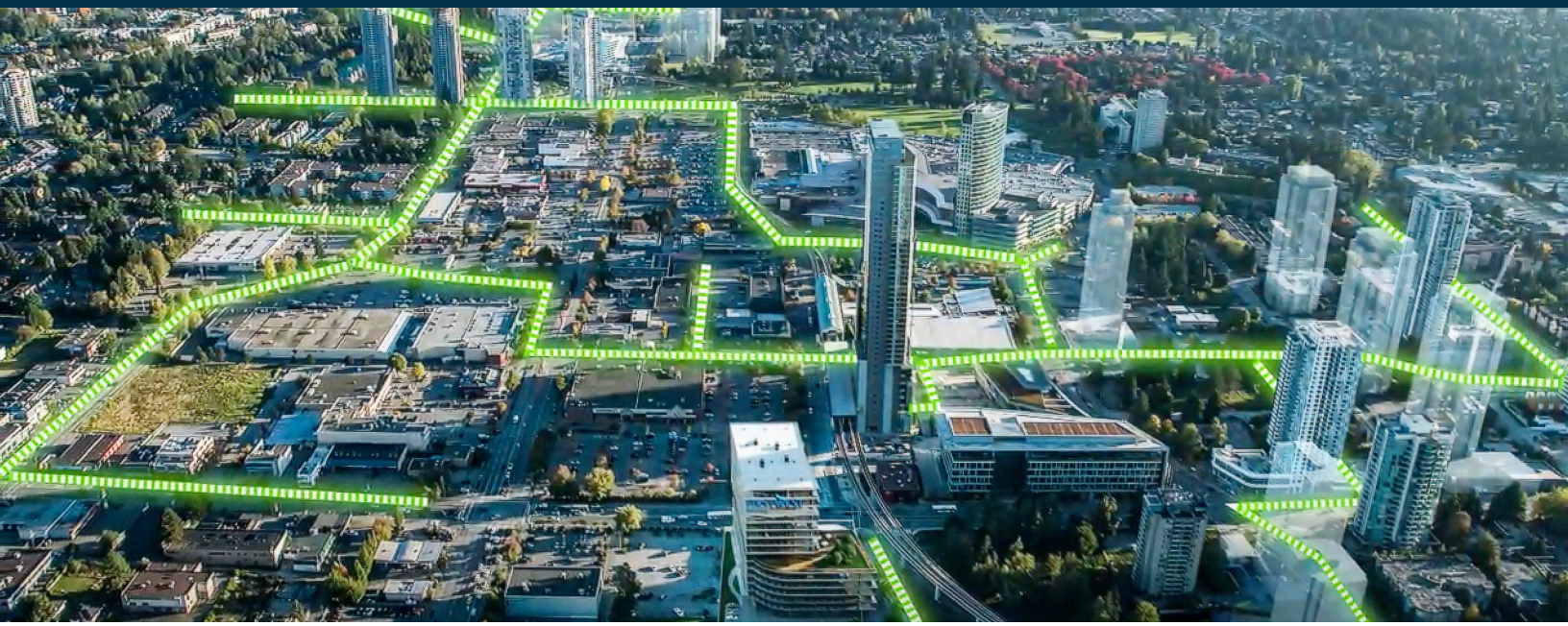
PICS
PACIFIC INSTITUTE
FOR CLIMATE SOLUTIONS

A PICS Snapshot
Energy

DID YOU KNOW ... NEARLY HALF OF THE ENERGY WE CONSUME IS LOST AS WASTE HEAT?

What if ... we could capture that waste energy in a mobile thermal battery, and use it to power district energy networks (DENs), potentially displacing the burning of fossil fuels and their associated GHG emissions.

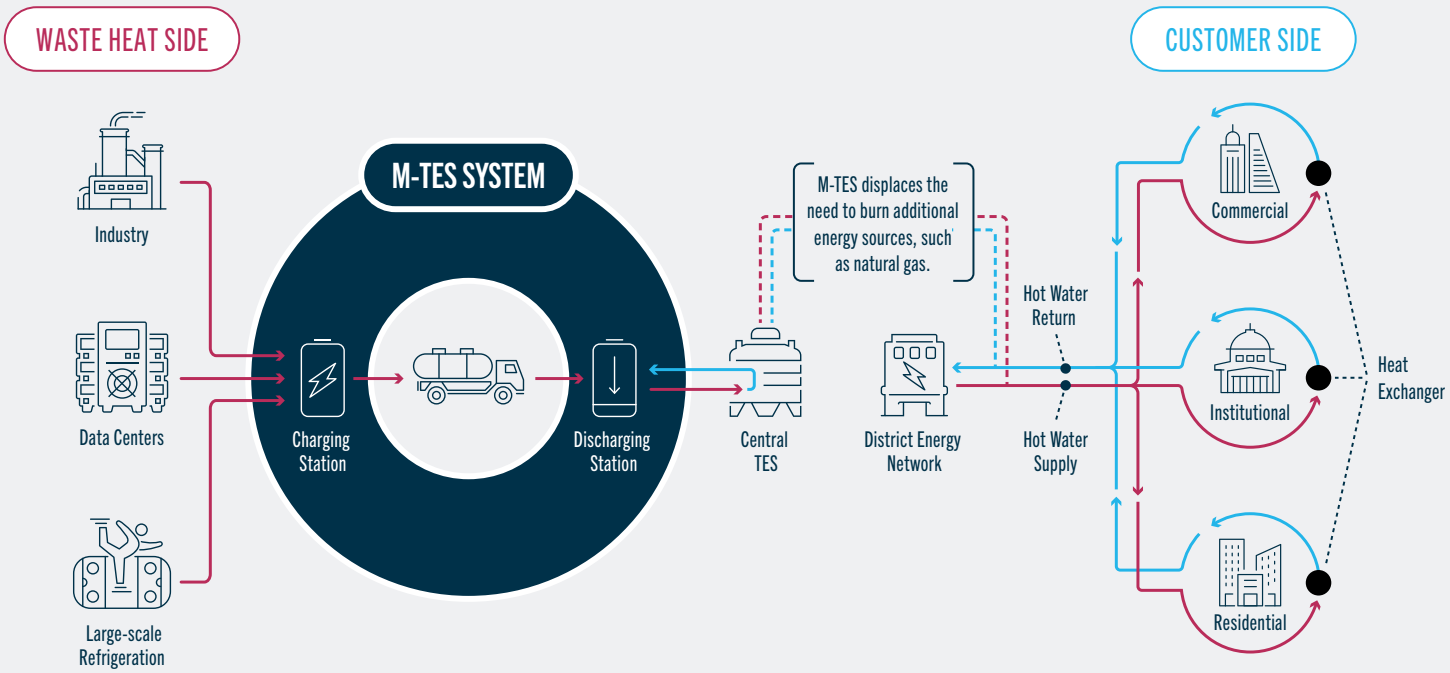


Introducing ...

the **PICS Innovations in Mobile Thermal Energy Storage (M-TES) project** led by Dr. Majid Bahrami at Simon Fraser University in partnership with the City of Surrey and CanmetENERGY. This team of engineers are developing a thermal battery prototype and system to collect waste heat from sources such as data centres, industrial facilities, and large-scale refrigeration units and transfer it into Surrey's DEN which supplies water/space heating to many buildings, some up to 50-plus storeys.

The Big Idea

The heart of M-TES is a liquid that that can store ten times more thermal energy than a hot-water tank. Waste-heat is captured and stored in this thermal battery, transported by tanker truck and then released into the DEN; a cost-effective and flexible solution compared to installing pipes to transport the heat, with less energy loss. This cutting-edge thermochemical storage system has been designed to be compatible with conventional DENs across Canada and around the world.

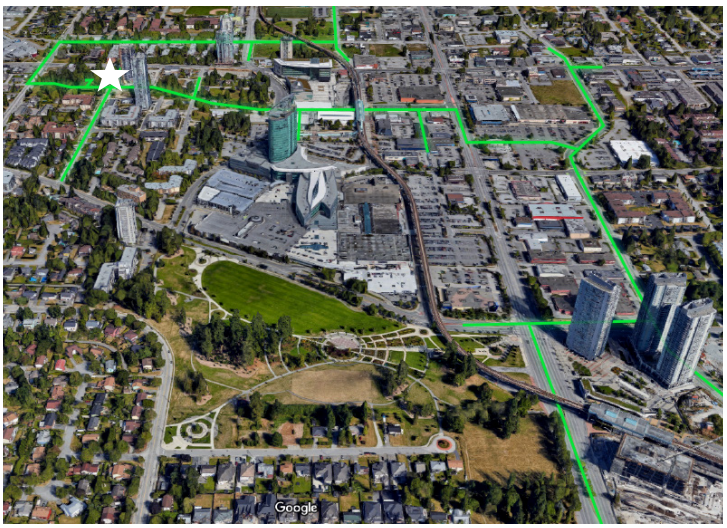


How it works

Thermo-chemical heat storage employs a reversible chemical reaction. A low-grade heat source of around 90 degrees Celsius is applied to decompose certain molecules. This separates the reaction products, which can be mixed again on demand when heat is required. This process is carried out at "charging" (waste-heat source) and "discharging" (DEN) stations. The charged thermo-chemical solution is carried back and forth between the heat sources and the DEN via trucks.

The climate solutions value ...

can be measured by reduced carbon emissions. Six trucks making six trips a day could supply a baseload of 40% of Surrey's DEN water/space heating needs (56,000 MWh) in 2022, displacing the need to burn additional natural gas. Further gains include integration of other renewables such as bioenergy into DEN energy stocks.

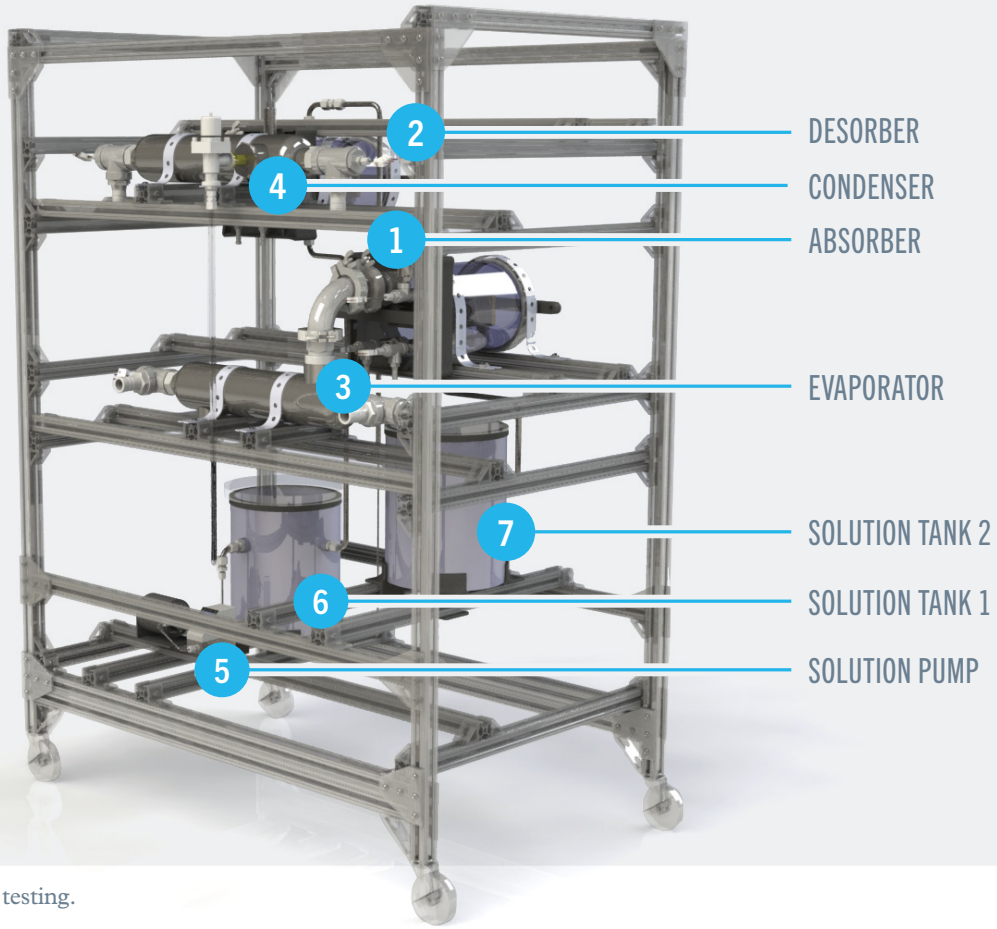


Location of West Village Park and Energy Centre (DEN) in Surrey.

What's the cost?

M-TES systems are cost competitive with other low-carbon energy sources such as biomass, renewable natural gas, and sewer heat recovery when the waste heat source is within 30 kilometers of the DEN.

Liquid Sorption Mobile Thermal Battery Prototype for Waste Heat Delivery to a District Energy System



The M-TES prototype is ready for trial testing.

End-users include ...

district energy managers, off-grid communities, industry and policymakers planning to align innovation with emission reduction targets. This cutting edge M-TES system will marry readily with conventional DENs across Canada and around the world.

What stage is it at?

The "mobile thermal battery" system is likely to be configured so that it supplies the system's baseload needs - with natural gas boilers or electric heat pumps - covering the peak load. Key to the feasibility of the system is the distance from the waste-heat source and the energy storage density (ESD) of the thermo-chemical liquid, and several promising candidates have been identified. A charging/discharging station prototype has been designed and constructed, and is ready for trial testing at Bahrami's lab at SFU.

Find out more

Visit the PICS website or email Dr. Majid Bahrami at mbahrami@sfu.ca. This project is funded by the PICS Opportunity Projects Program.

The Pacific Institute for Climate Solutions (PICS) develops impactful, evidence-based climate change solutions through collaborative partnerships which connect private and public sector solution seekers with experts from BC's four leading research universities. PICS is hosted and led by the University of Victoria, in collaboration with the University of British Columbia, Simon Fraser University, and the University of Northern British Columbia.

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