



PLUSS[®] | TECHNOLOGY FOR
A BETTER WORLD

CREATING IMPACTFUL INNOVATIONS



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About us

1994: Incorporated, PLUS Advanced Technologies started with R&D and manufacturing of specialized polymers.

2007: PLUS commenced development in the field of Phase Change Materials (PCMs) technology.

2012: Company raised equity funds from Tata Capital Innovations Funds and expanded R&D, developed and commercialized first of its kind temperature control solutions using proprietary materials.

Provides temperature control solutions across refrigeration, cold storage, cold-chain logistics, HVAC, and healthcare sectors

2021: Acquired by Carborundum Universal Limited – a Murugappa group company, with over 50,000 employees and presence in over 43 countries. Established as a tripartite in 1954, CUMI is a leading materials sciences engineering solutions provider. CUMI, part of the Murugappa Group, is listed on Indian Stock Exchanges – NSE, and BSE.

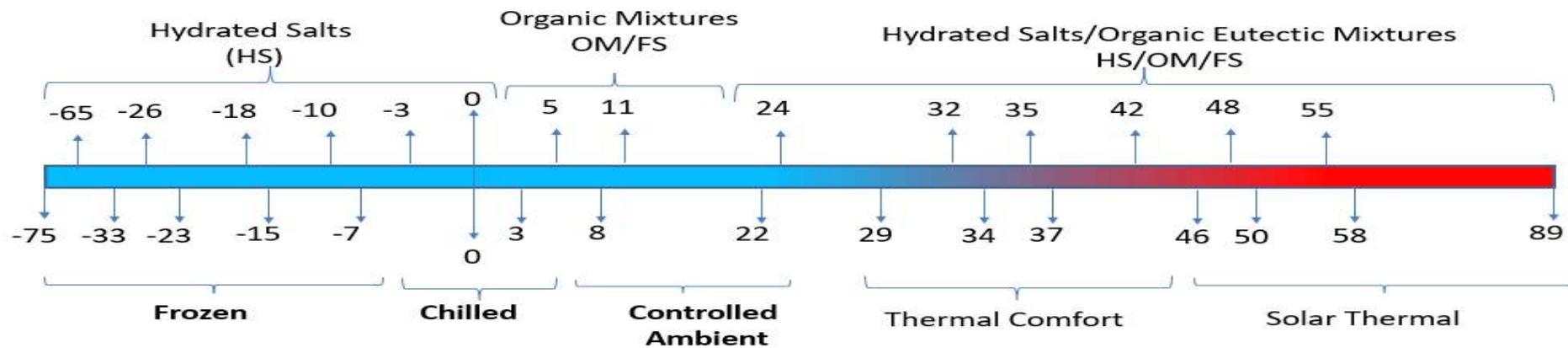
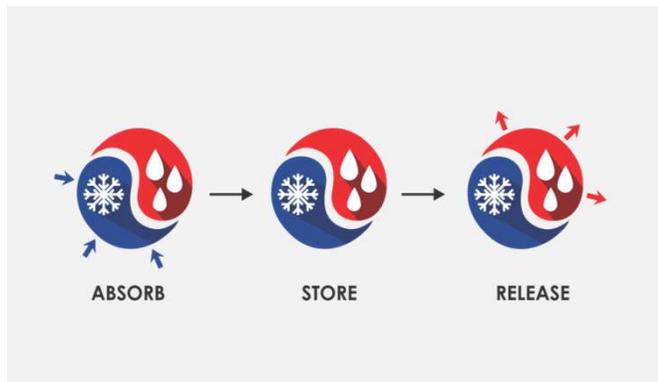
200+ customers

Products in **20+** countries

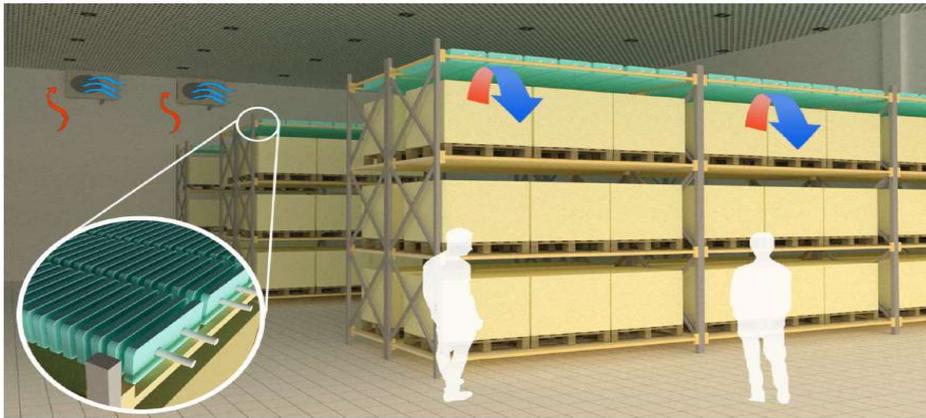
Distributors across **4 continents.**

150+ employees. Subsidiary in **The Netherlands**

What are Phase Change Materials?



Thermal Energy Storage in Commercial Buildings- Passive System

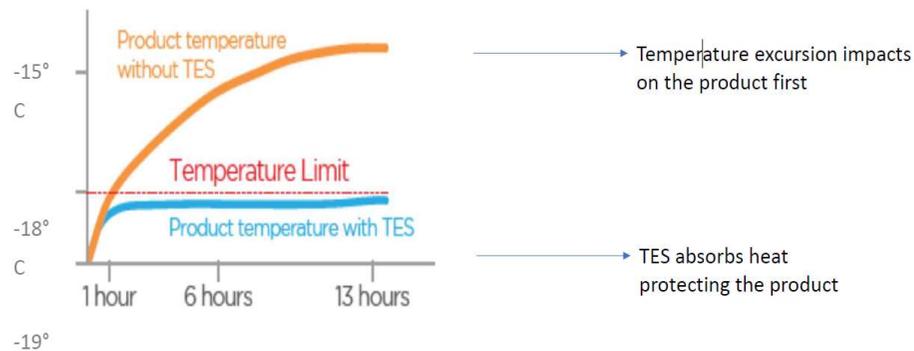


MassEffect™

- Reduces dependency over power source & reduces energy consumption
- Thermal management to increase efficiency
- Shifts peak power loads to off-peak hour

MassEffect™ Key Phenomenon - Thermal Inertia

- Thermal inertia is a state at which a change in temperature is resisted in a given space



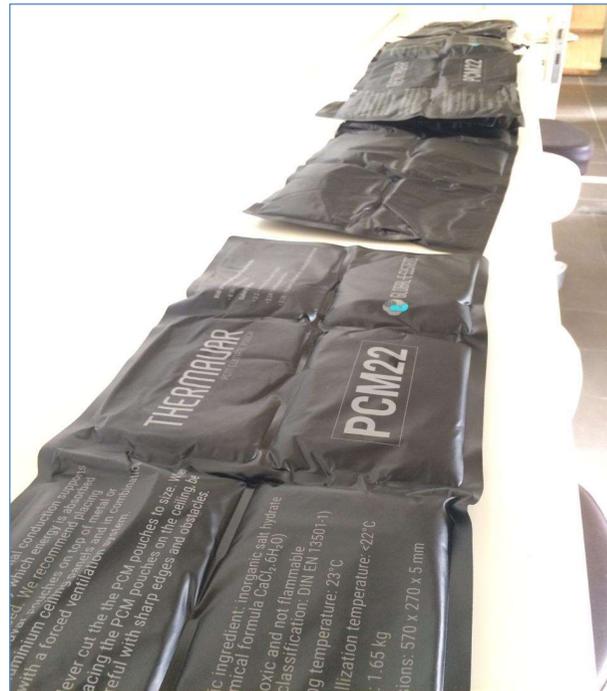
Thermal Energy Storage in Commercial Buildings- Passive System

In Office Spaces- MassEffekt®

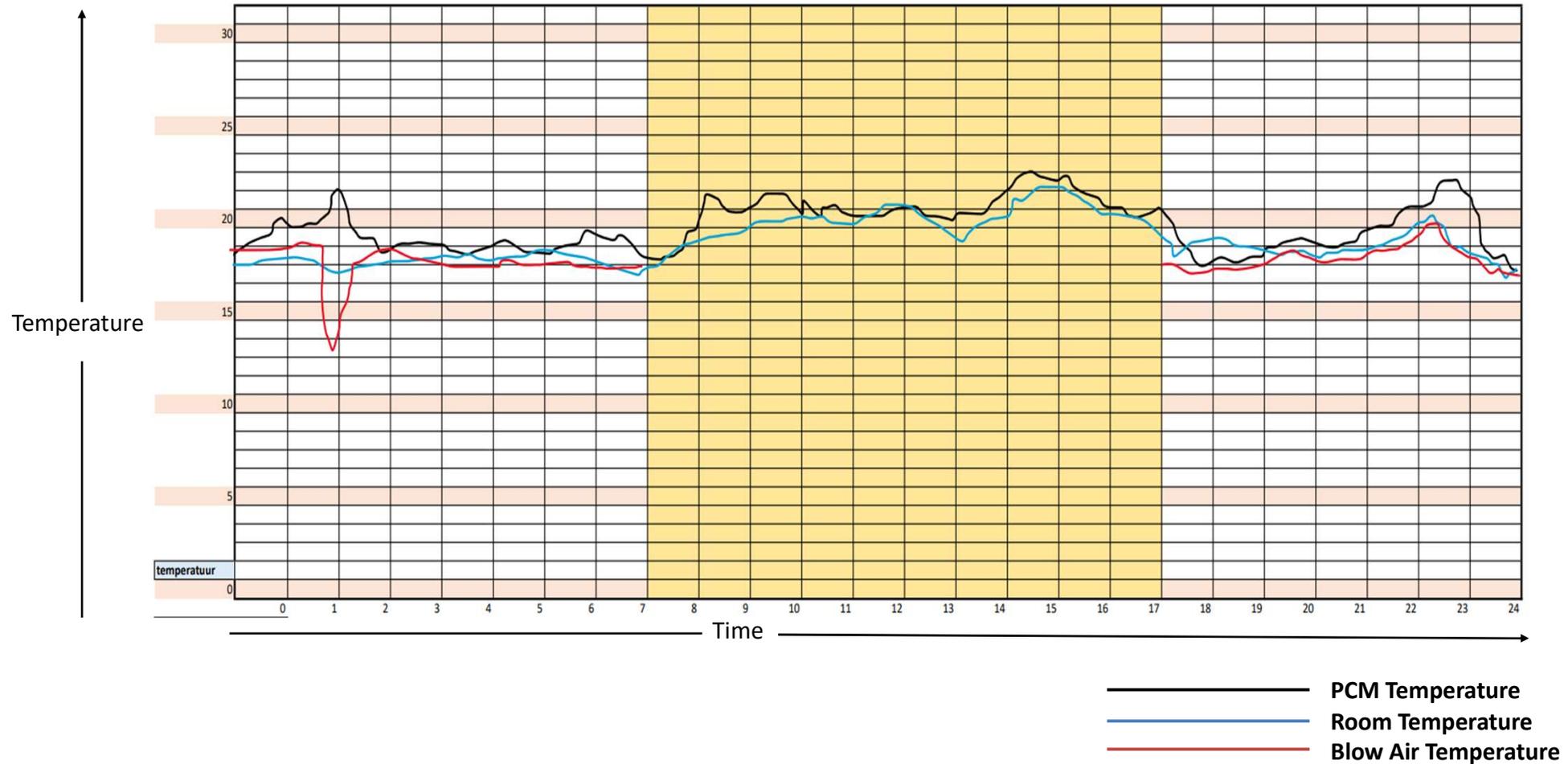


- Thermal energy storage can be recharged using **free cooling** at night.
- During the day the absorbed energy reduces load on the active system

PCM based Passive Air Conditioning in Netherlands



PCM Ceiling Pouches -



Aagun Spatial®- Off Grid Space Heating System

- Maintains 10-15°C at -20°C ambient temperature
- Operational during non sunny hours



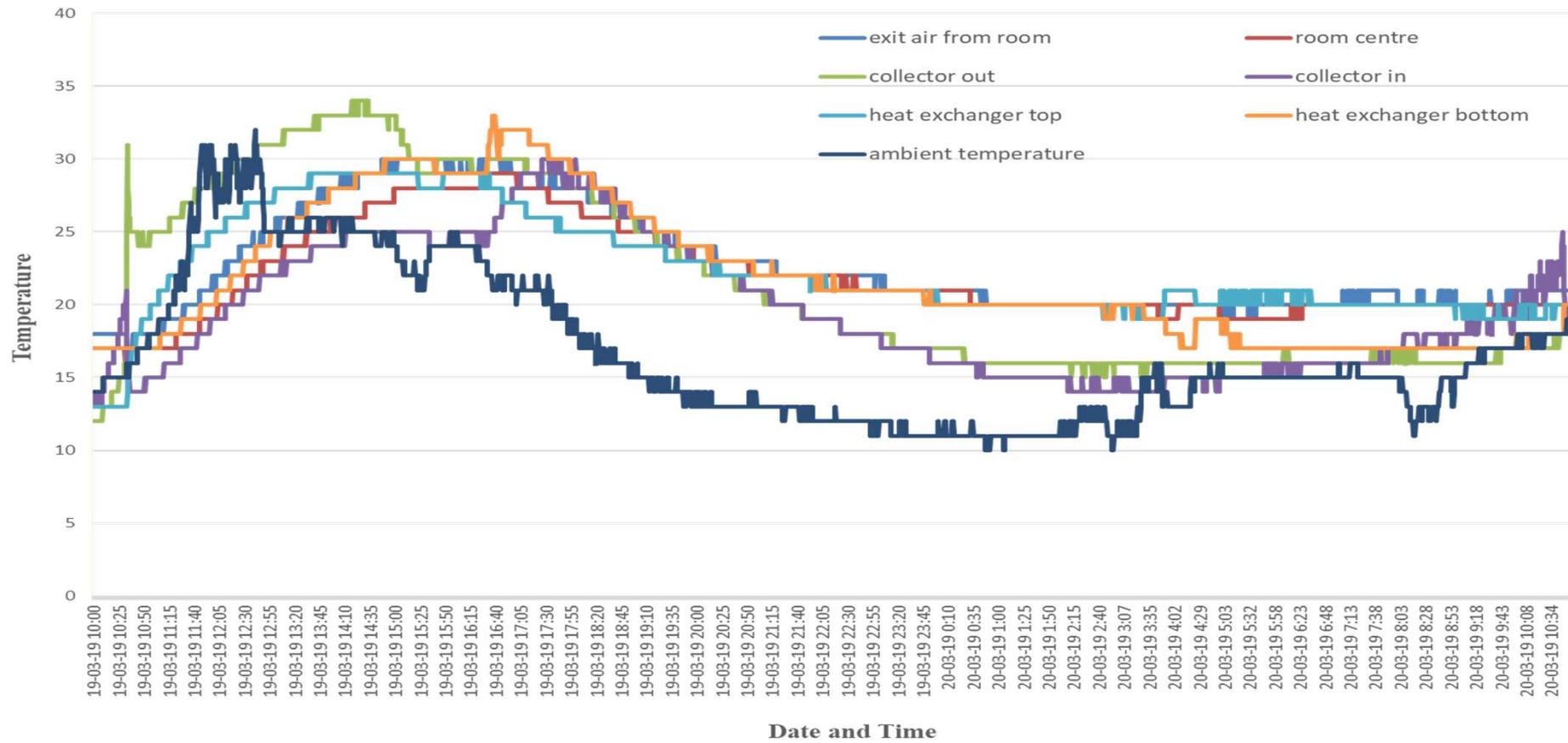
Outdoor Unit



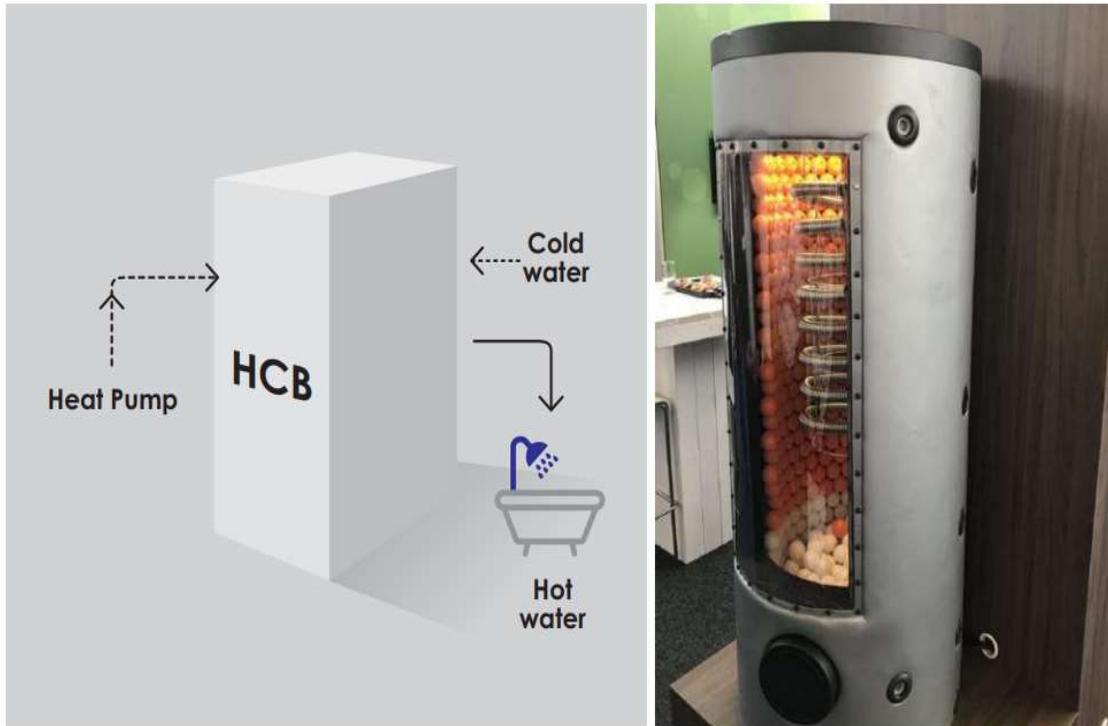
Indoor Unit



Aagun Spatial Unit Installed at IIT-Mandi



Heat Compact Battery

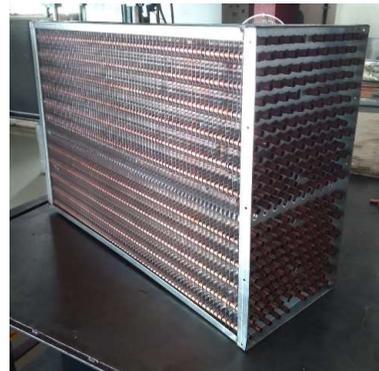
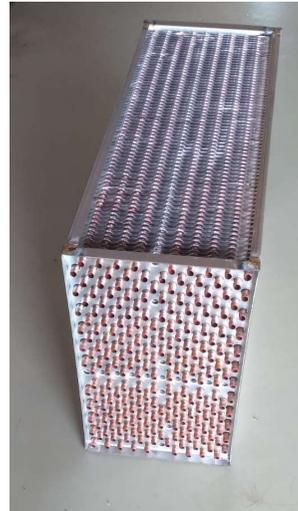


- 4 times smaller than the equivalent hot water cylinder
- Usable with wide range of energy sources supplies energy on demand
- Shifts the electricity load from peak to non-peak hours
- Downsizes the heat pump
- It can be used for both heating and cooling solutions
- Commonly used PCMs are 20°C, 48°C, 58°C

Case Study- Heat Compact Battery



Insulated outer shell integrated with fin and tube heat exchanger



Fin and tube heat exchanger

Charging circuit:

- Supply water flow rate: 12 lit/min
- Supply water inlet temperature: 62°C
- Supply water outlet temperature: 55°C
- Duration of charging: 4 hours
- Capacity of thermal battery: 10 to 12 kW

Discharging circuit:

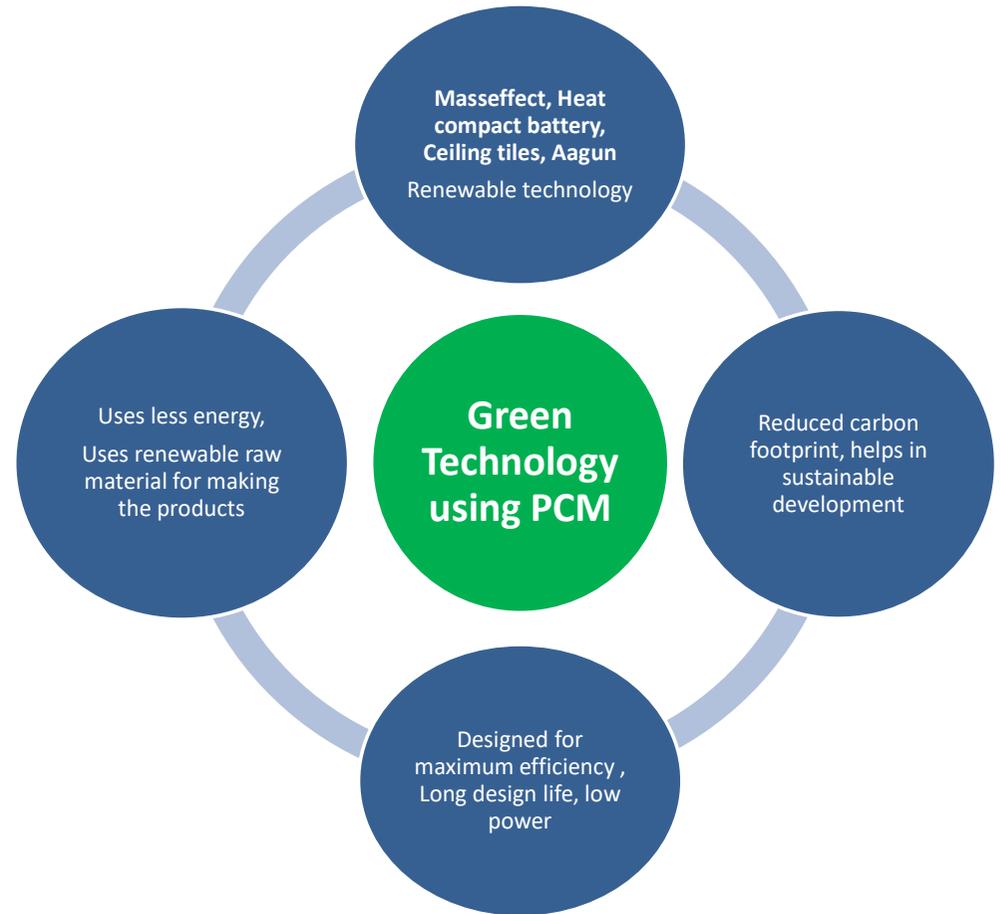
- Supply water flow rate: 20 lit/min
- Supply water inlet temperature: 10°C
- Supply water outlet temperature: 42°C
- Discharge duration: 40 min

Implementing challenges for various application

- Acceptance
- Awareness
- High initial cost barrier

Overcoming the implementation challenges

- Working on same technology prototypes with different customers
- Providing seminars/ presentations in forums
- Showcasing the pilots/case studies
- Amending mainstreaming policies by government bodies



PLUSStainable

/plʌsteɪnə'biəl/

the ability to maintain the optimal rate or level to meet the needs of the present without compromising the needs of future generations, **the PLUS way.**

Samit Jain – samit@pluss.co.in