Sun Horizon

Sun Coupled Innovative Heat Pumps

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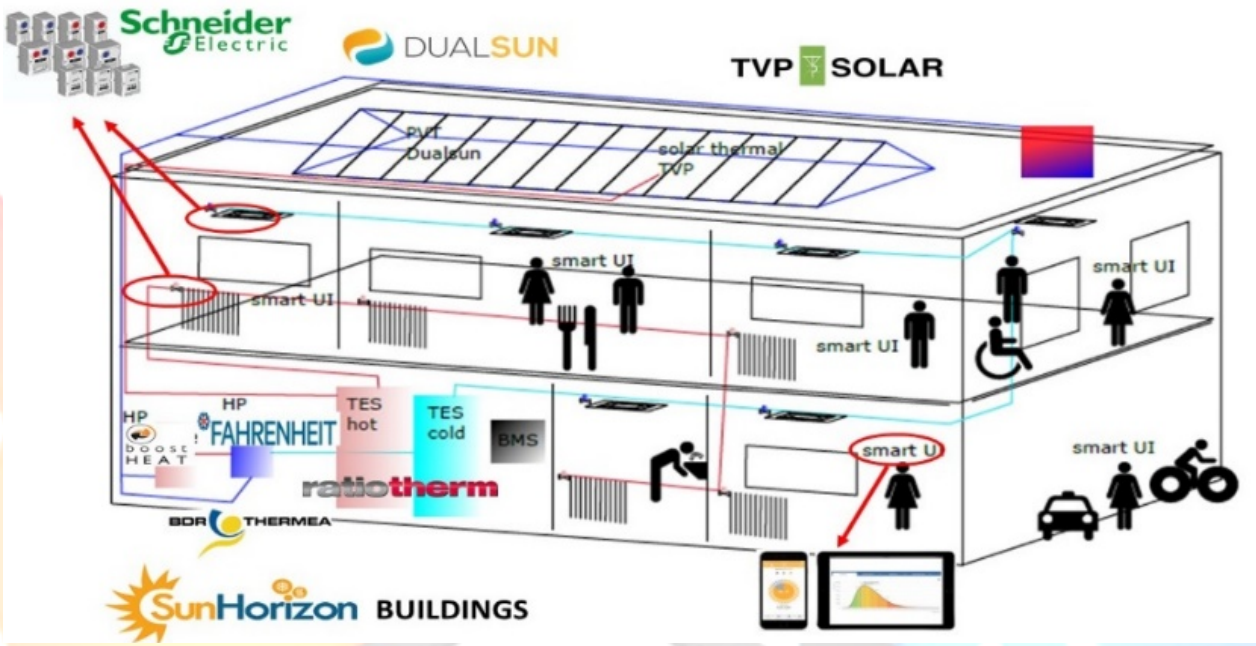
Project Coordinator - Rina Consulting

This Project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement N. 818329

Our Vision



Key Message: As stated in EU Strategy for H&C, *"large-scale demonstration projects of energy-efficient and low/zero-carbon technologies are needed to help reduce technical and market barriers by providing robust data to evaluate their performance in each market segment"*. At this purpose SunHorizon aims to be a breakthrough demonstration to market project involving **21 partners' expertise and 8 Demonstration Sites all around EU,** focusing its activities on *"reducing system costs and improving performance as well as optimising existing technologies for H&C applications and for some of the most promising market segments"*

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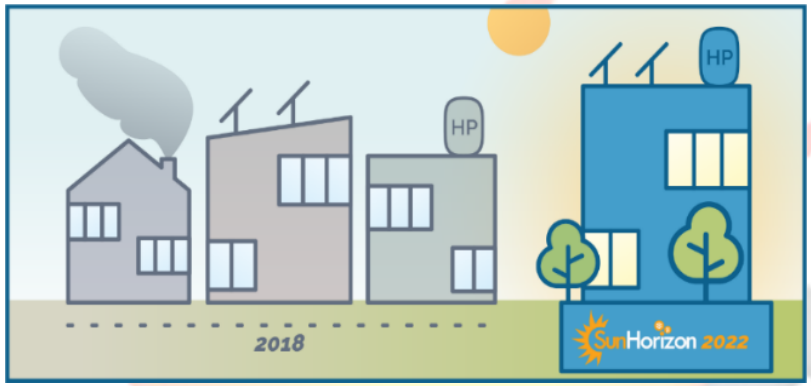
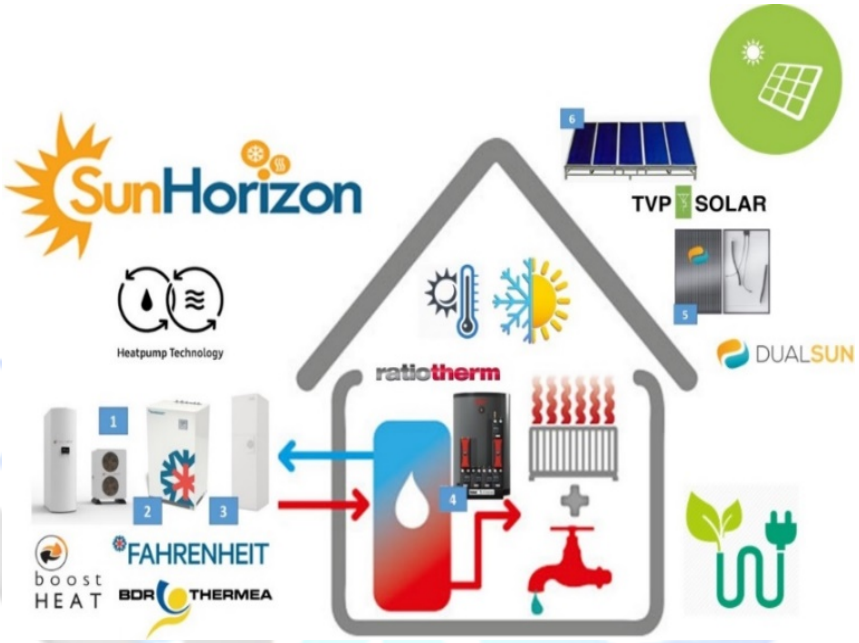
Our Vision





TRL 7 – Sun and HP as baseload of EU H&C systems
6 Technologies to be integrated – 5 Technology Packages – 7 Demos
3 Research Pillars based on Functional Monitoring Data exploitation

DESIGN – MANUFACTURE - CONTROL

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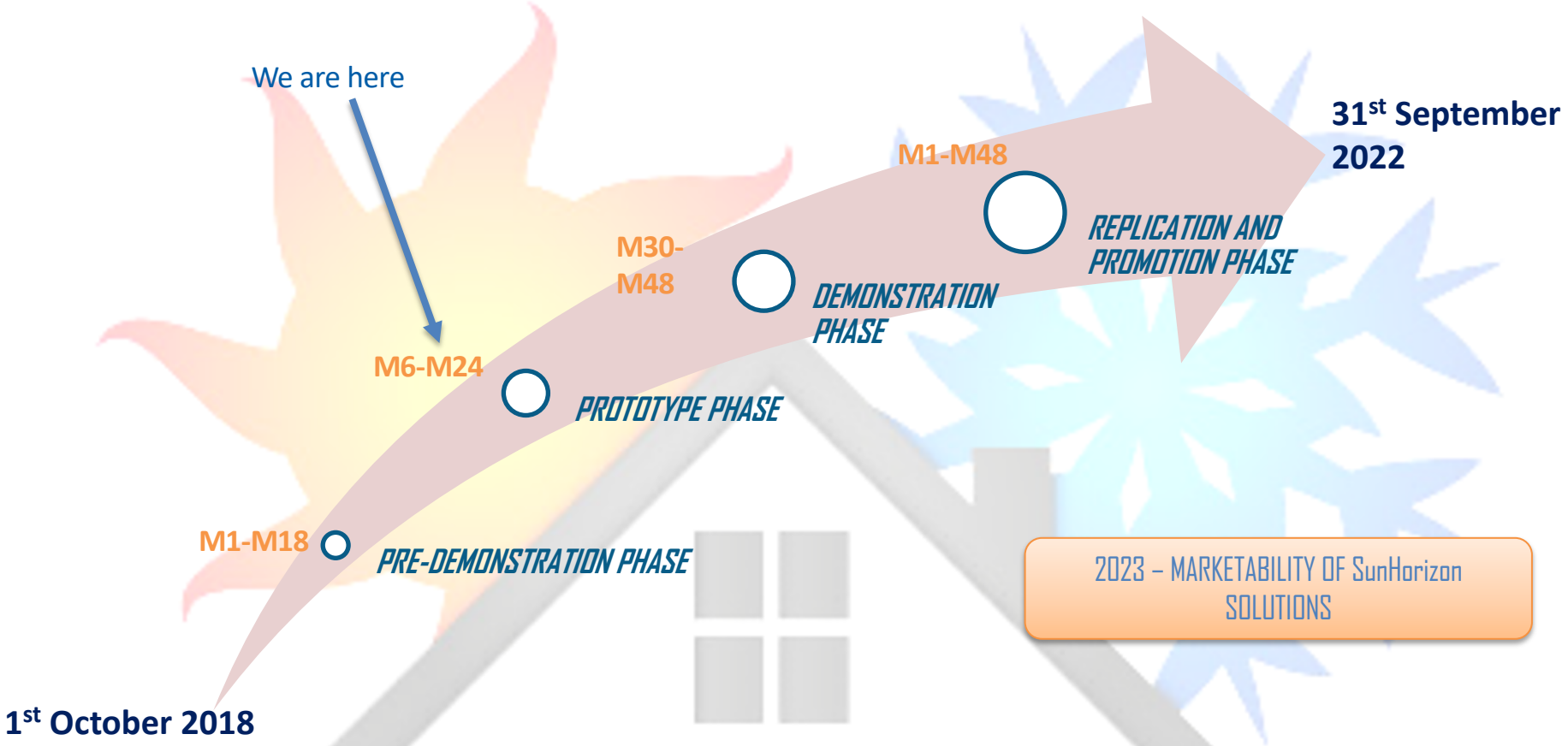
SunHorizon Timeline



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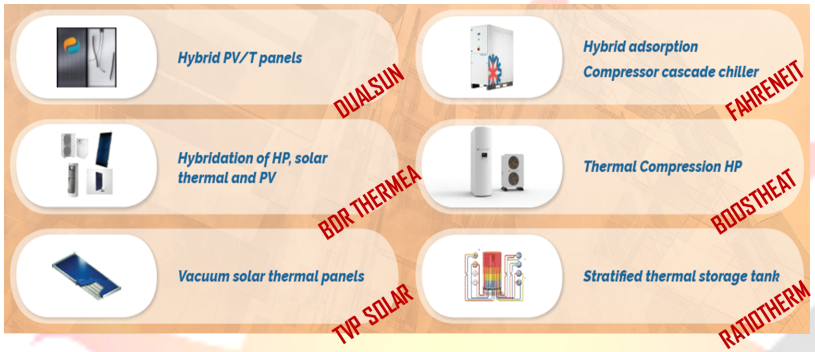
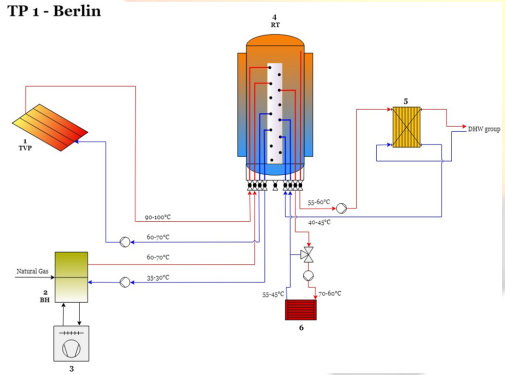
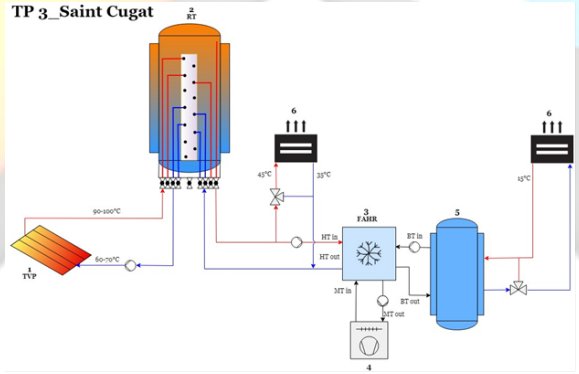
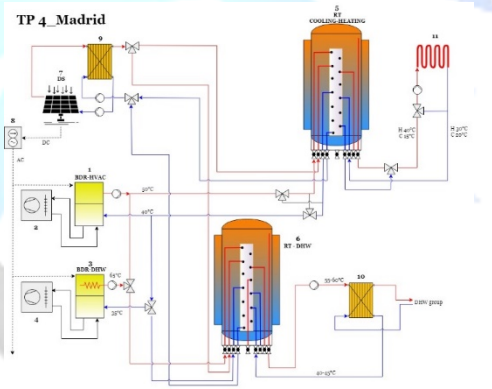
SunHorizon Technology Packages (TP)



SunHorizon TP		Solar-HP integration concept
TP1	TVP+BH	Parallel integration
TP2	DS+BH	Mixed solar-assisted/ parallel integration
TP3	TVP+FAHR	Solar-driven HP for cooling
TP4	DS+BDR	Parallel integration
TP5	TVP+BH+ FAHR	Mixed solar-driven/ parallel integration







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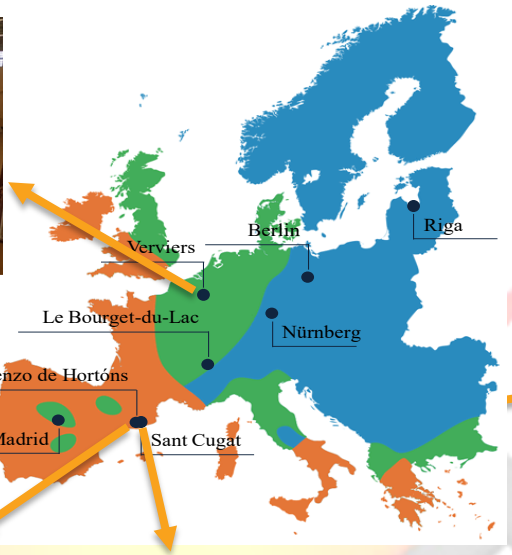
SunHorizon: Demosites



№	Location	Climate	Building type	SunHorizon TP
1	Berlin (Germany)	Cold	Small residential	TP1: TVP+BH
2	Nürnberg (Germany)	Cold	Large residential	TP2: DS+BH
3	Saint Cugat (Spain)	Warm	Tertiary (Civic centre)	TP3: TVP+FAHR
4	Madrid (Spain)	Average	Large residential	TP4: DS+BDR
5	S. Lorenzo (Spain)	Warm	Small residential	TP4: DS+BDR
6	Verviers (Belgium)	Average	Tertiary (Sport Centre)	TP1: TVP+BH
7	Verviers (Belgium)	Average	Tertiary (Swim. pool)	TP2: DS+BH
8	Riga (Latvia)	Cold	Small residential	TP2: DS+BH

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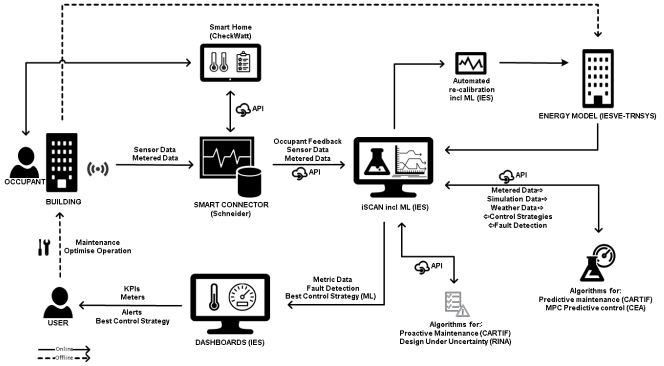
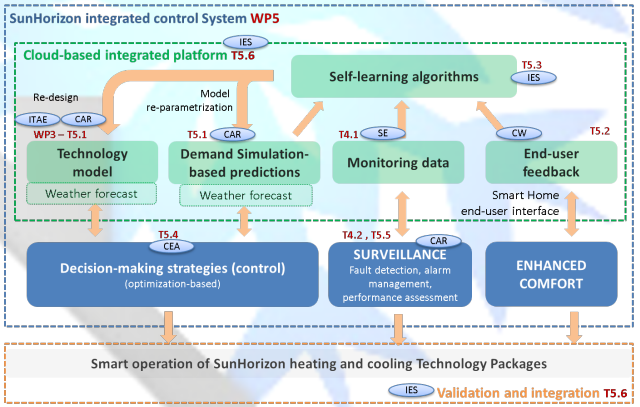
SunHorizon monitoring and control

- **Optimised sensoring/monitoring platform for:**
  - Control purposes
  - Design under uncertainty tool to reduce CAPEX (RINA-C)
  - Predictive maintenance strategy (reduce OPEX)



- **Developing an integrated smart control and surveillance system that combine**
  - Monitoring
  - Decision-making strategies
  - Prediction technique
  - Self-learning
  - End-users interaction



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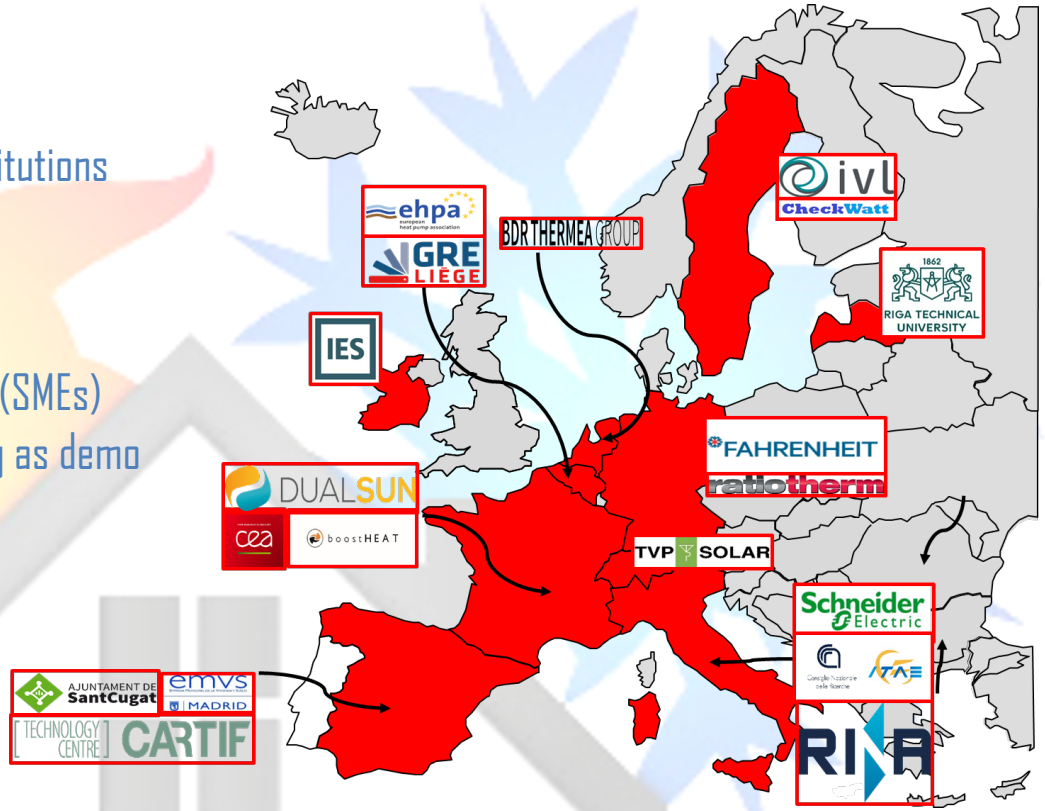
Project Team

An Industry Driven Consortium

- 5 top level Academic Polytechnic Institutions (RTOs)
- 12 industrial partners:
  - ✓ 5 Large Enterprise (LE)
  - ✓ 7 Small and Medium Enterprises (SMEs)
- 4 association and stakeholders acting as demo site



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SunHorizon: A demonstration to Market Project

Key Exploitable Results	TRL
TVP LT Solar Thermal	5
DS optimized PV-T	5/6
BH Thermal Compression HP	5
FAHR Adsorption HP	5
BDR Reversible HP for P2H	5/6
RATIO Enhanced TES	6
SE Functional Monitoring	6
SunHorizon Predictive Controller and DUU tools	5
SunHorizon TPs	5/6

Key Exploitable Results	TRL
TVP LT Solar Thermal	7
DS optimized PV-T	7/8
BH Thermal Compression HP	7
FAHR Adsorption HP	7
BDR Reversible HP for P2H	7/8
RATIO Enhanced TES	8
SE Functional Monitoring	7
SunHorizon Predictive Controller and DUU tools	7
SunHorizon TPs	7

Target Markets

EU Entry Markets

PROJECT STARTS — 2018 — TRL 5

2020 — TRL 6

2022 — TRL 7 — PROJECT ENDS

2023 — TRL 9

Project Drivers
Reduction of emission and energy bill for H&C
Increased penetration of RES in H&C sector
Coupling the most consolidated and socially accepted RES Based H&C systems: HP and solar energy
Use monitored data to facilitate design, control and predictive maintenance of H&C Systems
Increase of the performance of H&C components

Project Actions
Connecting the research and innovation activities to the public and professional audiences in order to increase the information, knowledge and expertise on solar based HP solutions
Improving the performance of the solar energy and heat pumps technologies
Coupling between solar energy and heat pump technologies

Project Deliveries
Technologies ready for Small and Large Residentialy and tertiary buildings
E-Handbook for replication 1 year of Monitored Data

Non Technological Barriers:	• Definition of best practices and measures for the installation of the SunHorizon at building level • Standardization of control and monitoring systems protocol also for smart end user interface • Increase social acceptability also via dedicated policies/supporting schemes (SunHorizon Positioning Paper thanks to EHPA) • Health and Safety Certification for the integrated system
Manufacturing & Installation	• Upscale the production capacity of DS, BH, TVP, RATIO, BDR, FAHR systems • Develop a dedicated integration scheme and procedure for a standardized system for single technologies and technology packages • Reduce installation timing and costs
Further demonstrations	• Demonstration of the SunHorizon in larger scale and with higher solar ratio • Application in other countries (Environmental, logistics and energy market scenario)
Marketing	• Start to promote the SunHorizon HW&SW technologies and TPs among building owners/managers, ESCOs, energy utilities, H&C manufacturers etc. • Selection of the first entry markets: Southern EU countries with high solar irradiation and presence of a robust gas grid • Assessment of the final business model for the commercial exploitation of the SunHorizon H&C Technologies

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THANKS FOR YOUR TIME!!!

www.sunhorizon-project.eu

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