



COMPANY PROFILE

i-TES is a Start Up Company that develops innovative thermal storage solutions using phase-change materials (PCM or Phase Change Material) and offers advanced energy services and energy efficiency measures mainly based on performance-based contracts as an ESCO provider.

ACTUAL PORTFOLIO

- Thermal Storage Tank with biobased and non hazardous PCM for industry application and thermal plants in the civil sector
- Monitoring and advanced analysis for energy consumption, from the field (based on IoT instruments) to the final report using Business Intelligence Tools
- Other PCM storage solution ready to be developed



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THERMAL ENERGY STORAGE DEVICE WITH PCM

Storage tank and heat exchanger containing phase change material (PCM) appropriately chosen depending on the thermal capacity to be exchanged, in terms of temperature, amount of energy and charge and discharge kinetics.

The device, that need to be built based on customer specifications, can be integrated into new or existing systems, in according to the technical and economic evaluation that demonstrates an improvement in overall energy efficiency.

GENERAL TECHNICAL FEATURES

The basic components of the proposed systems are, in addition to the PCM material for which a specific encapsulation is required, the storage tank that contains both the PCM and the heat transfer fluid, a heat exchanger that separates the primary and secondary circuits.

More than these main elements, there are accessory devices such as sensors (temperature, pressure, switches), actuator (valves, alarm systems) and an electrical panel containing the control logic and the interface to the outside.

Each of these must be selected, designed and tested to guarantee the proposed advantages. The PCMs selected by i-TES have, mainly, a biobased origin.

learn more on
www.i-tes.eu

PCM APPLICATION

Several example on the market, following the main application:

- Buildings, as passive cooling
- Thermal Solar application, to increase capacity and to avoid overheating
- Air Conditioning, as load shifting night/day
- Heat Pumps, to increase efficiency
- CHP, to increase the thermal usage
- Waste Heat Recovery, to be reused as is or to produce power with ORC
- Automotive (e-car), battery management improvement and power reduction for A/C load
- Demand Side Management and Micro Grid enhancement
- Every field in which thermal energy is used could be a potential application of PCM



ELEMENTS OF INNOVATION FOR ENERGY EFFICIENCY

Our proposal, mainly related to plant engineering, is applicable in well-established contexts (air conditioning of the rooms or in solar thermal collectors) but also towards innovative solutions such as the recovery of waste heat in industrial environments or even in very innovative areas such as electric cars.

As for traditional applications, the only equipment to refer to is water storage tanks where water has the task of absorbing and releasing thermal energy by changing its temperature (sensible heat); concerning innovative proposals, the use of water as a means of thermal storage is not technically possible or difficult to achieve.

Thanks to its chemical-physical characteristics (latent heat), the use of PCM instead of water, guarantees a greater storage capacity at the same volume / mass used but above all allows to select the exchange temperature level, reducing to the minimum necessary automatic regulation elements, requested by water systems, to guarantee process specifications.



ENVIRONMENTAL BENEFITS

The device is to be considered as a static element that has the function of absorbing thermal energy (at different temperature levels depending on the selected PCM) and then releasing it when needed. Environmental benefits should be considered indirectly, it means that the presence of PCM allows to design storage solutions that to date are not convenient; among these, the areas in which the maximum benefit is expected, are those where waste heat is dispersed without being recovered and exploited, eg. applications in which to use low-enthalpy ORC systems. In addition, introducing PCM as thermal storage device, will also reduce the overall water consumption aligned with the basic requirements of the circular economy philosophy

ELEMENTS THAT CHARACTERIZE THE PRODUCT/SYSTEM WITHIN A "SMART PLANT SMART CITY" LOGIC

Considering the specific characteristics of the proposed system, that is a storage tank of the thermal energy including an automatic operating logic that regulates the flows of water entering and leaving as a function of the temperatures and process pressures (energy balance at the entrance and in output), surely binding to an electronic integration towards the other systems according to the basic principles of Smart Grids; this possibility of dialogue between devices represents a substantial element that guarantees and maximizes the expected benefits. In fact, the thermal storage based on PCM allows to optimize the thermal flows present in a complex system, such as inside a heat transmission network (district heating) acting as a thermal buffer between production and users or alternatively it is possible to maximize energy efficiency and thermal storage generated by heat pumps powered by energy producers both locally and remotely.