SUSTAINABLE PLACES 2018 June 27-29,2018 Aix-les Bains, France

"The future of energy storage" Workshop

June 27th, 2018, Sustainable Places 2018, CEA-INES, France.

This workshop was organized on June 27th 2018 in the context of the International conference Sustainable Places 2018 with the aim to benchmark the progress of six projects supported by the European Commission which are focused on the development of innovative energy storage solutions.

Participating projects were:

- **HYBUILD** – Hybrid Energy Storage for Buildings (H2020 - 768824)
- **SCORES** - Self Consumption Of Renewable Energy by hybrid Storage systems (H2020 - 766464)
- **TESSe2b** - Thermal Energy Storage Systems for Energy Efficient Buildings (H2020 – 680555)
- **CREATE** - Compact REtrofit Advanced Thermal Energy storage (H2020 - 680450)
- **E2VENT** – Energy Efficient Ventilated Façades for Optimal Adaptability and Heat Exchange enabling low energy architectural concepts for the refurbishment of existing buildings (H2020 - 637261)
- **STORY**- Added value of STORage in distribution sYstems (H2020 - 646426)

Workshop summary

Energy storage can support the EU's plans for the Energy Union by helping to ensure energy security and a well-functioning internal market and helping to bring more carbon-cutting renewables online. By using more energy storage, the EU can decrease its energy imports, improve the efficiency and security of the energy system, and keep prices low by better integrating variable renewable energy sources. "With falling PV system and battery costs in 2017, the business case for storage is gathering pace" according to Germany Trade & Invest.

Energy storage will affect the entire electricity value chain as it replaces peaking plans, alters future transmission and distribution (T&D) investments, reduces the negative effects of intermittency of renewables, restructures power markets and helps to digitize the electricity ecosystem. For utilities, battery storage will become an integral tool for managing peak loads, regulating voltage and frequency, ensuring reliability from renewable generation, and creating a more flexible transmission and distribution system. For their customers, storage can be a tool for reducing costs related to peak energy demand.

Each project presented itself to the others with a 10' presentation covering:

1. A reminder of the project objectives and an update on the latest project progress (5')
2. A focus on some specific aspect / innovation / task of the project to be shared with sister projects and potentially leading to synergistic R&D and collaboration between our projects (5')

Synergistic topics which have been discussed are summarized in the table below – Cooperation was initiated during the workshop and will continue offline.

Project & Objectives	Website	Topics offering potential synergies
HYBUILD is focused on the development of two innovative hybrid storage concepts: 1. For the Mediterranean climate primarily meant for cooling energy provision, 2. For the Continental climate primarily meant for heating and DHW production.	www.hybuild.eu	• HYBUILD highlighted foreseen challenges in relation to the overall control system implementation: a connection with STORY has been identified on this aspect during the workshop. • TESSe2b and HYBUILD have both demonstrators in Spain and Cyprus and it was agreed that it would be useful to share demonstration results between both projects.
SCORES develops compact hybrid storage technologies, integrated through a smart Building Energy Management System. The project will optimize the self-consumption in residential buildings, bring new sources of flexibility to the grid, and enable reliable operation with a positive business case in Europe's building stock.	http://www.scores-project.eu/	• SCORES has a specific focus to develop hybrid storage capacity based on oxidation-redox reaction for heat and second-life for Li-ion batteries for electricity • It was funded on the same call as HYBUILD and therefore presents a lot of similarities, which include PCM heat storage, use of hybrid PV and solar collectors, and connection with a building energy management system. • SCORE suggested to organize specific stakeholders meetings which would specifically target policy makers in order to promote innovative energy storage solutions
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.	http://www.tesse2b.eu/	TESSe2b shared a number of challenges faced by the project including: • The selection of the most appropriate PCMs for each application (solved) • The improvement of performance of parrafins in heat exchangers immersed in PCM (solved) • The development of a protective thin film coating against the corrosivity of salt hydrates to the heat exchanger • Finding an appropriate solution for the geometry of the tank and its heat exchanger to ensure the stability of the hydrated salts • The development of a self-learning smart control system for operating the solution

CREATE develops and demonstrates a heat battery, i.e. an advanced thermal storage system based on Thermo-Chemical Materials (TCMs), that enables economically affordable, compact and loss-free storage of heat in existing buildings.	http://www.createproject.eu/	• CREATE shared its test results and intermediate findings of a real scale module (1/10 capacity of complete system) which include:
		  ○ Power output with 1479W is 40 % lower than the goal of 2500W
		  ○ Absorbed water mass in the avg. 31kg – theoretical max is 38,6kg (80 % of storage capacity)
		  ○ Non-condensable gases during dehydration detected which blocked the condenser – degasing procedure

		• Design is adapted to fulfill power requirements and tests are being continued
E2VENT developed and demonstrated an innovative adaptive ventilated façade system which includes a latent system using PCM that allows thermal storage mode for the reduction of energy peaks	http://www.e2vent.eu/	• E2VENT was the only project of the workshop with a specific focus on facades. • The embedded energy storage system was presented • Although the project is now completed, a test reaction to fire will be conducted in 2018
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.	http://horizon2020-story.eu/	• STORY is a well-advanced project which chose to share key lessons learnt and findings including main grid challenges to be addressed by storage solutions, and proposed scenarios for RES, grid, and storage • One of the lessons learned is that the storage technology is still not fully mature, and the availability of fully functional storage system may be limited, although the components are readily available

Workshop contributors

Contributor 1 (HYBUILD)			
Name:	Régis DECORME	Title:	Dipl.-Ing.
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Company:	R2M Solution	Country:	FR
Short bio:	ICT engineer (University of Nice – Polytech Sophia Antipolis '04) with senior experience in IT research and innovation addressing societal challenges. Regis is managing partner and co-founder of the French branch of R2M Solution located in Roquefort-les-Pins on the French Riviera. Regis is HYBUILD dissemination manager and will be the moderator of this workshop.		
Contributor 2 (HYBUILD)			
Name:	Andrea Frazzica	Title:	PhD
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Company:	CNR ITAE	Country:	Italy
Short bio:	Andrea is a researcher at the CNR ITAE in Italy since 2008. He got his master and PhD in materials engineering on sorption materials and systems for heating and cooling applications. He is now in charge for the ITAE' activities in four ongoing/starting H2020 projects, focusing on sorption technologies for heating, cooling and storage. Within HYBUILD he is in charge for the WP2 activities, dealing with the development of innovative components for hybrid storage applications.		
Contributor 3 (TESSe2b)			
Name:	Luis Coelho	Title:	Prof., PhD
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Company:	Polytechnic Institute of Setubal	Country:	Portugal
Short bio:	Luis Coelho is Assistant Professor at the Mechanical Engineering Department ESTSetubal of Polytechnic Institute of Setubal. He has a PhD degree in Mechanical Engineering. He has collaborated in an important number of international R & D Projects since 1991, related to combustion, geothermal energy, solar energy, biomass, heating ventilation and air conditioning (HVAC), pollutant emissions, and air quality. He has been responsible for some scientific researcher's scholarships at IPS. He has several publications in Scientific Journals and International Conferences Proceedings. He has experience in design installations of HVAC systems and he is a portuguese expert for the transposition and implementation of the European Performance of Buildings Directive (EPBD) in Portugal and he is consultor of the national energy agency (ADENE) for training expert on Building Energy Performance Certification. He is responsible for the IPS/ESTSetubal participation in 12 European R&D projects. He is the coordinator of the H2020 TESSe2b project on thermal energy storage based in solar thermal energy		

	and geothermal energy (GSHP) for heating, cooling and DWH production, for residential buildings.		
Contributor 4 (TESSe2b)			
Name:	João Garcia	Title:	Prof., PhD
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Company:	Polytechnic Institute of Setubal	Country:	Portugal
Short bio:	João Garcia is Assistant Professor at the Mechanical Engineering Department of Escola Superior de Tecnologia (ESTSetubal) of Polytechnic Institute of Setúbal (IPS) since November 1996. PhD in Mechanical Energy done at Instituto Superior Tecnico (IST) of Technical University of Lisbon, about urban air quality modelling. He obtained his MSc in 2001 at IST with the thesis titled "Implementation of an Exterior Air Quality Model". He obtained his graduation at the Mechanical Engineering Department of IST in 1990. He has a large experience in Refrigeration and HVAC systems. He worked as a Technical Director Assistant for 3 years (1990-1993) in ARNEG PORTUGUESA that is a large manufacturer of Refrigeration products. He also worked for 2 years (1994-1996) as Technical Director in HVAC Department at ATECNIC that is a Portuguese Manufacturer and Installer of HVAC products and systems. We also worked for 10 years as Refrigeration and HVAC systems designer and Consultant. He has participated in some R & D Projects related with HVAC systems, and air quality modelling and evaluation. He is a Portuguese expert for the transposition and application of European Performance of Buildings Directive (EPBD) in Portugal.		
Contributor 5 (STORY)			
Name:	Mia Ala-Juusela	Title:	M.Sc. (Tech), Senior Scientist
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Company:	VTT Technical Research Centre of Finland Ltd	Country:	Finland
Short bio:	Mia Ala-Juusela has 20 years of research experience at VTT in the research area of eco-efficient communities. Her expertise covers energy efficient buildings, renewable energy in buildings and the optimal connection of demand and supply of energy in the buildings, lately mostly on district scale. The user perspective is often in central role in her studies. She has participated in different roles in many national and international projects, recently e.g. as Coordinator of EU-projects STORY (Added value of STORage in distribution sYstems) and IntUBE (Intelligent Use of Buildings' Energy Information). She is currently conducting PhD studies related to thermal comfort.		
Contributor 6 (SCORES)			
Name:	Huub Keizers	Title:	M.Sc., Program Manager
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Company:	TNO	Country:	The Netherlands
Short bio:	Huub Keizers has 25 years of research experience at TNO, covering materials research, energy systems, chemistry, safety, building technology and international cooperation. As program manager Energy Built Environment, he is responsible for the TNO Knowledge Program Energy in the Built Environment, with special focus on energy harvesting, heat storage, conversion technologies and minimization of energy use, while maintaining a healthy and comfortable indoor climate. TNO participates amongst others in the EU H2020 projects CREATE and SCORES. Huub Keizers is representative for the Dutch knowledge institutes, in the Platform Sustainable Buildings and in the Mission Innovation Challenge number 7, Affordable Heating and Cooling.		
Contributor 7 (CREATE)			
Name:	Rebekka Köll	Title:	MSc
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Company:	AEE INTEC	Country:	Austria
Short bio:	Rebekka is scientific researcher at the Institute AEE INTEC in Austria since 2015. She works in several national and international research projects related to thermal energy storage topics. Her main responsibility in the CREATE project is the demonstration of the storage system and she will present the latest results achieved in the project.		
Contributor 8 (E2VENT)			
Name:	BONNAMY Paul	Title:	M.
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Short bio:	Paul Bonnamy is a research engineer in Nobatek/INEF4, a French RTO specialized in the field of building and energy. He is involved in the development of HVAC system and specializes in energy Storage system based on PCM for passive air cooling. He takes part in the H2020 projects E2VENT and HYBUILD.

Workshop agenda – June 27th, 2018

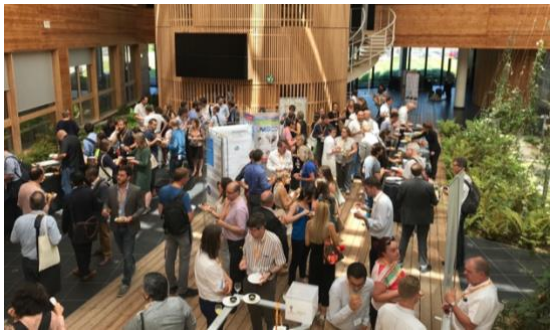
IUT - Room 07

11:30	Workshop introduction	Régis Decorme – R2M Solution
EEB-06-2017 projects - Highly efficient hybrid storage solutions for power and heat in residential buildings and district areas, balancing the supply and demand conditions		
11:45	HYBUILD	Andrea Frazzica – CNR ITAE
12:10	SCORES	Huub Keizers - TNO
EeB-02-2014 project - Adaptable envelopes integrated in building refurbishment projects		
12:35	E2VENT	Paul Bonnamy - NOBATEK
13:00	**Lunch break**	
EeB-06-2015 projects - Integrated solutions of thermal energy storage for building applications		
14:00	TESSe2b	Luis Coelho, João Garcia - Polytechnic Institute of Setubal
14:25	CREATE	Rebekka Köll - AEE INTEC
LCE-08-2014 project - Local / small-scale storage		
14:50	STORY	Mia Ala-Juusela - VTT Technical Research Centre of Finland Ltd
15:15	Workshop wrap-up	Régis Decorme – R2M Solution
15:30	**End of the workshop**	

Workshop presentations

All presentations from the Workshop are available for download at:
http://www.sustainableplaces.eu/previous/sp2018/sp2018-workshops

Workshop pictures



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