Another First for North Dakota

By Lorraine A. Manz

The numbers for 2010 aren't in yet, but the U.S. Energy Information Administration's (USEIA) geothermal report for 2009 (USEIA, 2010) places North Dakota first in the nation for the number of geothermal heat pumps (GHPs)* per capita (table 1). Although we only ranked second the year before, we were right there at the top in 2007 as well (USEIA, 2009). The numbers are modest, to be sure, but North Dakota's market share is on the rise and it will be very interesting to see where it stands in 2010. Unfortunately we will have to wait until November 2011, when the next EIA geothermal report is released, to find out.

2007		2008		2009	
North Dakota	**0.32**	Nebraska	0.71	**North Dakota**	**0.89**
Nebraska	0.31	**North Dakota**	**0.54**	Nebraska	0.51
Iowa	0.28	South Dakota	0.52	Iowa	0.43
Oklahoma	0.25	Iowa	0.43	South Dakota	0.34
District of Columbia	0.24	Minnesota	0.33	Minnesota	0.32
U.S.	0.08	U.S.	0.11	U.S.	0.11

Table 1. Top 5 states (including the District of Columbia and Puerto Rico) for the number of geothermal heat pump (GHP) shipments per 100 capita. These figures were calculated by dividing the number of GHP shipments (expressed as total rated capacity in tons) by estimated July 1 populations for each state in a given year. The fact that the table is dominated by northern plains states is no coincidence: GHPs work best in seasonably extreme climates. Sources: USEIA (2009, 2010) and U.S. Census Bureau (2010).

What is also encouraging is that North Dakota was one of only 20 states (and the only one in table 1) that saw an increase in GHP shipments in 2009, despite a 5 percent reduction nationwide. The 1,640 units shipped to North Dakota in 2009 represent a whopping 47 percent increase from the previous year's total, and is more than 2½ times the total for 2007.

This rapid growth in North Dakota's geothermal industry is reflected very clearly by the escalating number of geothermal energy extraction permits being issued (fig. 1). In the January 2009 edition of the DMR Newsletter (Manz, 2009) I reported that not only had 2008 been a record year for permits (the final count was 144) but also that the number of geothermal installations statewide had reached 500 – a milestone attained 24 years after the geothermal regulatory program was introduced in 1984. Less than two years later, that number stands at 895, and of those 395 additional installations, 234 were permitted in 2010. In other words, more than 40 percent of all North Dakota's geothermal installations were permitted during the last two years with 2010 accounting for about one-fourth of that total.

As figure 1 shows, the biggest boost to North Dakota's geothermal business has come from the residential sector. The upswing, which began in 2005, is more-or-less consistent with the national trend (except for the slight disparity in 2009). The surge in the number of residential geothermal permits issued in 2008 from the previous year is due, in part, to the removal, in April 2007, of a waiver that excluded residential geothermal installations from the permitting process. More importantly, however, the federal government's Energy Improvement and Extension Act of 2008 extended a 30% ($2,000 max.) residential tax credit previously reserved for solar systems and fuel cells to small wind-energy systems and GHPs. The credit was further enhanced by The American Recovery and Reinvestment Act

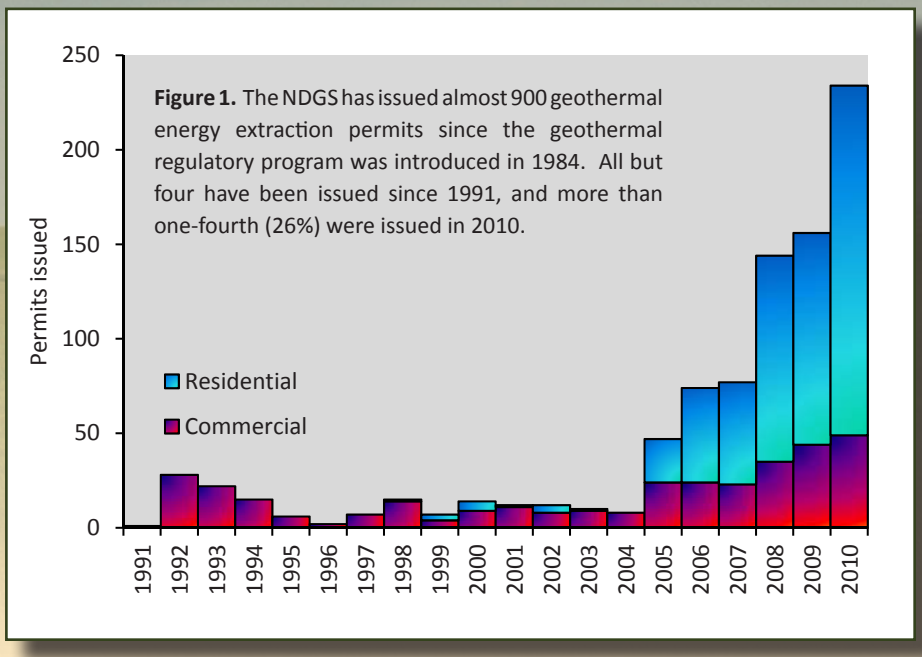

Figure 1. The NDGS has issued almost 900 geothermal energy extraction permits since the geothermal regulatory program was introduced in 1984. All but four have been issued since 1991, and more than one-fourth (26%) were issued in 2010.

* The USEIA uses "geothermal heat pump" (GHP) as a general term that includes the four classes under which geothermal heat pumps are certified and rated by the Air Conditioning, Heating, and Refrigeration Institute (AHRI). The vast majority of GHPs shipped to North Dakota are ARI-330 rated: that is, they are ground-source heat pumps designed for use with closed-loop systems.

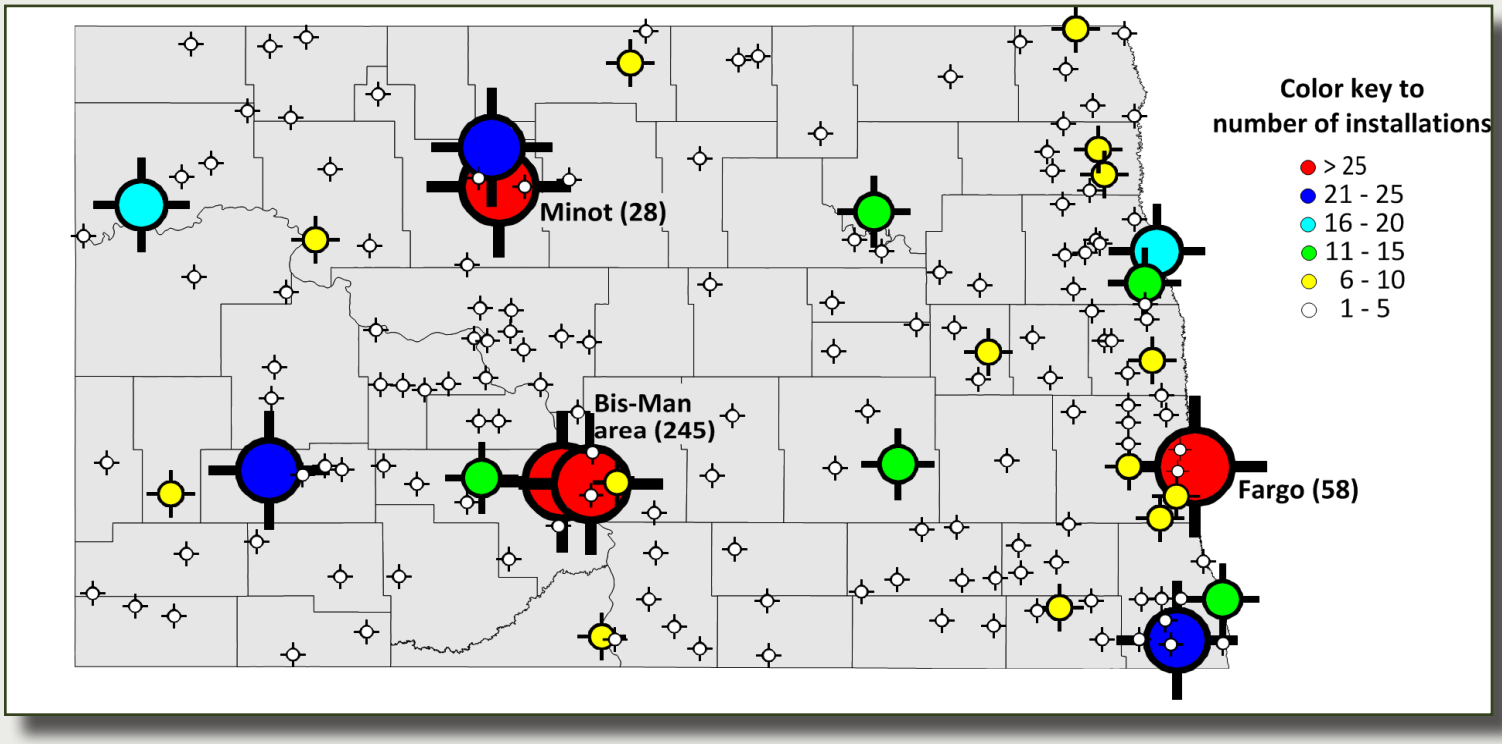

Figure 2. Location of geothermal installations in North Dakota by towns and cities. The number of installations is denoted by symbol size and color. Cities with more than twenty-five installations (large red symbol) are labeled with the number of installations shown in parentheses.

of 2009, which removed the $2,000 cap for systems installed after 2008 (and before December 31, 2016). Along with the financial incentives offered by the state and several local and regional utility companies, to North Dakota homeowners this represents a minimum saving of 45 percent on the purchase and installation of a geothermal system. In terms of initial cost to the homeowner, it is comparable to a more conventional, but less energy-efficient HVAC system, and thereby eliminates the main barrier to the expansion of the geothermal industry in North Dakota. Looking at the column in figure 1 for 2010, one can only speculate on what increases we will see in 2011.

There are geothermal systems in almost every county in North Dakota (fig. 2). Most are concentrated in the main urban areas with one exception. The large blue symbol just north of Minot is Minot Air Force Base. Although not all of the installations are on the base itself, since November 2006, it has commissioned the construction of twenty-one geothermal systems with well counts ranging from 8 at the firing range to the 130 that will heat and cool one of at least five new dormitories. At least 11 more are expected to be permitted in 2011-2012.

When it opens in the fall of 2011, Judge Ronald N. Davies High School in south Fargo will boast the largest geothermal system in the state. The 276,000-square-foot environmentally friendly complex will be heated and cooled by 928 wells drilled to a depth of 180 feet. Construction of this huge well field began in November 2009 and took about twelve months to complete. Not long after, test holes were being drilled on the campus of Minot State University in preparation of phase I of an even bigger project that is ultimately intended to heat and cool the entire campus. The size of the fully constructed well field is not known at this point, but it is expected to be on the order of 1,000 wells. A geothermal system will also heat and cool the 97,000-square-foot addition to the North Dakota Heritage Center on the capitol grounds in Bismarck, which officially broke ground in November 2010.

Finally, readers of the previous issue of Geo News might recall that my own house was retrofitted with a geothermal system last spring (Manz, 2010). I am delighted to report that, so far this winter; it has continued to effortlessly provide us with all the heat and hot water we need. The auxiliary electric heater strips remain unused and even during the coldest weather the two-stage compressor that is part of the heat pump cruised along on its lowest setting. Our utility bills are looking good too!

References

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