

## CRISTOPIA : world leader of Thermal Energy Storage

**+ 3 000**  
customers worldwide

**+ 6 000 000**  
kWh daily transferred

**+ 500**  
MW electricity saved



CIAT group subsidiary, expert in heating, refrigeration and air-conditioning  
Headquarters and factory in France  
Subsidiary and factory for Asia Pacific in Zhongshan in China (near Hong Kong)  
A proven technology since 1982:  
- Thermal Energy Storage systems  
- communicating systems: control, automation, monitoring and services  
International Network thanks to exclusive partners

## Why use a Thermal Energy Storage system?



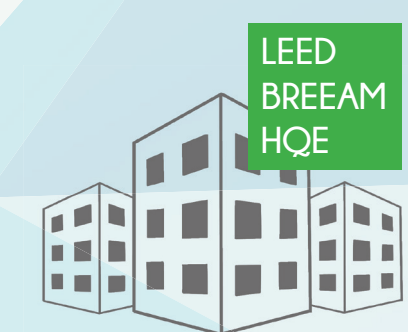
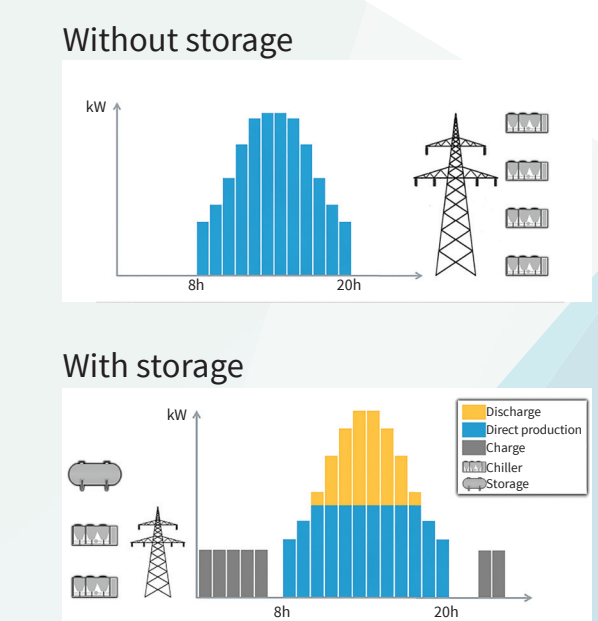
### For centralized cooling producers installation on water loop

		Reduction of the chillers capacity by 30 to 70%
		Peak shaving of the cooling demand over 24 hours
		To shift electricity consumption from peak hours to off-peak hours
		Reduction of the electricity power by 30 to 70% of the cooling production
		Reduction of the electricity costs and operating costs
		Making the electricity consumption profile more attractive for operators
		Improving the environmental assessment

## A key technology for energy demand management

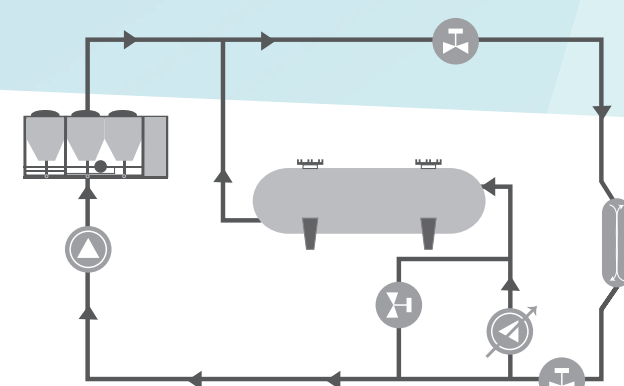
Shaving the cooling production over 24 hours  
Shaving the electrical demand (load management)  
Sustainability of long-term performance  
Renewal energy & sustainable development  
Integrating technology in a sustainable building development:  
- energy optimization of the HVAC system  
- eco-friendly site  
- HVAC system reliability and maintenance savings

### Histogram of a building's daily cooling needs and its electricity consumption profile



# Expert of Thermal Energy Storage systems by latent heat

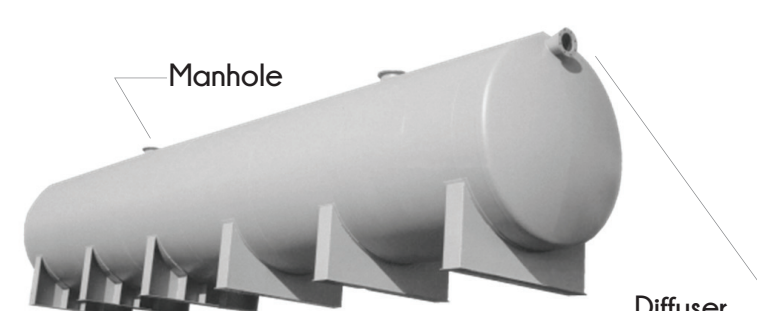
## Engineering: an individualized support



### A system approach with made-to-measure support

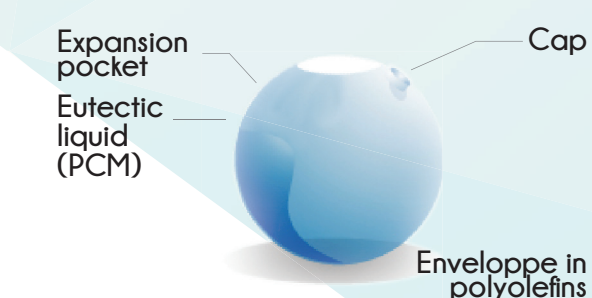
System engineering in terms of specific needs and customer constraints  
Full system control which includes others energies optimizing technologies like free cooling or energy recovery for domestic hot water  
Functional analysis and hydraulic principle  
Constructor commitment on the operating of the cooling production system with a STL  
Commissioning of the control and monitoring system and remote control follow-up of the installation  
Training on control and monitoring system  
Operating optimization and readaptation of the strategy in case of needs evolution  
Support during the entire storage system lifespan

## STL technology: nodules and tank



### Nodules inside...

The CRISTOPIA STL is a Thermal Energy Storage by Phase Change Material (PCM) encapsulation  
The STL system is composed by one or several tanks filled with spherical elements (called nodules) containing the PCM  
The use of PCM in the nodules provide a very high energy density and power exchange



### ...a made to measure tank

CRISTOPIA STL storage offers a full range of integration possibilities inside available spaces  
Two (upper and lower) distributors distribute the heat transfer fluid in the tank for optimum performance

The heat exchange between the nodules and the system is ensured by the heat transfer fluid circulating in the tank

## Control and monitoring of the full system



- Events
- Curves
- Synoptic

### Cristo'Control2: control and monitoring of the full system

Automatic management of the operating modes  
Regulation of the thermal equipment: chiller or heat pump, dry coolers, valves, pumps...  
Management of the dry coolers in free cooling and the energy recovery on chillers or heat pumps  
Optimizing the use of the STL  
Thermal and electrical measurements with temperature probes, sensors, flow and consumption meters  
Reporting of alarms, defaults, state of equipment and operating parameters by SMS, email and to the BMS (by Modbus or other protocol in option as LON, BACnet...)  
Local installation monitoring with touch screen and remote monitoring thanks to its communication features (ADSL, WAN ou 3G)