms, outdoors and secondary loops
- Input data incl. refrigerant composition and quality
- End-of-life up to the sealed, labelled recovery container

Out of scope

- Setting acceptable-risk thresholds – this stays with national regulators
- Domestic appliances such as tumble dryers and dishwashers
- Transport and downstream treatment of recovered refrigerant, unless needed to assess recovery risks

Backup: countries invited

Interest signalled (7)

- Austria (AIT)
- Belgium
- Canada
- France (CETIM)
- Japan (HPTCJ)
- Switzerland
- USA

Proponent: Germany (Fraunhofer ISE)

Invited (9)

- Czech Republic
- Denmark (DTU)
- Ireland
- Italy (Polimi)
- Korea (CAU, KIER)
- Netherlands
- Norway
- Spain (UPV)
- United Kingdom