

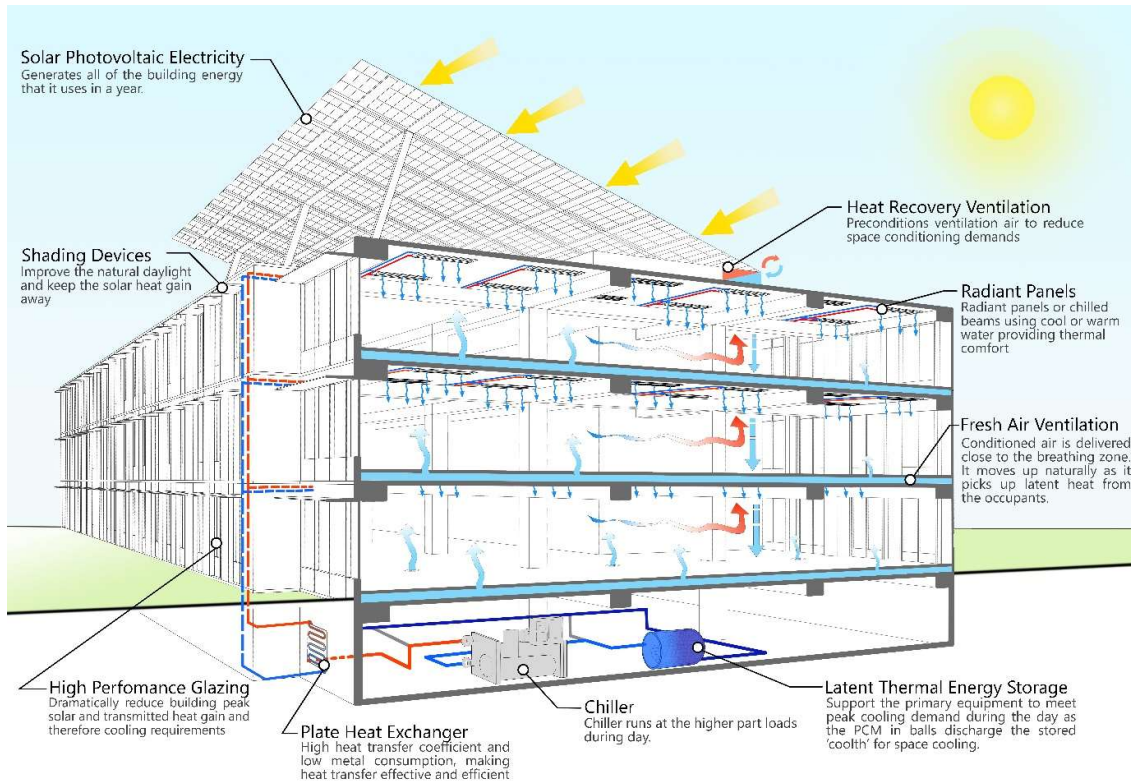
Passive cooling

The ability to utilize materials within the building envelope to contribute to maintaining the desired temperature without depending on an active source of refrigeration system. Phase Change Materials can be used inside a building space to absorb the surplus cooling energy during low peak periods. This stored energy is released passively during high peak demand times.

PCMs also can be used to take advantage of the low temperatures in geographies with a large diurnal temperature difference. This energy can be stored into PCMs which can be used to reduce partial HVAC loads. This concept is known as free cooling (Illustration – Graphics/videos to be put)

Demand side Management

HVAC constitutes about 70% of the total energy consumed in a building. Typically the peak electricity consumption in a building is reached during the month of July for a duration of 3 to 4 hours between noon to 4pm. Therefore, the electric utilities such as the transformers, diesel generator backups and the HVAC capacity is sized to take care of the peak demand which results in an oversizing of the capacities pushing the CAPEX by atleast 25% only to meet the peak season. Thermal Energy storage enables 50% reduction across electrical and HVAC capacities thus managing the demand smartly.



PCM Thermal Energy Storage Benefits

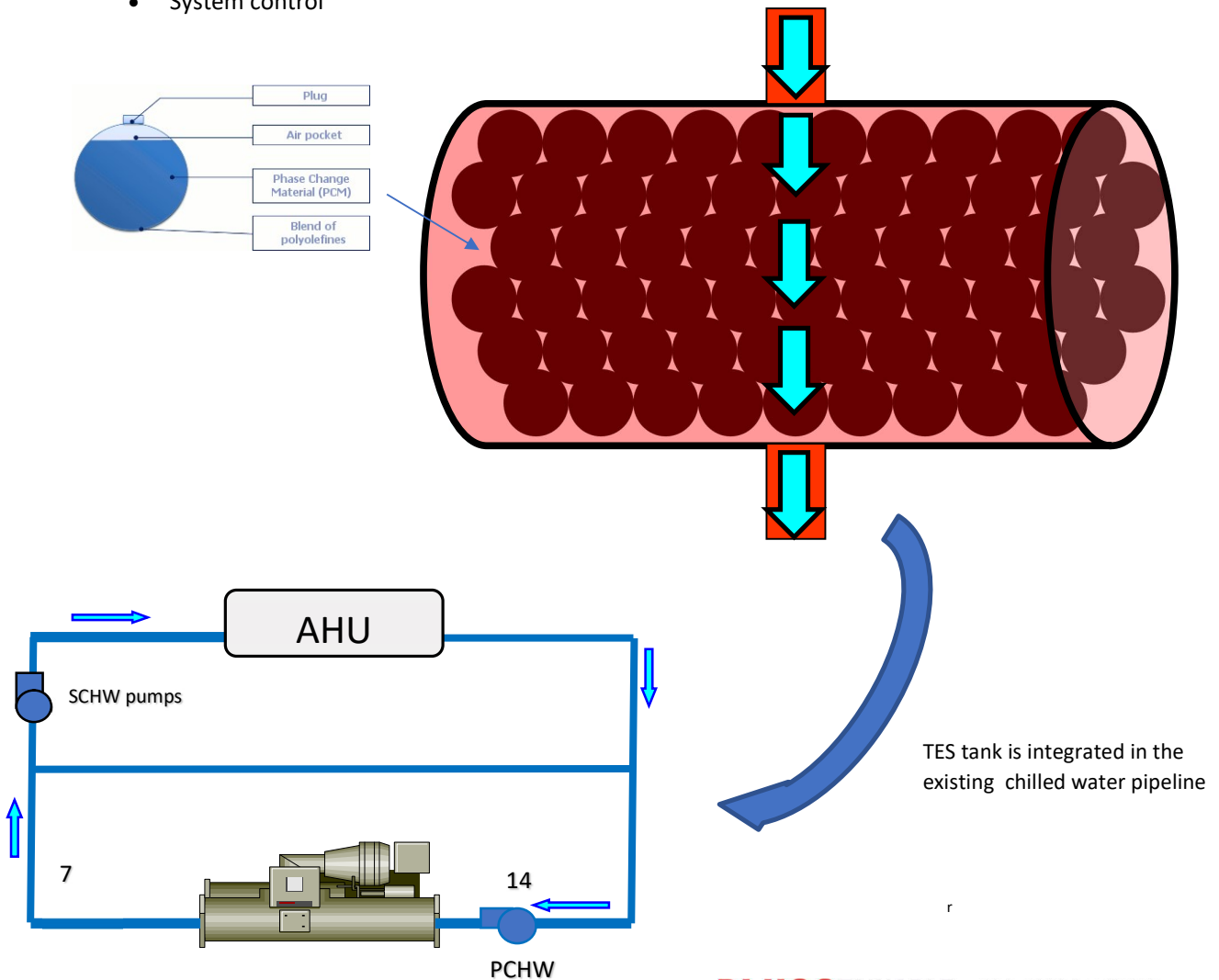
The impact of integrating TES scheme are as follows:

Reduces,

- Reduce Chiller size by 30 to 70%
- Cooling towers/ Dry Coolers by 40 to 80%
- Electrical supply & distribution (transformer size)
- Chiller short cycling
- Maintenance cost
- Running cost by up to 40%
- Noise level
- Electricity charges: demand (kW) and energy cost (kWh)

Enhances

- Cooling capacity from existing plant
- Electrical and plant utilisation
- Equipment life
- Efficiency and reliability
- System control



TES tank is integrated in the existing chilled water pipeline

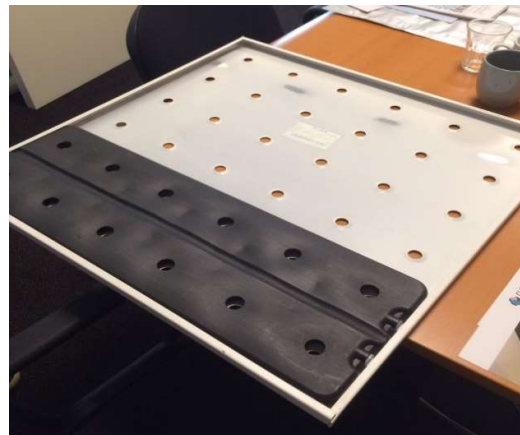
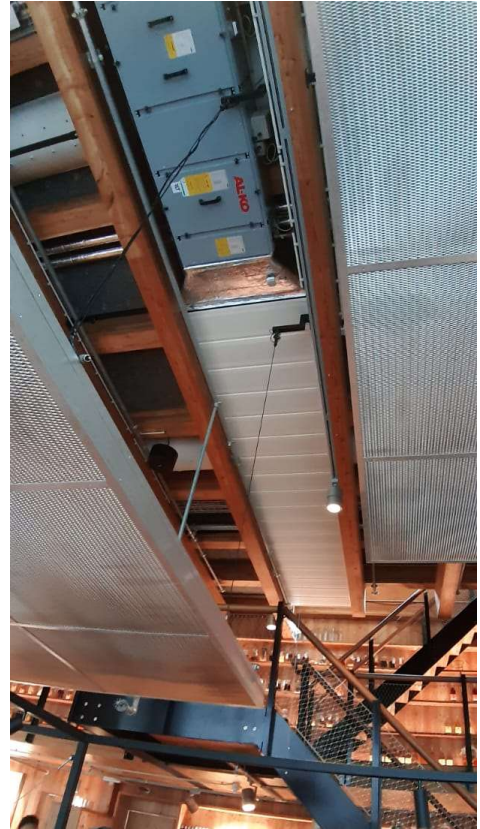
Case study 1 Miesen Plaza, Dublin



- PCM used - +11 deg C
- Stores latent energy which is used to pre-cool the return chilled water temperature.
- Utilizes off-peak tariff to run the chillers at night – 50% lower than day time tariff.
- The +11 deg C latent storage consumes 30% less energy than ice storage



Case study 2 Commercial Building project, Netherland



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- PCM used - +22 deg C
- Stores latent energy from the free cooling from the ambient available during night time.
- Increases buildings thermal efficiency by 25%, by capturing residue energy which could otherwise get lost in the atmosphere.
- Helps reduce the installed capacity by upto 15%

About PLUSS[®]

PLUSS[®] is a materials research and manufacturing company in the field of Phase Change Materials (PCMs) for **thermal energy storage**. PLUSS pioneered PCM based Sustainable Temperature Control Solutions across sectors including refrigeration, food and pharmaceutical cold-chain, medical devices, building HVAC, agriculture, electric vehicles, etc. Experience, interdisciplinary thinking, and practical skills form the growth guidelines of PLUSS[®] and has helped it receive various recognitions by Government and Industry bodies. PLUSS[®] contributes significantly towards innovative solutions that create a definitive change in the thermal energy storage industry and developing breakthrough products to meet the current and future needs of the society. Research and Innovation has been the cornerstone of the company since its inception. With a network of partners world over and offices in **India and Europe**, PLUSS is today well poised to make a global impact with its innovative solutions.

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