



SUNHORIZON PRESS RELEASE - December 2021

“SUN COUPLED HEAT PUMPS NOW READY TO SUPPLY THE SUNHORIZON DEMO SITES”

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SunHorizon is an EU funded project¹ which aims to demonstrate up to TRL 7 innovative and reliable heat pump solutions (thermal compression, adsorption, reversible) able to provide heating and cooling to residential and tertiary buildings with lower emissions, energy bills and fossil fuel dependency when coupled and managed with advanced solar panels (PV, hybrid, thermal).

The project is currently on its 38th month of activity, and the work on the demo sites is progressing; three of the eight demo sites are finalizing the commissioning stage and are ready to supply the residential and tertiary buildings!

The coldest location selected for the demonstration of SunHorizon technologies is **Riga (Latvia)**, where two single-family residential houses have been upgraded with a heat pump coupled with photovoltaic thermal collectors (PVT) and stratified thermal storage. Integrated and efficient operation of the whole SunHorizon technology package #2 (TP2) is enabled by advanced control solutions developed within the project, and end-users' feedback during the demonstration is acquired through a dedicated mobile app.

The gas-driven thermal compression heat pump replaces the existing gas boiler to provide space heating and domestic hot water in a much more efficient way. The outside air and heat produced by the PVT panels serve as additional heat sources to the heat pump. When there is no immediate heat demand, the thermal energy provided by the PVT field is stored in a stratified thermal storage tank, whereas the electricity produced by the solar panels fully covers the electricity demand of the household during the year (employing net metering). Additionally, TP2 includes a smart electric heater enabling power-to-heat conversion for the surplus electricity from the PVT field.

“Demonstration of the innovative SunHorizon technology package in Latvia is going to provide broad experience for the local stakeholders considering that gas-driven heat pumps, stratified energy storage and PVT panels haven't been used much in our country so far,” explained Zane Broka (Riga Technical University). *“Whilst replacing their existing gas boiler, the households will be able to continue benefiting from their already existing gas grid infrastructure, meanwhile significantly increasing the operating efficiency of their heating system. Also, thanks to the onsite electricity generation, their overall energy cost is going to decrease. The flexibility and efficiency of the new SunHorizon system is further enhanced by the thermal storage and power-to-heat solutions.”*



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The deployment of SunHorizon TP2 in Latvia is managed by Riga Technical University. The technologies installed are provided by SunHorizon partners: Boostheat, DualSun, Ratiotherm and Schneider Electric. In addition, the demonstration strongly relies also on the modelling efforts and cloud solutions provided by Cartif, CheckWatt, IES and RINA-C.

The installation of the main TP2 components in both demo sites was completed by November 2021. The commissioning is scheduled for December 2021 (Imanta site) and January 2022 (Sunisi site).



Figure 1 Sunisi demo site



Figure 2 PVT panels installed in Imanta

Another location selected for the demonstration of the SunHorizon technologies is a social housing building built in 1948 in **Madrid (Spain)**, which originally served as a police station, then was



retrofitted and converted into 10 apartments (1072 m²). The installation of SunHorizon technology package #4 (TP4) has been concluded and the commissioning phase is going to start soon.

The SunHorizon contribution to the building comprehends a full renovation of the HVAC system by installing two heat pumps (one air-to-water and one water-to-water) coupled with hybrid solar panels and stratified storage tanks to supply the demand for space heating and cooling (SHC) and domestic hot water system (DHW).

Moreover, inside the dwellings, the SHC and ventilation are integrated into the same all air system, zoned per room by means of a fan-coil with plenum and a heat recovery unit. On the other hand, DHW production is produced instantaneously through an individual heat exchanger. The system is centralized and remotely controlled.

The demo site manager, Diego Romera (Empresa Municipal de la Vivienda) said, *“SunHorizon project will help to improve the quality of life of the tenants, by attempting to achieve high degree of comfort, reducing to minimum the energy consumption.”*

Furthermore, the *“SunHorizon project aspires to become a replicable model for retrofitting EMVS buildings or even new EMVS buildings in the city center of Madrid.”*

The technologies installed are provided by the SunHorizon partners: Schneider Electric, BDR THERMEA, DualSun and Ratiotherm. Other partners, Veolia and Cartif, supported the work in the demo site.

The commissioning is scheduled for December 2021.



Figure 3 Main façade of the demo site after the renovation



Figure 4 Individual heat meters for SHC and DHW inside the installation shaft



Figure 5 Solar field and heat pump on the rooftop

The SunHorizon technology package #3 (TP3) has been put in place in the Mira-sol civic center (1050 m²), a facility dedicated to cultural activities, located in **Sant Cugat del Vallès (Spain)**.

10 different rooms of the civic center are monitored with CO₂, temperature, humidity, window and occupancy sensors. The heating and cooling demands are covered by the hybrid adsorption-compression chiller, high-vacuum solar thermal panels, storage tanks, and advanced monitoring and controls interface components.

The center has a 50 m² outdoor technical room, where the heat pump is installed, additionally, the building has a large roof surface (350m²) available where the solar collectors have been installed. The high-vacuum solar thermal panels are connected directly to the heating distribution system, thus to reduce the heat pump heat production.

The integration between solar and heat pump technology aims to cover part of the heating and cooling demand of the building, to maximize solar self-consumption and guarantee adequate internal comfort.



As the site manager Gerard Riba (Sant Cugat del Valles City Council) explained, *“The SunHorizon solutions applied in the Sant Cugat demo site will rely on renewable, local energy sources to promote feasible alternatives to traditional fossil fuel-based solutions. The solutions are expected to have positive impact in terms of: GHG emission savings (14.6 tCO₂/year) and primary energy savings (122.95 MWh/year), reduction of thermal energy bill: 6,147 €/year, and the creation of 10 new jobs, among others.”*

The technologies installed are provided by the SunHorizon partners: Schneider Electric, FAHRENHEIT, TVP Solar and Ratiotherm; while Veolia and Cartif supported in the installation, commissioning, monitoring and data acquisition.

The commissioning is foreseen to be finalized between end of December and beginning of January 2022.



Figure 6 Mira-sol civic center, aerial view



Figure 7 Solar thermal panels from TVP- High-Vacuum Solar Thermal Panels



Figure 8 Technical room with the heat pumps

The status of the commissioning in the above-mentioned demo sites, and others, will be discussed further during the next review meeting with the EC Project Officer on the 09th of December 2021.

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