



UNIVERSITÀ DEGLI STUDI
DI PERUGIA

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DIPARTIMENTO DI
SCIENZE POLITICHE



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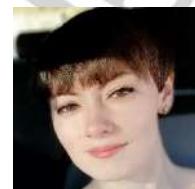
ENERGIA E RICERCA: IL RUOLO DELL'UNIVERSITÀ ESPERIENZE E PRASSI

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**A.L. Pisello****C. Piselli****C. Fabiani**<https://www.eaplab.eu/>**I. Pigliautile****J. Romanelli****B. Pioppi****L. Boquera****I. Kousis****F. Landi****M. Di Grazia****C. Chiatti****F. Vittori**DIPARTIMENTO DI
SCIENZE POLITICHEPerugia
24-04-20Cofinanziato dal
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DI PERUGIA**F. Cotana**



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Horizon2020 e l'efficienza energetica: prassi

Dr. Cristina Piselli



Cattedra Jean Monnet "THE IMPLEMENTATION OF EU POLICIES BY

REGIONAL AND LOCAL AUTHORITIES – EUREL"



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THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZON 2020



**EXCELLENT SCIENCE
COMPETITIVE INDUSTRIES
BETTER SOCIETY**



Perugia
24-04-20



H2020:

- Public largest international, competitive, cooperative Research & Innovation Programme for the period 2014-2020.
- Central instrument for the implementation of the European Research Area (ERA).
- Strategic Programme, some pre-defined thematic areas.
- Supports competitiveness in Europe.
- Beyond Europe: International Cooperation.



H2020:

- **Main aim:** to **create economic activity**, namely to create jobs.
- A core part of **Europe2020**, Innovation Union & European Research Area:
 - Responding to the **economic crisis** to invest in future jobs and growth;
 - Addressing people's concerns about their **livelihoods, safety and environment**;
 - Strengthening **EU's global position in research, innovation and technology**.
- Three priorities:
 - (i) **Excellent science**
 - (ii) **Industrial leadership**
 - (iii) **Societal challenges**



Societal challenges:

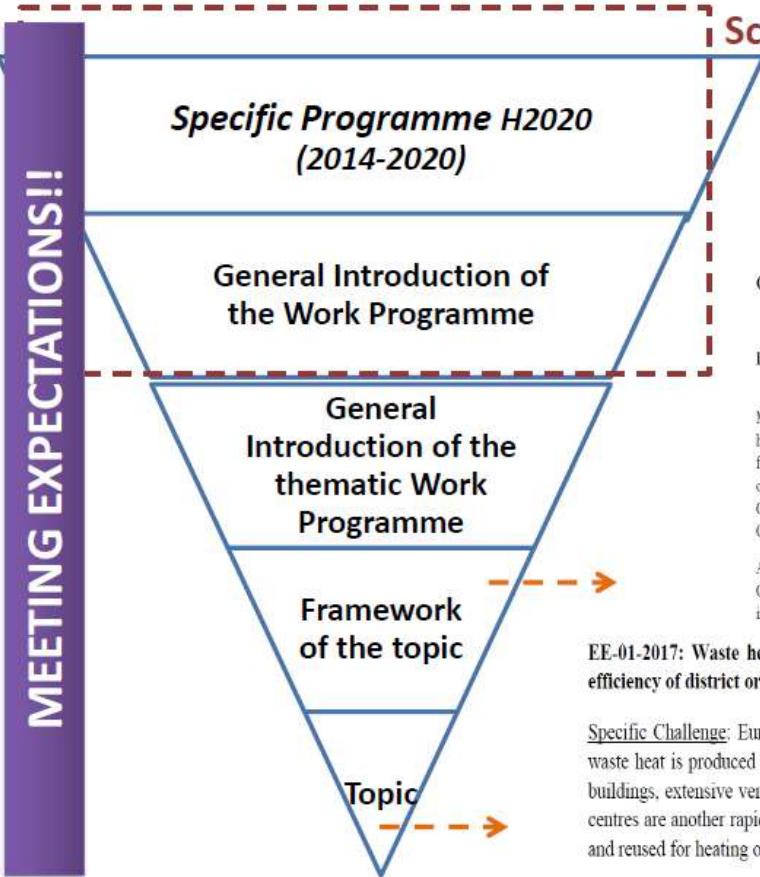
- **SC1** - Health, demographic change and wellbeing
- **SC2** - European bioeconomy challenges: Food security, sustainable agriculture and forestry, marine and maritime and inland water research
- **SC3** - Secure, clean and efficient energy
- **SC4** - Smart, green and integrated transport
- **SC5** - Climate action, resource efficiency and raw materials
- **SC6** - Europe in a changing world – inclusive, innovative and reflective societies
- **SC7** - Secure societies – protecting freedom and security of Europe and its citizen



Europe2020 Climate&Energy framework



MEETING EXPECTATIONS!



Biannual Work Programmes
(2014/2015; 2016/2017; 2018-2020)

Call - Energy Efficiency Call 2016-2017

H2020-EE-2016-2017

INTRODUCTION

Moderating energy demand can be considered as 'the foundation of the energy transition'^[1]. A high level of energy efficiency is beneficial for security of supply, sustainability, affordability for households and industry and competitiveness of the EU economy. It is one of the key objectives of EU energy and climate policy, as set out in the recent Energy Union Communication^[2], the 2014 European Energy Security Strategy^[3] and Energy Efficiency Communication^[4].

Achievement of the EU's energy efficiency objectives for 2030, as endorsed by the European Council in October 2014, will require a strong boost in Research and Innovation (R&I) investments to remove current technological and market uptake obstacles.

EE-01-2017: Waste heat recovery from urban facilities and re-use to increase energy efficiency of district or individual heating and cooling systems

Specific Challenge: Europe is not recovering enough of its waste energy. A vast amount of waste heat is produced in urban areas from a range of local sources (e.g. from metros, large buildings, extensive ventilation systems) and from urban waste or waste water systems. Data centres are another rapidly growing sector generating heat that could potentially be recovered and reused for heating or cooling buildings.

Action Type, Scope (actions), Expected Impact



Consortium:

- **Geographical distribution:** transnational consortium, with the participation of at least 3 institutions from 3 different member or associated states.
- Consortium **size** varies depending on the **project** and **type of actions**, but might be quite large.
- **Less RTD, more industry**, much more SME (50% of the consortium). Here, “industry and SME” includes administration and NGO.
- **COMPLEMENTARITY**



Coordinator and partners



Interdisciplinarity:

- Breakthrough solutions come from **multi-disciplinary collaborations**, including social sciences & humanities.
- The European Commission is supporting better **integration of energy-related social sciences and humanities** (energy-SSH) in shaping European energy policy.
- Designing future **energy policies**: social sciences and humanities to accelerate the **energy transition**.
- Cross-cutting issue: **social interest** of the project.



Science with and for society



Impact:

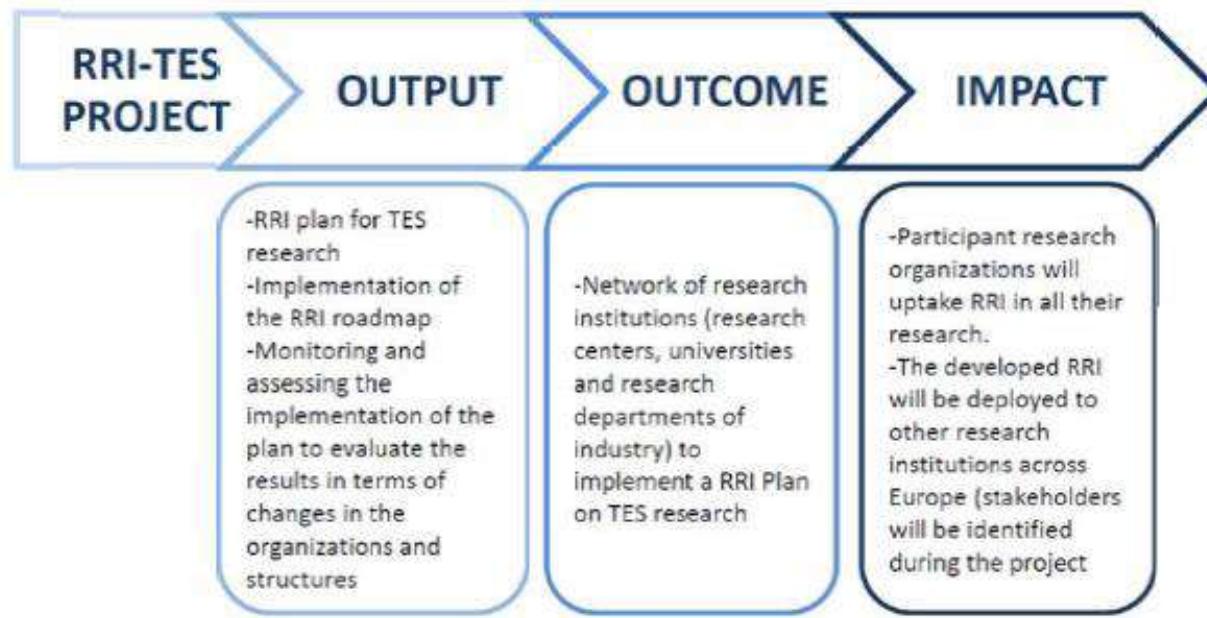
- **Environmental, economic and social impacts!**
→ Impacts touches several environments, not only Science.
- Enhancing **innovation capacity** and integration of new knowledge.
- Strengthening the competitiveness and growth of the industrial partners by developing and delivering innovations **meeting market needs**.
- Identifying the **Stakeholders**.
- In line with the “Expected Impacts” of the specific “Topic”.



From Policy to Programmes to Projects



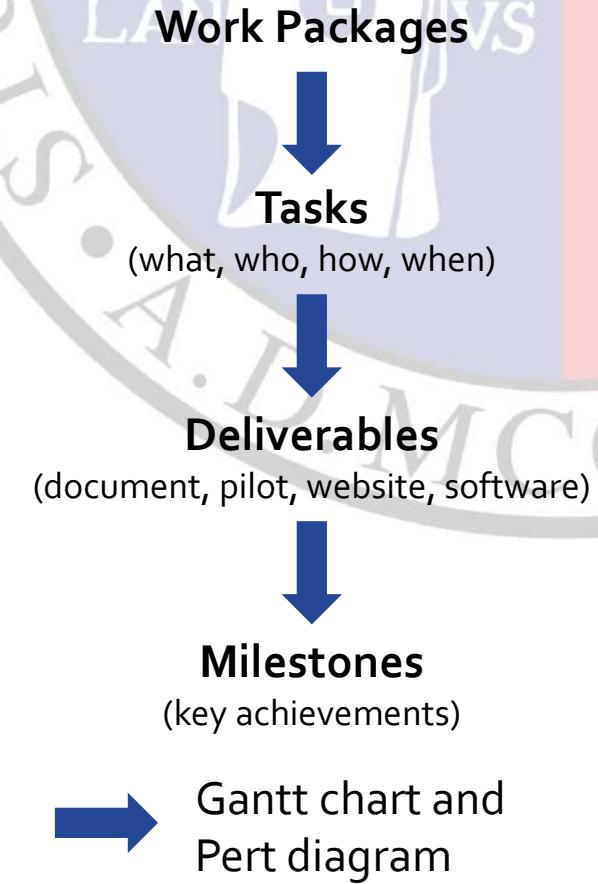
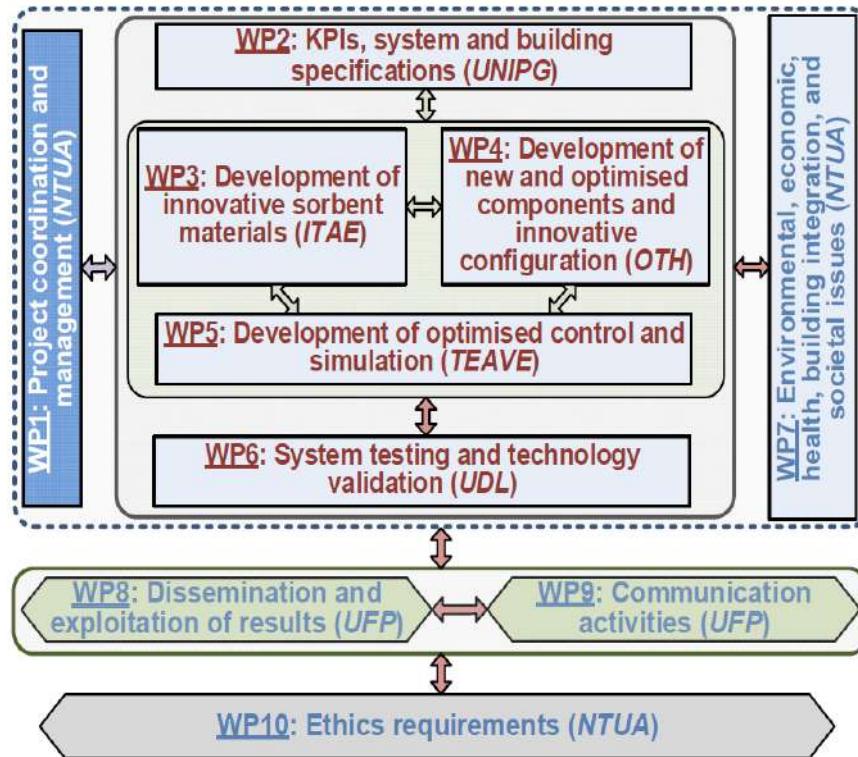
Impact:



Impacts are the **long term socio-economic and political changes** the public intervention brings about.



Project work plan:





Dissemination, communication and exploitation:

- **Measures to maximize the impact!**
- **Dissemination:** public disclosure of the results to the project own community, including by scientific publications.
- **Communication:** targeted and adapted to audiences that go beyond the project own community **to reach society, policy makers and final users.**
- **Exploitation:** use of the results in further research activities, or in developing, creating and **marketing a product or process**, or in creating **ad providing a service**, or in **standardization activities**.

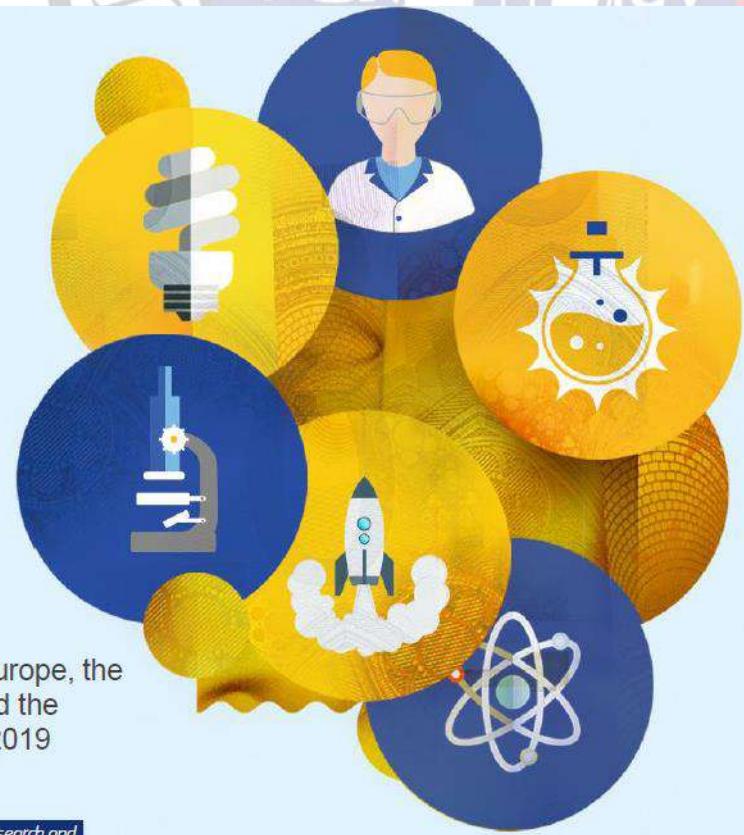


Horizon Europe

THE NEXT EU RESEARCH & INNOVATION
INVESTMENT PROGRAMME (2021 – 2027)

#HorizonEU

Based on the Commission Proposal for Horizon Europe, the common understanding between co-legislators and the Partial General Approach, both approved in April 2019



Research and
Innovation



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Horizon2020 e l'efficienza energetica: esperienze

Dr. Cristina Piselli

H2020 projects @ EAP LAB:

- **INPATH-TES** (G.A. N°657466) → Coordination and Support action (**CSA**)
- **ZERO-PLUS** (G.A. N°678407) → Innovation action (**IA**)
- **HERACLES** (G.A. N°700395) → Research and Innovation action (**RIA**)
- **Cold Energy** (G.A. N°737929) → Fast Track to Innovation Pilot (**FTI**)
- **SAFERUP!** (G.A. N°765057) → Marie Skłodowska-Curie Innovative Training Networks (**MSCA-ITN-ETN**)
- **SWS-HEATING** (G.A. N°764025) → Research and Innovation action (**RIA**)
- **GEOFIT** (G.A. N°792210) → Innovation action (**IA**)
- **NRG2peers** (G.A. N°890345) → Coordination and Support action (**CSA**)

Types of actions (1/3):

- Marie Skłodowska-Curie Innovative Training Networks (**MSCA-ITN**):
Aim to **train a new generation of** creative, entrepreneurial and innovative **early-stage researchers**, able to face current and future challenges and to convert knowledge and ideas into products and services for economic and social benefit.
EU funding rate – 100%
- Coordination and Support action (**CSA**):
Accompanying **research support measures** such as standardization, dissemination, awareness-raising and communication, networking, coordination or support services, policy dialogues and mutual learning exercises and studies.
EU funding rate – 100%



Types of actions (2/3):

- Research and Innovation action (**RIA**):

Activities aiming to establish **new knowledge** and/or to **explore the feasibility of a new or improved technology, product, process, service or solution**. For this purpose they may include basic and applied research, technology development and integration, testing and validation on a small-scale prototype in a laboratory or simulated environment. Projects may contain closely connected but **limited demonstration or pilot activities** aiming to show technical feasibility in a near to operational environment.

EU funding rate – 100%

TRL 3 → TRL 5

Types of actions (3/3):

- Innovation action (**IA**):

Activities directly aiming at **producing plans** and arrangements or designs **for new, altered or improved products**, processes or services. For this purpose they may include prototyping, testing, demonstrating, piloting, large-scale product validation and market replication. Projects may include **limited research and development activities**.

EU funding rate – 70% (SME and industry) / 100% (public entities)

TRL 4/5 → TRL 6/7

- Fast Track to Innovation Pilot (**FTI**):

It is a **fully-bottom-up innovation** support programme promoting **close-to-the-market innovation activities open to industry-driven consortia** that can be composed of all types of participants. It can help partners to co-create and test breakthrough products, services or business processes that have the potential to revolutionize existing or create entirely new markets, under the helm of the Enhanced European Innovation Council (EIC) pilot.

EU funding rate – 70% (SME and industry) / 100% (public entities)

TRL 6 → TRL 9



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INPATH-TES (CSA):

"PhD on Innovation Pathways for Thermal Energy Storage"

- EU H2020 – LCE – 2014-2
- May 2015 – Apr 2018 (36 months)
- 22 international partners:

<http://www.inpathtes.eu/>

Overall budget: € 4.301.072,66

EU contribution: € 4.301.072,66



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INPATH-TES (CSA): 

OBJECTIVE: Creation of a **network** of universities and research institutes to implement a **joint PhD programme on thermal energy storage (TES) technologies** (following EC SET-Plan Education and Training Roadmap).

- **Qualification of professionals** for the European research and industry institutions, necessary for Europe to continue maintain leadership in these technologies.
- The partners in the proposal will be the core of a future larger **network of excellent R&D institutions and industries** that will supply the necessary skilled workforce **for future thermal energy storage development in Europe**.



ZERO-PLUS (IA):

"Achieving near Zero and Positive Energy Settlements
in Europe using Advanced Energy Technology"

- EU H2020 – EE – 2014-2015
- Oct 2015 – Sept 2019 (48 months)
+ 12 months extension (Sept 2020)
- 16 international partners:



National and Kapodistrian
UNIVERSITY OF ATHENS



אוניברסיטת בן-גוריון
Ben-Gurion University of the Negev



Technical
University
of Crete



Technische Universität München



THE CYPRUS
INSTITUTE



CONTEDIL di RICCO MARIA & C. S.A.S.

GEORGE VASSILIOU Ltd



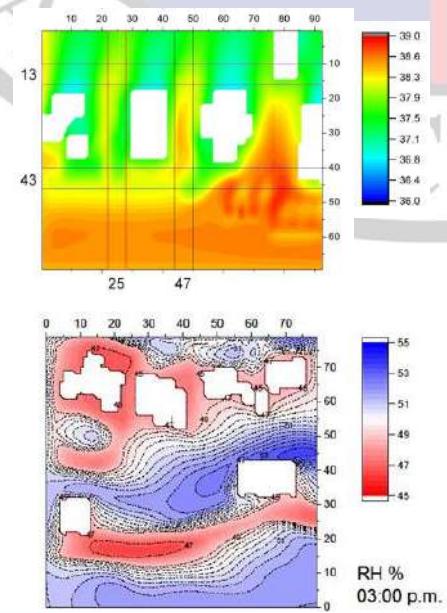


ZERO-PLUS (IA):



OBJECTIVE: Development of a **comprehensive** and **cost-effective** modular system for Net Zero Energy residential neighborhoods, including the definition of guidelines for its design, construction, monitoring, and performance assessment.

- Implementation of the system in **4 demonstration case study settlements**, with varying **climate** boundary conditions and **building typologies**.
- Sprawling the boundaries from **Net ZEB** to **NZE settlements**, i.e. from design at single building level to integrated settlement level.



ZERO-PLUS (IA):



- i. Reduction of the **operational energy usage** in each residential unit
→ **20 kWh/m² per year.**
- ii. Generation of **renewable energy** on average in the NZE settlement
→ **50 kWh/m² per year.**
- iii. Reduction of **carbon footprint** towards resource-efficient, low-carbon, and climate-resilient buildings and districts
→ **total 408 tons CO₂ offset** for all ZERO-PLUS case studies.
- iv. NZE settlements **cost reduction** compared with current ones
→ **16%.**

ZERO-PLUS (IA):



FIBRAN XPS Insulation



SBskin



FAE High Concentration PV



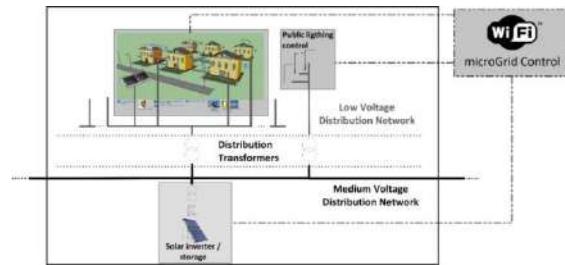
WindRail



FREESCOO



BEMS



Integrated Energy Resource Management



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HERACLES (RIA):

"Heritage Resilience against Climate Change Events
on Site"

- EU H2020 – DRS – 2015
- May 2016 – Apr 2019 (36 months)
- 16 international partners:

<http://www.heracles-project.eu/>

Overall budget: € 6.564.313,75

EU contribution: € 6.564.313,75

Coordination:



Consiglio
Nazionale delle
Ricerche



e-geos
AN ASI/TELESPazio COMPANY



FINMECCANICA



Fraunhofer
IOSB



UNINOVa



ARIA
TECHNOLOGIES



SISTEMAI
Sistemi Integrati per l'Ambiente



E-MRS



THALES



HELLENIC REPUBLIC
Ministry of Culture, Education
and Religious Affairs



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COMUNE
di
GUBBIO



FORTH
FONDAZIONE NAZIONALE DI RICERCHE - PIRELLA

HERACLES (RIA):



OBJECTIVE: Design, validate and promote **responsive systems for effective resilience of Cultural Heritage against climate change effects**, considering an holistic, multidisciplinary approach through the involvement of different expertise (end-users, industry/SMEs, scientists, conservators/restorators and social experts, decision, and policy makers).



Identify, assess and evaluate the risks a monument might face and incorporate these into an **online ICT platform to be used by a variety of users**, including municipalities, planners, government agencies and companies.



The methodology is validated when applied to **4 cultural heritage sites**: in Italy and in Crete.



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Cold Energy (FTI):

"Industrialization and path to commercialization of a patented innovative industrial kit to modify COLD cycle in order to drastically reduce ENERGY consumption"

- EU H2020 – FTIPilot – 2016-1
- Jan 2017 – Dec 2019 (36 months)
- 5 international partners:



<http://www.turboalgor.it/>

Overall budget: € 3.441.980

EU contribution: € 2.409.385,63



subcontractor



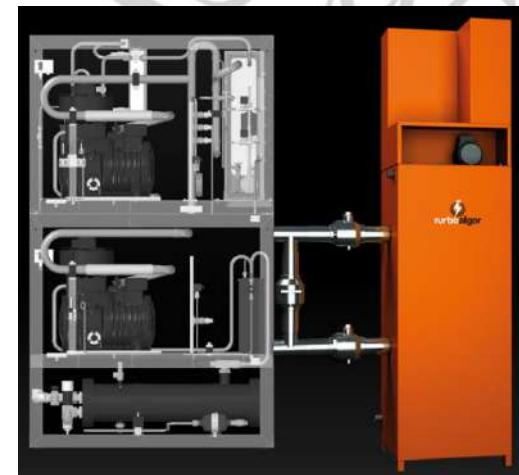
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Cold Energy (FTI):

OBJECTIVE:

Engineering, manufacturing and testing of a turbocharger for refrigeration systems mainly in Food and Chemical industries. Innovation is related to the introduction of an **energy recovery heat exchanger** and a turbocharger (technology coming from the automotive industry) into a conventional refrigeration plant.

- Engineering and realization of **2 pilot-plants** equipped with Cold Energy Industrial kit.
- To increase energy efficiency for refrigeration appliances, achieving up to **23%** of energy savings.





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SAFERUP! (MSCA-ITN-ETN):

**"Sustainable, Accessible, Safe, Resilient and Smart
Urban Pavements"**

- EU H2020 – MSCA-ITN – 2017
- Mar 2018 – Feb 2022 (48 months)
- 13 international partners:

<https://site.unibo.it/saferup/>

Overall budget: € 3.878.868,96

EU contribution: € 3.878.868,96



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



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WIEN



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The University of
Nottingham
UNITED KINGDOM · CHINA · MALAYSIA



Durth Roos
Consulting GmbH



S.A.P.A.B.A.



SAFERUP! (MSCA-ITN-ETN):

OBJECTIVE: Develop innovative solutions of urban paved environment for more livable cities, by training new professionals in the related fields, i.e. from smart, recycled and durable paving materials, to provision for vulnerable users accessibility and protection, to life cycle analysis, to energy harvesting and self-sensing technologies.



15 ESRs will undertake PhD in a research and training programme designed to optimize their multidisciplinary and cross-sectoral experience to increase the employability and satisfy the demand for qualified researchers and managers.



Enhance academia-industry **Transfer of Knowledge** in both directions.



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SWS-HEATING (RIA):

"Development and Validation of an Innovative Solar Compact Selective-Water-Sorbent-Based Heating System"

- EU H2020 – LCE – 2017
- Jun 2018 – May 2022 (48 months)
- 16 international partners:

<http://www.swsheating.eu/>

Overall budget: € 5.236.488,75

EU contribution: € 4.994.926,25

NATIONAL
TECHNICAL
UNIVERSITY OF
ATHENS

Universitat de Lleida



KOKORELIA ARCHITECTS

TEABE ENE

Akotec

PCM

E3G INGENIERÍA
Y ENERGÍA

US

UNIVERSITY
OF SUSSEXOTH
ÖSTRÄRISCHE
TECHNISCHE HOCHSCHULE
REGENSBURGfpd
User feedback program

AIREC

FAHRENHEIT



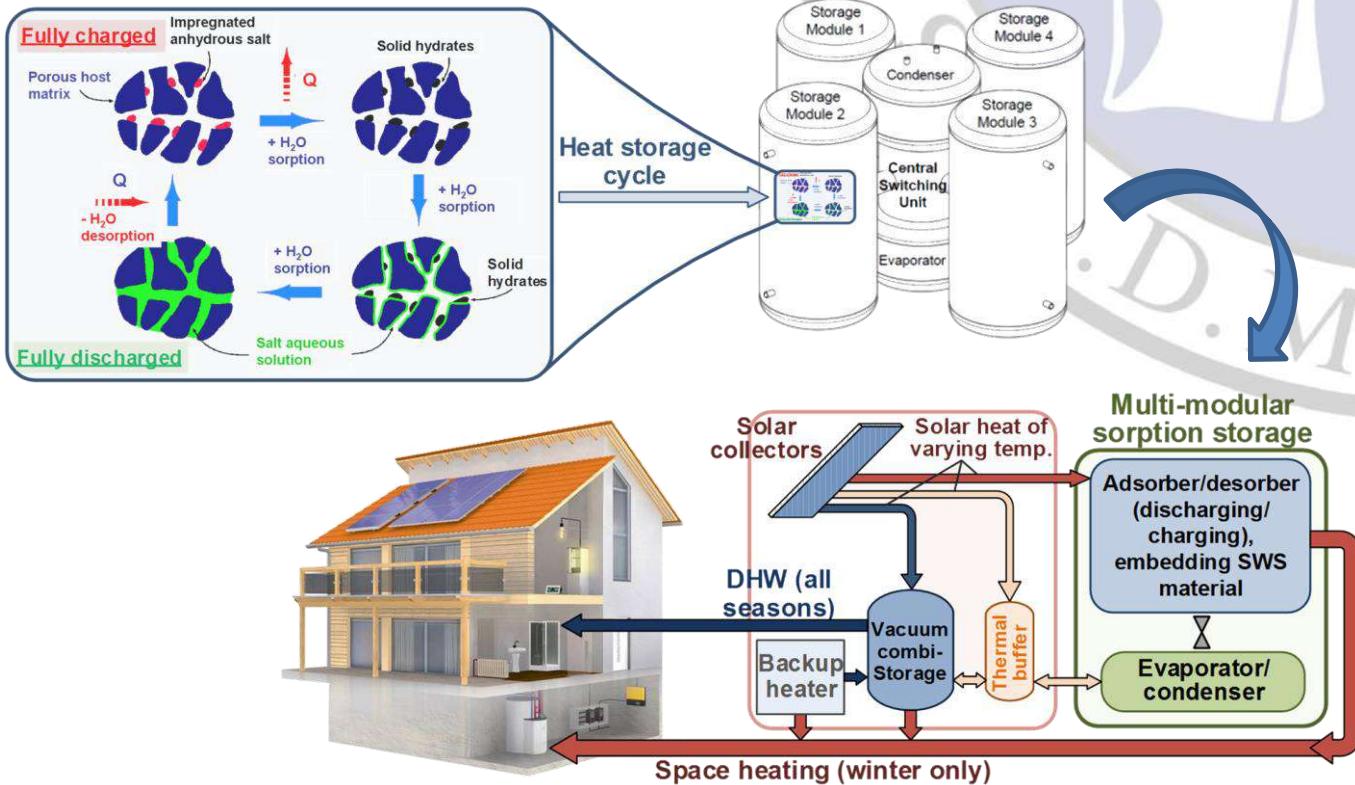
SWS-HEATING (RIA):

OBJECTIVE: Develop an innovative seasonal thermal energy storage (STES) unit with a novel storage material of Selective Water Sorbents (SWS) family and creative configuration, i.e. a sorbent material embedded in a compact multi-modular sorption STES unit, matching the working conditions of a heat storage cycle with low temperature solar heat charging to allow efficient application also in less sunny countries.

- Targeted benefit of this **solar heating technology** is to reach a **solar fraction of 60%** in central/north Europe and 80% in the south of Europe, with a compact and high-performing STES system at low cost for solar-active houses throughout EU.
- A building prototype including the SWS-heating system will be tested in 3 case studies in Spain, Germany, and Sweden.

SWS-HEATING (RIA):

SWS
heating

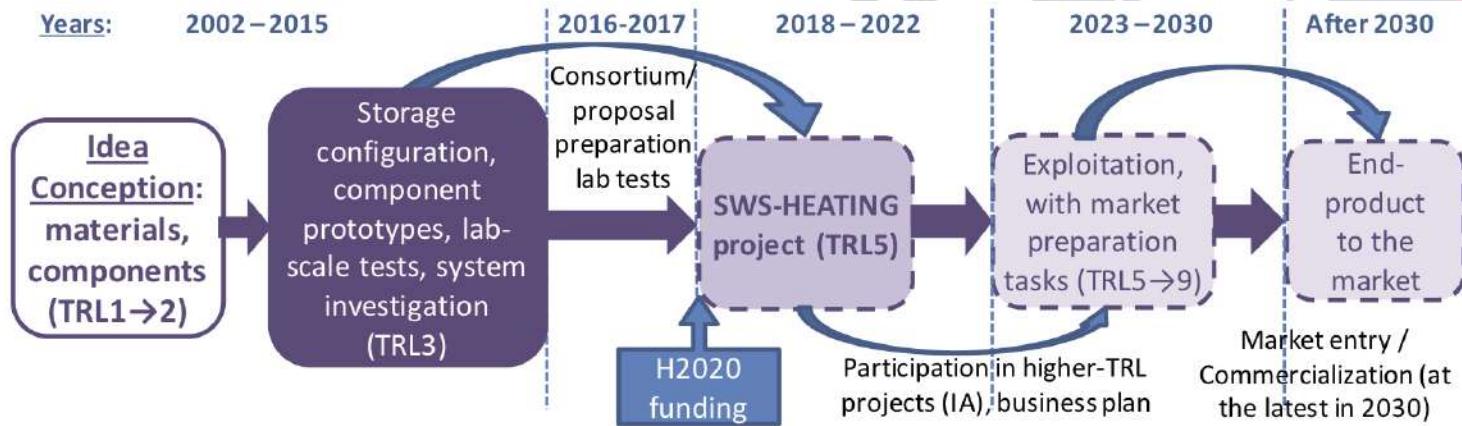




SWS-HEATING (RIA):



SWS
heating



Exploitation activities include **long-term deployment path** development through a technology roadmap.

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GEOFIT (IA):

"Deployment of novel GEOthermal systems,
technologies and tools for energy efficient building
retroFITting"

- EU H2020 – LCE – 2017
- May 2018 – Apr 2022 (48 months)
- 24 international partners:

<http://geofit-project.eu/>

Overall budget: € 9.861.980

EU contribution: € 7.896.940,14



GEOFIT (IA):



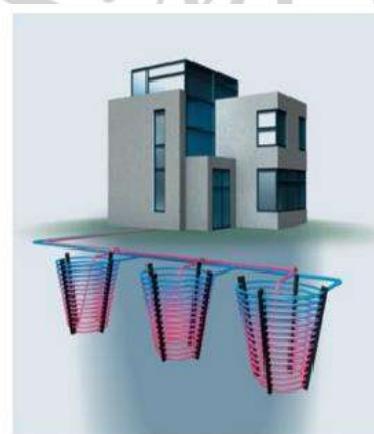
OBJECTIVE: Integrated industrially driven action aimed at **deployment of cost effective enhanced geothermal systems (EGS)**, with non-standard heat exchanger configurations, **on energy efficient building retrofitting**. Advanced ICT control and monitoring technologies will be integrated to ensure the maximum use of RES and energy efficient HVAC operation.



5 demonstration sites in 4 countries and climates, featuring different representative technical scenarios/business model, including historical buildings with seismic risk.



Implementation of a global, effective, energy-efficient retrofitting strategy for the stock of existing buildings in Europe.





GEOFIT (IA):

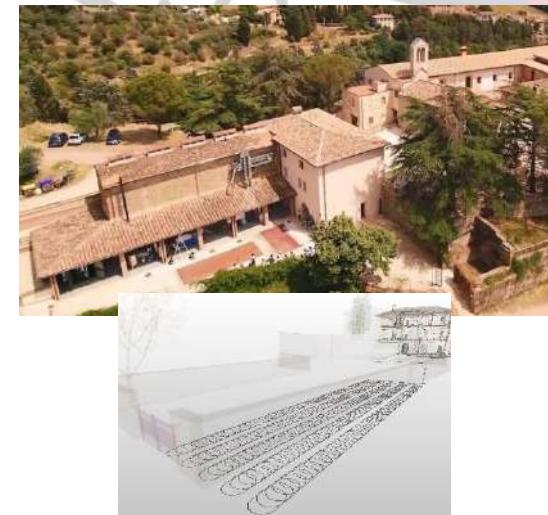


Italian demonstration site:

Historical pilot case consisting on an ex stable building, part of medieval complex of **Sant'Apollinare fortress in Perugia**, built in the second half of the XIX century and recently refurbished through seismic and energy renovations.

→ **Development of an Historical BIM (HBIM) model of the building.**

→ Ad hoc implementation of a **ground source heat pump (GSHP) system** with horizontal slinky type ground source heat exchangers (GHEXs).





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NRG2peers (CSA):

"Towards a new generation of EU peer-to-peer Energy Communities facilitated by a gamified platform and empowered by user-centered energy trading mechanisms and business models"

- EU H2020 – EE – 2019
- Sep 2020 – Oct 2023 (36 months)
- 15 international partners:

Overall budget: € 1.998.437,50
EU contribution: € 1.998.437,50



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Stichting
Pioneer
Vessel



NRG2peers (CSA):

OBJECTIVE: support the uptake of a next generation of European peer-to-peer Energy Communities. NRG2peers sets up a **gamified platform**, supporting the uptake and multiplication of attractive, financially, legally and technically viable, user-centered residential energy communities, to increase energy efficiency and to integrate a higher share of renewable energy, by combining behavioral-based support mechanisms for peer-to-peer (peer-to-community and peer- to-market) energy transactions.



9 pilot sites in 4 four EU ecosystems (Innovators & Early Adopters – Netherland; Early Majority – Spain; Early Majority – Slovenia; Late Majority & Laggards: Italy), representing contrasting socio-economic conditions of customer segment, legislative, regulatory, financial barriers.

NRG2peers (CSA):





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GRAZIE PER L'ATTENZIONE

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