

Customer Connection for **BUSINESS**



Energy information to help you manage your operation

May 2023

Smart glass improves geothermal system efficiency

Enhances heating and cooling in area business

Arvig Communications, a cable and Internet provider based in Perham, Minnesota, recently approached us for assistance with an office expansion.

Their existing building was heated and cooled by a geothermal heat pump system. But expanding from 55,000 to 77,000 square feet would mean outgrowing their current system. With a land-locked building, there wasn't room for an additional underground loop system. The only option, it appeared, was to purchase a traditional boiler and chiller.

"If Arvig had chosen to go with a boiler and chiller system, it wouldn't have been as efficient, and they would've abandoned a perfectly good ground loop system," said Connor Daquay, a consultant for GeoOptimize, an Otter Tail Power Company partner. Thankfully, with the help of GeoOptimize, a clear solution was identified. Or a tinted one, if you will.

One of the unique aspects of this new expansion design was the abundance of windows. After the expansion, the window-to-wall ratio would be 29 percent, meaning almost one-third of the building's outer walls would consist of windows.

"That kind of ratio changed heating and cooling loads completely," said Daquay.

GeoOptimize staff suggested using smart glass. It works when lithium ions, the same element used in batteries, are embedded in five layers of ceramic material and coated onto glass. When an electric field is applied to the window, the ions move from one layer to another, causing the window to tint or clear.

"Think of it as a pair of Transitions® lenses for a building," said Jill Hutchinson, a marketing specialist for SageGlass, a manufacturer of smart glass.

Smart windows can be automatically programmed to tint or clear glass based on weather, season, time of day, clouds, and occupancy.

In the summer when the sun beats on the windows, the windows tint—blocking light and reducing the heat gain that comes with it—which in turn reduces the building's cooling load. In the winter the windows automatically change to fully clear, letting in as much sunlight as possible, thus reducing heating load.



"Smart glass is designed to supplement and work in sync with our geothermal HVAC system," said David Arvig, Vice President and Chief Operating Officer at Arvig Communications.

"If we change the window tint, we modify the heating and cooling loads," said Daquay. "The big win was that we could use our existing ground heat exchanger for the new building."

A model of the new system showed that the building's annual cooling demand decreased by 32 percent when the dynamic windows were fully tinted (compared to clear glass). The integrated system made financial sense too: The 30-year net present value of the system—upfront construction costs plus energy costs—was approximately \$140,000 less than a conventional system.

Smart windows also offer benefits beyond energy costs. Shades and blinds are no longer necessary, and employees are assured of comfortable temperatures no matter what it's like outside.

"The windows are one of the most striking features of our building, but they provide so much more than just great views," said Arvig. "One of the things we strongly considered with our headquarters remodel was the need for natural light. The windows not only provide an abundance of light, but their smart features will contribute to energy efficiency and savings for us in the long term."

For more information on SageGlass, contact your energy management representative or our Idea Center at 800-493-3299.



Meet Scott Sigette

Energy Management Representative serving the Devils Lake, Langdon, and Rugby, North Dakota areas

Scott's been an energy advisor for more than 15 years and has worked for our company for 39 years. He specializes in sizing thermal-storage heating applications for both underfloor and electric thermal-storage furnaces as well as large boiler systems. He's a certified geothermal installer and a demand side manager. Scott previously worked for us as a lineman, service representative, and land management purchaser.

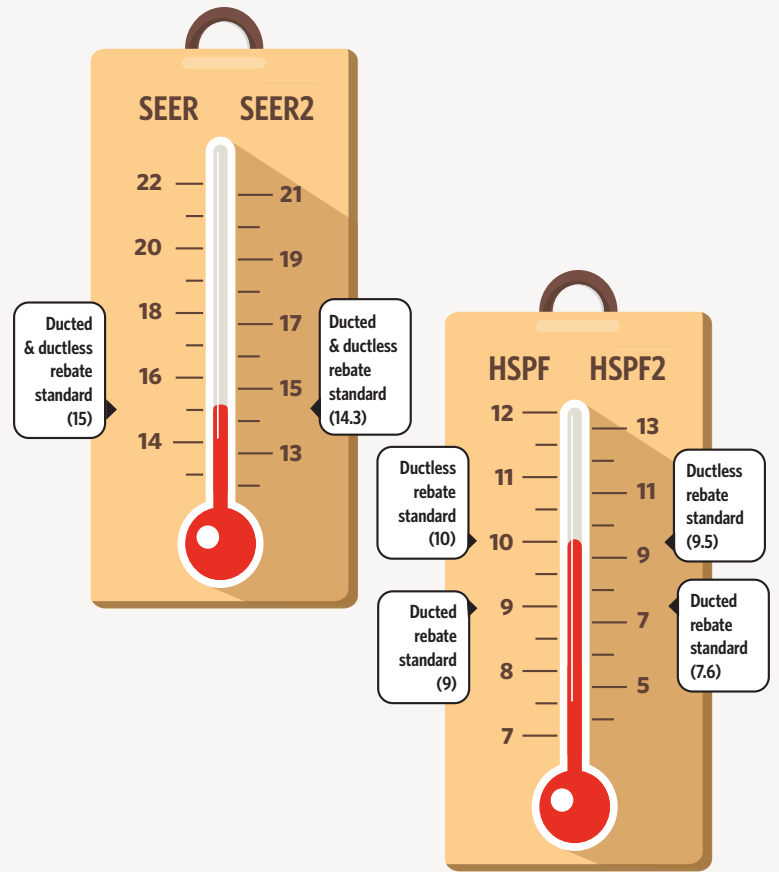
Call Scott at **701-351-3502**, or find the rest of our team listed on the back.

Heat pump ratings have changed

The Department of Energy recently updated efficiency standards for air conditioners and heat pumps. Testing procedures used to establish ratings have changed. Seasonal Energy Efficiency Ratio (SEER) and Heating Season Performance Factor (HSPF) ratings will be replaced by SEER2 and HSPF2.

Equipment manufactured before January 2023 will be rated according to old SEER and HSPF testing processes. Equipment manufactured after January 1 will be rated with SEER2 and HSPF2. Both ratings offer high-efficiency performance. Understanding which energy-efficiency ratings are applied to a prospective purchase ensures you'll get the efficiency level you desire along with a qualified rebate.

If you have questions about a heat pump purchase, contact your Energy Management Representative or visit learnmetrics.com/hspf2-rating.



Commercial tax incentives

The federal Business Energy Investment Tax Credit (ITC) has been amended a number of times, most recently by the Inflation Reduction Act of 2022. That bill expands eligible technologies and establishes new prevailing wage and apprenticeship requirements for larger systems to qualify for the full 30 percent tax credit. In 2023 the Treasury Secretary will issue guidance for these new labor provisions. The table at right shows available credits for different project types.

Some of the technologies eligible for tax credits under the ITC include:

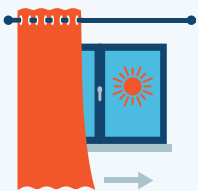
- **Solar energy generation.**
- **Geothermal heat pump systems** that meet ENERGY STAR® requirements.
- **Energy storage systems**, such as battery-storage installations, both when paired with generation and as a stand-alone system.
- **Thermal energy storage systems.**

Business Energy Investment Tax Credit summary*

Base credit	Meets labor requirements	Does not meet labor requirements
Under 1 MW	30%	30%
Over 1 MW	30%	6%
Domestic content bonus		
Under 1 MW	10%	10%
Over 1 MW	10%	8%
Low-income bonus		
	10%	10%

* Tax credits vary by community location, labor guidelines, and material sources. Talk to your tax advisor before starting your project.

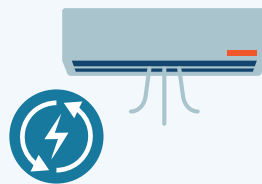
Save on cooling



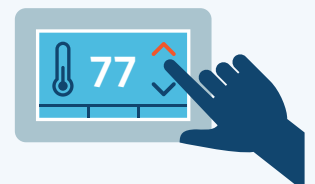
Close the shades during early morning and late evening to reduce heat gain from the sun.



Close the doors to the outside to contain air conditioning.



When possible, turn the air conditioning off for the last hour of each workday.



Keep room area temperatures at 77°F during summer.

Our team of energy experts



Bill Gronwald
Fergus Falls, MN area



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Jamestown and Oakes, ND areas



Brandon Johnson
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Call one of our representatives at 800-493-3299 to discuss your project.



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