UNIVERSITÀ DEGLI STUDI DI TRIESTE

Regulatory Framework and Building Energy Design

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Fluorinated greenhouse gases Regulation (F-GAS)

ARTICLE 1

EU 573/2024 Regulation – February 7, 2024

Lays down rules on:

- containment, use, recovery, recycling of fluorinated greenhouse gases
- production, import, export, placing on the market, subsequent supply and use of fluorinated greenhouse gases
- specific uses of fluorinated greenhouse gases (**F-gases**)

What is an F-gas?

Is a gas used in applications like:

- refrigeration
- air conditioning
- industrial processes

Usually has a high global warming potential (**GWP**)

Traps heat in the atmosphere and significantly contributes to global warming

Fluorinated greenhouse gases Regulation (F-GAS)

The Regulation aims to prevent gas emissions into atmosphere by:

ARTICLE 4

- prohibiting the intentional release of F-gases into the atmosphere where the release is not technically necessary for the intended use
- requiring the implementation, if an intentional release is technically necessary for the intended use, of all measures that are technically and economically feasible to prevent such release into the atmosphere, including by recapturing the gases emitted

What does this mean?

- necessity of a declaration of conformity regarding origin, production process and usage of F-gases (for producers and importers)
- implementation of technical measures to prevent leaks from technical plants using F-gases **ARTICLES 5, 6**
- […]

Fluorinated greenhouse gases Regulation (F-GAS)

ARTICLE 8

Operators of equipment that contain F-gases shall ensure that, after the decommissioning of the equipment, those substances are recycled, reclaimed or destroyed

Such obligation shall be applied to operators of equipment like:

- cooling circuits of refrigeration
- air-conditioning equipment
- heat pumps
- fire protection equipment

Such obligation also applies to refrigerating or similar systems used on vehicles like:

- trains
- planes
- light and heavy-duty vehicles
- […]

Fluorinated greenhouse gases Regulation (F-GAS)

ARTICLE 11

The placing on the market of:

- products and equipment, including parts thereof, listed in **Annex IV**, shall be prohibited from the date specified in that Annex
- products and equipment required for repair and servicing of existing equipment listed in Annex IV is allowed provided that the repair or servicing does not result in:
  - an increase in the capacity of the product or equipment
  - an increase in the amount of F-gas contained in the product or equipment
  - a change in the type of F-gas used that would lead to an increase of the global warming potential of the fluorinated greenhouse gas used

Fluorinated greenhouse gases Regulation (F-GAS)

Products and equipment		Date of prohibition
(9) Split air-conditioning equipment and heat pumps (1):	(a) Single split systems, containing less than 3 kg of fluorinated greenhouse gases listed in Annex I, that contain, or whose functioning relies upon, fluorinated greenhouse gases listed in Annex I with GWP of 750 or more;	1 January 2025
	(b) Split air-to-water systems of a rated capacity up to and including 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 150 or more, except if required to meet safety requirements at the site of operation;	1 January 2027
	(c) Split air-to-air systems of a rated capacity up to and including 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 150 or more, except if required to meet safety requirements at the site of operation;	1 January 2029
	(d) Split systems of a rated capacity up to and including 12 kW containing, or whose functioning relies upon, fluorinated greenhouse gases, except if required to meet safety requirements at the site of operation;	1 January 2035

ANNEX IV

Typical air conditioning system present in many residential buildings

The most common F-gas used for this type of system is the R-410A (GWP = 2088)

Due to F-gas regulation new systems cannot use R-410A

F-gas R32 will be used (GWP = 675)

Italian interministerial Decree 26 June 2015

"Application of energy performance calculation methodologies and definition of the minimum requirements of buildings"

Defines the methodology for calculating the energy performance of buildings, including the use of renewable sources, *the integration of electric vehicle charging infrastructure*, as well as the minimum requirements and requirements regarding the energy performance of buildings

Specify that the **general** criteria and energy performance requirements for building design and for the design and installation of systems are established by:

- National Law 10/1991
- Presidential Decree 412/1993
- subsequent amendments
- additional provisions set forth in Annex 1 of the Decree

Modifications that will be probably introduced with the upcoming regulatory update are displayed in purple

Italian interministerial Decree 26 June 2015

A brief focus on National Law 10/1991

- TITLE I - Regulations on the rational use of energy, energy saving, and the development of renewable energy sources
- TITLE II – Rules for reducing energy consumption in buildings
  - Interventions to reduce energy consumption of buildings and systems and to use renewable energy sources are identified through an energy performance certificate or an energy diagnosis carried out by a qualified technician
  - Public and private buildings, regardless of their intended use, must be designed and operated in a way to minimize, in relation to technological progress, thermal and electrical energy consumption
  - The characteristics and energy performance of building components and systems must be certified
  - Thermal and electrical energy consumption for buildings must be limited taking into account the intended use of the buildings, the systems they are equipped with and the climate zone they belong to

Italian interministerial Decree 26 June 2015

A brief focus on Presidential Decree 412/1993

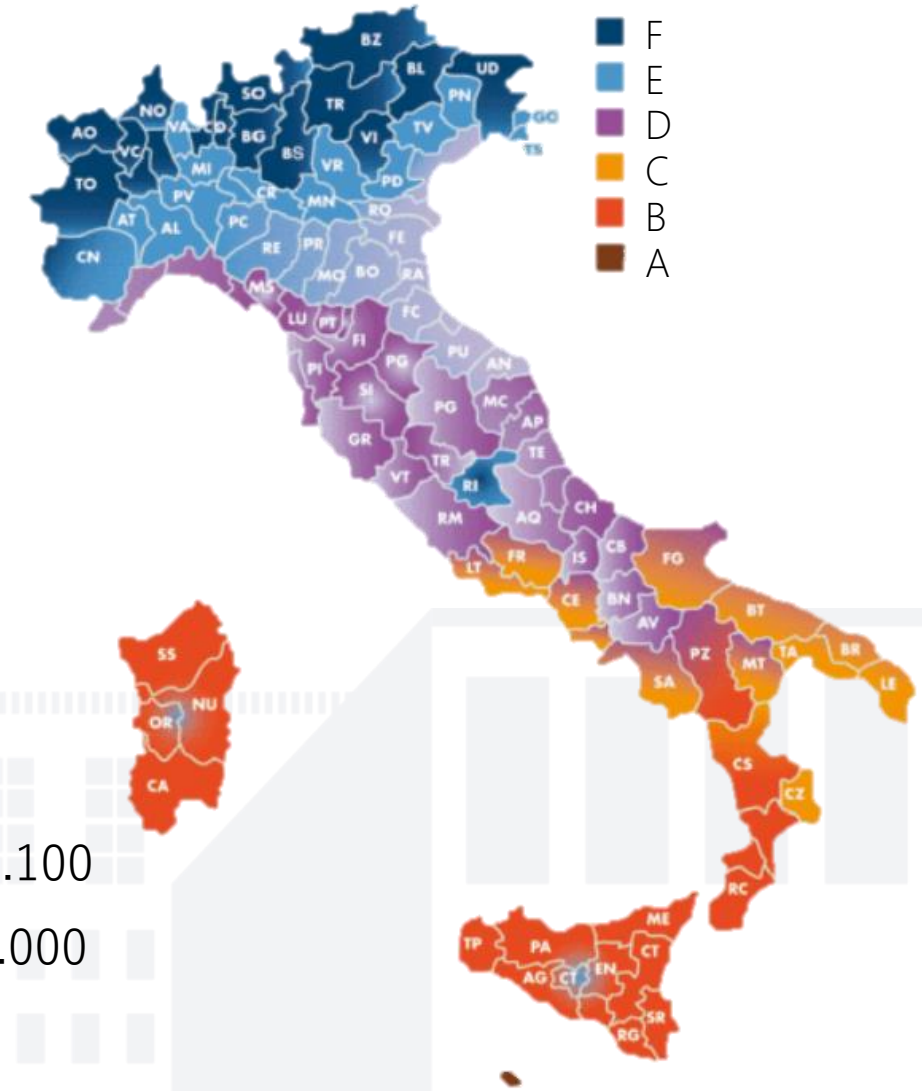
Divides the national territory into six climate zones based on Degree-Days (DD), regardless of the geographical location

$$DD = \sum_{e=1}^{n} (T_0 - T_E)$$

n = number of days of the conventional heating period

T_0 = conventional room temperature (inside a home heated to the conventional temperature of 20° C)

T_E = average daily external temperature such that $T_E < T_0$



Zone A → DD <= 600

Zone B → 600 < DD <= 900

Zone C → 900 < DD <= 1.400

Zone D → 1.400 < DD <= 2.100

Zone E → 2.100 < DD <= 3.000

Zone F → DD > 3.000

Italian interministerial Decree 26 June 2015

A brief focus on Presidential Decree 412/1993

Classifies buildings according to their intended use:

- **E.1** Buildings used for residential purposes and similar
- **E.2** Office buildings and similar
- **E.3** Buildings used as hospitals, clinics, or nursing homes and similar
- **E.4** Buildings used for recreational or religious activities and similar
- **E.5** Buildings used for commercial and similar activities
- **E.6** Buildings used for sports activities
- **E.7** Buildings used for school activities at all levels and similar
- **E.8** Buildings used for industrial, craft and similar activities

Italian interministerial Decree 26 June 2015

Specifies that the calculation of energy performance in buildings, including the use of renewable sources, should be carried on by following the national technical standards:

- UNI/TS 11300 - 1 Determination of building thermal energy requirement for summer and winter air conditioning
- UNI/TS 11300 - 2 Determination of the primary energy (PE) requirement and efficiency for winter air conditioning, production of domestic hot water, ventilation, and lighting
- UNI/TS 11300 - 3 Determination of PE demand and efficiency for summer air conditioning
- UNI/TS 11300 - 4 Use of renewable energy and other energy generation methods for space heating and domestic hot water preparation
- UNI EN 15193 - Energy requirements for lighting
- *UNI/TS 11300 – 5 Calculation of PE and the share of energy from renewable sources*
- *UNI/TS 11300 – 6 Determination of energy requirements for elevators, escalators, and moving walks*

Italian interministerial Decree 26 June 2015 – Annex I

The energy performance of buildings is determined based on the amount of energy required annually to meet the needs associated with standard use of the building and corresponds to the global annual primary energy (PE) requirement for:

- Heating
- Ventilation
- Air Conditioning (cooling)
- domestic hot water production
- in the non-residential sector, for lighting, elevators, and escalators

The global annual energy requirement is calculated as PE for each individual energy service, with **monthly calculation intervals**. The same methods are used to determine energy from renewable sources produced within the system boundary.

Italian interministerial Decree 26 June 2015 – Annex I

Energy by RES produced and used within the system boundary can be accounted to satisfy energy needs:

- only to contribute to the needs of the same energy source (electricity with electricity, thermal energy with thermal energy, etc.)
- up to the full coverage of the corresponding energy needs or energy source used for the services considered in the energy performance

Excess energy over the monthly needs, produced on-site and exported, does not contribute to the building's energy performance

Any excess electricity produced from renewable sources and exported in certain months cannot be counted towards covering needs in months in which production is insufficient

Italian interministerial Decree 26 June 2015 – Annex I

To verify design compliance to the minimum requirements, both total primary energy and non-renewable primary energy are calculated, obtained by applying the relevant conversion factors into total primary energy $f_{P,tot}$ and non-renewable primary energy $f_{P,nren}$

$$f_{P,tot} = f_{P,nren} + f_{P,ren}$$

To determine buildings energy class the reference parameter is the non-renewable primary energy consumption

Energy vector	$f_{P,nren}$	$f_{P,ren}$	$f_{P,tot}$
Natural gas	1,05	0	1,05
LPG	1,05	0	1,05
Diesel or fuel oil	1,07	0	1,07
Coal	1,10	0	1,10
Solid biomass	0,20	0,80	1,00
Liquid and gas biomass	0,40	0,60	1,00
Electricity from network	1,95	0,47	2,42
District-heating	1,50	0	1,50
Solid waste	0,20	0,20	0,40
District-cooling	0,50	0	0,50
Thermal energy from solar panels	0	1,00	1,00
Electricity from photovoltaic, mini-eolic, mini-hydro	0	1,00	1,00
Free cooling	0	1,00	1,00
Heat Pumps	0	1,00	1,00