

Delivered Fuels: A Driver for Solar Thermal Technology

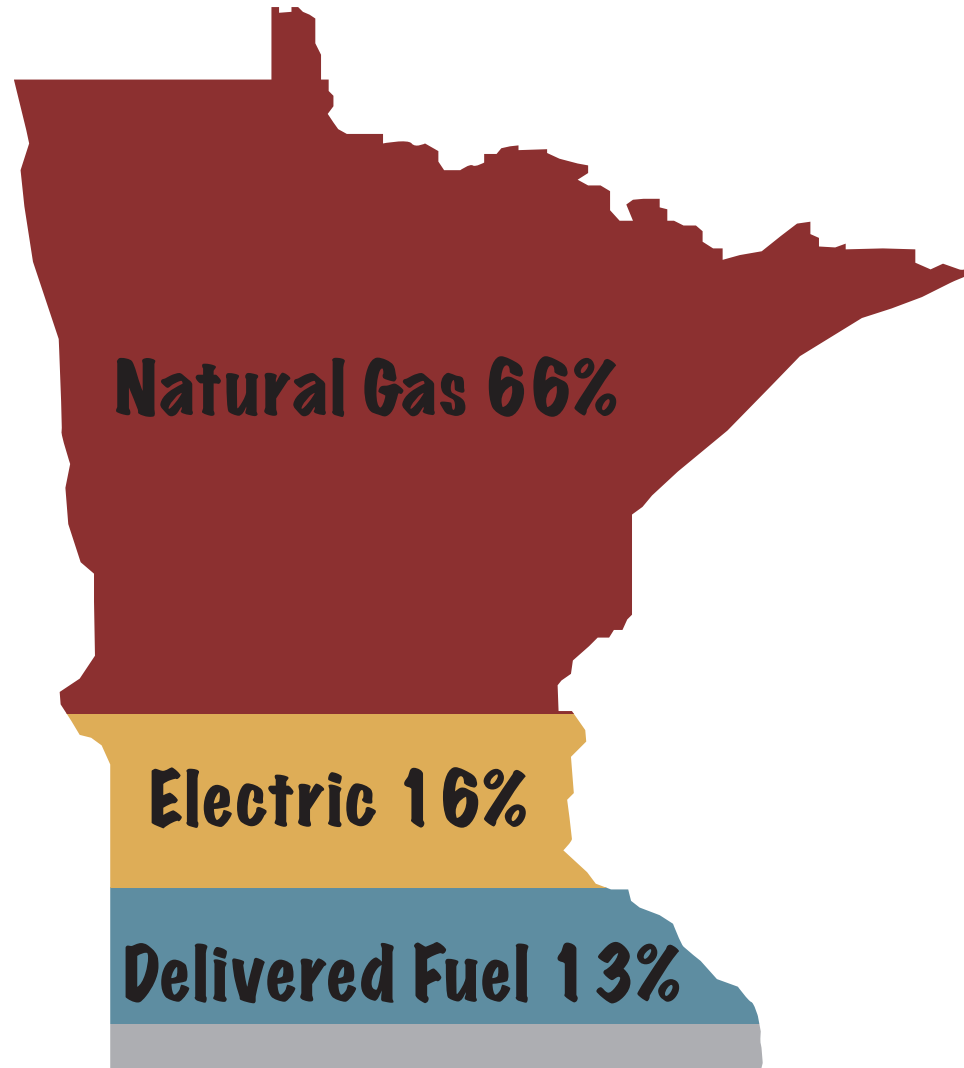


Abby Finis



**Solar Powering Minnesota
March 7, 2013**

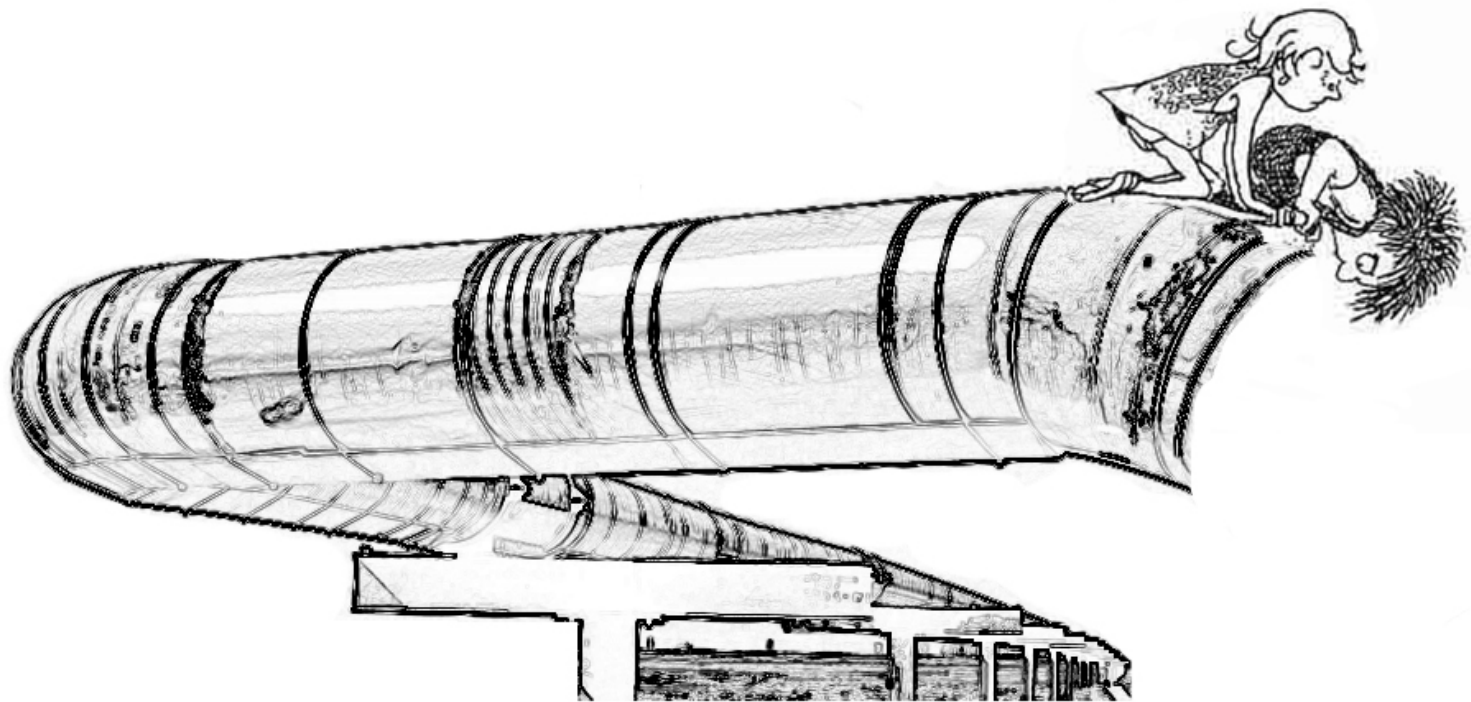
Minnesota Heating Sources



Source: 2012 American Community Survey

Propane Qualities

- **Versatility in transportation and use**
- **Cleaner than other conventional sources (i.e., oil and coal)**
- **Reaches people beyond the end of the pipeline**



Consumption in Minnesota

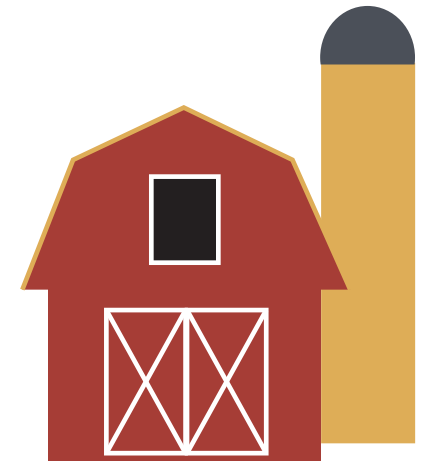
- Total retail demand of propane is estimated at **485 million gallons**
- **230,000** homes, businesses, and farms depend on propane for:

Space Heating

Water Heating

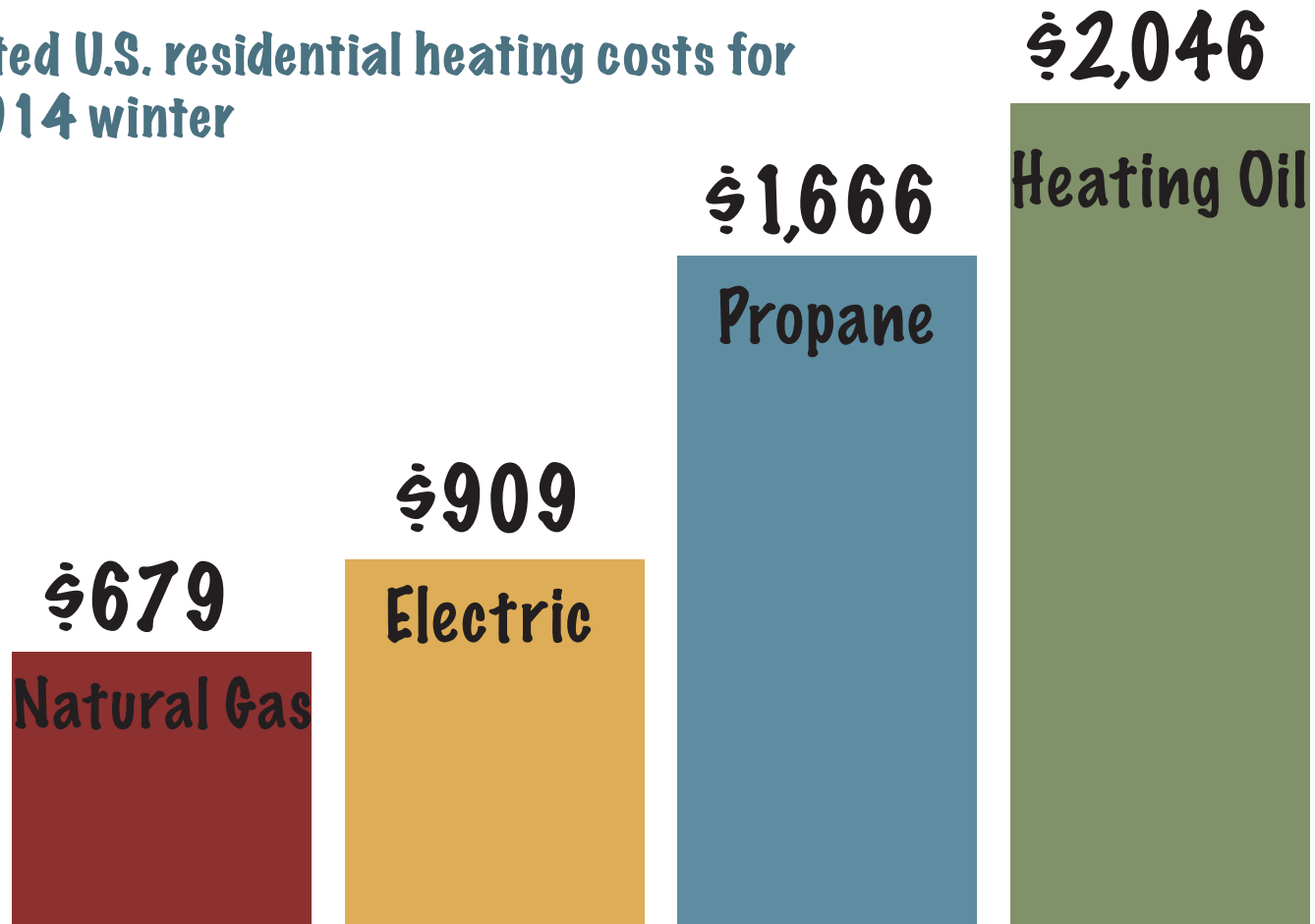
Cooking

Grain Drying



Fuel Costs

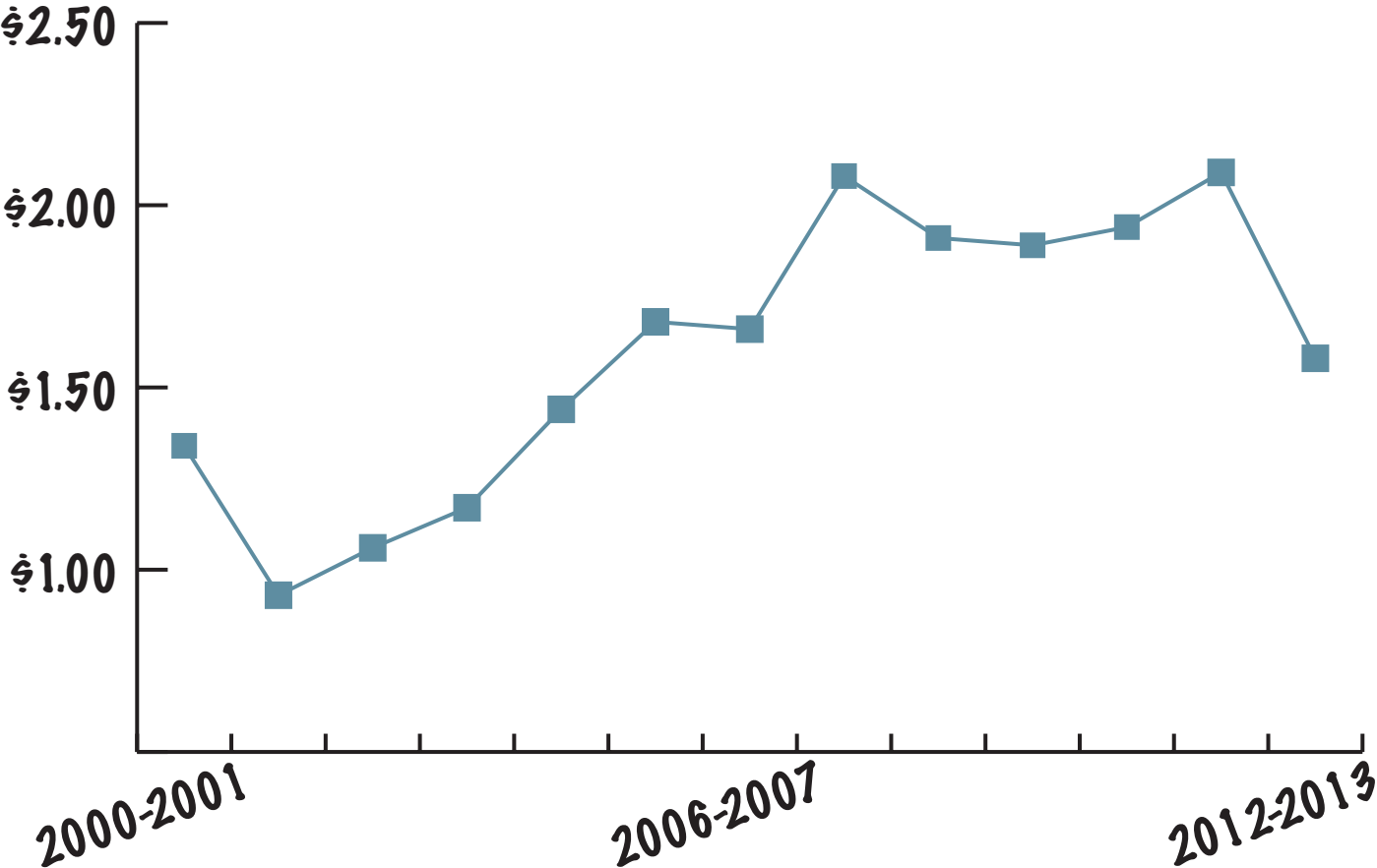
Anticipated U.S. residential heating costs for 2013-2014 winter



Source: Energy Information Administration, 2013

Minnesota Propane Costs

Average Annual Propane Prices (per gallon)



Source: Energy Information Administration via Minnesota Department of Commerce

2013-2014 Issues



Photo Credit: Chiles Propane

Grain Drying

2013-2014 Issues



Cold Fall

2013-2014 Issues



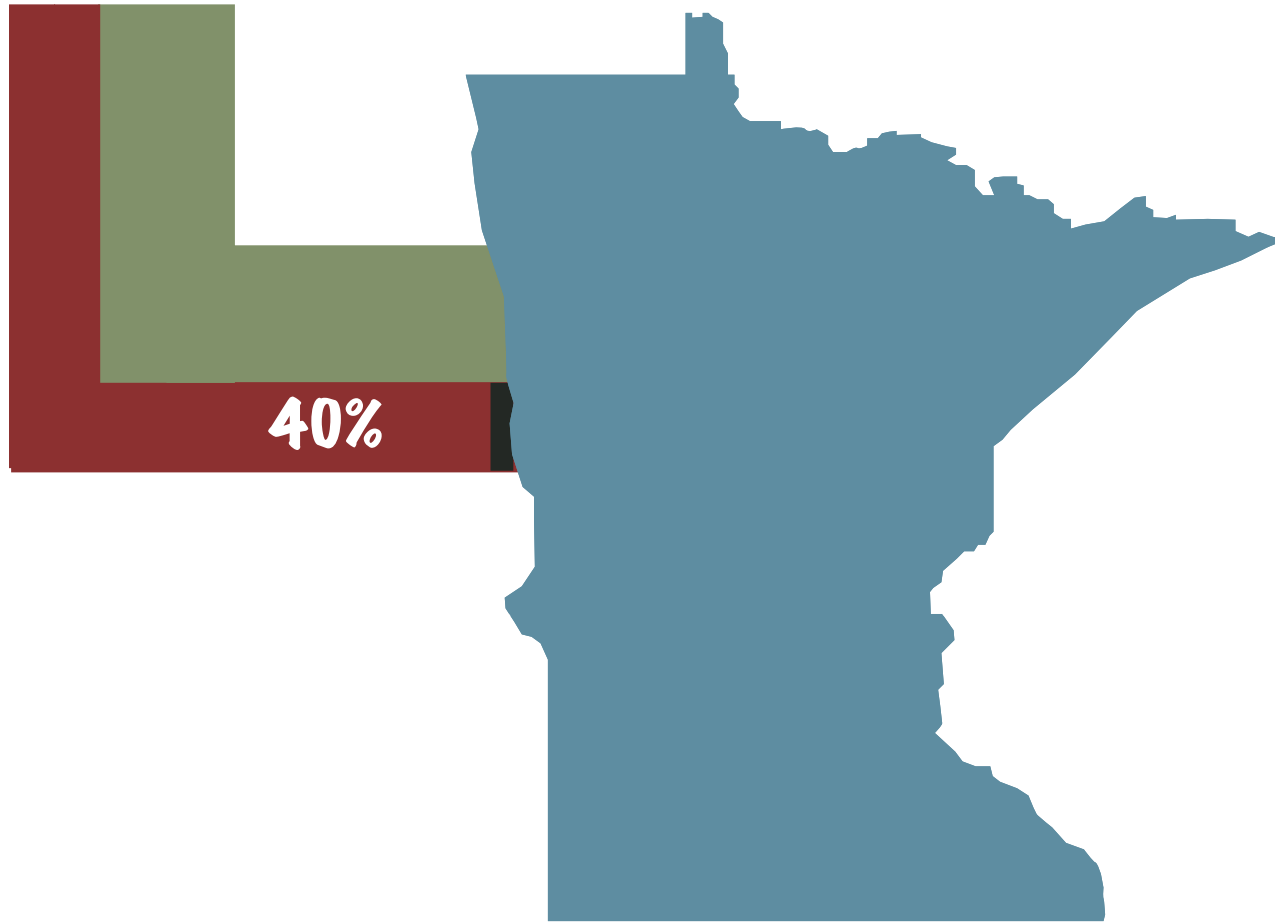
Polar Vortex

2013-2014 Issues



Railroad Traffic

2013-2014 Issues



Pipeline Shutdown

The Shortage

2013-14 Weekly Average Propane Prices (per gallon)



Source: Energy Information Administration via Minnesota Department of Commerce

Impact of Volatile Prices

Harvest

Sticker Shock

Profit Margin

Uncertainty

Delivery Charges

Budgets

Long Driving Hours

Energy Assistance

Impact of Volatile Prices: Low-Income

**“The amount of propane needed to heat Minnesota homes, farms, and businesses during this exceptionally cold winter and the skyrocketing cost of propane threatened to exhaust our state’s LIHEAP funding and put our citizens out in the cold. This funding crisis required immediate action - action that the legislature wisely took today.”
- Governor Dayton.**

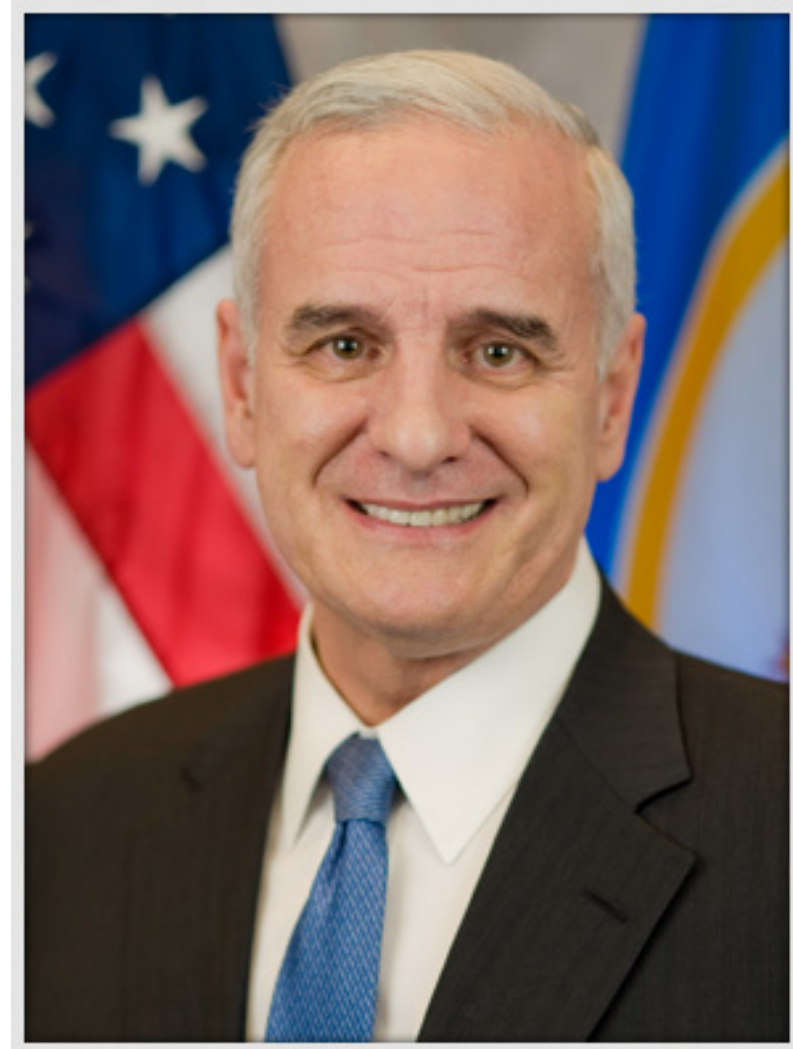


Photo Credit: State of Minnesota

Solar Opportunity - Space Heating

Value of Solar Thermal Study:

“Businesses and homeowners using solar thermal can mitigate or eliminate the negative impacts of price volatility, because they can ‘lock in’ a portion of their heating costs by using free fuel.”



Photo Credit: RREAL

Residential Solar Air Heating:

- Provides up to **25-30%** of a home's space heating demand
- Potential: **6.2 trillion Btus** or **5%** of total space heating demand

Solar Opportunity - Space Heating



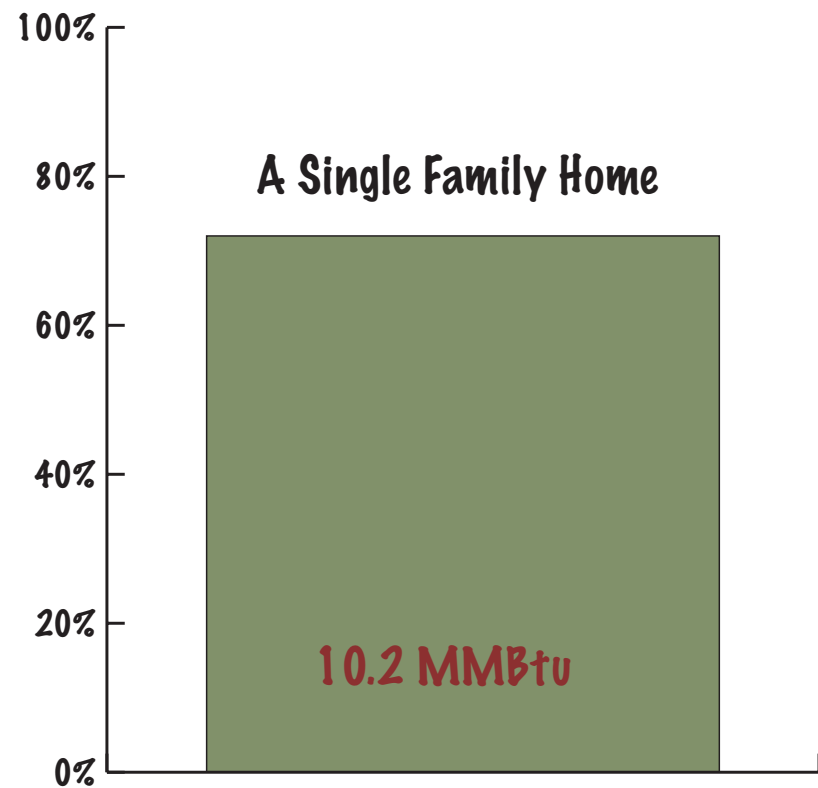
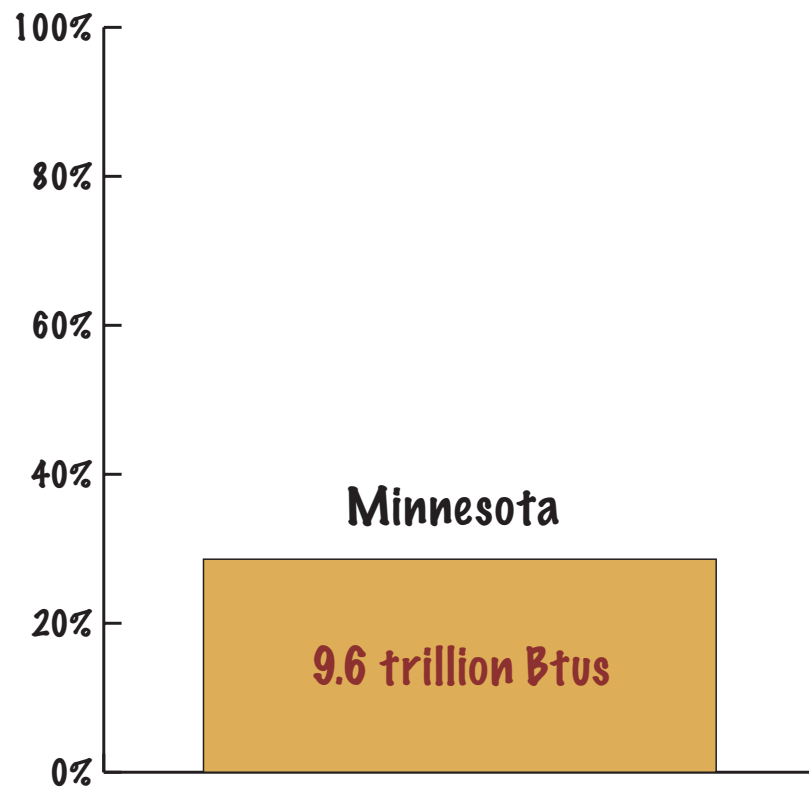
Photo Credit: Minneapolis Police Department

Commercial Solar Air Heating:

- Provides up to **15%** of a building's space heating demand
- Potential: **2.5 trillion Btus** or **6.5%** of total space heating demand

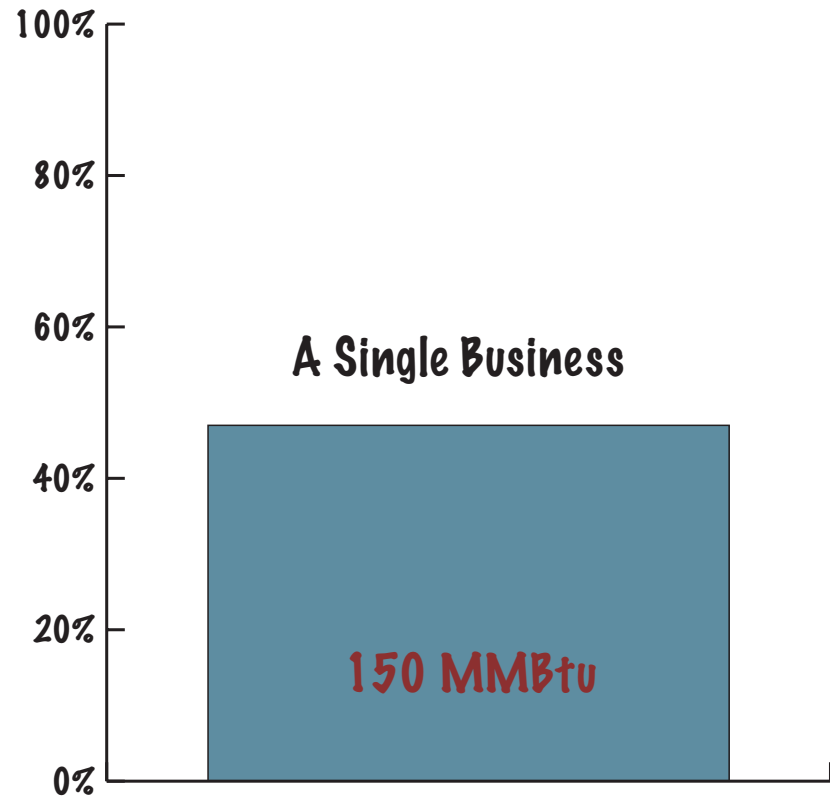
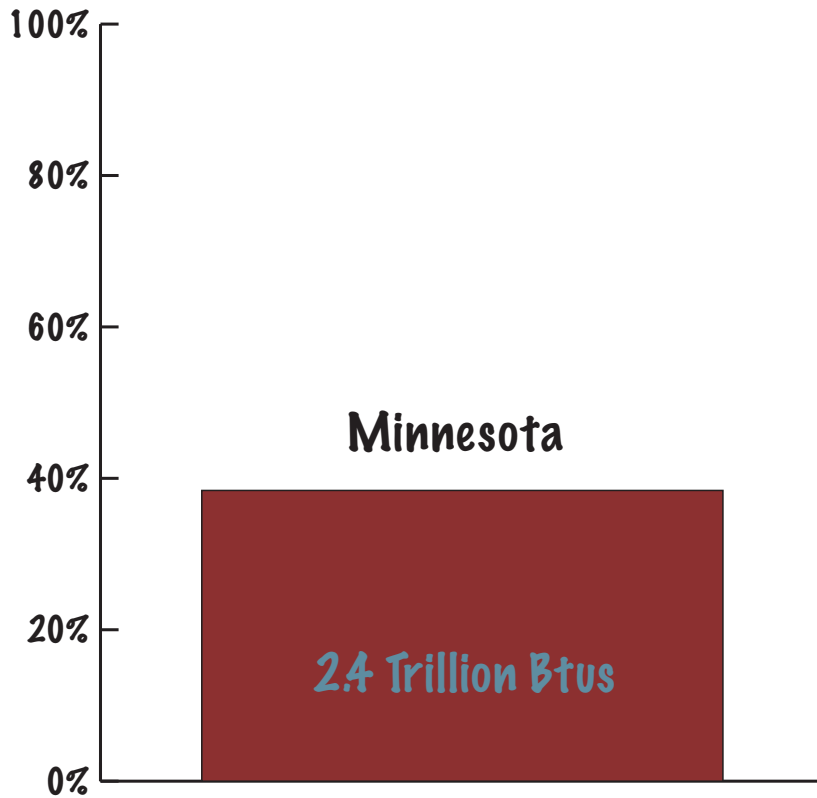
Residential Solar Hot Water

Residential domestic hot water demand that can be satisfied with solar hot water systems.



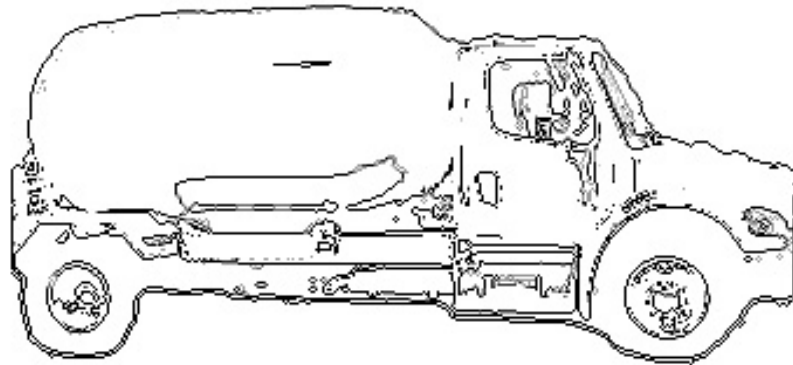
Commercial Solar Hot Water

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Delivered Solar

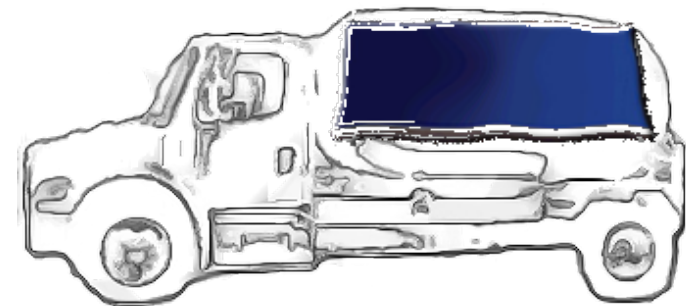
- **Delivered fuel customers often represent high-value customers for the solar thermal industry.**
- **Engage delivered fuel providers to explore solar thermal opportunities**
 - **Install and maintain oil and propane heating equipment**
 - **Substantial knowledge of HVAC equipment, building systems, the supply chain for fuel distribution**
 - **Established customer base.**
- **New market opportunity, providing a means to diversify product offerings and enter a growing market.**



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