



UNIVERSITÀ
DEGLI STUDI
DI TRIESTE

Regulatory Framework and Building Energy Design

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Italian interministerial Decree 26 June 2015 – Annex I ↔ Appendix B

Technical requirements for energy requalifications – heating plant

In the case of replacement of heat generators, all current provisions regarding the rational use of energy, including the one referring to the average seasonal efficiency, are deemed to be complied with if the following conditions coexist:

- new gas or liquid fueled heat generators have a thermal efficiency higher than:

$$\eta_{min} = 90 + 2 * \log(P_n)$$

where: P_n is the nominal power of the generator [kW]

For generators with $P_n > 400$ kW is considered the η_{min} value computed for $P_n = 400$ kW

If, to ensure safety conditions, it is not possible to comply with the above condition, the following requirements apply:

- installation of boilers with a thermal efficiency, at part load equal to 30% of P_n , higher than:

$$\eta_{min} = 85 + 3 * \log(P_n)$$

- as an alternative to the previous condition, installation of a generator having a seasonal space heating energy efficiency compliant with the provisions of EU Regulation 813/2013
- preparation of a detailed report certifying the reasons for the derogation from the aforementioned provisions, to be attached to the system logbook

Italian interministerial Decree 26 June 2015 – Annex I ↔ Appendix B

Technical requirements for energy requalifications – heating plant

- new electric or gas heat pumps have a coefficient of performance (COP, EER) higher than the values indicated in paragraph 1.3, subsection 2, of Appendix B
 - the current document reports a series of Tables with COP and EER values depending on heat pump type and on dry-bulb and wet-bulb temperatures of outside and inside environments
 - *the coming update simply recalls that the requirements set for heat pumps in specific product regulations must be fulfilled and that heat pumps performances must be guaranteed and certified by the producer, on the basis of test carried on in compliance with the aforementioned regulations*
- in the case of installations of generators with a nominal power greater than the existing value by more than 10%, the increase in power is justified by a dimensional verification of the heating system
- in the case of installation of heat generators in systems serving multiple real estate units, or in buildings used for non-residential purposes, there must be a regulation system for each individual room or real estate unit, assisted by climate compensation, and a direct or indirect heat metering system that allows for the allocation of consumption for each individual real estate unit

Italian interministerial Decree 26 June 2015 – Annex I

Technical requirements for energy requalifications – cooling plant

In case of new installation or renovation of summer air conditioning systems in existing buildings, or replacement of generator refrigeration units, the following rules apply:

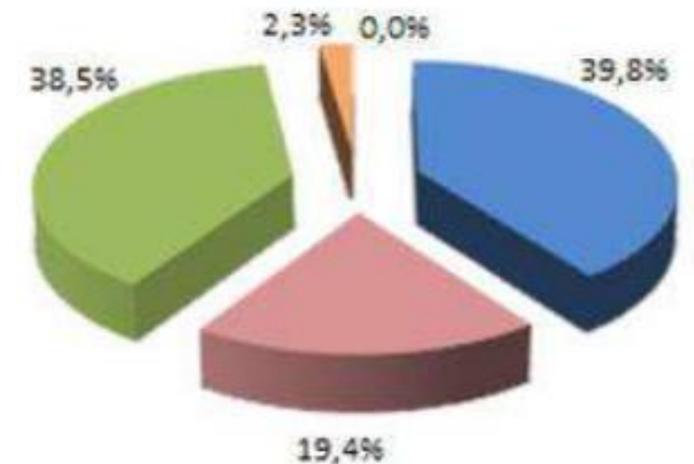
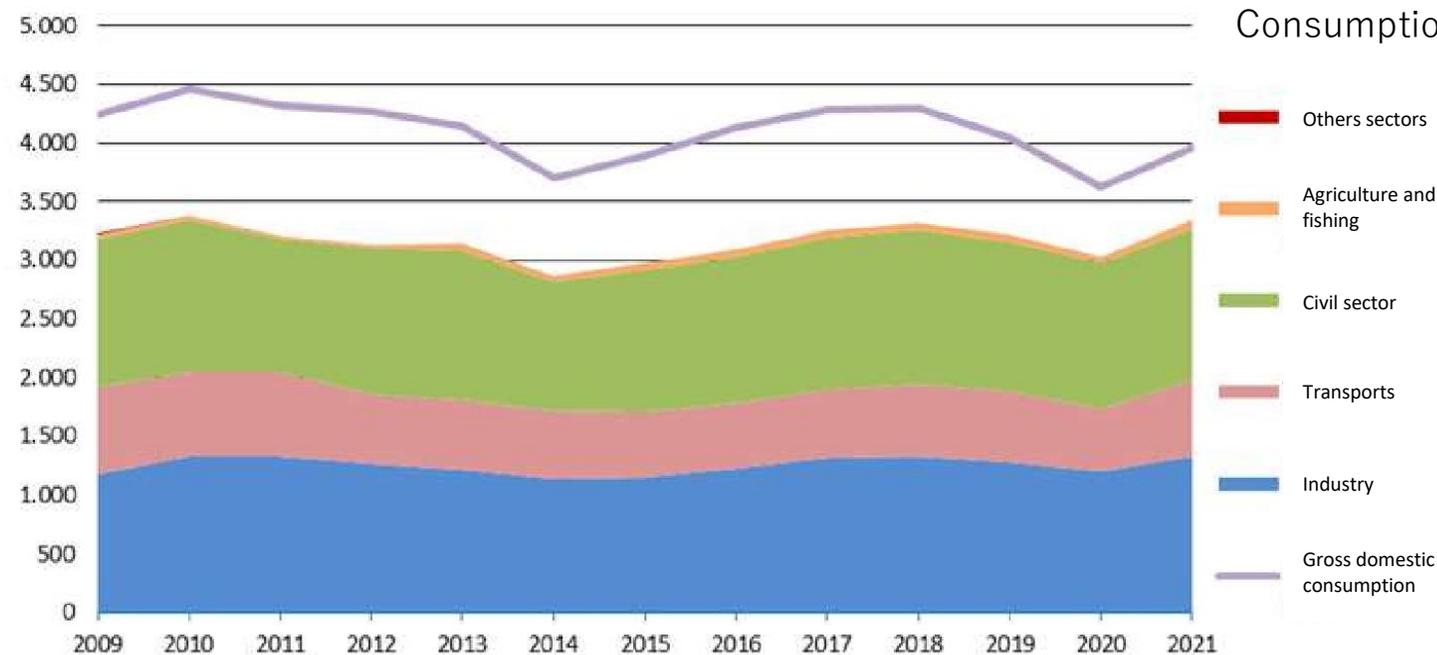
- the average seasonal efficiency of the cooling system must be higher than the limit value calculated using the efficiency values provided in Appendix A for the reference building (Tables 7 and 8)
- individual room regulation systems and direct or indirect metering systems that allow for the allocation of consumption to each individual property unit must be installed
- in the case of replacement of refrigeration units, all current provisions regarding the rational use of energy, including the one referring to the average seasonal efficiency, are deemed to be complied with if the conditions reported in the first and third bullet points of the previous slide are met

The Regional Regulation FVGreen and the Regional Energy Plan

Regional Law 04/2023

The Region is committed to achieving the long-term goal of net-zero greenhouse gas emissions by 2045 and to reducing greenhouse gas emissions at least equal to the national target set by the European Union by 2030

Regional Energy Plan (2024) – State of the art of the building sector



The Regional Regulation FVGreen and the Regional Energy Plan

Regional Energy Plan (2024) – State of the art of the building sector

State of conservation of buildings in FVG

	Friuli-Venezia Giulia				
	ottimo	buono	mediocre	pessimo	totale
1918 e precedenti	14.797	21.567	10.050	1.793	48.207
1919-1945	7.875	13.830	6.245	810	28.760
1946-1960	12.014	20.816	7.288	609	40.727
1961-1970	17.494	26.580	5.618	275	49.967
1971-1980	25.233	30.068	3.837	156	59.294
1981-1990	19.745	14.909	1.200	34	35.888
1991-2000	15.143	4.822	200	15	20.180
2001-2005	10.961	1.518	54	3	12.536
2006 e successivi	10.032	736	30	6	10.804
Totale	133.294	134.846	34.522	3.701	306.363

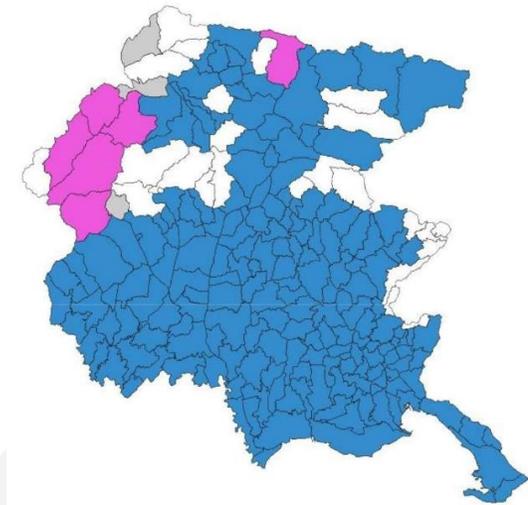
Number of Energy Performance Certificates in FVG

DESTINAZIONE	PROPRIETA'	ZONA CLIMATICA	A4	A3	A2	A1	B	C	D	E	F	G	TOTALE
			RESIDENZIALE	Privato	E	6.767	2.492	3.100	4.305	5.303	9.817	20.123	26.120
F	251	92			128	193	244	456	775	1.102	1.626	3.654	8.521
Pubblico	E	56		5	7	23	9	22	42	79	179	248	670
	F	1				1	7	2	9	28	38	58	144
Uso Pubblico	E	2		1	3	4	8	16	16	12	11	17	90
	F										1	4	5
NON RESIDENZIALE	Privato	E	255	289	450	781	1.379	2.745	3.708	3.137	2.961	4.363	20.068
		F	17	11	9	36	48	90	143	133	156	286	929
	Pubblico	E	20	20	21	35	55	134	269	242	198	156	1.150
		F	3		6	4	10	10	21	31	35	38	158
	Uso Pubblico	E	12	6	12	44	85	86	125	87	64	88	609
		F			1	2	5	9	13	7	9	15	61
TOTALE RESIDENZIALE			7.077	2.590	3.238	4.526	5.571	10.313	20.965	27.341	37.039	44.977	163.637
TOTALE NON RESIDENZIALE			307	326	499	902	1.582	3.074	4.279	3.637	3.423	4.946	22.975
TOTALE FVG			7.384	2.916	3.737	5.428	7.153	13.387	25.244	30.978	40.462	49.923	186.612

The Regional Regulation FVGreen and the Regional Energy Plan

Regional Energy Plan (2024) – Some public administration actions to retrofit the building sector

- Action 02.1 – Granting contributions for the diffusion of collective self-consumption (FTV systems)
- Action 04.1 – Analyzing alternative supply solutions for non-methane areas
- Action 05.1 – Granting contributions for the installation of solar thermal systems
- Action 05.2 – Granting contributions for the connection to existing district heating networks
- Action 05.3 – Developing actions in favor of economically disadvantaged parts of the population
- Action 06.2 – Carrying on energy audits for Regional Administration buildings
- Action 06.3 – Carrying on energy refurbishment interventions on Regional Administration and Municipalities buildings
- Action 07.1 – Granting contributions for refurbishment interventions on buildings envelope
- Action 07.2 – Granting contributions for the substitution of existing heating generators



LEGENDA

Reti di distribuzione combustibili

□ Assenza di reti canalizzate

■ Gas naturale

■ GPL

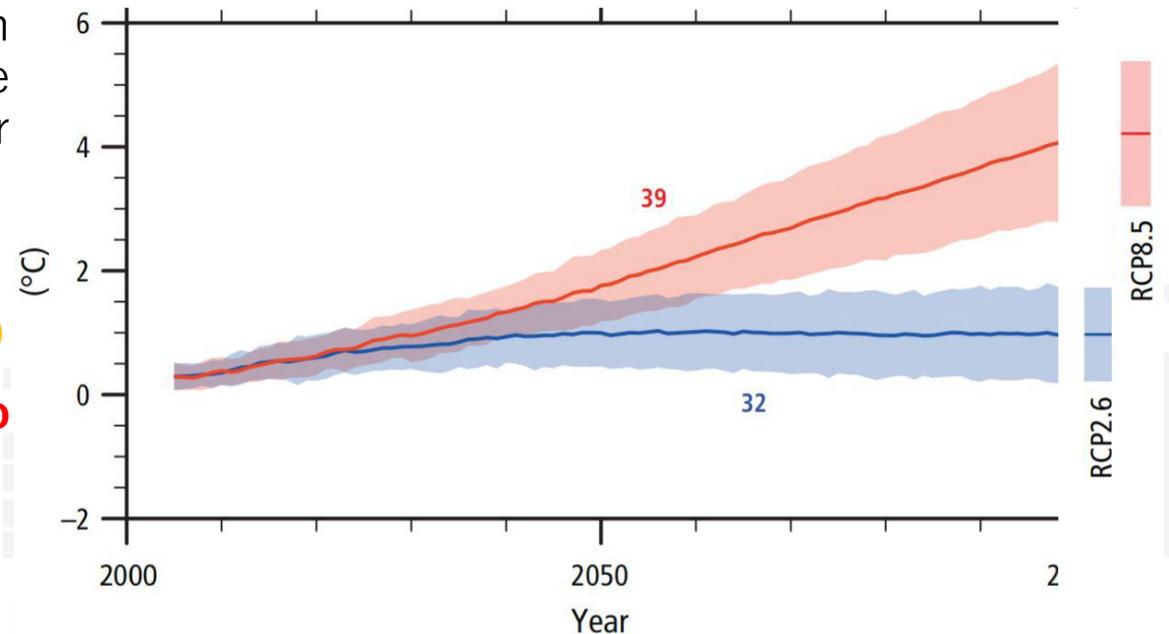
■ Aria propanata

Climate change impact on heating and cooling energy consumption

Climate change scenarios

In order to properly assess the future effects of human actions on the atmosphere, the IPCC considers all the GHG emissions human-related drivers to create Representative Concentration Pathways (RCPs) to make projections of future GHG emissions, air pollution and land use. Four main Pathways are used:

- **The mitigation scenario (RCP2.6)**
- **Two intermediate ones (RCP4.5 and RCP6.0)**
- **High emission scenario (RCP8.5) also defined as "business as usual"**



Climate change impact on heating and cooling energy consumption

An example of climate change: actual and forecasted extreme thermal events for Trieste area and surroundings

Defining **heat waves** as events where, for 3 consecutive days:

- Minimum daily temperature $> 22^{\circ} \text{C}$
- Maximum daily temperature $> 30^{\circ} \text{C}$

Defining **cold spells** as events where, for 3 consecutive days:

- Mean daily temperature $< -5^{\circ} \text{C}$

Defining **frost days** as days where the minimum daily temperature $< 0^{\circ} \text{C}$

Checking the presence of heat waves using the climatic data collected by the Trieste meteorological station

Checking the presence of cold spells and frost days using the climatic data collected by the Trieste and the Sgonico meteorological stations, the latter located 9 km as the crow flies from Trieste

Climate change impact on heating and cooling energy consumption

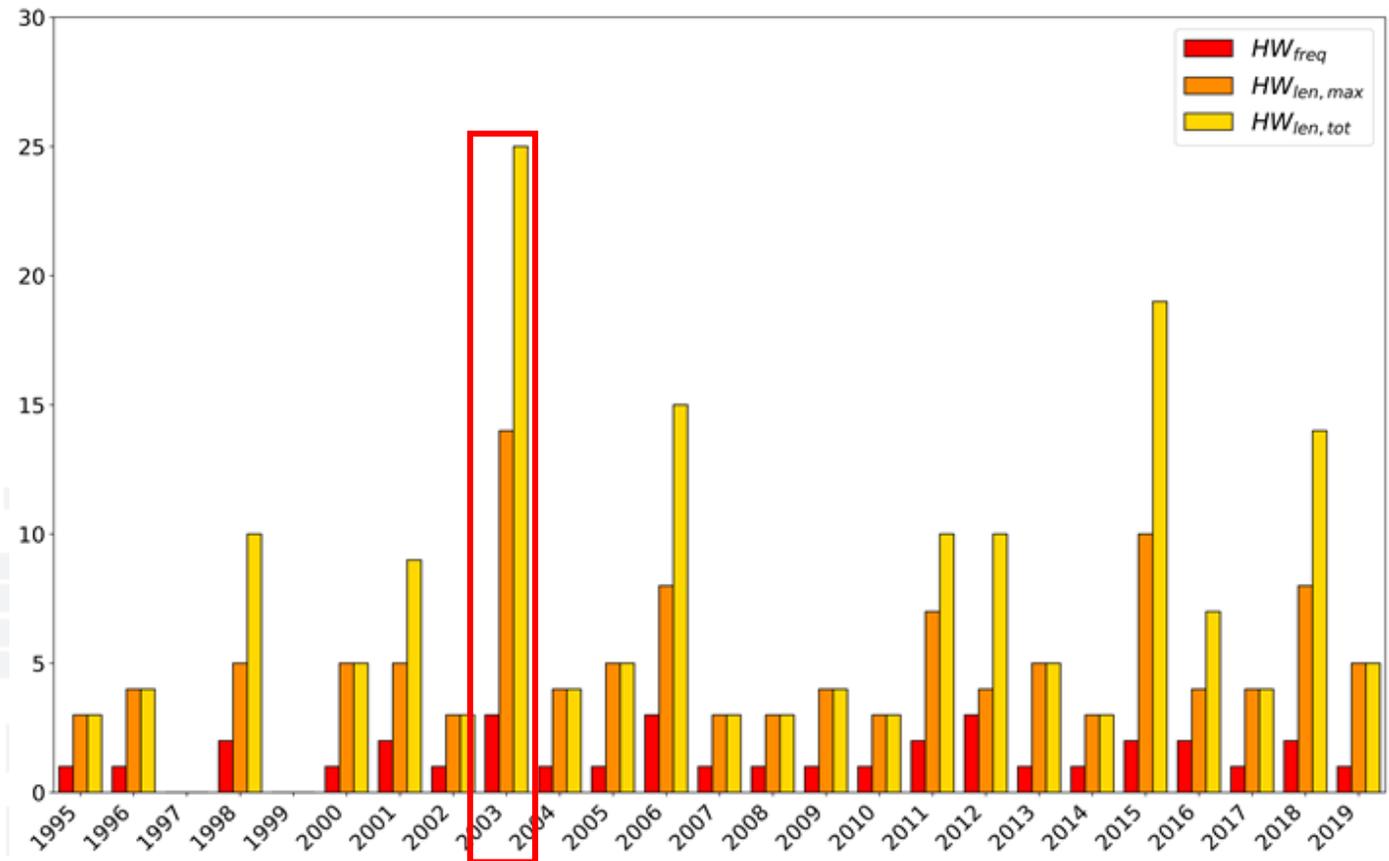
An example of climate change: actual and forecasted extreme thermal events for Trieste area and surroundings

HW_{freq} = number of heat waves

$HW_{len,max}$ = maximum heat wave length

$HW_{len,tot}$ = total heat waves length

Regarding the data detected by the Trieste meteorological station, an increase in maximum and total length of heat waves can be noted, as well as the remarkable events of the summer of 2003



Climate change impact on heating and cooling energy consumption

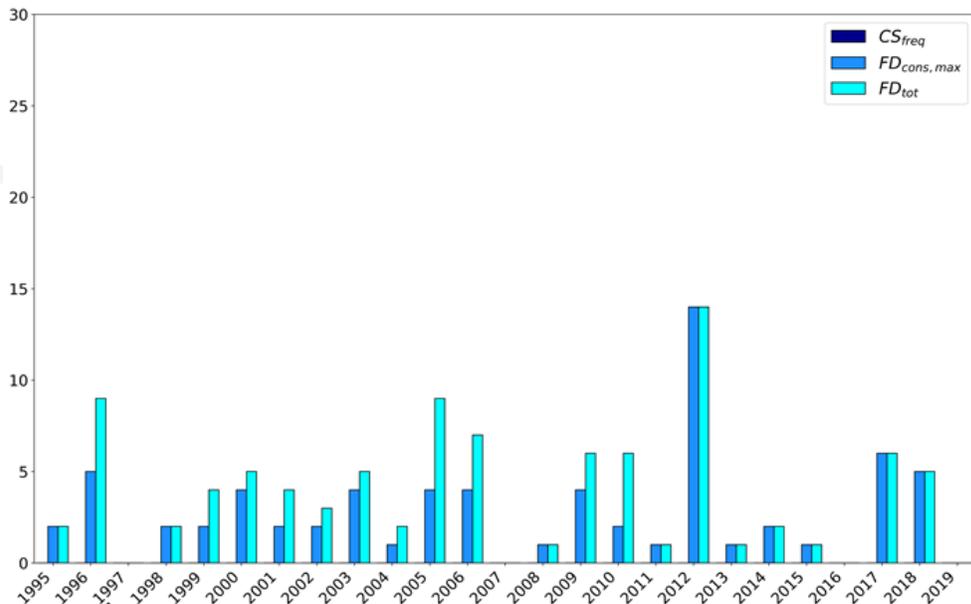
An example of climate change: actual and forecasted extreme thermal events for Trieste area and surroundings

CS_{freq} = number of cold spells

$FD_{cons,max}$ = maximum number of consecutive frost days

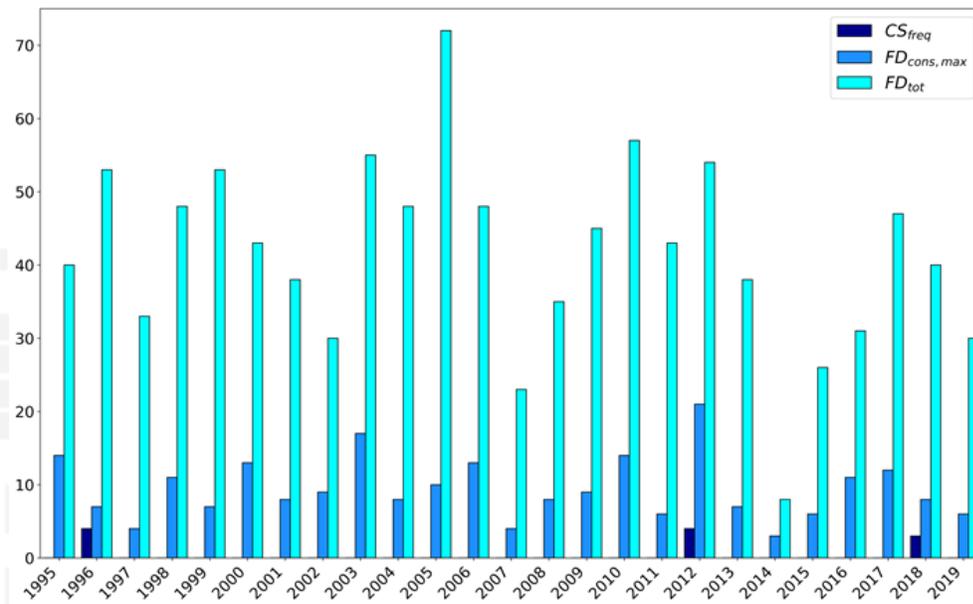
FD_{tot} = total number of frost days

Trieste station



Great difference between the two stations, despite being only 9 km away as the crow flies, however ...

Sgonico station



... Trieste is located at sea level, while Sgonico is located at 278 meters above sea level, therefore ...

... great attention must be used in using climatic data for building energy design



In commercial softwares for both locations the data from Trieste are used, because Sgonico falls within the municipality of Trieste

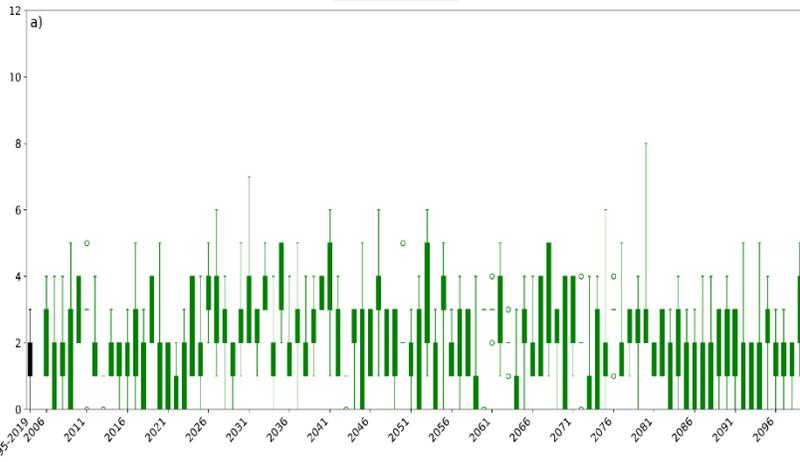


Climate change impact on heating and cooling energy consumption

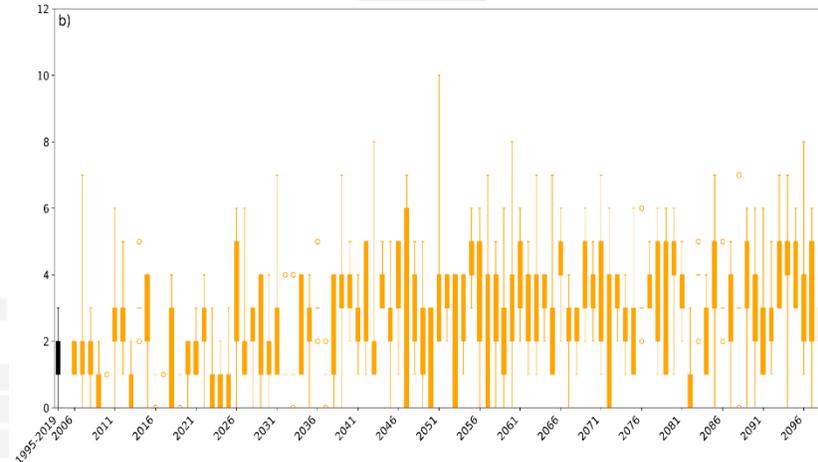
An example of climate change: actual and forecasted extreme thermal events for Trieste area and surroundings

Projecting heat waves frequency for Trieste into the future using the RCP2.6, RCP4.5 and RCP8.5 scenarios and five different climate models resulted in:

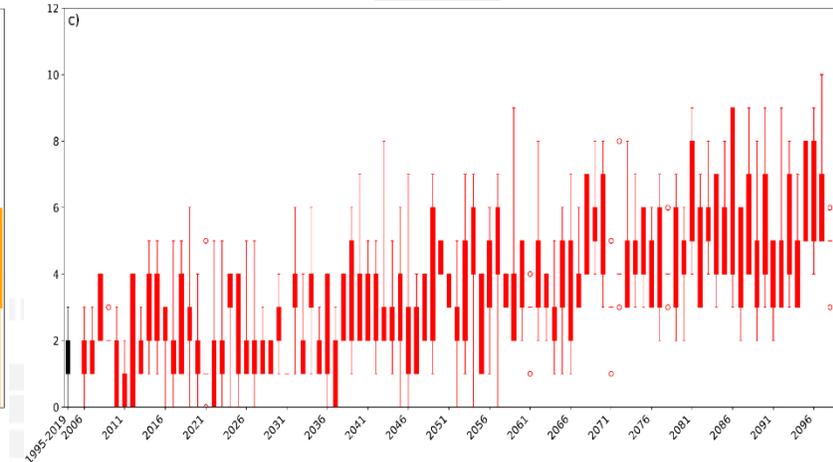
RCP2.6



RCP4.5



RCP8.5



For what concerns cold spells the analysis highlighted that no significant variations are forecasted in any combination of climate models and RCP scenarios

Climate change impact on heating and cooling energy consumption

Climate change impact on buildings

Due to the forecasted increase of temperature the Degree Days will vary

Probable consequences will be:

- Increase of cooling energy consumption
- Decrease of heating energy consumption
- Increased possibility of thermal discomfort due to the absence of cooling in many buildings
- Current refurbishment solutions (mainly focused on heating performance) could be counterproductive for energy performance in the future

Historical and forecasted Heating (a) and Cooling (b) Degree Days for Trieste using five different climate models

