

# Why cooling with the sun energy?

Adriacold Final Event  
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# Main drivers (EU2020 objectives)

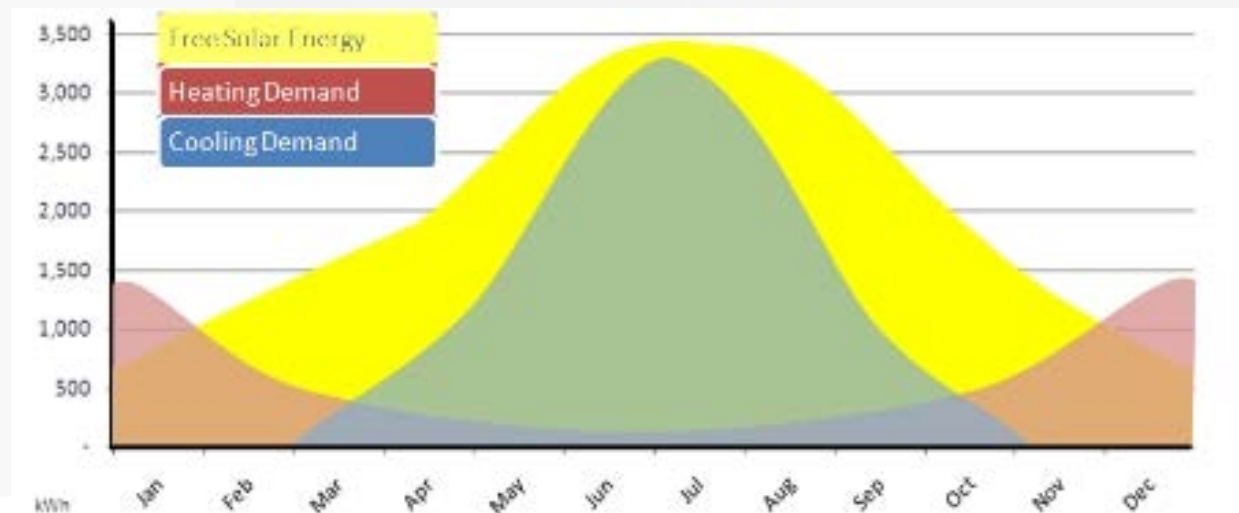
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- 1) Power energy reduction for building purpose
- 2) Energy local production from RES
- 3) Mitigate the environmental pollution with innovative and efficient energy systems
- 4) New markets development and employment increase

# Why a project on solar cooling ?

Solar Cooling offers substantial environmental, financial and social benefits over the conventional compressor driven cooling systems. Disadvantages with compressor driven systems are that they consume a lot of electricity and use refrigerants which damage the ozone layer of the atmosphere.

Using the sun's energy for heating during winter and cooling during summer fully uses its potential all year round.



# Objectives

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## *„Diffusion of Cooling and Refreshing Technologies using the Solar Energy Resource in the Adriatic Regions“*

Project Acronym: **Adriacold**

Project code: 2° ord/0030/1

Website: [www.adriacold.eu](http://www.adriacold.eu)

- Promotion of the use of renewable (solar) energy for refreshing and cooling needs
- Contribution to the decarbonisation of the Adriatic area
- Study and assessment of the refreshing and cooling requirements (up to 2020)
- Identification of the most effective and appropriate solar cooling technologies
- Technical & economic feasibility study to be used as guideline for potential users
- Set up the first example of transnational network in the Adriatic Regions of pilot plants aiming to facilitate the fast diffusion of solar cooling & heating technologies adoption for buildings summer/winter conditioning

# Involved Territories (5) & Partners (12)

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- *ITA:*
  - Consorzio per l'AREA di ricerca scientifica e tecnologica di Trieste (Leader)
  - ENEA - Agency for the New Technology, Energy and the Environment, Bari
  - Cortea, Trieste
  - Province of Rimini
- *SLO:*
  - GOLEA - Goriska Local Energy Agency
  - Josef Stefan Institute, Ljubljana
  - Municipality of Piran
- *CRO:*
  - Faculty of Mechanical Engineering and Naval Architecture, Zagreb
  - Regional Energy Agency Kvarner
  - City of Dubrovnik
- *B&H:*
  - Economics Institute Ltd. Banja Luka
- *ALB:*
  - City of Durres

# The challenge of a potential market

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SC Medium- and small-size plants (less than 200 kWf):

- PUBLIC BUILDING (i.g. offices, schools, kindergarden, sport center)
- AGRICULTURE (i.g. greenhouses)
- AGROINDUSTRY(i.e. wineries, small diaries )
- TOURIST ACCOMODATION (i.g. hotels, camping sites, marinas, farm holidays)
- COMMERCIAL BUILDING (i.g. small shopping centers)

# Target beneficiaries

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- **Public administrators** that can promote and buy this type of innovative cooling systems using renewable energy sources
- **Professionals, manufacturing companies and relevant industry associations** that can enter new markets with innovative products
- **Researchers** that can have access to actual fresh experimental data to be compared with theoretical ones
- **Owners/managers of hotels, fitness centre, greenhouses, nursing homes, small shopping canters** that can understand if they can save money installing cooling systems based on the solar cooling technologies.

# The Pilot Plants innovative network

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Total 6 pilot plants (in the range of 15 - 50 kW)\*

- ✓Italy (3) - Trieste, Rimini and Bari
- ✓Slovenia (1) - Piran
- ✓Croatia (2) - Rijeka and Dubrovnik.



\*Main purpose is to investigate the pilot performances in terms of energy saving and efficiency and not the economic return of investments



# Technical / economical challenges

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- ✓ assure high efficiency, high reliability and low maintenance competing with the other existing systems (i.e. PVs coupled with HPs);
- ✓ provide variable power depending on the heat load through an “intelligent” control;
- ✓ introduce standardized procedures for the plants design and drop fixed costs for the installation.

The investment cost of SC installation is higher than conventional air conditioning systems thus relatively few installations are place and this in turn keeps the cost of components (such as chillers) relatively high due to the absence of economies of scale.

The cost of investments result very important and strongly influence the economics values. In fact the 40% reduction of investment costs allows having interesting payback. In this sense, the availability of public subsidies seems absolutely necessary.

# Key considerations

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Today the investment costs of SC installation are still higher than conventional air conditioning systems thus relatively few installations are place and this in turn keeps the cost of components (such as chillers) relatively high due to the absence of economies of scale.

The cost of investments result very important and strongly influence the economics values.

According to project studies it seems that the 40% reduction of investment costs allows having interesting payback. In this sense, the availability of public subsidies seems absolutely necessary.

# Results achieved so far

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- ✓ A common template & methodologies to understand the potential territory cooling energy demand have been created as well building energy audits performed
- ✓ a report “Energy use for cooling and potential of solar assisted cooling in the public, hotel and tourist, agriculture and service sector” has been released encompassing around nr. 300 buildings located in 5 IPA Countries (AL, BiH, HR, IT and SI).
- ✓ Many technical reports have been produced to well asses and compare the pilot plants final characteristics and expected performances.
- ✓ A common monitoring layout and data acquisition procedures have been designed
- ✓ Nr. 6 solar cooling pilot plants have been installed with an investments for a total of 800.000 Eur. In Croatia they are the very first ones!
- ✓ Nr. 10 pre-feasibility studies on solar cooling systems done with a preliminary investment payback period calculation (5 hotels, 1 school, 1 winery, 1 wellness centre, 1 elderly home and 1 hospital)

# Final Event focus & aims

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- To share working principles and characteristics of the different technologies  
Solar Cooling: system configurations, components and performance, user profile, engineering solutions;
- To present advanced systems of monitoring and evaluation of the technical performance of the plant;
- To discuss technological interventions to lower the costs of investment to small-medium range power;
- To assess the economic viability and return on investment
- To consider the actual drawbacks and suggest possible countermeasures

**project coordinator**



**project partners**

*Cortea*



PROVINCIA  
DI RIMINI

**ENEA**

Agenzia nazionale per le nuove tecnologie,  
l'energia e lo sviluppo economico sostenibile



Institut "Jožef Stefan"  
Ljubljana, Slovenija



OBČINA PIRAN  
COMUNE DI PIRANO



**REA**  
KVARNER



DURA  
Illegirna agencija Grada Dubrovnika  
City of Dubrovnik Development Agency

**Economics  
Institute**  
Banja Luka



BASHKIA DURRES

**THANKS FOR YOUR LISTENING !**

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**Adriacold**



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