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Work Package 9

Deliverable 9.3

“D9.3 - Report on synergies between HYBUILD and other global initiatives “

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Project Title:

Innovative compact HYbrid electrical/thermal storage systems for low energy BUILDings

Project Acronym:

HYBUILD

Deliverable Report

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Report on synergies between HYBUILD and other global initiatives

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Publishable executive summary

This deliverable summarises the synergies developed between the project HYBUILD and other global initiatives. This deliverable does not want to reproduce the activities listed in other deliverables in WP7 and WP8, but here the list of other projects and initiatives are presented.

This deliverable includes synergies with other 31 H2020 EU funded projects, two synergies with nationally or regionally funded projects, and with nine other global initiatives.

1 Introduction

1.1 Aims and objectives

This deliverable summarises the synergies developed between the project HYBUILD and other global initiatives. This deliverable does not want to reproduce the activities listed in other deliverables in WP7 and WP8, but here the list of other projects and initiatives are presented.

1.2 Relations to other activities in the project

This deliverable has strong relation with activities developed in WP7 and WP8, since a lot of the relations listed here have been implemented in those WPs. In particular, readers are recommended to consult HYBUILD Deliverable D7.2 which provides a summary of dissemination workshops that were organised during the HYBUILD project; many of these workshops were run in cooperation with the projects referenced in this deliverable, and often links to a workshop report and/or workshop recording are provided.

1.3 Report structure

Chapter 2 presents all EU funded projects identified during the project duration aiming at establishing synergies with HYBUILD. The main objective as well as the contact person are briefly shown for each of them. Similarly, Chapter 3 presents the details on nationally or regionally funded projects with which synergies were established. Chapter 4 completes this report by presenting synergies with other global initiatives at international level, established mainly through the participation of a few HYBUILD partners in those initiatives.

1.4 Contributions of partners

UDL has drafted the deliverable based on the Excel file created at the beginning of the project and updated throughout the project duration by project partners. Moreover, R2M and COMSA have thoroughly reviewed the draft version and completed the list of synergies and any missing information.

2 Synergies with other H2020 funded projects

- SCORES (www.scores-project.eu/)

The main goal of SCORES is to demonstrate in the field the integration, optimization and operation of a building energy system including new compact hybrid storage technologies, that optimizes supply, storage and demand of electricity and heat in residential buildings and that increases self-consumption of local renewable energy in residential buildings at the lowest cost.

Contact person: Dr. Christophe Hoegaerts (coordinator)

Synergies: Prof. Dr. Luisa F. Cabeza (UDL) was member of the Stakeholder Advisory Board of SCORES. Moreover, SCORES participated to the following clustering workshops with HYBUILD (see **workshop reports in Deliverable 7.2**):

- [The Future of Energy Storage Workshop](#) at Sustainable Places 2018; 27-29 June 2018 (M9), Aix-les-Bains, R2M, CNR-ITAE
- “Thermal Energy Storage Systems for Energy Efficient Buildings” workshop; 3 November 2018 (M14), Athens, NTUA;
- World Sustainable Energy Days 2019 –Innovation Workshops Energy and Buildings. Feb-March 2019 (M17), Wels, AIT, UDL, FRESNEX, OCHSNER, R2M
- Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
- Workshop at World Sustainable Energy Days 2021; 25 June 2021 (M45), Wels, AIT, R2M, AKG, CSEM, FAHR
- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021. 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M
- BUILD-UP workshop “Hybrid domestic energy systems of the future” final conference; 17 February 2022(M53), Digital event, R2M, COMSA, UDL

- Innova MicroSOLAR (<http://innova-microsolar.eu/>)

Development of an innovative high performance and cost-effective 2-kW_{el}/18-kW_{th} solar heat and power system for application in individual dwellings and small business residential buildings.

Contact person: Dr. Khamid Mahkamov (coordinator)

Synergies: UDL is also partner of Innova MicroSOLAR. Moreover, this project has the demo site in Almatret, next to the HYBUILD demo. Moreover, Innova MicroSOLAR participated to the following clustering workshops with HYBUILD (see **workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M

- SWS-Heating (<http://www.swsheating.eu/>)

To develop innovative seasonal thermal energy storage unit with a novel storage material and creative configuration.

Contact person: Dr. Sotirios Karellas (coordinator)

Synergies: NTUA is coordinator; UDL, and CNR-ITAE are partners both in SWS-Heating and HYBUILD. Moreover, SWS-Heating participated to the following clustering workshops with HYBUILD (see **workshop reports in Deliverable 7.2**):

 - Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
 - Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M

- ZERO-PLUS (<https://cordis.europa.eu/project/id/678407>)

Design and construction of near zero energy settlements with storage technologies.

Contact person: Dr. Anna Laura Pisello (partner)

Synergies: Exchange of information between the two projects due to close collaboration of UDL and CNR-ITAE with Dr. Anna Laura Pisello from University of Perugia.

- HERACLES (<http://www.heracles-project.eu/>)

New solutions for preserving cultural heritage against climate change events. There are new materials development, which may include PCM-based materials.

Contact person: Dr. Anna Laura Pisello (partner)

Synergies: Exchange of information between the two projects due to close collaboration of UDL and CNR-ITAE with Dr. Anna Laura Pisello from University of Perugia.

- SAFERUP! (<https://cordis.europa.eu/project/id/765057>)

ITN project by Marie Curie about smart pavements, so TES-based pavements may be of interest.

Contact person: Dr. Anna Laura Pisello (partner)

Synergies: Exchange of information between the two projects due to close collaboration of UDL and CNR-ITAE with Dr. Anna Laura Pisello from University of Perugia.

- SHIP2FAIR (<http://ship2fair-h2020.eu/>)

The main goal and innovative aspect of SHIP2FAIR is to foster the integration of solar heat in industrial processes from the agro-food sector.

Contact person: Stefano Barberis (exploitation manager)

Synergies: RINA is partner of SHIP2FAIR and is also participating in HYBUILD. Moreover, SHIP2FAIR participated to the following clustering workshops with HYBUILD (see **workshop reports in Deliverable 7.2**):

- Sun and Thermal Energy: Europe's Precious Energy Sources for Efficient Industries and Buildings. Sustainable Places 2019 -Innovation workshop for the EU building research community; 5-7 June 2019 (M21), Cagliari, R2M, CNR-ITAE
 - Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
 - Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M
- STORY (<http://horizon2020-story.eu/>)
- STORY aims to (1) demonstrate and evaluate innovative approaches for energy storage systems, (2) find solutions, which are affordable, secure and ensure an increased percentage of self-supply of electricity and (3) accelerate innovation and business models for deployment of storage at local level.
- Contact person: Mia Ala-Juusela (coordinator)
- Synergies: STORY participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):
- The Future of Energy Storage Workshop at Sustainable Places 2018; 27-29 June 2018 (M9), Aix-les-Bains, R2M, CNR-ITAE
 - Thermal Energy Storage Systems for Energy Efficient Buildings; 3 November 2018 (M14), Athens, NTUA
- CREATE (<http://www.createproject.eu/>)
- CREATE develops and demonstrates a heat battery, i.e. an advanced thermal storage system based on ThermoChemical Materials (TCMs), that enables economically affordable, compact and loss-free storage of heat in existing buildings.
- Contact person: Rebekka Köll (coordinator)
- Synergies: Prof. Dr. Luisa F. Cabeza (UDL) was member of the Stakeholder Advisory Board of CREATE. Moreover, CREATE participated in some of the Sustainable Places workshops where also HYBUILD participated.
- TESSE2B (<http://www.tesse2b.eu/>)
- TESSE2b develops an integrated solution for residential building energy storage using solar and geothermal energy, with the purpose of correcting the mismatch that often occurs between the supply and the demand of energy in residential buildings.
- Contact person: Luis Coelho (coordinator)
- Synergies: TESSE2B participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):
- The Future of Energy Storage Workshop at Sustainable Places 2018; 27-29 June 2018 (M9), Aix-les-Bains, R2M, CNR-ITAE
 - Thermal Energy Storage Systems for Energy Efficient Buildings; 3 November 2018 (M14), Athens, NTUA

- Thermal Energy Storage Systems for Energy Efficient Buildings; 3 November 2018 (M14), Athens, NTUA; Thermal Energy Storage Systems for Energy Efficient Buildings; 3 November 2018 (M14), Athens, NTUA

- E2VENT (<http://www.e2vent.eu/>)

E2VENT has developed, demonstrated and validated a cost effective, high energy efficient, low CO₂ emissions, replicable, low intrusive, systemic approach for retrofitting of residential buildings, able to achieve remarkable energy savings, through the integration of an innovative adaptive ventilated façade system.

Contact person : Antoine Dugue (adugue@nobatek.com)

Synergies: the HYBUILD partners NOBATEK and RINA are also partners of E2VENT, allowing knowledge exchange. Moreover, E2VENT participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

 - The Future of Energy Storage Workshop at Sustainable Places 2018; 27-29 June 2018 (M9), Aix-les-Bains, R2M, CNR-ITAE

- HYCOOL (<https://hycool-project.eu/>)

HYCOOL mission is increasing the use of solar heat in industry processes, by coupling of a new Fresnel CSP Solar thermal collector (FCSP) with specially build Hybrid Heat Pumps.

Contact person: Dr. Andrea Frazzica (project manager)

Synergies: AIT, FARENHEIT, R2M are partners of HYCOOL, and CNR-ITAE is the coordinator of HYCOOL, allowing knowledge exchange. Moreover, HYCOOL participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

 - Sun and Thermal Energy: Europe’s Precious Energy Sources for Efficient Industries and Buildings. Sustainable Places 2019 -Innovation workshop for the EU building research community; 5-7 June 2019 (M21), Cagliari, R2M, CNR-ITAE
 - Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
 - Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M

- THERMOSS (<https://thermoss.eu>)

THERMOSS ensures an efficient match between supply and demand of energy through real-time management of thermal energy and by retrofitting through advanced heating and cooling technologies, leading to up to 30 % savings in energy consumption.

Contact person: Fernando Centeno (coordinator)

Synergies: the HYBUILD partner CSEM is also partner of THERMOSS, giving opportunities of knowledge Exchange. Moreover, THERMOSS participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

 - World Sustainable Energy Days 2019 –Innovation Workshops Energy and Buildings. Feb-March 2019 (M17), Wels, AIT, UDL, FRESNEX, OCHSNER, R2M

- Sun and Thermal Energy: Europe's Precious Energy Sources for Efficient Industries and Buildings. Sustainable Places 2019 -Innovation workshop for the EU building research community; 5-7 June 2019 (M21), Cagliari, R2M, CNR-ITAE

- SUNHORIZON (<http://www.sunhorizon-project.eu>)

SunHorizon aims to develop heat pump solutions that will act properly coupled with advanced solar panels providing heating and cooling both for residential and tertiary buildings.

Contact person: Alessandra Cuneo (coordinator)

Synergies: CNR-ITAE, FAHRENHEIT, and RINA, are partners of both projects, SUNHORIZON and HYBUILD, ensuring knowledge exchange. Moreover, SUNHORIZON participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

 - Sun and Thermal Energy: Europe's Precious Energy Sources for Efficient Industries and Buildings. Sustainable Places 2019 -Innovation workshop for the EU building research community; 5-7 June 2019 (M21), Cagliari, R2M, CNR-ITAE
 - Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
 - Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M

- Heat4Cool (<https://www.heat4cool.eu/>)

The Heat4Cool concept proposes innovative, efficient and cost-effective solutions that support EU energy efficiency policies through an optimal integration of relevant rehabilitation systems. The project develops, integrates and demonstrates an easy to install and highly energy efficient solution for building retrofitting.

Contact person: Serena Scotton (communication and dissemination manager)

Synergies: the knowledge exchange was possible through FAHRENHEIT, partner in both projects. Moreover, Heat4Cool participated to the following clustering workshop with HYBUILD (**see workshop reports in Deliverable 7.2**):

 - Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL

- GEOFIT (<https://geofit-project.eu/>)

The innovation project Geofit is developing a holistic and novel approach to geothermal retrofitting, which is cost-competitive, easy to install, and capable of providing efficient low-temperature heating & high-temperature cooling by using the most innovative tools and methods.

Contact person: Dr. Thomas Messervey (coordinator)

Synergies: Knowledge exchange through R2M, CNR-ITAE, NOBATEK, OCHSNER, AIT, FAHRENHEIT, and COMSA, partners in both projects (in fact, COMSA is coordinator of HYBUILD and R2M of GEOFIT). Moreover, GEOFIT participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
- Workshop at World Sustainable Energy Days 2021; 25 June 2021 (M45), Wels, AIT, R2M, AKG, CSEM, FAHR
- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Romaand online (hybrid event), CNR ITAE, R2M

- RES4BUILD (<https://res4build.eu/>)

RES4BUILD will decarbonise the energy consumption in buildings by developing integrated renewable energy-based solutions that are tailored to the needs and requirements of users and installers.

Contact person: Michael Papapetrou (Coordinator)

Synergies: RES4BUILD participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Romaand online (hybrid event), CNR ITAE, R2M

- FRIENDSHIP (<https://friendship-project.eu/>)

FRIENDSHIP plans to bring together research centres, industrial designers, technologies & heat suppliers into the same consortium in order to unite skills towards the boost and control of the heat supply temperature according to processes needs. It will evaluate to what extent high share of solar heat heating and cooling will allow to reduce the dependence of industrial processes on carbon energies and associated polluting emissions, and to quantify economic gains related to the use of solar energy in a context of a changing fossil fuel market and changing climatic constraints.

Contact person: Valery Vuillerme (Coordinator)

Synergies: RINA is partner in both projects, FRIENDSHIP and HYBUILD, ensuring knowledge exchange. Moreover, FRIENDSHIP participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Romaand online (hybrid event), CNR ITAE, R2M

- ASTEP (<https://asteproject.eu/>)

Application of Solar Thermal Energy to Processes (ASTEP) will create a new innovative Solar Heating for Industrial Processes (SHIP) concept focused on overcoming the current limitations of these systems.

Contact person: Prof. Antonio Rovira (Coordinator)

Synergies: UDL and CNR-ITAE have strong relationship with prof. Oronzio Manca, who is part of the ASTEP consortium from Università della Campania, allowing an exchange of information with the ongoing activities, especially focusing on storage technologies for industrial processes. Moreover, ASTEP participated to the following clustering workshop with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Rome and online (hybrid event), CNR ITAE, R2M.

- Ministor (<https://ministor.eu>)

Minimal Size Thermal and Electrical Energy Storage System for In-Situ Residential Installation is a 54 months long project funded by the European Union's Horizon 2020 research and innovation programme to offer a sustainable solution to harness the energy efficiency potential of the European building stock.

Contact person: Carlos Ochoa (Coordinator)

Synergies: Knowledge exchange was possible thanks to R2M, partner in both projects, Ministor and HYBUILD. Moreover, Ministor participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 2: Integrated Storage systems for Residential buildings; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M

- ENSNARE (<https://www.ensnare.eu/>)

ENSNARE will boost the uptake of novel and highly efficient solutions for NZEB renovation via comprehensive methodology, tools and technologies that will accelerate the current renovation rate.

Contact person: Peru Elguezabal (Coordinator)

Synergies: the partners of the HYBUILD project R2M and NOBATEK are also partners of ENSNARE, ensuring knowledge exchange. ENSNARE also participated to the following clustering workshop with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Rome and online (hybrid event), CNR ITAE, R2M

- INFINITE (<https://infinitebuildingrenovation.eu/>)

INFINITE relies on the "Renovation4.0" approach, which combines digitalisation and industrialisation to offer high-quality, tailor-made, sustainable solutions designed to last. INFINITE will unleash the market potential of prefabrication in the construction sector and will pave the way for the decarbonisation of the European building stock.

Contact person: Stefano Avesani (Coordinator)

Synergies: Knowledge exchange was possible thanks to EURAC (coordinator of INFINITE), NOBATEK and RINA, partners in both projects, INFINITE and HYBUILD. INFINITE also participated to the following clustering workshop with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Rome and online (hybrid event), CNR ITAE, R2M

- POWERSKIN (<https://www.powerskinplus.eu/>)

POWERSKIN PLUS (POWERSKIN+) intends to be at the forefront of the first generation of off-site prefabricated, modular “ready-to-buy” and easy-to-install glazing and opaque elements, with sustainable ecodesigned connecting framings, improved functional coatings, active and passive thermal energy storage (TES) technology solutions and BiPV cells.

Contact person: Jorge Corker (Coordinator)

Synergies: POWERSKIN participated to the following clustering workshop with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Rome and online (hybrid event), CNR ITAE, R2M

- PLURAL (<https://www.plural-renovation.eu/>)

The European Research & Innovation project PLURAL funded by the Horizon 2020 programme aims to design, validate and demonstrate a palette of versatile, adaptable, scalable, off-site prefabricated Plug-and-Use kits.

Contact person: Prof. Maria Founti (Coordinator)

Synergies: NTUA is partner in HYBUILD and coordinator of PLURAL; DAIKIN is partner in both projects. PLURAL also participated to the following clustering workshop with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Rome and online (hybrid event), CNR ITAE, R2M

- ENVISION (<https://www.energy-envision.eu/>)

The ‘ENVISION’ project will demonstrate a full renovation concept that, for the first time, harvests energy from ALL building surfaces (transparent and opaque). ENVISION’ focusses on energy harvesting of the façade and works by absorbing the invisible part of the solar radiation (the near-infrared (NIR) part, roughly 50% of the solar energy spectrum) allowing visible aspects to be retained.

Contact person: Dr. ir. S.J.F. (Bart) Erich (Coordinator)

Synergies: RINA is partner in both projects, ENVISION and HYBUILD, ensuring knowledge exchange. ENVISION also participated to the following clustering workshop with HYBUILD (**see workshop reports in Deliverable 7.2**):

- Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Rome and online (hybrid event), CNR ITAE, R2M

- SolBio-Rev (<http://www.solbiorev.eu/>)

SolBio-Rev system is based on a creative combination of technologies to efficiently and flexibly exploit renewable energy for providing heating, cooling, DHW and electricity in different climatic conditions.

Contact person: Dr. Sotirios Karellas (coordinator)

Synergies: Knowledge exchange was possible through NTUA, coordinator of SolBio-Rev and partner in HYBUILD, and through UDL and CNR-ITAE, partners in both projects. Moreover, SolBio-Rev participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

 - Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
 - Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M

- Hybrid-BioVGE (<http://hybrid-biovge-project.eu/>)

The Hybrid – BioVGE project has the primary objective of developing and demonstrating a highly integrated solar/biomass hybrid air conditioning system for space cooling and heating of residential and commercial buildings that is affordable, operating with improved efficiency and reduced need for maintenance.

Contact person: INEGI (coordinator)

Synergies: Hybrid-BioVGE participated to the following clustering workshops with HYBUILD (**see workshop reports in Deliverable 7.2**):

 - Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL
 - Renewable Heating and Cooling Solutions for Buildings and Industry 2.0" workshop at Sustainable Places 2021; 29 Sept-1 Oct 2021 (M48), Roma and online (hybrid event), CNR ITAE, R2M

- TRI-HP (<https://www.tri-hp.eu/project>)

The overall goal of the TRI-HP project is the development and demonstration of flexible energy-efficient and affordable trigeneration systems. The systems will be based on electrically driven natural refrigerant heat pumps coupled with renewable electricity generators (PV), using cold (ice slurry), heat and electricity storages to provide heating, cooling and electricity to multi-family residential buildings with a self-consumed renewable share of 80%.

Contact person: Dr. Dani Carbonell (coordinator)

Synergies: Exchange of information between the two projects due to close collaboration of UDL and CNR-ITAE with Dr. Dani Carbonell, coordinator in TRI-HP. Moreover, TRI-HP

participated to the following clustering workshop with HYBUILD (see **workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 1: Renewable Heating and Cooling Solutions for Buildings and Industry; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL

- LowUP (<http://lowup-h2020.eu/>)

LowUP will develop and demonstrate three new efficient technologies: one heating and one cooling system for office buildings, and one heat recovery system for industrial processes.

Contact person: Rafael Claret Socorro Hernandez (coordinator)

Synergies: LowUP developed innovative technologies for heat upgrading, thanks to sorption processes, exchanging knowledge with the solution developed by HYBUILD for the Mediterranean concept.

- HEAT INSYDE (<https://www.heat-insyde.eu/>)

The EU-funded HEAT-INSYDE project is addressing this through a ground-breaking compact heat battery. The prototype will use a thermochemical material to store renewable energy in an inexpensive and lossless way. It will be able to connect to various energy systems, such as the electricity grid and heat networks, as well as in heat pumps and solar panels. Offering an alternative pathway for storing renewable energy, the new heat battery prototype delivers a new grid flexibility solution across the energy value chain.

Coordinator: Francesco Pizzocolo Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO), NL (coordinator)

Synergies: HEAT INSYDE participated to the following clustering workshop with HYBUILD (see **workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 2: Integrated Storage systems for Residential buildings; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL

- InteGRIDy (<https://www.integrityd.eu/>)

inteGRIDy aims to integrate cutting-edge technologies, solutions and mechanisms in a scalable Cross-Functional Platform connecting energy networks with diverse stakeholders, facilitating optimal and dynamic operation of the Distribution Grid (DG), fostering the stability and coordination of distributed energy resources and enabling collaborative storage schemes within an increasing share of renewables.

Contact person: Lorenzo Corghi (UNE); Giuseppe Mastandrea (Energy@Work)

Synergies: InteGRIDy participated to the following clustering workshop with HYBUILD (see **workshop reports in Deliverable 7.2**):

- Sustainable Places 2020 Workshop 2: Integrated Storage systems for Residential buildings; October 2020 (M37), Digital event, R2M, CNR ITAE, UDL

3 Synergies with nationally or regionally funded projects

- Xarxa d'R+D+I Energy for Society, XRE4S (<https://xre4s.cat/>)

XRE4S is the R+D+I Network Energy for Society: a multidisciplinary and transversal ecosystem that gathers the expertise in the energy field of the main universities and research centres in Catalonia. The main goal is to promote the technology transfer and valorisation of energy technologies to industry and society.

Contact person: Dr. Luisa F. Cabeza (member)

Synergies: Dr. Luisa F. Cabeza (UDL) is member of this Catalan network and partner in HYBUILD, she was able to share the results from HYBUILD in the network and to exchange knowledge.

- Spanish Network on Thermal Energy Storage, RedTES (<https://redtes.udl.cat/>)

The mission of this network is to create and strengthen meeting spaces and synergistic activities between different Spanish research groups that allow the elimination of technological and economic barriers, as well as existing social barriers to the deployment of thermal energy storage (TES) in order to improve and consolidate the scope of Spanish research at an international level.

Contact person: Dr. Luisa F. Cabeza (coordinator of the network)

Synergies: Dr. Luisa F. Cabeza (UDL) is the coordinator of this Spanish network and partner in HYBUILD, she was able to share the results from HYBUILD in the network and to exchange knowledge.

4 Synergies with other global initiatives

- International Energy Agency Technology Collaboration Platform: Energy Storage TCP (<https://iea-es.org/>)

Energy Conservation and Energy Storage (ECES) facilitates integral research, development, implementation and integration of energy-storage technologies such as: Electrical Energy Storage, Thermal Energy Storage, Distributed Energy Storage (DES) & Borehole Thermal Energy Storage (BTES).

Contact person: Teun Bokhoven (Chair)

Synergies: UDL and CNR-ITAE are active in different tasks of this IEA TCP, ensuring knowledge exchange.

- International Energy Agency Technology Collaboration Platform: SolarPACES (<https://www.solarpaces.org/>)

Facilitate technology development, market deployment and energy partnerships for sustainable, reliable, efficient and cost-competitive concentrating solar technologies.

Contact person: secretariat

Synergies: UDL is active in different tasks of this IEA TCP, ensuring knowledge exchange.

- Annex 28 ES TCP (<http://www.eces-desire.org/>)

The overall goal of Annex 28 is to foster the role of Distributed Energy Storage (DES) and to better evaluate the potential storage capacities for the integration of renewables at an economical competitive level.

Contact person: Dr. Andreas Hauer (Operating agent)

Synergies: UDL and CNR-ITAE are active in this task of this IEA TCP, ensuring knowledge exchange.

- Annex 30 ES TCP (<http://www.eces-a30.org/>)

The main objective of Annex 30 is to encourage the implementation of thermal energy storage systems and evaluate their potential with respect to CO₂ mitigation and cost-effective thermal energy management.

Contact person: Dr. Antje Seitz (Operating agent)

Synergies: UDL was active in this task of this IEA TCP, ensuring knowledge exchange.

- Annex 33 ES TCP/ Task 58 SHC TCP (<https://iea-es.org/annex-33/>)

This joint SHC Task 58 / ECES Annex 33 deals with advanced materials for latent and chemical thermal energy storage, Phase Change (PCM) and Thermo Chemical (TCM) materials.

Contact person: Dr. Andreas Hauer and Wim van Helden (Operating agents)

Synergies: UDL and CNR-ITAE were active in this task of this IEA TCP, ensuring knowledge exchange.

- Annex 40 ES TCP/Task 60 SHC TCP (<https://iea-es.org/annex-40/>)

Compact thermal energy storage (CTES) technologies are the subject of Task 40. These technologies are based on phase change materials (PCM) and thermochemical materials (TCM). Materials from these classes will be studied, improved, characterized, and tested in components. The main components for these technologies are heat exchangers and reactors, and these are also studied and further improved in the Task.

Contact person: Dr. Andreas Hauer and Wim van Helden (Operating agents)

Synergies: UDL and CNR-ITAE are active in this task of this IEA TCP, ensuring knowledge exchange.

- Annex 50 HPT TCP (<https://heatpumpingtechnologies.org/annex50/>)

The overall aim of this Annex is to increase the use of heat pumps in multi-family buildings. The main objective is therefore to demonstrate possible energy savings and the utilisation of renewable energy by means of heat pumps in buildings retrofitted with heat pumps without improving the building envelope.

Contact person: Dr. Marek Miara (Operating agent)

Synergies: CNR-ITAE is working in close contact with the Fraunhofer ISE (operating agent of the Annex), ensuring knowledge exchange.

- RHC Platform (<http://www.rhc-platform.org/home/>)

The European Technology and Innovation Platform on Renewable Heating & Cooling (RHC-ETIP) brings together stakeholders from the biomass, geothermal, solar thermal and heat pump sectors – including the related industries such as district heating and cooling, thermal energy storage, and hybrid systems – to define a common strategy for increasing the use of renewable energy technologies for heating and cooling.

Contact person: Secretariat

Synergies: UDL is member of this platform, ensuring knowledge exchange.

- International Solar Energy Society, ISES (<https://www.ises.org/>)

ISES, through its knowledge sharing and community building programs, helps its global membership provide the technical answers to accelerate the transformation to 100% renewable energy and thereby achieve the following vision: The International Solar Energy Society (ISES) envisions a world with 100% renewable energy for everyone used wisely and efficiently.

Contact person: Secretariat

Synergies: UDL is member of this society, ensuring knowledge exchange.