

ENERGICE

PROJECT OBJECTIVES

Electricity rates are more competitive now due to the open electricity market. Rates differ between suppliers and at different times of the day, with electricity up to 39% cheaper during off-peak periods. Historical Electricity Tariff (2014 – 2019):

- 7am to 11pm – Peak Period (20.84¢/kWh)
- 11pm to 7am – Off-peak Period (12.67¢/kWh)

[Source : SP Group – www.spgroup.com.sg]

For industrial usage, nighttime electricity rates are cheaper. This is due to:

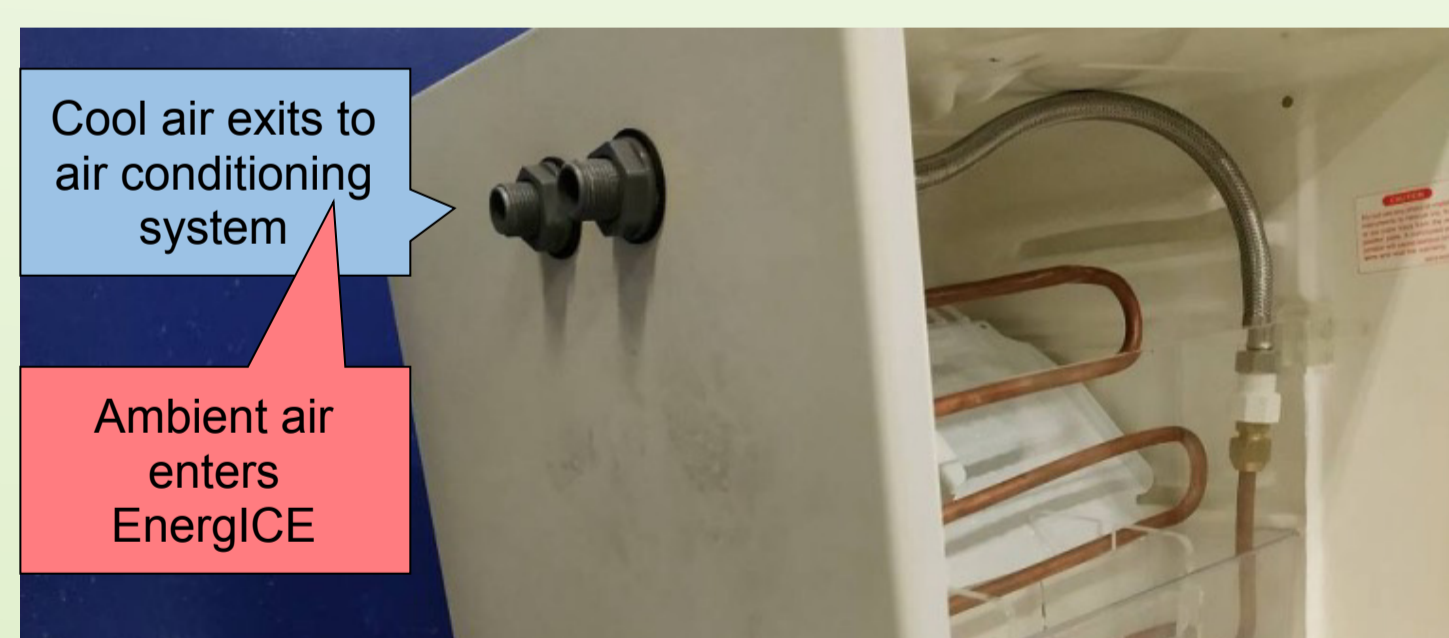
- Cooler power lines at night that transmit electricity more efficiently;
- Greater efficiency in operating power plants at night, thereby lowering fuel usage and reducing greenhouse gas emissions.

Given the above, this project aims to leverage the difference in electricity prices at night and harness this energy to be used in the daytime.

PROJECT SUMMARY

In Singapore, there is an increasing demand for electricity, with a huge amount of this electricity being used for space cooling. Non-residential buildings make up 31% of total energy consumption in Singapore, with the bulk of this (60%) being used for air-conditioning.

This increase in electricity demand will lead to a greater surge in CO₂ emissions and pollutants, thus exacerbating climate change. The good news is that the region can adopt more efficient technologies and support a culture change in cooling consumption.



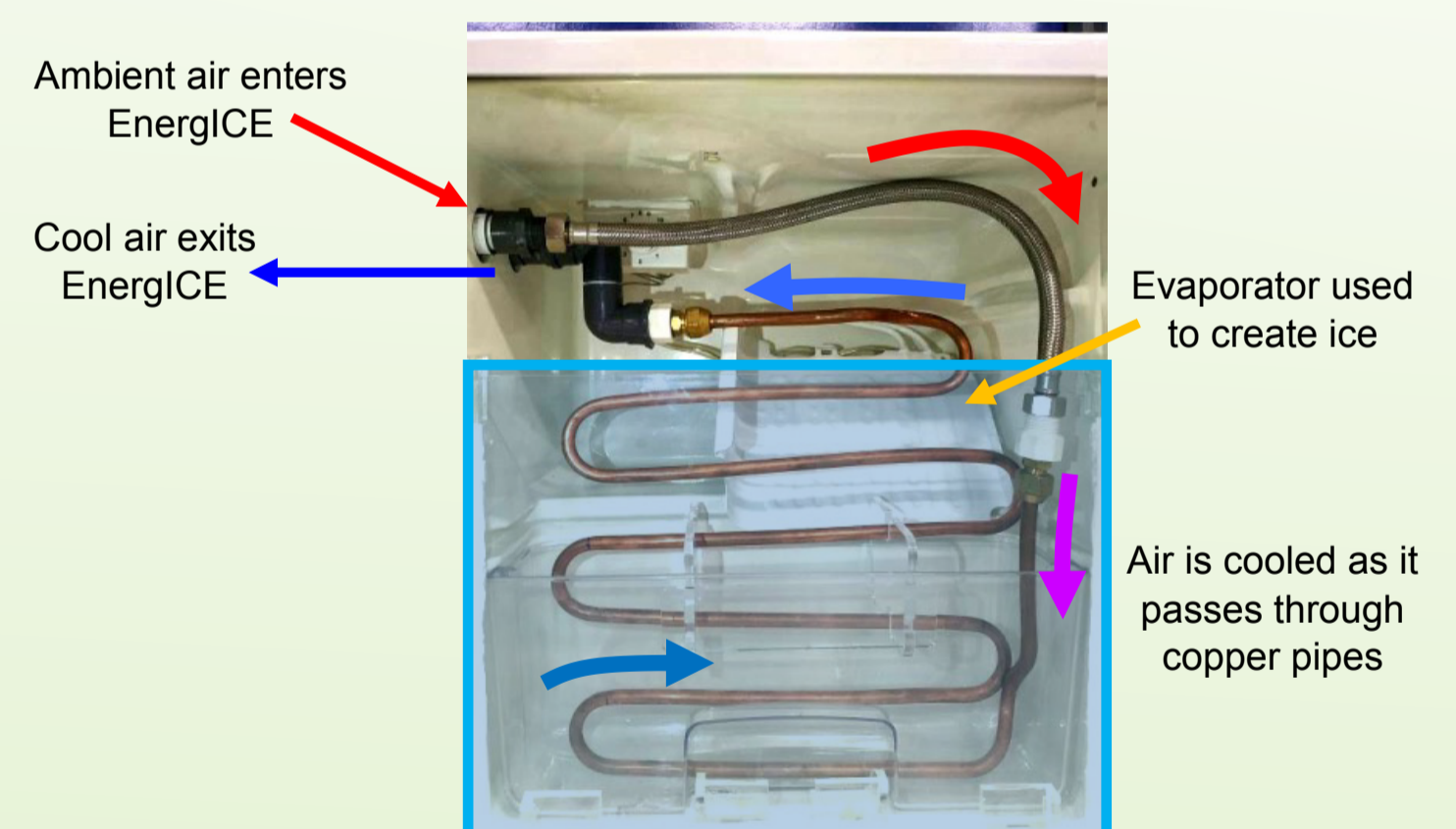
PROJECT OUTCOMES

EnergICE is a new concept of energy storage

- It can be used to “store” thermal energy in cool/ frozen fluids that can then be channelled back into the air-conditioning system during the day, when electricity rates are higher.
- Cooling the fluids at night means that there is a smaller thermal difference between the ambient temperature and fluid temperature. Based on our calculations, the thermal difference in this case amounts to approximately 22.71%.

EnergICE – Working Principle

- EnergICE creates ice from fluids during off-peak periods.
- During peak periods, the air-conditioning compressor is turned off. Air-conditioning fans are still turned on but draw cold air from EnergICE instead of the compressor.
- When EnergICE is unable to supply the required temperature to the air-conditioning system, the system is programmed to cut off the air supply and turn on the air-conditioning compressor.



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