

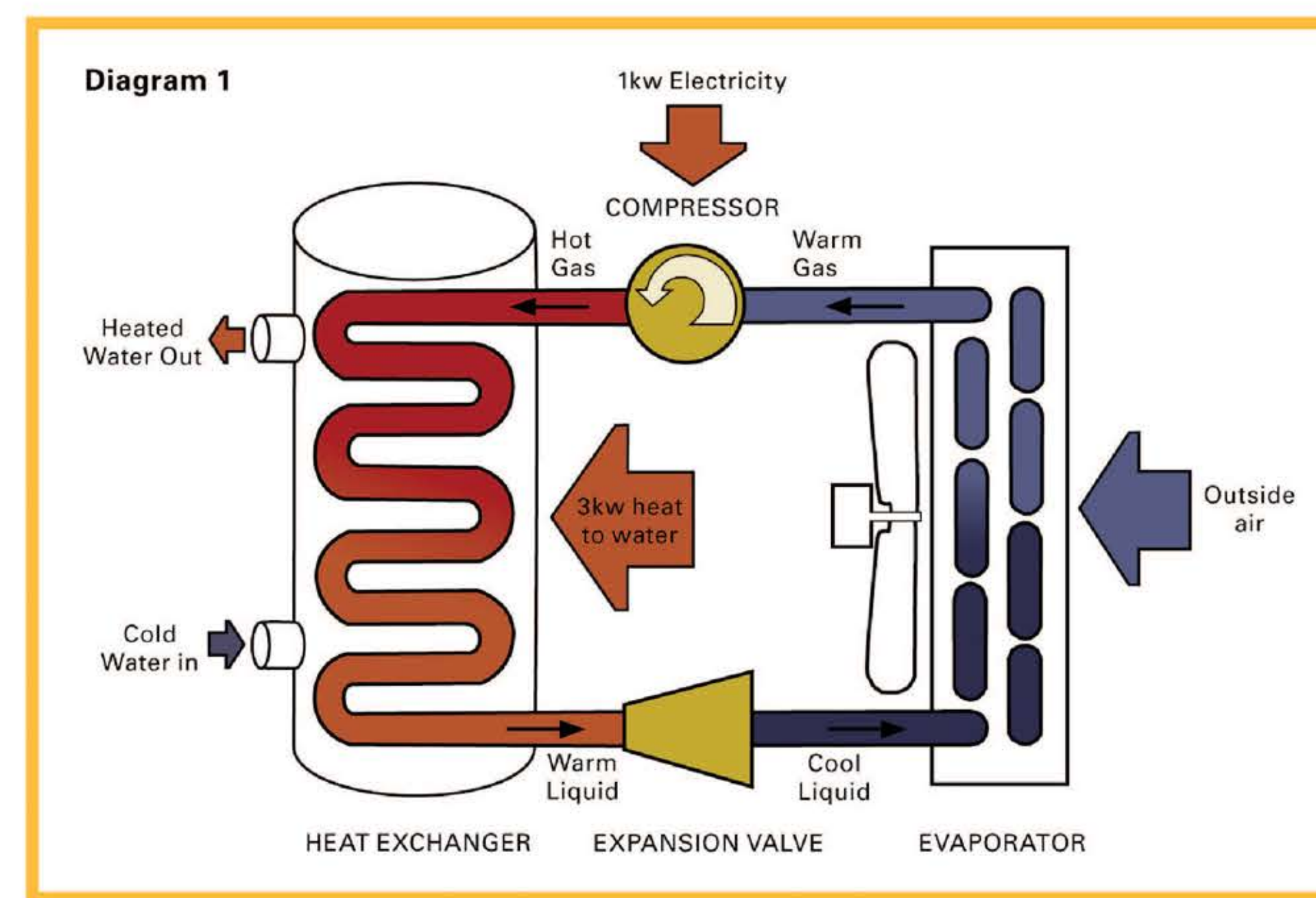
Heat Pump Water Heaters

The Savings Potential in Minnesota

Heat pump water heaters (HPWHs) have seen increased interest and market share in recent years. By transferring heat from air to domestic hot water storage, HPWHs have the potential to save more than 50% of electric water heating energy. The majority of installations have been in hot climates in the Southern and Western USA, but installation areas have been expanding, as the operable temperature range has been increased. How will Minnesota's climate and housing stock impact HPWH savings?

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Heat Pump Mechanics



Cite: New Zealand Ministry of Business, Innovation, and Employment.

Heat Pump Water Heater Calculator

CEE developed a web based calculator to help homeowners and utilities assess the impact of HPWHs in Minnesota. This calculator takes inputs from a specific home or a service territory, and estimates the COP, electric savings, and demand profile impacts.

[Access the calculator at mncee.org/hpwh](http://mncee.org/hpwh)

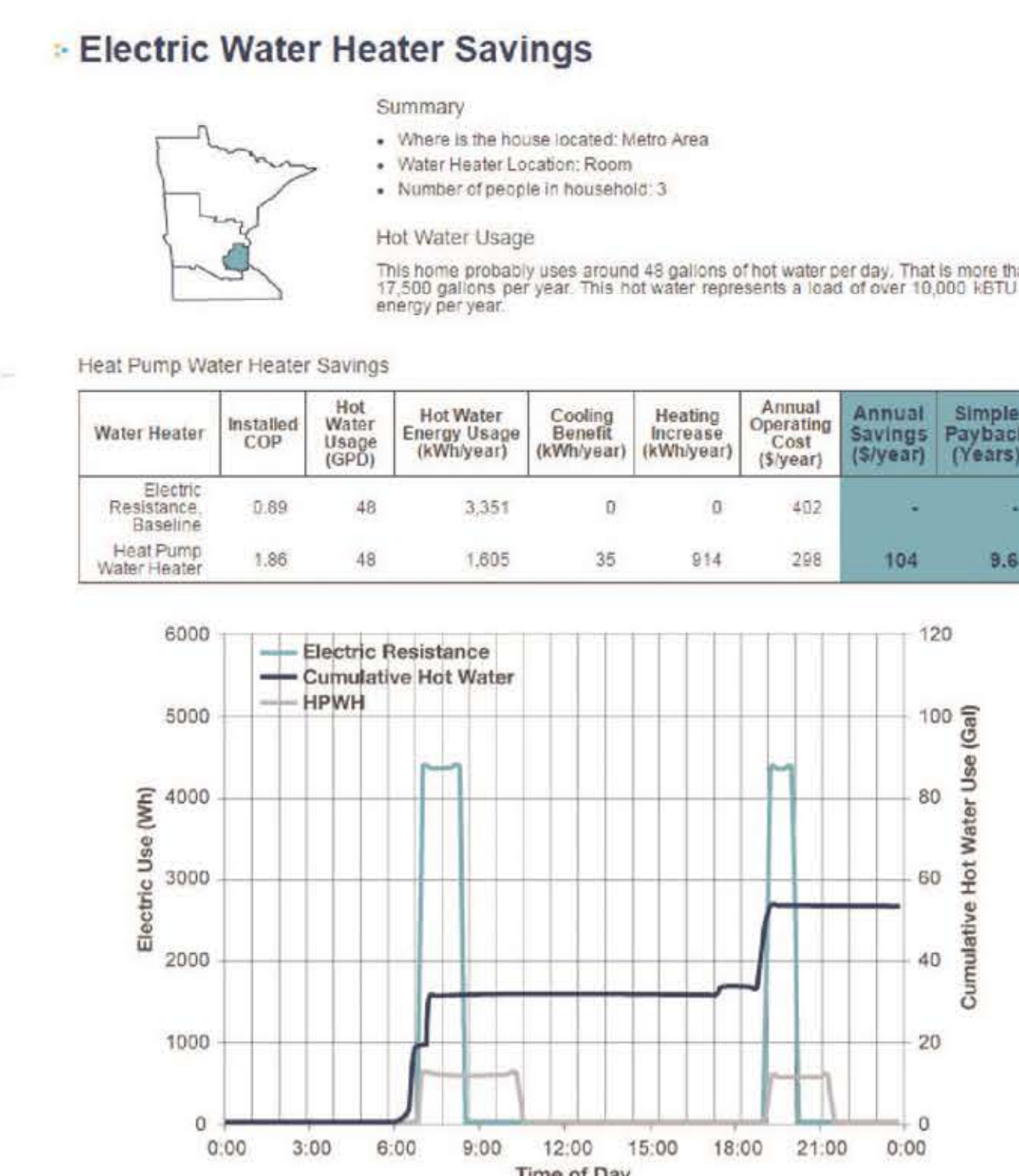
Input

House location: North, Central, Metro, South

Heating Source: Electric, Natural Gas, Propane, Fuel Oil

Cooling Source: Central, Window, Fan

Output



RESULTS

- MN homeowners can expect HPWHs to operate with COPs between 1.5 and 1.9, a significant increase over electric resistance water heaters (0.9 COP).
- Space heating impacts dependent on specific installation.
- Annual DHW energy consumption reduced by 20-45%.
- Family using 60 gallons of hot water per day can save \$110-\$250 a year.

Table 1. Coefficient of performance and estimated savings for HPWHs.

Occupants	Showers Clustered?	Daily Hot Water Volume Gal/Day	COP	HPWH Energy Consumption		Savings compared to Electric Resistance WH		
				kWh/yr	\$/yr	kWh/yr	\$/yr	%
1	No	24	1.92	777	\$93	918	\$110	54%
2 to 3	No	48	1.86	1605	\$193	1785	\$214	53%
4	No	54	1.74	1927	\$231	1887	\$226	49%
5 and up	No	80	1.37	3640	\$437	2010	\$241	36%
2 to 3	Yes	48	1.76	1696	\$203	1694	\$203	50%
4	Yes	54	1.64	2044	\$245	1770	\$212	46%
5 and up	Yes	80	1.27	3926	\$471	1724	\$207	31%

Note: These savings do not account for space conditioning effects.

CONCLUSION

- HPWHs are gaining significant market share nationally.
- HPWHs give MN homeowners an efficient option for electric water heating.
- Installation of HPWHs will reduce peak demand for electric utilities in MN.

Innovation Exchange
Center for Energy and Environment

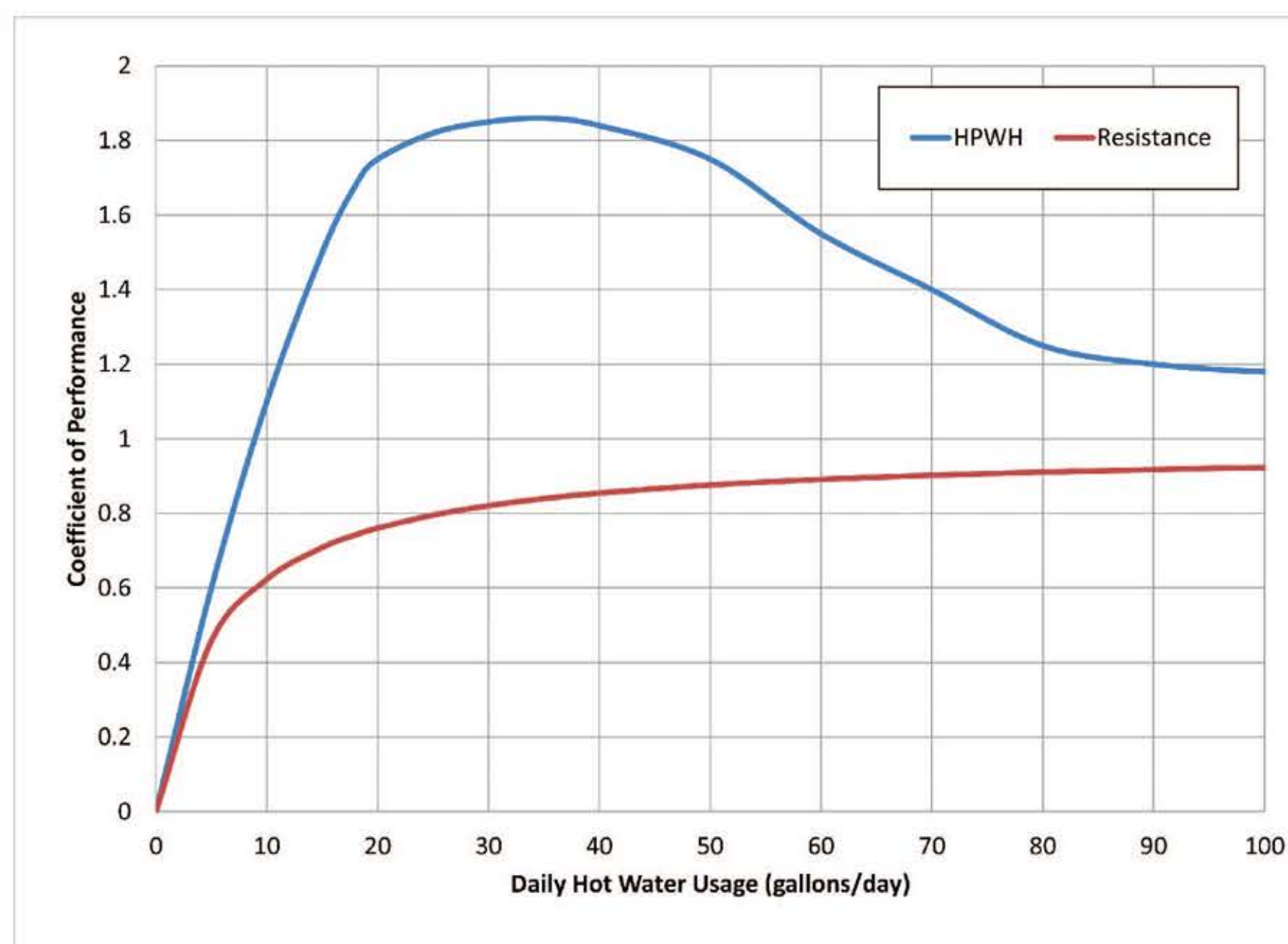
MINNESOTA DEPARTMENT OF
COMMERCE
DIVISION OF ENERGY RESOURCES

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METHOD

- Assessed HPWHs for MN installs by analyzing existing research and information about MN buildings and climate.
- Developed info and recommendations for utilities and homeowners.
- Created a calculator to analyze HPWH performance in MN.
- Created web applications to assist with water heater installation, performance and demand management.

Water Heater Efficiency



Comparing the Demand Profiles of 10 Homes

