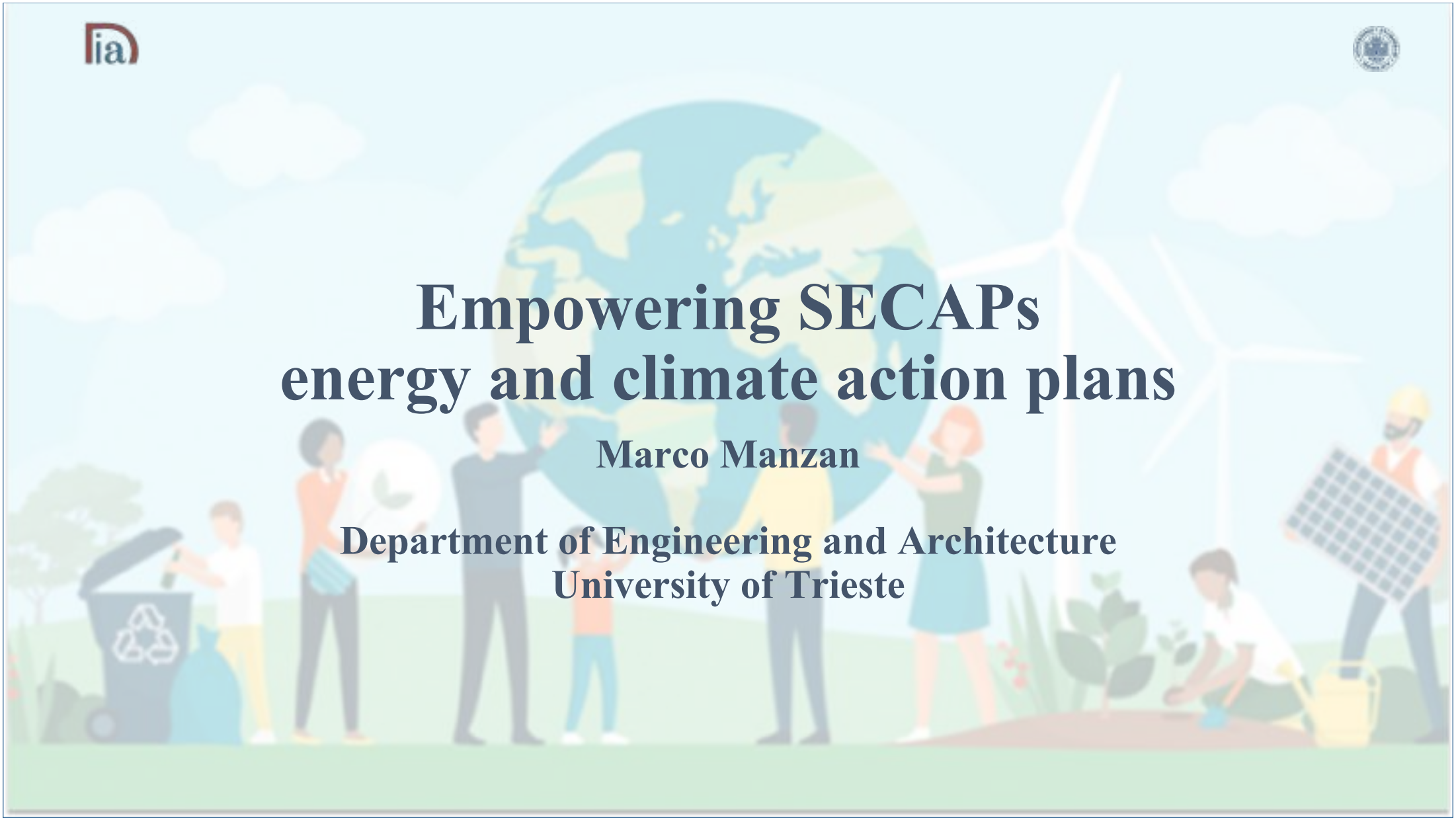
Empowering SECAPs energy and climate action plans

Marco Manzan

Department of Engineering and Architecture
University of Trieste



EU Adaptation Strategy

- Europen Union adopted 24 February 2021 the new strategy on climatic change
- The purpose is to create an Europe resilient to the climatic change by 2050
- Four objectives for adaptation:
  - smarter
  - swifter
  - more systemic
  - step up international action on adaptation to climate

Smarter

- Adaptation actions must be supported by robust data and risk analysis methodologies available to all
- The strategy stimulates the frontiers of knowledge on adaptation
- More and better data on climate risks need to be collected
- Direct reference to Climate-ADAPT
  - Platform to access and share data on climate change, strategies, case studies, tools

  https://climate-adapt.eea.europa.eu/

Swifter

- The effects of climate change are already clear
- Action must be faster
- The strategy focuses on developing and proposing adaptation solutions to reduce the risk related to climate change
- Covenant of Mayors with SECAPs developed in this direction fostering different adaptation initiatives

more systemic

- Climate change will have impacts at all levels in society and the economy
- Actions must be systematic
- It directly involves government structures with three priorities
  - Integrating climate resilience in national fiscal frameworks
  - Promoting nature-based solutions for adaptation
  - Local actions
- The SECAPs development move in this direction. Strengthening the active role of local government

Step up international action on adaptation to climate

- increase support for international climate resilience and preparedness
- provision of resources
- prioritising action and increasing effectiveness
- scaling up of international finance
- stronger global engagement and exchanges on adaptation.
- New ideas must be exchanged

European Green Deal

- Objective: to make Europe neutral for emissions in 2050
- Revisions of regulations and standards
- Eight areas of intervention
  - Increase 2030 e 2050 objectives
  - Effort for clean energy
  - push industry towards the circular economy
  - Build and renovate buildings efficiently
  - Avoid pollution for a non-toxic environment
  - Preserve ecosystems and biodiversity
  - From producer to consumer: an environmentally friendly food system
  - Accelerate the transition to sustainable mobility

The benefits of the European Green Deal

The European Green Deal will improve the well-being and health of citizens and future generations:

Actions of European Green Del

Clima

Energy

Agricolture

Industry

Environment

Transpor t

Finance and regional development

Research and innovation

European Covenant of Mayors & Mayors Adapt

- launched in 2008 in Europe with the ambition to gather local governments voluntarily committed to achieving and exceeding the EU climate and energy targets.
- Success for: bottom-up governance, multi-level cooperation model and its context-driven framework

Covenant of Mayors
Committed to local sustainable energy

MAYORS ADAPT
THE COVENANT OF MAYORS INITIATIVE ON ADAPTATION TO CLIMATE CHANGE

- Cities vulnerable to extreme weather events and other effects of climate change
- Cities signing up to the initiative commit to contributing to the overall aim of the EU Adaptation Strategy
- development a comprehensive local adaptation strategy or integrating adaptation to climate change into existing plans

European Covenant of Mayors for Climate & Energy

- In 2015 the Covenant of Mayors and Mayors Adapt joined forces
- The focus expanded from Energy to Energy and Climate Adaption
- brings together thousands of local governments voluntarily committed to implementing EU climate and energy objectives.
- bottom-up approach to energy and climate action, quickly raised beyond expectations.
- Gathering 11,000+ local and regional authorities across 55 countries
- Success for: bottom-up governance, multi-level cooperation model and its context-driven framework

Covenant of Mayors
Committed to local sustainable energy

MAYORS ADAPT

Covenant of Mayors
for Climate & Energy
EUROPE

Evolution of the initiative

SEAP: Sustainable Energy Action Plan

- The SEAP is the document by which Covenant of Mayors signatories demonstrated how they could reach the 20% target CO2 emissions reduction commitment by 2020.
- Emission Inventories: Final energy consumption and CO2 emissions
- The SEAP must be revised on a regular basis as localities gain experience, achieve results and incorporate new climate science and technologies.
- The SEAP should be formulated such that projects arising in the future are developed to support the SEAP objectives.
- Efficient use of energy, renewable energy sources and other reduction actions should inform decision-making for all new projects, even with an already approved SEAP.

SECAP: Sustainable Energy and Climate Action Plan

- The SECAP is the document by which CoM signatories demonstrated how they could reach the energy and climate resilience targets by 2030
- Strategy
  - CO2 reduction targets, adaption goals. Attribution of staff and financial capabilities
- Emission Inventories
  - Final energy consumption and CO2 emissions
- Mitigation Actions
  - List of actions to implement strategy
- Risk and Vulnerabilities
  - Climate vulnerabilities, hazards and impact
- Adaption Actions
  - Sction Plans and actions to be implemented

NEW

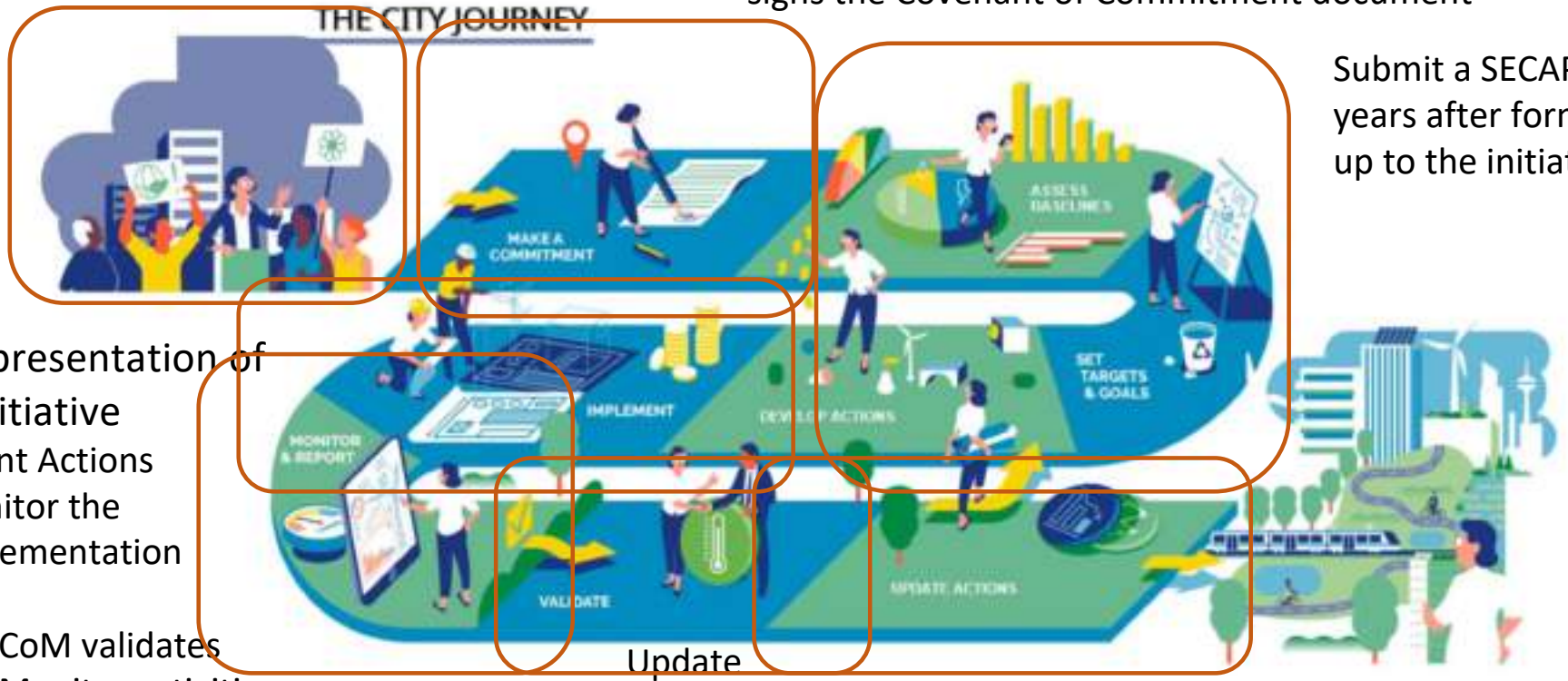
From SEAP to SECAP

Initiative:	Covenant of Mayors	Mayors Adapt	Covenant of Mayors for Climate & Energy
Time period:	From 2008 to 2015	From 2014 to 2015	**From 2015 onwards**
Commitments:	- Mitigation (2020 time horizon)	- Adaptation	- Mitigation (2030 time horizon) - Adaptation - Energy Access
Reporting template to be filled in:	SEAP template	Mayors Adapt template	SECAP template

The City Journey

the Mayor or other representative signs the Covenant of Commitment document

Submit a SECAP within two years after formally signing up to the initiative



local presentation of the initiative

Implement Actions

Monitor the implementation

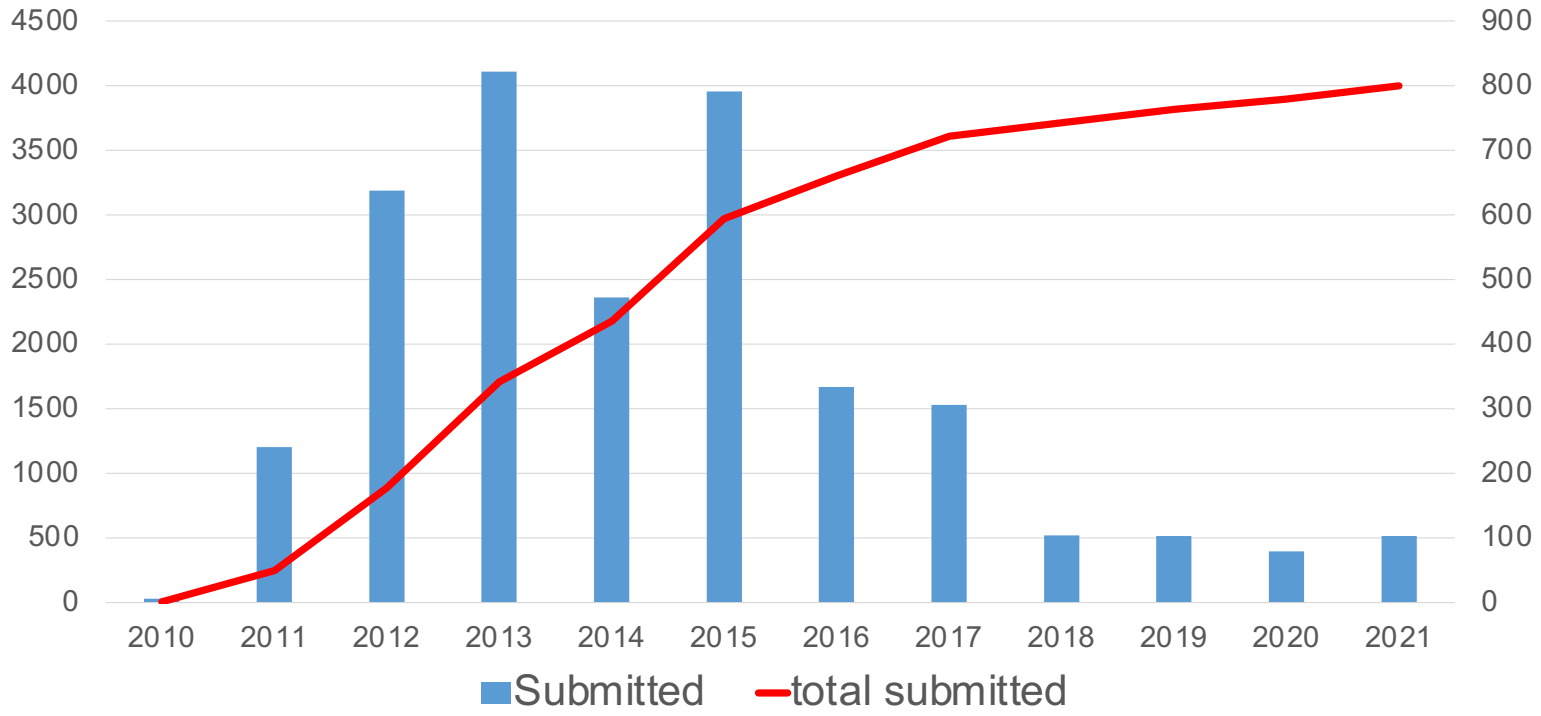
CoM validates

Monitor activities

Update Actions

CoM in Numbers

CoM in Italy


4500
4000
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700
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200
100
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Submitted
total submitted

Interreg project SECAP

- Support for energy and climate adaptation policies
- encourage the sustainable development of the cross-border territory
- promoting low-carbon strategies for all types of territory, especially urban areas, creating relevant adaptation and mitigation measures
- cross-border sharing of tools, methodologies and databases
- Promote sustainable development models of the Covenant of Mayors with an improvement in the quality of life and resilience to climate change

Project partners

- Friuli Venezia Giulia Autonomous Region
- University of Trieste
- Area Science Park Trieste
- City of Venice
- University of Architecture (IUAV) Venice
- Unioncamere Veneto
- Goriška local energy agency (GOLEA)
- Local energy agency of Gorenjska region (LEAG)
- Regional development agency for Ljubljana urban region (RRA LUR)
- Municipality of Pivka

SECAP

Preparation of SECAP strategic documents and support

- Ajdovščina
- Nova Gorica
- Koper
- Idrija
- Pivka
- Brezovica
- Sacile, Brugnera, Polcenigo, Budoia, Caneva, Fontanafredda
- Trieste Duino Aurisina

Population of the municipalities involved: 400.000 inhabitants

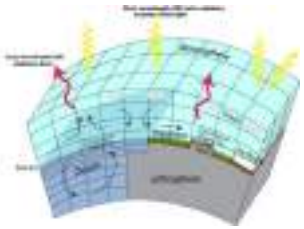
Risk and vulnerability assessment

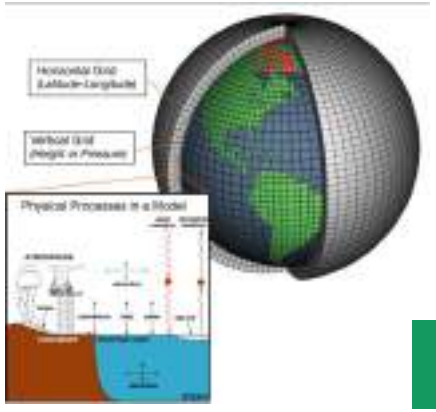
Climate hazards	<< Current risk of hazard occurring >>		<< Future hazards >>		
	Probability of hazard	Impact of hazard	Expected change in hazard intensity	Expected change in hazard frequency	Timeframe(s)
① Step 1) Check the boxes for the climate hazards that are applicable to your local authority. >>> Step 2) Fill in all green fields for the selected hazards by choosing (i.e. copying and pasting) option(s) in row# 14 >>> Step 3) Optionally, fill in information for the relevant sub-hazards (do not fill anything for sub-hazards that are not relevant).					
	Single choice: Low Moderate High Not known	Single choice: Low Moderate High Not known	Single choice: Increase Decrease No change Not known	Single choice: Increase Decrease No change Not known	Multiple choice: Short-term Mid-term Long-term Not known
Extreme heat	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]
Extreme cold	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]
Heavy precipitation	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]
Floods & sea level rise	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]
Droughts & water scarcity	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]
Storms	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]
Mass movement	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]
Wild fires	[Please choose]	[Please choose]	[Please choose]	[Please choose]	[Please choose]

SECAP

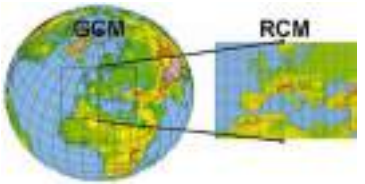
Climatic models – Global - Regional

- Regional Circulation Models
  - Use GCM su finee grid
  - Resolution 10 km
  - Models, required comparison with recorded data
  - These are the GCM-RCM models

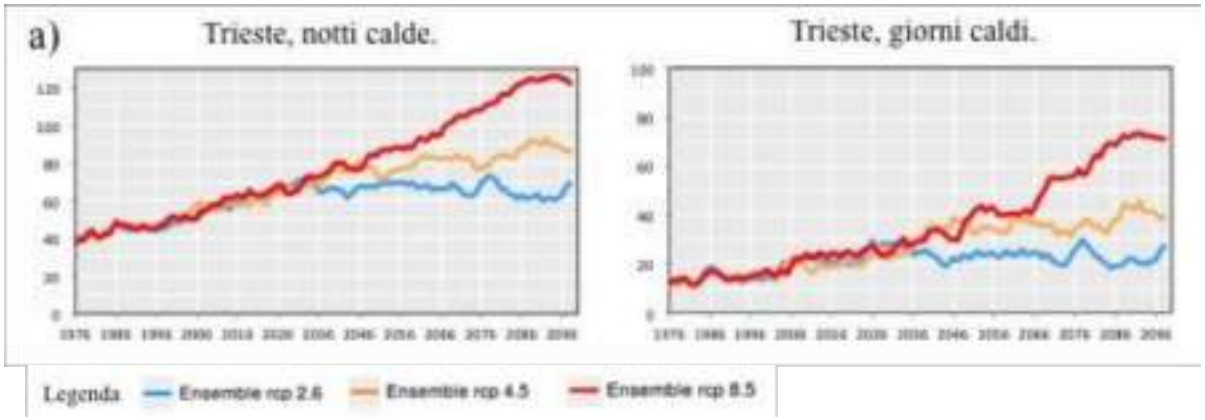




- Global Circulation Models
  - Mathematical model on global scale
  - numerical model
  - Resolution 250 km
  - Large resources required

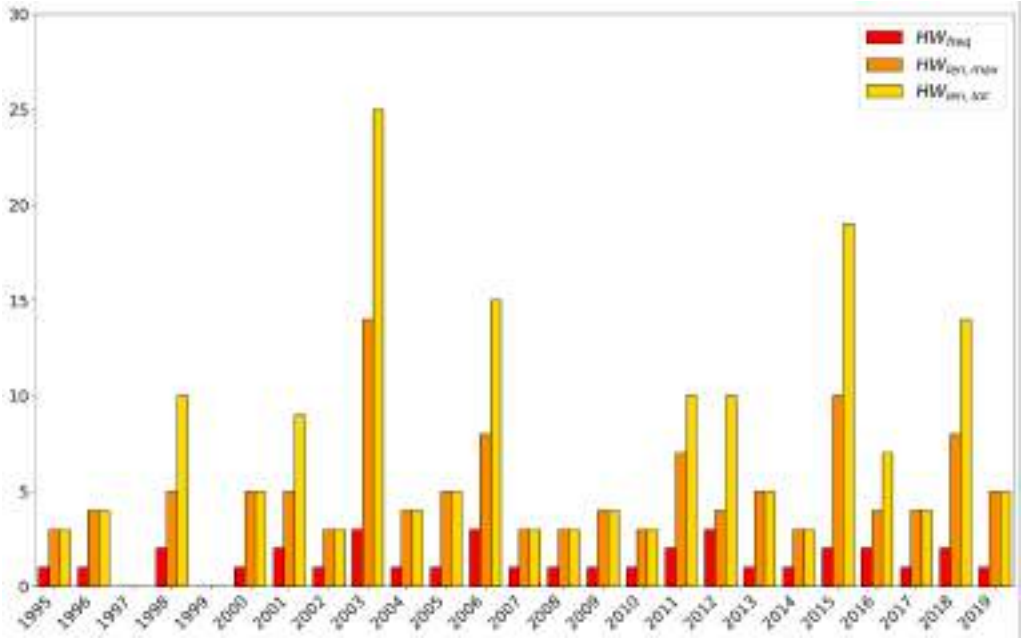


ARPA study about climate change in FVG region



1. HadGEM2-ES_RACMO22E
2. MPI-ESM-LR_REMO2009
3. EC-EARTH_CCLM4-8-17
4. EC-EARTH_RACMO22E
5. EC-EARTH_RCA4

Hazard - Heat wave

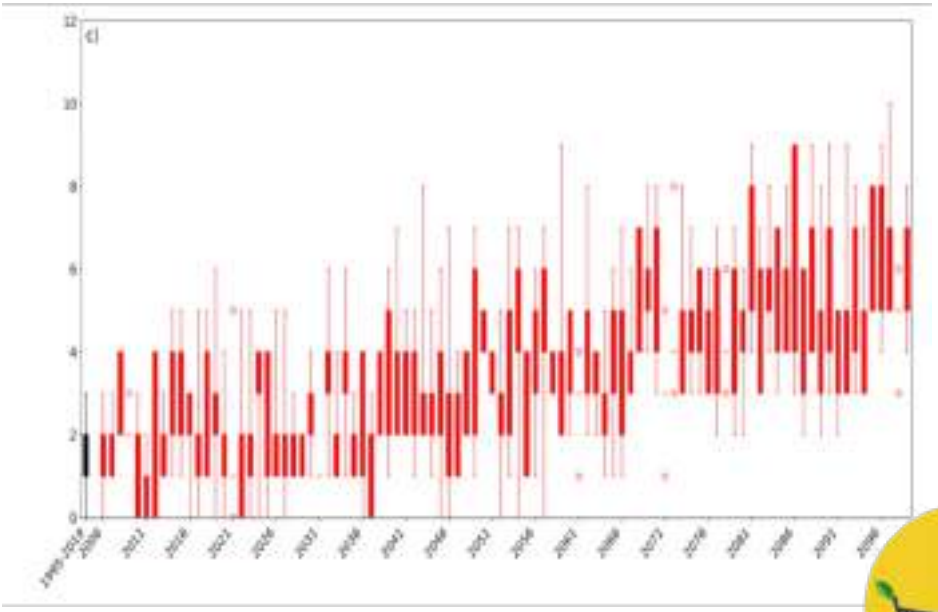


- Historical data
- Data recorded in weather stations
- Heat wave
  - Maximum temperature > 30 °C
  - Minimum temperature > 22 °C
  - At least for 3 days
- Dangerous for people

SECAP

Hazard - Heat wave

- Future data
- Obtained from five models
- Five models used to introduce uncertainty
- Distribution of heat waves with models
- The trend is increasing

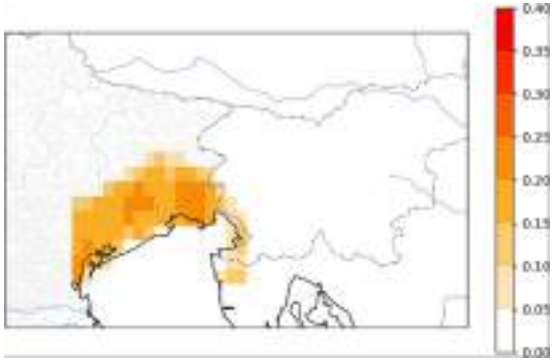


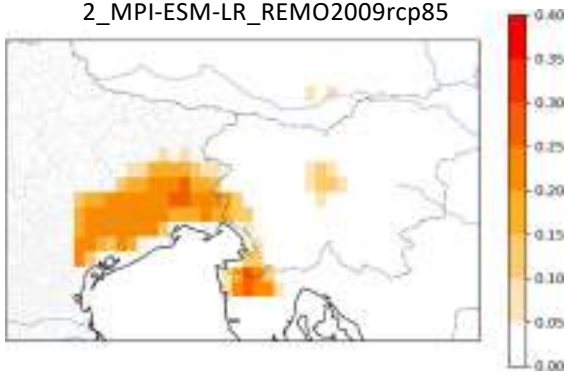
Heatwave increase trend

1_HadGEM2-ES_RACMO22Ercp85

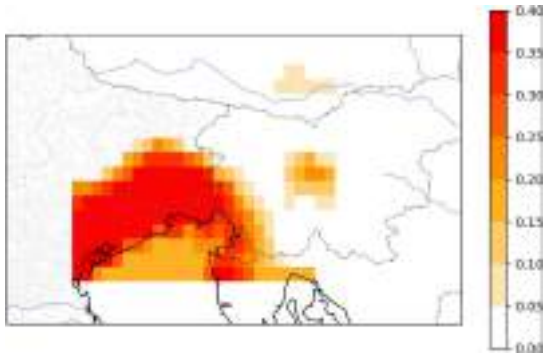
2_MPI-ESM-LR_REMO2009rcp85

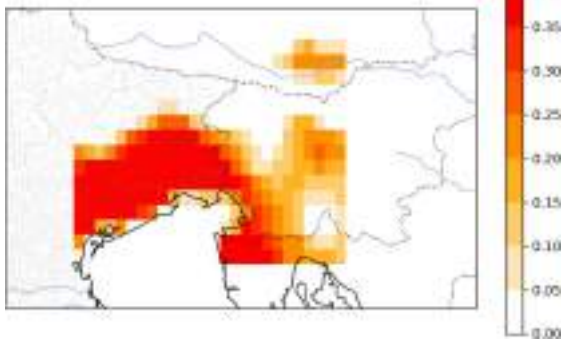
2050





2100





SECAP

Pilot actions of the project

- Small infrastructure investments for monitoring energy consumption (municipality of Log - Dragomer)
- Collection of good practices with a set of appropriate measures in the field of climate change mitigation and adaptation



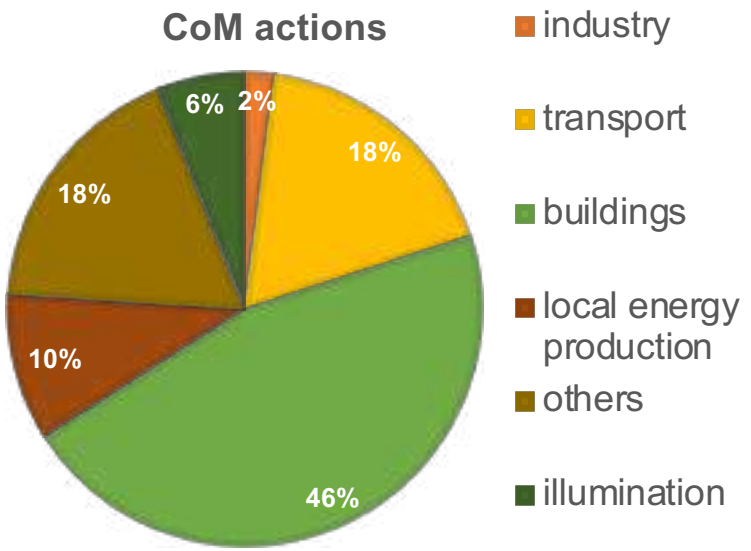

SECAP

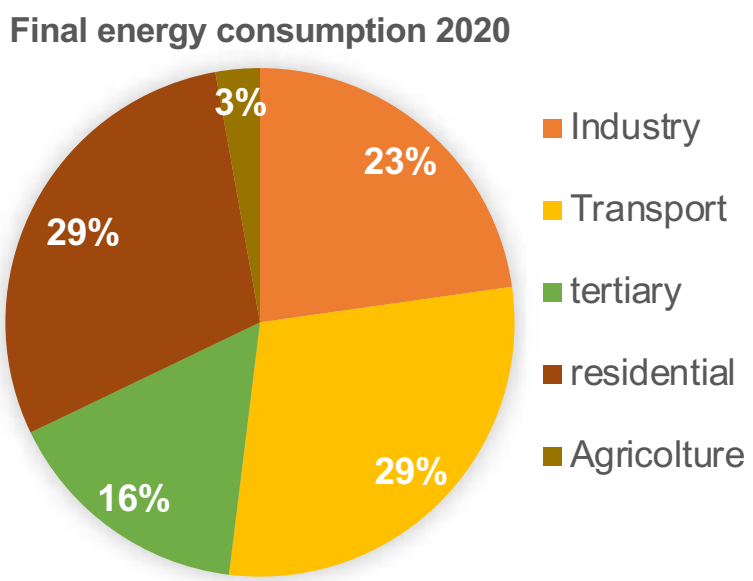
Pilot actions of the project

- Air quality measuring station (smart city Kranj)
- Study: Potential of heat use from municipal wastewater in the Municipality of Kranj
- Energy audit (Museum Revoltella in Trieste)

SECAP

CoM SEAP Actions



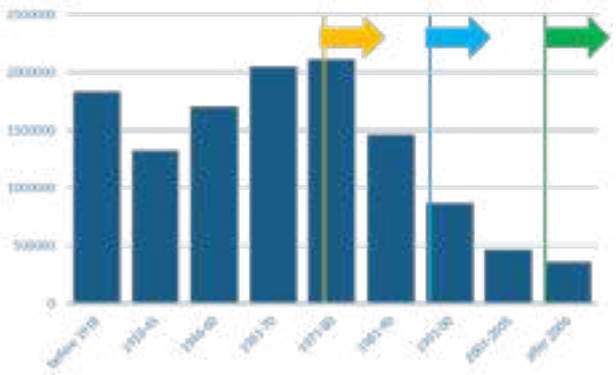


Assessment of climate change mitigation policies in 315 cities in the Covenant of Mayors initiative
Sustainable Cities and Society journal, 60 (2020) https://doi.org/10.1016/j.scs.2020.102258

Buildings in Europe/Italy

- More than 75 % inefficient buildings
- 11 % annual refurbishment rate
- 1% energy refurbishment
- 0.2% of the building stock per year with deep renovations: reductions of energy consumption by at least 60%
- The objective is to at least double the annual energy renovation rate of residential and non-residential buildings by 2030 and to foster deep energy renovations.
- A lot of measures involve building energy analysis
- Project SECAP -> Energy Audit Revoltella Museum

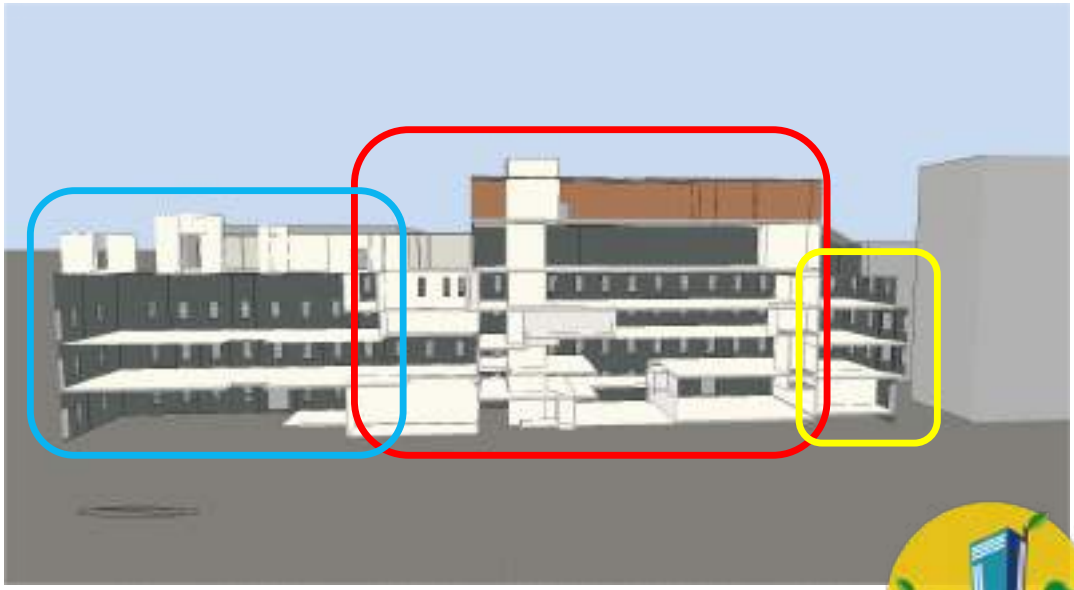
Buildings for year od construction



Energy Audit Revoltella Museum

Heated/Cooled volume	29 000	(m^3)
Heated/Cooled surface	6 000	(m^2)

- Three main zones
  - Museum
  - exhibition space
  - Offices

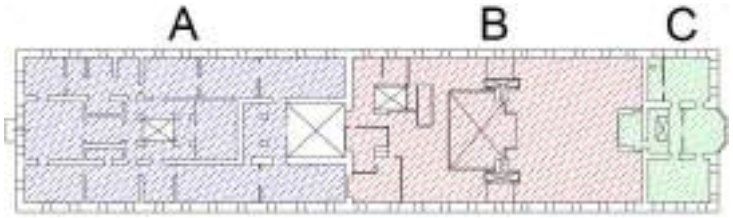


SECAP

State-of-the-art modelling

Transmittance values of envelope opaque elements

Element	**U** [W/(m^2 K)]
External walls	0.72
Earth retaining walls	1.20
Ground floor	0.41
Internal floor	1.94
Roof	1.77

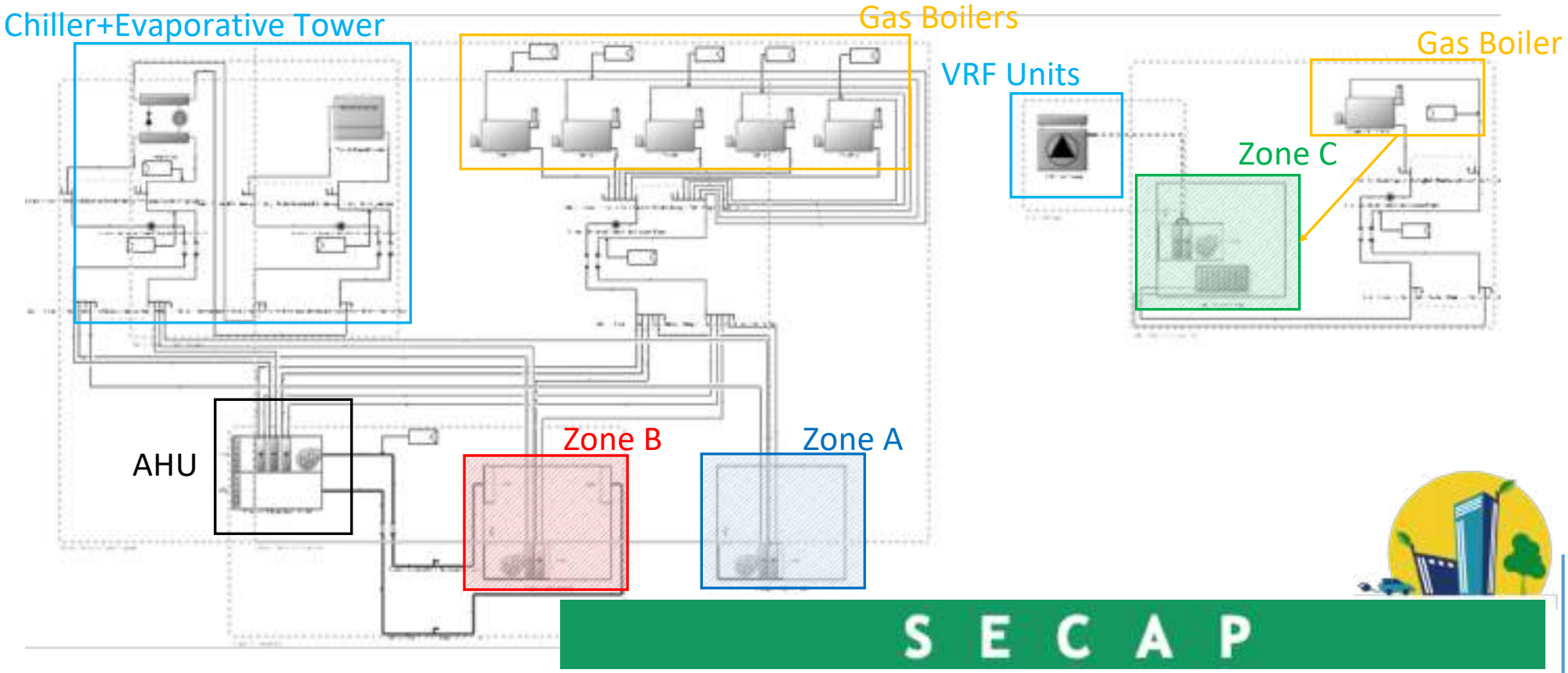


Building internal zones features and plant terminals

Parameter \ Zone	**A**	**B**	**C**
People density [people/m^2]	0.143	0.143	0.070
Lighting norm. power dens.[W/(m^2 - 100lux)]	6	6	4
Illuminance [lux]	200	200	300
Plant terminals [/]	Fan-coils	Fan-coils + CAV units	Radiators + VRF units

SECAP

State-of-the-art modelling



Model calibration

- Envelope elements transmittance
- People and lighting internal gains
- Plant components characteristics

Model calibration results

Energy vectors consumption	Historical	Model	Model Error [%]
Gas [m^3]	56 056	52 458	-6.86
Electricity [kWh]	313 020	319 371	+2.03

2010-2012 yearly average

2019, 2020 yearly value

2017-2020 monthly values

1995-2020 hourly values

Climatic data for calibration:

Jan 1 - Apr 15, Oct 15 - Dec 31:

2010-2012 three-years average

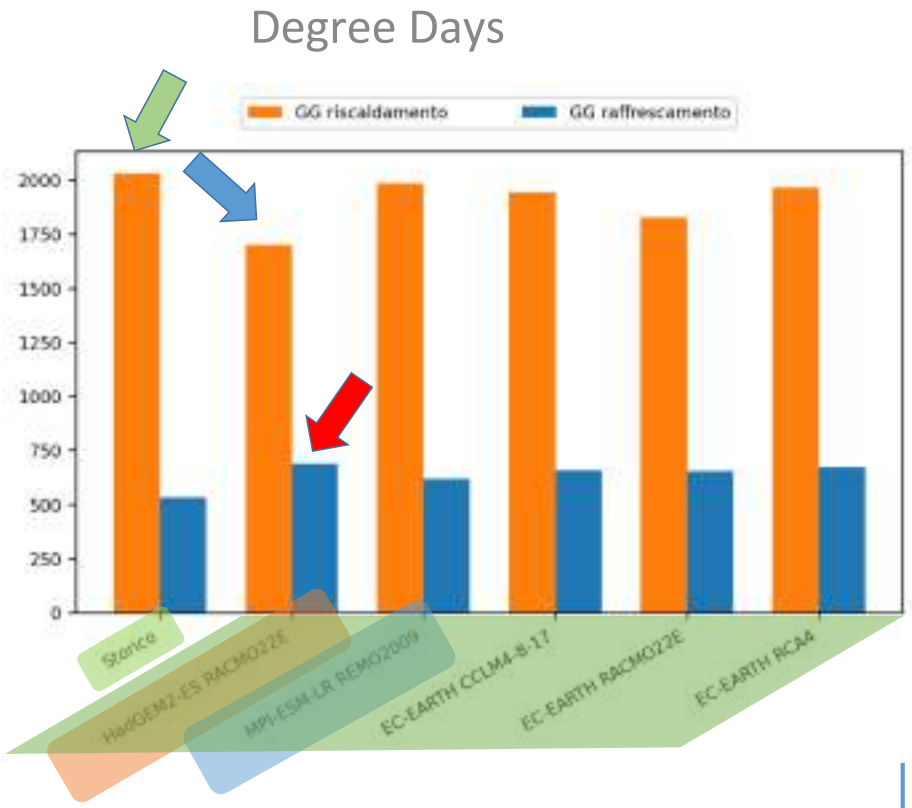
Apr 16 - Oct 14:

2018 values

SECAP

Anni climatici di riferimento

- New data from models
  - history 1995-2019
  - Future 2021-2035
- Decrease Heating DD
- Increase Cooling DD
- For cooling identified
  - Max increase of DD
  - Min increase of DD



Consumption for present and future scenarios

Period	gas consumption [m^3]	Electricity consumption [kWh]	Var. Gas [%]	Var. Ele. [%]
1995-2019	52931	289193	\	\
2021-2035	43961	318398	-16.95	10.10
2036-2050	42654	325025	-19.42	12.39

SECAP

Refurbishment interventions

Envelope

External Facades and windows cannot be modified

10 cm of rock wool + 2 cm of plaster

λ = 0.038 W/(m K)

ρ = 35 kg/m³

c = 840 J/(kg K)

Cost = 409,264 €

Zone A

Cannot be modified internally

PVC Frame

Coated Glass 6 mm / SHGC = 0.3622

16 mm Argon-filled cavity

Clear Glass 4 mm

Cost = 67,783 €

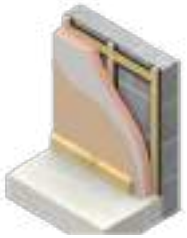
Plant

Main components are still pretty new

Cost = 477,047 €

Solution A

Internal insulation of walls pertaining modern art museum

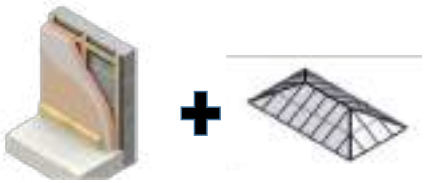


Solution B

Substitution of existing skylights with new ones featuring solar control glasses

Solution C

Solution A + Solution B



Results 2035-2050

TRY	actions	gas [m³]	elettricity [kWh]	Var. Gas [%]	Var. Ele. [%]	Cost [€]	Simple return [years]
2021-2035	SF	43961	318398	\	\	\	\
	A	36875	317161	-16.12	-0.39	409264	47
	B	41840	311235	-4.82	-2.25	67783	19
	C	34395	307362	-21.76	-3.47	477047	36

TRY	Azione	gas [m³]	elettricità [kWh]	Var. Gas [%]	Var. Ele. [%]	Costo [€]	Simple return [years]
2036-2050	SF	42654	325025	\	\	\	\
	A	35768	323689	-16.14	-0.41	409264	48
	B	40618	317525	-4.77	-2.31	67783	19
	C	33345	313582	-21.82	-3.52	477047	37

Conclusion

- Covenant of Mayors is an interesting initiative
- Comes from the bottom
- Help municipalities develop plans for mitigation
- Nowadays of fundamental importance, not only for climate action but also for reducing expanses
- SECAP is a good framework,lot of resources
- Important to made available to municipalities data
- Required an intermediate layer between municiplaities and CoM

Thank you for your attention

Manzan@units.it