Harnessing Winter Snow for Seasonal Energy Storage

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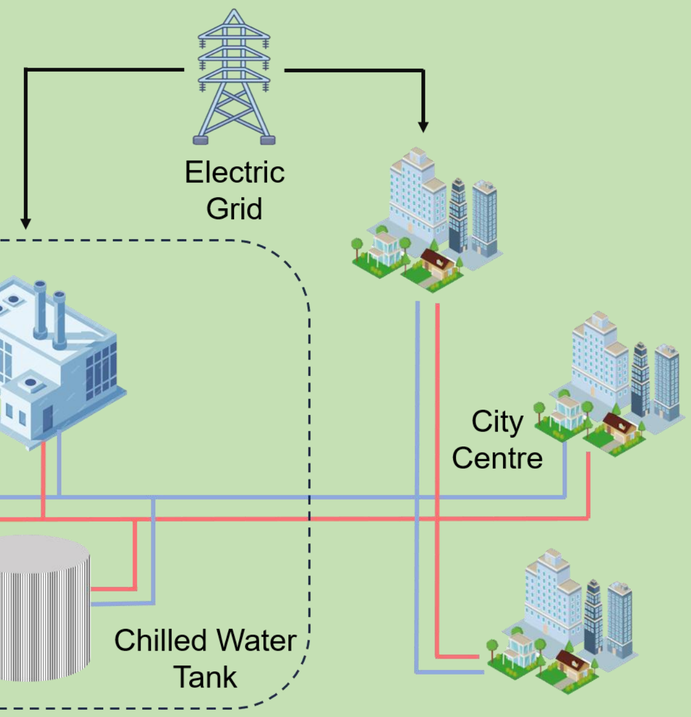
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Seasonal snow storage can enhance urban energy sustainability

Snow storage units facilitates utilization of locally available free cooling sources, that would otherwise remain unused.

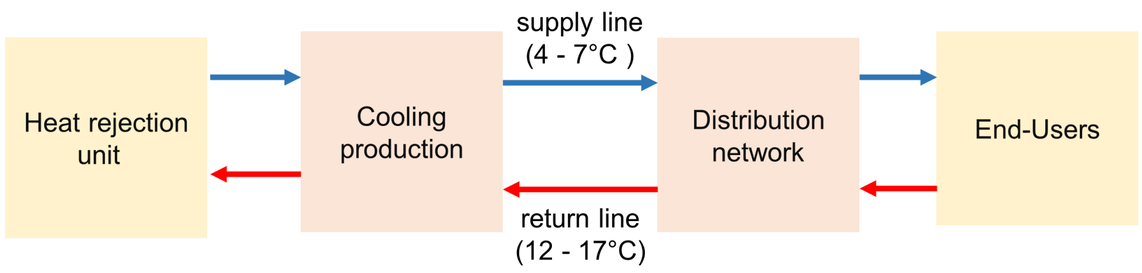
Redevelopment of snow dump site provides an excellent opportunity for snow cooling facilities in cold regions.

Multiple cooling sources enhance operational flexibility and ensure reliable cooling during climate extremes.



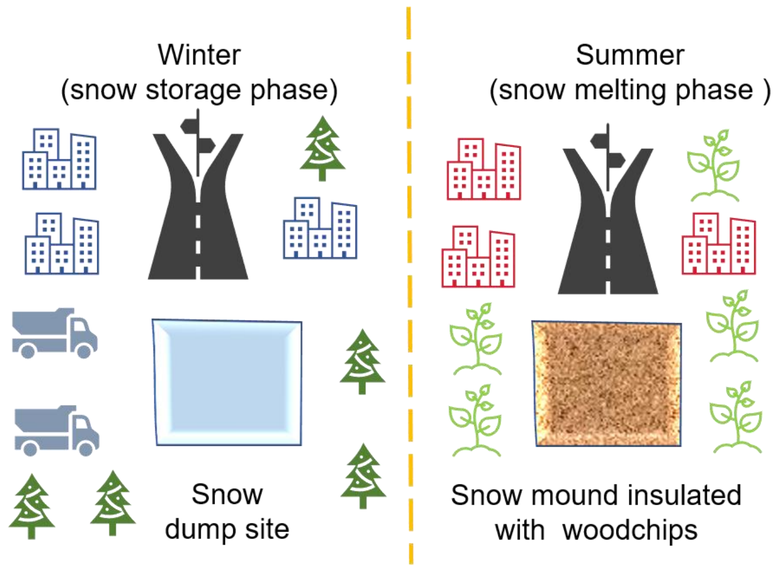
Global Cooling Challenge

Hotter weather and economic growth drive energy demand for cooling which will be more than triple by 2050 globally[1]. Centralized cooling systems can play a crucial role in urban areas. It offer pivotal platform for integrating diverse cold supply, renewables, and energy storage solutions.



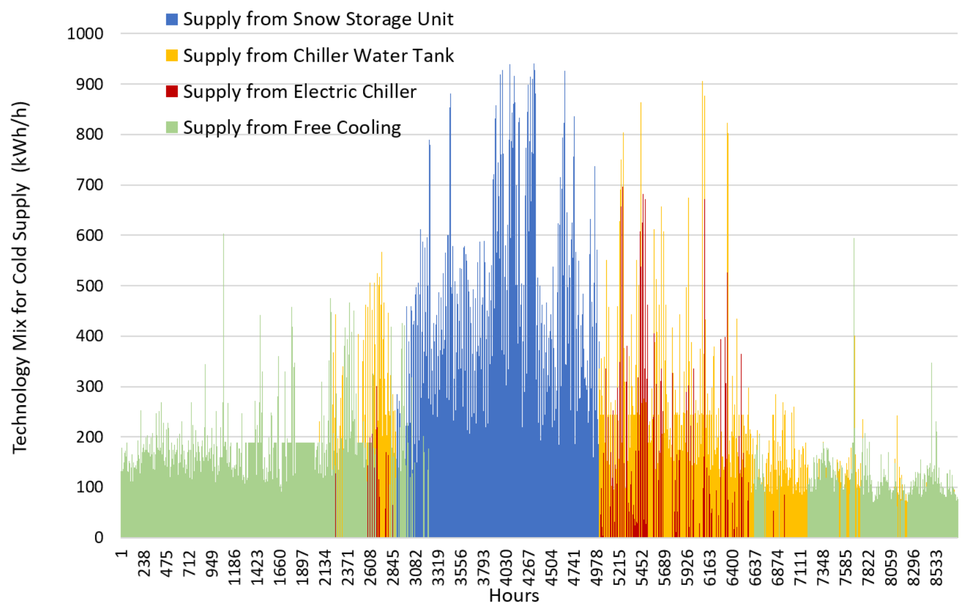
Snow Storage Technology

Winter snow/ice is stored in an insulated pit. During the warmer months, this stored mass acts as a natural cold supply. This approach has been developed and implemented for Nordic climate at building level[2].



Use Case – Estonian City

Hybrid district cooling system is proposed to meet the cooling requirements. Snow storage unit is estimated to meet around 45% of the annual cooling demand[3].



Policy Landscape

A positive outlook is observed for existing snow cooling facilities. In Japan, snow/ice is acknowledged as a new type of energy[4]. Similar regulatory measures are needed to drive wider adoption in cold, heavy snowfall regions.

- City Governments – Effective snow management and utilisation
- DC Utilities – Enhance operational flexibility & cost competitiveness
- Consumers – Reduce cost of cooling and its fluctuations

Acknowledgement

This work was supported by the Estonian Research Council grant (MOB3JD1230)
Disclaimer: The funding agency, affiliated organization and authors are not legally responsible for the information and views expressed in this poster

References

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[2] Moe,Jesper Mæx (2018) Using stored snow as cooling at Oslo Airport, Norway
[3] Volkova et al., (2022) District Cooling Network Planning. A Case Study of Tallinn
[4] Third National Communication Under the UNFCCC (2002) Government of Japan