

Training & Certification: reskilling HVACR Installers

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Why technicians need reskilling

Two changes are reshaping the skills the sector needs

01

More heat pumps

A growing installed base needs more technicians with the right skills to install and maintain heat pumps.

Higher numbers, integration and competence

02

New refrigerants

The refrigerant transition changes safety requirements and makes updated technical skills essential.



Training and certification obligations

EU F-gas Regulation 2024/573 and Implementing Regulation 2024/2215 extend certification requirements to relevant alternative refrigerants, through applicable national schemes.

01 The Skills Gap is Becoming the Biggest Bottleneck

Region	Current Workforce	Workforce Needed	Estimated Gap	Source
United Kingdom	4,000–10,000 active **heat pump installers** (2024)	~70,000 installers by 2035	**≈60,000 additional installers**	UK Government – Clean Energy Skills Assessment
European Union	around 117,000 (2024)	450,000–500,000 full-time equivalent (FTE) employees by 2030	**Hundreds of thousands**	European Heat Pump Association (EHPA), European Labour Authority (ELA)

School
↓
Vocational Education
↓
Training Centre
↓
Certification
↓
Installer
↓
Continuous Upskilling

We are facing a shortage of technicians

- **Skills requirements are increasing**
- **The number of technicians is decreasing**
  - Numerous initiatives to attract new talent:
    - INWIC
    - European Rising Stars
    - Schools



02 Path to “meet” Kigali requirements (Building on 20 Years of EU F-gas Experience)

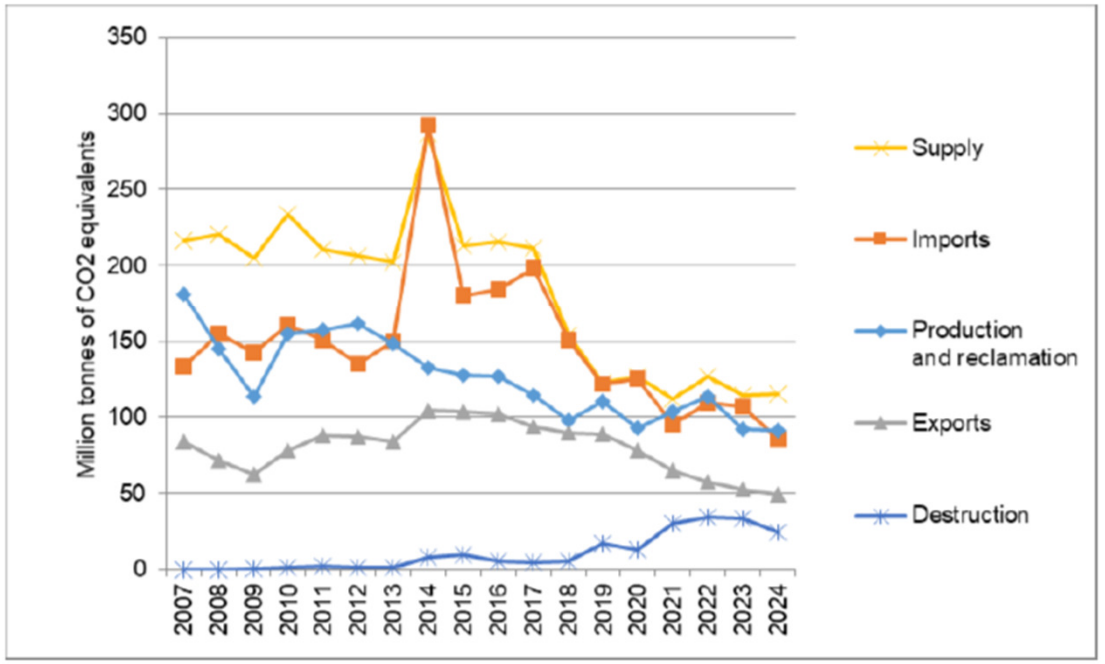
Fgas Regulation and the Certification is working (400.000 certified technicians in EU):

- Refillable Cylinders
- Mandatory leak checks
- More controls on the system, periodical inspections
- Mandatory Training and certification more competence, skilled personnel and companies
- Mandatory Equipment better equipped, calibration, recovery, reuse, reclaimed refrigerant

→ lower quantities of high GWP refrigerants in the market

→ higher quantities of alternative refrigerants (mainly flammables)

Figure B-3 Supply, production, import, export and destruction of F-gases (CO_2e)



EEA Fluorinated greenhouse gases report 2025

F-gas certified personnel and companies by country (2023)

Austria	1,321
Belgium	2,563
Croatia	1,906
Czech Republic	550
Denmark	2,767
Estonia	N/A
Finland	4,995
France	20,000
Germany (1)	3,500
Greece	120
Ireland	817
Italy	43,786
Netherlands	2,000
Poland	13,557
Portugal	2,200
Slovakia	1,979
Spain	19,100
Sweden	1,745
Total EU	**122,906**
Norway	1,359
Turkey	26
Total non-EU	**1,385**
Grand total	**124,291**

Companies

Austria	3,970
Belgium	9,742
Croatia	2,434
Czech Republic	7,126
Denmark	5,944
Estonia	430
Finland	11,220
France	50, 000
Germany	63,900
Greece	10,600
Ireland	4,800
Italy	79,281
Netherlands	3,200
Poland	43,245
Portugal	6,536
Slovakia	1,728
Spain	56,000
Sweden	8,716
Total EU	**368,872**
Norway	4,037
Turkey	5,000
Total non-EU	**9,037**
Grand total	**377,909**

Personnel

UK 52.300 (in 2021)

Certification and training

- **Certificate A1** attesting that holders may carry out all the activities provided for in Article 2(1) in relation to **fluorinated greenhouse gases and hydrocarbons**;
- **Certificate A2** limited to equipment with a charge size of less than 3 kg (6 kg hermetically sealed)
- **Certificate B** attesting that holders may carry out all the activities provided for in Article 2(1) in relation to carbon dioxide (**CO_2**)
- **Certificate C** attesting that holders may carry out all the activities provided for in Article 2(1) in relation to ammonia (**NH_3**);
- **Certificate D** attesting that holders may carry out the activity of recovery for the equipment containing less than 3 kg HFC/HFO (6 kg hermetically sealed); (**Recovery**)
- **Certificate E** attesting that holders may carry out leak check HFC/HFO (**Leak check**)

F-Gas Certification curriculum

		Certificate					
	SKILLS AND KNOWLEDGE	A1	A2	B	C	D	E
1	**Legislation and basic thermodynamics**						
1.00	Basic understanding of the applicable EU and national legislation, in particular F-gas, WEEE and Ecodesign	T	T	T	T	T	T
1.01	Knowledge of the basic ISO standard units for temperature, pressure, mass, density and energy	T	T	T	T	T	T
1.02	Understanding of basic theory of refrigeration systems: basic thermodynamics (key terms, parameters and processes such as Superheat, High Side, Heat of Compression, Enthalpy, Refrigeration Effect, Low Side, Sub-cooling), properties and thermodynamic transformations of refrigerants, including identification of zeotropic blends and fluid states	T	T	T	T	T	—

- **set of minimum competence requirements (2215/24, Implementing Regulation Annex I)**
- Certificate A1&A2,B,C,D,E: HFCs and flammable large, HFCs & flammable small, CO2, Ammonia…….
- based on state-of-the-art standards EN 13313 and ISO/DIS22712

Contains: (a) applicable regulations and technical standards;

(b) emission prevention;

(c) recovery of fluorinated greenhouse gases listed in Annex I and in Section 1 of Annex II;

(d) safe handling of equipment of the type and size covered by the certificate;

(e) safe handling of equipment containing flammable or toxic gases or operating under high-pressure or involving other relevant risks;

(f) the measures for improving or maintaining the energy efficiency of equipment during installation, or maintenance or servicing.

EU MOBILE AC / HP Certification

The new **F-gas Reg. (EU) 2024/573** sets new minimum attestations requirements which expand to more vehicle types.

- **Attestations and Training Types**:
  - **M1**: Full range of activities including servicing, leak checks, repair and recovery of F-gases and Hydrocarbons.
  - **M2**: activities including servicing, leak checks, repair and recovery of F-gases and Hydrocarbons only when an automatic recovery station is used (pics below).
  - **M3**: activities with units using CO2.
  - **M4**: Recovery of F-gases and limited-service activities.
- The EU association of contractors and technicians dealing with larger stationary and mobile AC / HP and refrigeration units
- There are no specific requirements to possess particular tools, but since recovery and leak checks are mandatory, it is pr machine and a leak detector would be necessar







Situation in Europe October 2026

Country	Available certification 3.0	Country	Available certification
Austria	None / w. for nat. legislation	Poland	None / w. for nat. legislation
Belgium	None / exp. Q3 2027	Portugal	A,B,C,D,E
Bulgaria	None / w. for nat. legislation	Romania	A,B,C,D,E
Croatia	A,B,D,E / C in 2027	Slovakia	A,B,C,D,E
Czechia	A,B,D,E / C in 2027	Spain	None / w. for nat. legislation
Denmark	A,B,C,D,E		
Germany	A,B,D,E / C in 2027	Norway	None / w. for nat. legislation
Greece	None / w. for nat. legislation	Tükriye	None / w. for nat. legislation
Hungary	A,B,C,D,E		
Italy	None / w. for nat. legislation		
Netherlands	A,B,C,D,E		



Countries in RED = no certification available

Countries in ORANGE = certification avalilable, not all types

Countries in GREEN = complete certification available

Countries in GREY = no data

Different equipment & procedures with low GWP refrigerants

The use of flammable gases in the equipment will be subject to the implementation of some risk mitigation measures such as, among other things: the introduction of shut-off valves, pump down to the outdoor unit, pressure switches, continuous ventilation or additional regulated by leak detector on board the machine, ATEX certified electronics. All this can make us understand how the initial cost of the appliance, installation, but also maintenance/repair, of a small domestic air conditioner can increase considerably.

In addition to the inevitable increase in costs for the equipment, it is useful to remember that the individual companies involved in the installation, maintenance and repair of these appliances must face considerable investments to equip themselves with tools and equipment suitable for flammable gases.



Service procedure differences

Need to carry out or refer to a <u>RISK ASSESSMENT</u>
and taking into account control measures prior to carrying out any work.

- The properties of the alternative refrigerants, and in particular their hazards, affect how systems are serviced and maintained

Remember
If you are unsure of anything:
Do Not Proceed.
Stop work and ask the question!



Suitable gloves and safety glasses should be worn when working with any refrigerant, and when carrying out hot works (brazing / welding). Antistatic wrist strap should also be worn



Refrig.	Work area	Equipment	Leak testing	Charging	Recovery / disposal
R744	Very well ventilated	Suitable for the very high pressure	Method must be sensitive to R744	Initial charge should be gas to prevent dry ice formation	Venting is the usual practice
R717	Very well ventilated and free from sources of ignition	Suitable for use with R717 and free from sources of ignition	Method must be safe and sensitive to R717		Recovered
R32		Suitable for the high pressure and free from sources of ignition	Method must be safe and sensitive to R32		Recovered
R1234ze		Free from sources of ignition	Method must be safe and sensitive to R1234ze		Recovered
R600a R290			Method must be safe and sensitive to HCs	Charge weight is less so accuracy important	Small amounts* can be vented, otherwise HC is recovered
R1270					

Maintenance and Repair

*Small amounts are usually considered to be less than 150g.

MRV Monitoring Reporting Verification System

- Badge / Online public list of certified technicians and companies
  - only Certified Technicians holding a certificate are allowed to:
  - ➢install, maintain, repair, recover, dismantle RAC systems containing refrigerants
  - ➢buy the refrigerant
- Online logbook with interventions, repairs, installations (census)
- Periodical inspections…



Certificate N. xxxxxxxxxx

CEPAS

Cepas S.r.l. declares that:

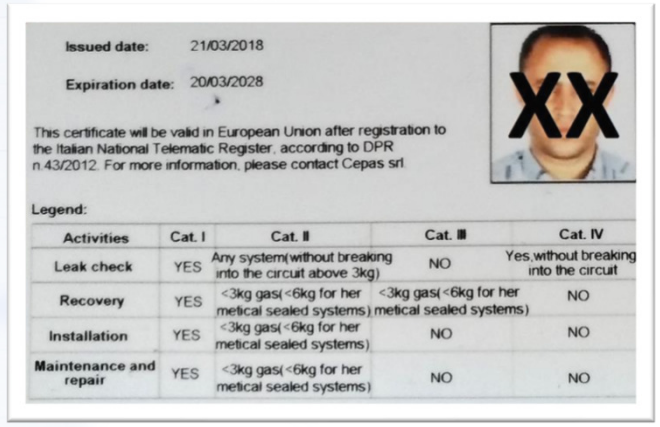
HOUSSEM xxxxxxxxxx

xxxxxxxxxxxxxxxxx

Born on 29/06/1981 in xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Is certified in accordance with Regulation (CE) 303/2008 as operator of stationary refrigeration, air-conditioning and heat pump equipment containing certain fluorinated greenhouse gases, category I

Massimo Dutto
Cepas Chief Executive



Issued date: 21/03/2018

Expiration date: 20/03/2028

This certificate will be valid in European Union after registration to the Italian National Telematic Register, according to DPR n.43/2012. For more information, please contact Cepas srl

Legend:

Activities	Cat. I	Cat. II	Cat. III	Cat. IV
Leak check	YES	Any system(without breaking into the circuit above 3kg)	NO	Yes,without breaking into the circuit
Recovery	YES	<3kg gas(<6kg for her metical sealed systems)	<3kg gas(<6kg for her metical sealed systems)	NO
Installation	YES	<3kg gas(<6kg for her metical sealed systems)	NO	NO
Maintenance and repair	YES	<3kg gas(<6kg for her metical sealed systems)	NO	NO

Recent Training, Certification, Venue assesment in Bhutan, Bangladesh, Nigeria, Egypt, Marocco







REAL Alternatives
consistent learning among EU contries
for low GWP refrigerants

- **Flammables** (HCs - HFOs - low GWP blends), **CO_2, Ammonia**
- **9 Modules Free learning material** available for download
- **Multi-lingual** programme (17 languages – 21 EU or 25 tot countries)
- **Licensed training providers (around 30) in each country:**
  - **Best Practices** in fully equipped laboratories, focusing on the safety issues
  - **Theory** in classroom or remote
- **Certification (theory and practice)** consistent and recognized among project members (more than 3000 certificates so far)



www.realalternatives.eu

Instructions on how to organise a course & certification

→New partners, Training providers or just learners in our training centres are welcome!

Next ToT in the Netherlands



Project Structure:

Coordinator: *Associazione Tecnici del Freddo (Italy)*

CSG is ATF's Official Training Provider

Partners: 7 Founding Partners across Europe

Network: 17 National Leads + 11 Official Training Providers

Resources available in 18 languages

New partner from Bulgaria

Many countries are using Real Alternatives as a reference framework for training and certification linked to EU Regulation 2024/2215 Es. Czechia, Greece, Croatia, Ireland, etc…

Hydrocarbon heat pumps

Complementary skills for equipment safety and refrigerant handling

SkillSAFE

HEAT PUMP SAFETY

Safe installation, connections, transport, storage

For heat pumps containing hydrocarbon refrigerants

REAL Alternatives

REFRIGERANT COMPETENCE

Safe handling of hydrocarbons as refrigerants

Technician training and assessment supporting certification aligned with EU F-gas Regulation 2024/573 and Implementing Regulation 2024/2215

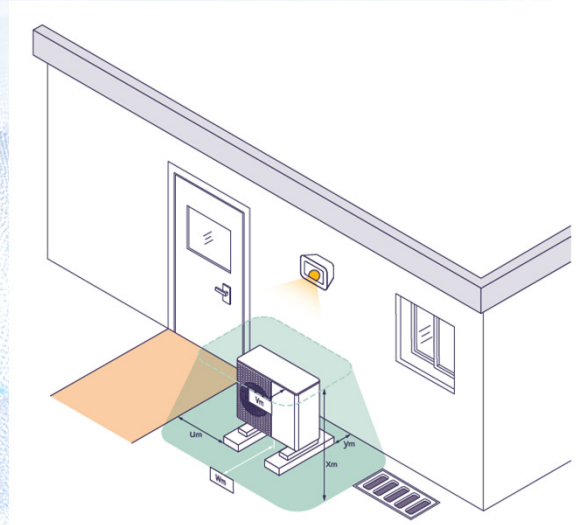
Complementary scopes. A shared focus on safe practice.

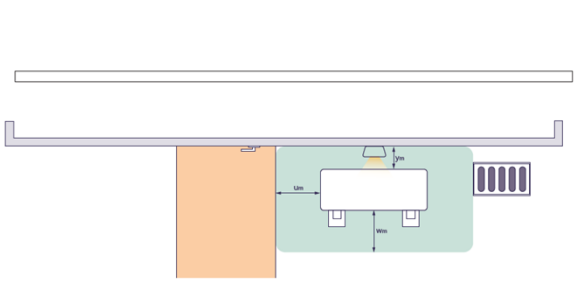
Regulatory certification: authorised bodies issue certificates under applicable national schemes.
Completion of the REAL Alternatives programme does not automatically confer this certification.

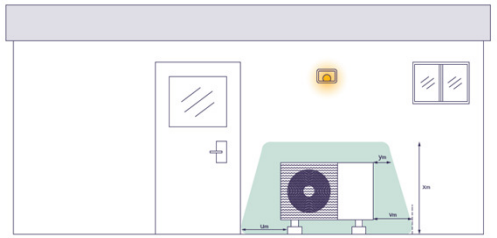
Ground-level outdoor installation

guideline chapter 3.1

- Follow manufacturer's minimum clearance requirements
- Avoid ignition sources, building inlets, and sewer connections







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IMPACT-F | Integrated Mitigation Platform for Assessing Climate Targets for F-Gases

Project duration
36 months
(2026-2029)

10 Archetype Countries

14 International Partners

- ***What the project will do?***

Develop a state-of-the-art global web platform to visualize and predict F-gas consumption in the refrigeration sector.

- ***How it will support capacity building?***

Strengthen global and national capacities through tailored training programmes, knowledge transfer and practical tools

Follow our journey!
Scan the QR code

IMPACT-F is funded by the European Commission under grant agreement 101294600

22° European Conference 27-28 May 2027

UNEP-IIR-AREA-CSG

- 250+ participants
- 50+ remotely
- From 4 continents and 40+ nations
- 40+ presentations
- Award ceremony for the “European Rising Stars – Youth Best Practice" Video Competition 2027



Conclusions

- **A lot of work still to do – A Growing Sector**
- **New equipment**: hydrocarbons in A/C, HP,
  crucial year will be 2029 with HC in Split systems
- **New behaviour / Change of mindset**: technicians & design engineers. Improved attention to flammability & refrigerant recovery
- **The transition requires all elements to work together:** Phase-down of HFCs, Training and certification, Equipment bans, Responsible sale and handling of refrigerants, Recovery and reclamation for reuse
- **Collaboration is essential**:
  - Institutions (UN agencies, NOUs, etc.)
  - Associations
  - Industry
  - SMEs & technicians
- Top of the class are trained ➔ **No one left behind**

National Italian Workshop on Heat Pumping Technologies
Pisa - November 17th 2026



Stronger together

Thank you

Marco Buoni

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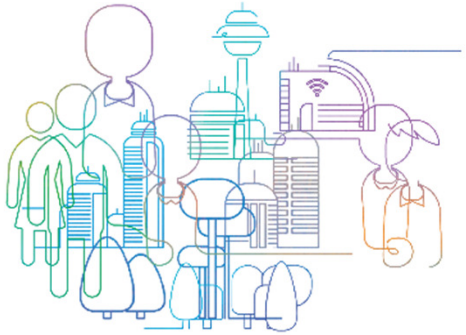

"For a clean, decarbonised and sustainable heating and cooling sector"

AREAVISION2030

AREA