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Air source heat pump (ASHP) boilers for K-12 schools August 26, 2026 webinar: Can air-to-water heat pumps be a practical pathway to decarbonization for K-12 schools? – Question and answer

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Audience questions:

With air-to-air ASHP, a cold-climate ASHP can make the difference. Is there such a thing as a cold-climate air-to-water heat pump?

- Yes. What has been considered in this research are cold-climate air-to-water heat pumps. They are increasingly being deployed in the Canadian market. Similar to cold-climate air-to-air heat pumps, these units are designed to maintain useful heating capacity and efficiency at low outdoor temperatures, often down to approximately -20°C to -30°C depending on the manufacturer and model.

Did you look at the possibility of having CO_2 as the refrigerant and whether the economics of a CO_2 heat pump work?

- CO_2-based heat pumps were not specifically evaluated as part of this study. They can be particularly attractive for applications requiring higher water temperatures, such as domestic hot water, because of the characteristics of the transcritical CO_2 cycle.

- For space-heating applications, however, the economics and performance need to be evaluated carefully against conventional air-to-water heat pump technologies. The suitability depends on factors including required supply-water temperatures, load profile, climate, part-load operation, and the ability to utilize the temperature glide effectively.

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Have you considered SolarWall as a preheat for the heat pump?

- SolarWall was not included in the scope of our current study. Integration as a preheat mechanism would require detailed hourly data to align with our heat pump modeling. We aren't sure if that level of data is available, but would look into it if the dataset can be provided.

Do the costs include pump operating costs?

- This analysis only accounts for the additional electricity consumption of the ASHP. We have assumed that the rest of the system continues to consume electricity at the baseline system level.

Why are you using square feet and not square meters when presenting data?

- We used square feet because much of the source building information and benchmarking data available for schools is commonly reported that way, particularly in existing facility records and energy reporting tools. That said, we recognize that square metres and GJ are standard SI units and may include SI and imperial units in future editions to make the results easier to compare across jurisdictions.

Is there any potential scenario where installing an ASHP just dedicated for smaller systems such as pools and domestic hot water tanks (that run year-round) would make sense given that hydro is cheapest in the shoulder months and COP is higher in those months as well?

- Yes, that can be a reasonable scenario to investigate. Year-round or shoulder-season loads such as pools and domestic hot water can be good candidates because they may operate when outdoor temperatures are milder and heat pump COP is higher. The business case would depend on the load profile, required water temperature, storage strategy, utility rate structure, avoided fuel cost, and whether the heat pump can avoid high-demand or peak-period electricity charges. Domestic hot water and pool heating should be assessed separately from space heating because their operating hours, temperature requirements, and economics can be quite different.

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Can you clarify why in your performance chart the COP seems to get better with higher outdoor temperatures?

- Good clarification. That chart shown earlier in the presentation was for cooling performance, not heating performance. In cooling mode, the relationship between outdoor temperature and efficiency is the opposite of heating.