



Figure 1. A typical Minnesota manufactured home.

Examining the energy saving opportunities in Minnesota manufactured housing

Manufactured homes represent an untapped opportunity for utilities to meet energy savings goals and address what is primarily a low-income market in Minnesota. The purpose of a 2014 CARD grant awarded to [Seventhwave](#) was to conduct a study of manufactured housing in Minnesota in order to characterize the households and homes, gauge the nature and extent of energy-saving opportunities, and provide recommendations for how Minnesota Conservation Improvement Programs (CIPs) can enhance their engagement with manufactured housing.

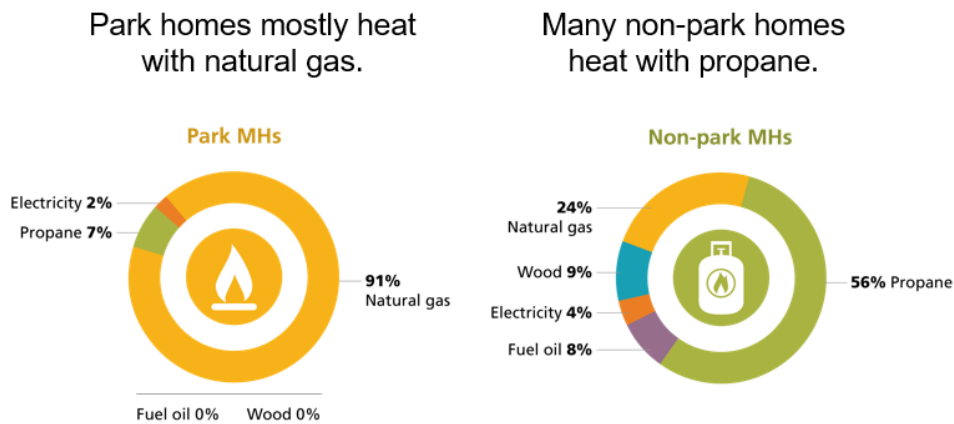
The core of the study was a large telephone survey of 633 residents of manufactured homes, combined with site-visit data gathered for a subsample. The survey was stratified both geographically and in terms of homes in manufactured-home parks versus individual manufactured homes on private property.

From the pool of survey respondents, 100 households were recruited for on-site data collection. At each home, researchers gathered more-detailed information about the characteristics of the home and its appliances, as well as conducted an interview with the household. In addition to gathering basic data, researchers assessed each home for energy-saving opportunities; later, site-visit data was used to estimate the applicability, potential energy savings, and cost for 30 specific retrofit, upgrade and behavioral opportunities.

Using results from the study, researchers estimate there are about 80,000 manufactured homes in Minnesota, about half of which are located in a manufactured-home park, and half on individually owned private property. The results show that there are underlying differences between those homes in parks and those on private property; these differences become important in developing programs that engage with residents of manufactured housing.

The study found that about 60% of Minnesota manufactured homes are heated with natural gas, but 30% are heated with propane—and propane is the dominant heating fuel among non-park homes (Figure 2). Only a small percentage use electricity as the primary heating fuel. Nearly all have some form of air conditioning.

Figure 2: Heating fuels of park homes and non-park homes



With a median annual income of \$35,000, nearly half of households living in a manufactured home in Minnesota are eligible for low-income weatherization services. Based on interviews with site-visit participants, about two-thirds of households have positive attitudes toward saving energy and are willing to take steps to do so. However, a third of households have low ability to do so, mainly due to financial constraints.

Most households pay their own energy bills directly to a utility or supplier; a small proportion of park residents are billed by the park operator. As part of this research effort, researchers sought permission from all survey and on-site participants to obtain electricity, natural gas and propane usage data from suppliers of these fuels. Analyzing these data, the study concludes that the average manufactured home uses about 8,000 kWh per year of electricity. Those with natural gas service use an average of 675 therms per year. Extrapolated to all heating fuels, overall annual energy costs faced by households in manufactured homes average about \$2,000 per year (Figure 3).

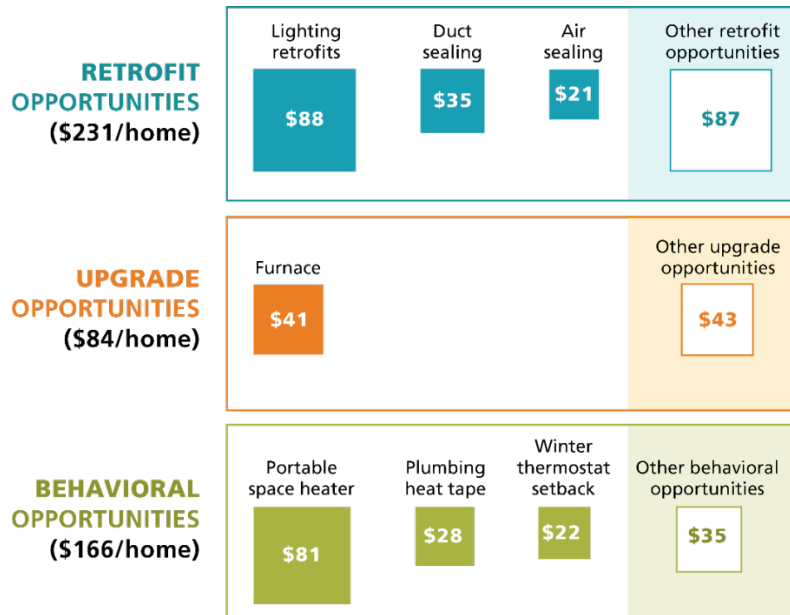
Figure 3: Estimated overall annual energy costs

Heating fuel	Percent of homes (survey)	Annual total energy costs*
Natural gas	59%	\$1,860
Electricity	3%	\$2,930
Propane	30%	\$2,330
Fuel oil	4%	\$2,280
Wood	4%	\$1,930
Weighted average	100%	\$2,050

About half of households in this population practice some form of thermostat setback during the winter, be it manually or by using a programmable thermostat. The use of portable electric space heaters is common among residents of manufactured homes: about 40 percent report using them, and utility consumption records suggest an average of about 3,000 kWh per year of consumption when used.

Among the 30 energy-saving opportunities examined, cost-effective opportunities were estimated to be worth an average of about \$480 per year per home, or about 25 percent of typical household energy bills (Figure 4). Key opportunities that are readily amenable to utility programs include furnace upgrades, lighting retrofits, duct sealing and air sealing. Other opportunities with significant cost-effective potential include reducing or eliminating the use of electric space heaters (which may require addressing other underlying thermal issues), thermostat setback, and managing the use of plumbing heat tape. The ability for programs to upgrade insulation levels in manufactured homes is limited both by their construction and Minnesota regulations, which prohibit alterations to the original structure of a manufactured home.

Figure 4: Cost savings of energy conservation measures



Minnesota utilities could achieve additional savings in this housing stock by working closely with the Weatherization Assistance Program, identifying manufactured homes on private property (which tend to be older and in worse shape), creating “blitz” type programs for manufactured-home parks, developing approaches that result in less space-heater use, and incorporating ENERGY STAR manufactured homes into new construction programs.

Details on this research are available in the full report, [Minnesota Manufactured Homes Characterization and Performance Baseline Survey](#). A [webinar summarizing the results of the manufactured homes study](#) is also available on the Seventhwave website. For more information, contact project manager [Laura Silver](#) or CARD program administrator [Mary Sue Lobenstein](#).