



SOLAR POWER FOR MINNESOTA



Owens Companies Inc., Bloomington, MN. Photo courtesy of Solarflow.

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Powering Minnesota's schools, police and fire stations, and other public buildings with solar

A report prepared for the Solar Works for Minnesota coalition by Christina Mills of the Institute for Energy and Environmental Research, and John Farrell of the Institute for Local Self-Reliance. The Solar Works for Minnesota coalition is a group of more than 150 businesses, consumers, labor groups, the solar industry and clean energy advocates working collaboratively to promote solar power across Minnesota.

POWERING MINNESOTA'S SCHOOLS, POLICE AND FIRE STATIONS, AND OTHER PUBLIC BUILDINGS WITH SOLAR

Buildings use a lot of energy. Forty percent of U.S. primary energy supply in 2008 was consumed by buildings. Nearly half of the energy consumed by buildings is used to light, heat, and cool the building space.¹ And over the past 30 years, building energy use has increased by almost 25%.² In Minnesota, the energy used for buildings comes mostly from coal, nuclear, and natural gas, which must be imported from outside of the state. Minnesotans spend more than \$20 billion dollars every year on these energy imports.

Publicly-owned buildings are particularly sensitive to energy costs because they rely on tax revenue collected from residents. For instance, **Hennepin County pays more than \$9 million every year to provide electricity to its offices, hospitals, jails, libraries, courts, and other buildings. That's equivalent to over \$8 per resident.** Installing solar power on buildings like schools, libraries, and fire stations makes sense because it not only provides a source of clean, renewable energy, but it also creates jobs across the state and saves taxpayer money.

Minnesota currently has approximately 5 megawatts (MW) of solar electricity generation, providing less than 1% of our total electricity generation.³ Despite this low number, a recent poll shows that **87% of Minnesota voters support increasing the use of solar power in the state, and 82% of Minnesota voters support policies that encourage the use of solar specifically on Minnesota's schools and other public buildings.**⁴

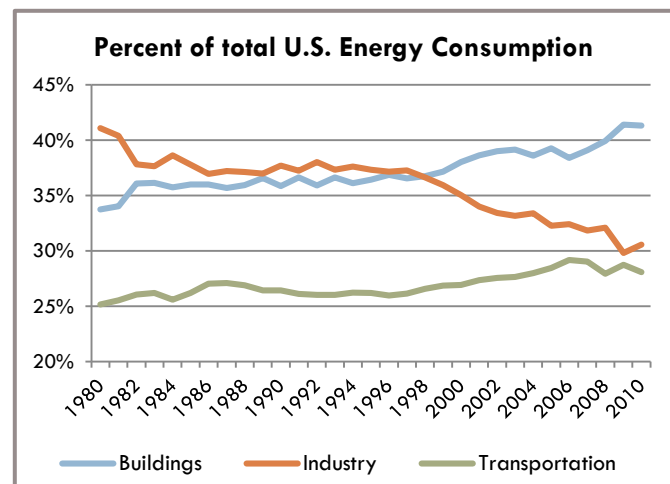
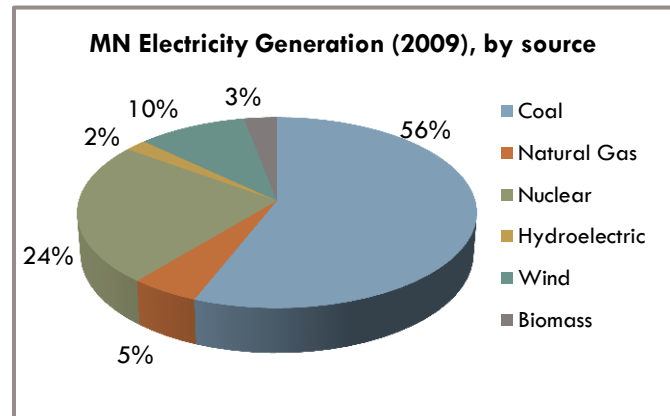


Photo courtesy of Environment Minnesota

MINNESOTA'S SCHOOLS AND PUBLIC BUILDINGS SPEND A LOT ON ENERGY

Minnesota has a variety of public buildings located all across the state, including public schools, libraries, town halls, city and county government centers, and police and fire stations. Because public buildings are typically open and operating during the daytime hours, solar PV generation can help meet on-site electricity demand.

Solar Power for Minnesota

Installing solar on public buildings is also one of the few ways to reduce the cost of building operations without impacting or sacrificing the quality of education schools. With an estimated \$378 million dollars in electricity costs for Minnesota's public buildings, there is a significant opportunity for cost savings.⁵ And this has impacts beyond the costs of operating these buildings. For instance, a school in Texas will be able to fill three teaching positions with the \$115,000 they expect to save each year with their solar panels and a California school district will be able to fund 30 required teacher positions with their savings from solar on 13 of their school buildings.⁶



Photo courtesy of MRES



Photo courtesy of Environment Minnesota

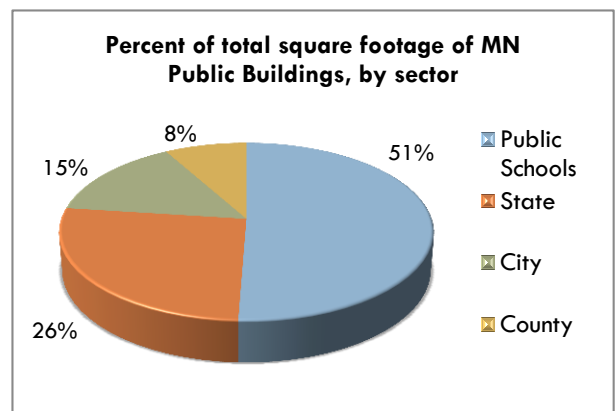
Solar can do more than save energy. Putting solar on schools also provides a tremendous educational opportunity to incorporate real-life science and math applications into the classroom. Efforts to incorporate solar technology into classroom education is already happening in schools across Minnesota., like the Rochester school district and the North Shore Community School.⁷

HOW MUCH SOLAR COULD WE PUT ON PUBLIC BUILDINGS?

Minnesota has approximately 282 million square feet of space in public buildings.⁸ It is difficult to calculate the actual rooftop space that would be suitable for solar due to a variety of factors such as multi-story properties, existing rooftop structures, and/or engineering limitations.

A rough estimate – assuming schools have an average of 2 stories, and that half of the available roof space is suitable for solar – is that solar PV could generate as much as 30% of the electricity needs of all Minnesota's schools.⁹ Getting a more accurate figure would require a more detailed study of the rooftop space available on schools, and other public buildings, as has been done in other states.¹⁰ This detailed information could also be used to help prioritize which solar projects provide the largest benefits with the shortest payback times – looking at both solar PV and solar thermal technology.

Additional advancements in solar photovoltaic (PV) technology can increase the amount of solar electricity potential on schools and other building rooftops. For instance the solar panels built by Bloomington, MN based tenKsolar, have an innovative design that allows for more electrical output per square foot of roof space than other solar panel manufacturers.¹¹ Solar thermal technology is also increasing in popularity in Minnesota.¹² This technology uses the sun's energy to heat all or a portion of a building's water supply, offsetting the use of a gas-fired heat exchange system



SOLAR ON PUBLIC BUILDINGS SAVES TAXPAYERS MONEY

Policies designed to promote cost-effective development of solar on Minnesota's public buildings can dramatically reduce energy costs and therefore ease burden to taxpayers for operating their schools, libraries, police and fire stations, and other public buildings. Solar PV panels installed and paid for in 2012 will generate electricity through 2037 and beyond, at little additional cost for maintenance. Grid electricity prices, on the other hand, have risen 47% in the past 10 years.¹³



Minnesota Office Plaza, Roseville, MN. Photo courtesy of Solarflow

SOLAR POWER CREATES JOBS AND SUPPORTS ECONOMIC DEVELOPMENT

Solar power is an economic development driver – it was the only industry actually *growing* in strength and jobs during the national recession. Studies continue to show that **solar is one of the highest density job creators per megawatt of electricity generated**.¹⁴ Similarly, public investment in renewable energy provides more jobs than spending in any other area.¹⁵



Photo courtesy of Environment Minnesota

With the right policy, the solar industry can create investment opportunities in local economies. It can create family-supporting and sustainable jobs not only from the installation of solar panels, but also in the supply chain with manufacturing and ancillary business development opportunities. Minnesota already has more than 100 solar-related businesses such as installers, distributors, manufacturers, and training programs in places like Duluth, Alexandria, Rochester, and Mountain Iron. These businesses continue to grow and add jobs at time when they are most desperately needed.¹⁶

WHAT POLICIES CAN GET SOLAR ON OUR SCHOOLS AND PUBLIC BUILDINGS?

Ideal policies will create a competitive market for solar by sending the industry a strong demand signal while also removing barriers to cost-effective solar installations. Minnesota's advantage is that it is already home to many technology-based industries that serve the solar industry. Whether the state can maximize the economic development potential of the solar industry will be determined by whether policy makers help remove some of the barriers to cost-effective solar development in the state.

- Require a **study of the potential for solar** on schools and other public buildings to identify including the existing electricity consumption, the available space solar power, solar and energy efficiency combinations that can help reduce local energy demand, the nearest interconnection point and available capacity on the utility's distribution system.
- Creating a **Solar Energy Standard** would create a strong market demand for solar, while at the same time letting the solar industry compete and drive costs down. Minnesota has experience with creating a strong market demand for wind energy with its successful Renewable Energy Standard. A policy supporting 10% solar standard by 2030 would create a strong market signal and tell solar businesses to invest in Minnesota and its growing solar energy workforce.

- Implement a **standard contract** program for distributed solar on public buildings. When schools want solar power, it should be simple. A standard contract program would provide a long-term (i.e. 20-year) contract to buy the electricity from any solar installation on public property, at a price that ensures a modest return on the investment. This type of policy gives schools, police and fire stations, libraries, and other public building operators the confidence to invest in solar and cut energy costs.
- Allow schools and other public entities to partner with the private sector in developing solar on their buildings. As it stands, schools must leave the generous federal solar tax incentives on the table because they only apply to taxable entities. But **third-party partnerships** have allowed schools in California, Colorado, Maine, and Massachusetts to capture those benefits and sharply reduce the cost of installing solar.¹⁷ In this scenario the school provides the physical roof space for the solar PV system, while a third party installs and owns the system, either leasing the solar array to the school or directly selling the electricity to the school. This model is attractive for public buildings because the third party can use the federal tax incentives for solar that the school itself cannot (a 30% tax credit and accelerated depreciation) which helps to lower the overall project costs, and allows for public dollars to be used leveraged across more solar projects.
- Cut red tape to smooth the way for more solar on schools and other public buildings. This includes **streamlining the local permitting process and limiting the fees paid by building owners during the permitting process**. Because of inexperience with solar, local governments may require much more paperwork than is necessary to safely install solar projects. Improving utility interconnection standards and requirements for rooftop solar installations would also help eliminate redundancies in the process.
- Establish **spending criteria for Xcel Energy's Renewable Development Fund** that will encourage broad deployment of solar on our schools, town halls, police and fire stations.
- Modify the state's net metering law to **allow on-site solar projects to be sized to the electricity load of the building** (rather than limited by an arbitrary number). This will help solar installations become more cost-effective for larger buildings, like government buildings and schools because they will be able to offset a larger portion of their energy needs through on-site solar generation.



D&E Management, Minneapolis, MN. Photo courtesy of Solarflow

CONCLUSION

While some schools in Minnesota have already put solar on their rooftops, there is potential for many more to benefit from solar power. Across Minnesota, schools, libraries, town halls, police and fire stations, community centers, hospitals and other public buildings buildings have significant potential to generate solar power from their rooftops. In addition to saving money, these projects would create jobs, generate investment in the state, ease the financial burdens of local governments and schools, provide hands-on science and technology education opportunities for children across the state, and propel Minnesota forward as a leader into a new energy economy. Minnesota policy makers should look for ways to reduce the barriers for solar power in communities all across Minnesota.

- ¹ Data from the U.S. Department of Energy Buildings Energy Data Book, Table 1.1.3 (<http://buildingsdatabook.eren.doe.gov/ChapterIntro1.aspx>)
- ² Data from the U.S. Department of Energy Buildings Energy Data Book, Table 1.1.8 (<http://buildingsdatabook.eren.doe.gov/ChapterIntro1.aspx>)
- ³ Installed solar capacity from: http://en.wikipedia.org/wiki/Solar_power_in_the_United_States. The majority of this capacity was installed in 2009 and later, and is therefore not reflected in the most currently available data from the EIA for Minnesota's electricity generation by source from 2009.
- ⁴ From a statewide telephone poll of 500 registered Minnesota voters, conducted Jan 9-11, 2012, for the Minnesota Environmental Partnership by the bipartisan research team of Fairbank, Maslin, Maullin, Metz & Associates and Public Opinion Strategies. The margin of sampling error for the full statewide samples is 4.4 percentage points, plus or minus; margins of error for subgroups within the sample will be larger.
- ⁵ Our calculation is based on an average \$1.34 spent on electricity per square foot in office buildings as reported by Xcel Energy to estimate the amount spent by public building owners – the taxpayer. (<http://www.xcelenergy.com/staticfiles/xcel/Marketing/Files/Managing-Energy-Costs-Office-Buildings.pdf>)
- ⁶ See Pierre Bertrand. (2011, August 17). Green is the word for local schools. *San Antonio Express News*. Retrieved from <http://www.mysanantonio.com/news/education/article/Green-is-the-word-for-local-schools-2067877.php> and Chevron Energy Solutions. Press Release, May 20, 2011. Retrieved from http://www.chevronenergy.com/news_room/default.asp?pr=pr_20110520.asp.
- ⁷ See *Renewable energy and schools*. Published 2011. Retrieved from Minnesota Renewable Energy Society website: http://www.cleanenergyresourcesteams.org/sites/default/files/publication_files/RenewableEnergy_SchoolsGuide_MRES.pdf
- ⁸ Data reported by building owners to the State of Minnesota B3 Benchmarking database, developed by the MN Department of Administration and the MN Department of Commerce. For more information visit the B3 website: <http://www.mnbenchmarking.com>
- ⁹ Data reported for 2011 by the Minnesota Department of Education for all of its schools and other education-related buildings (including administration) gives 166,893,273 total square feet of public school buildings across the state. Calculation based on the average electricity use in schools across the country as 10 kilowatt-hours per square foot (See http://www.energystar.gov/index.cfm?c=business.EPA_BUM_CH10_Schools)
- ¹⁰ See *Distributed Renewable Energy Operating Impacts and Valuation Study*. Published 2009. Retrieved from the Arizona Public Service website: <http://www.aps.com/files/solarRenewable/DistRenEnOplmpactsStudy.pdf>. And for a national perspective, see J. Paidipati, L. Frantzis, H. Sawyer, and A. Kurrasch. Rooftop Photovoltaics Market Penetration Scenarios. February 2008. Navigant Consulting (Prepared for NREL under subcontract NREL/SR-581-42306). Accessed via the NREL website: <http://www.nrel.gov/docs/fy08osti/42306.pdf>
- ¹¹ For more information see the tenKsolar website: <http://www.tenkSolar.com/index.html>
- ¹² See Stephanie Hemphill. (2011, August 18). Interest in solar thermal energy heating up. *Minnesota Public Radio News*. Retrieved from <http://minnesota.publicradio.org/display/web/2010/08/18/solar-thermal-energy/>
- ¹³ Based on the Consumer Price Index for Urban Areas, national data, 2001-11.
- ¹⁴ Daniel M. Kammen, Kamal Kapadia, and Matthias Fripp (2004) *Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?* RAEI Report, University of California, Berkeley. (<http://rael.berkeley.edu/sites/default/files/very-old-site/renewables.jobs.2006.pdf>)
- ¹⁵ Robert Pollin, Heidi Garrett-Peltier, James Heintz, and Helen Scharber (2008) *Green Recovery: A program to create good jobs and start building a low-carbon economy*. PERI Report, University of Massachusetts-Amherst. (http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf)
- ¹⁶ Solar energy finds a home on the iron range. January 12, 2012. Duluth News Tribune. (<http://www.duluthnewtribune.com/event/article/id/219687/>)
- ¹⁷ See Craig S. Semon. (2011, November 14). Tantasqua schools going solar by thanksgiving. *Worcester Telegram & Gazette*. Retrieved from <http://www.telegram.com/article/20111114/NEWS/111149863>; and Vin Staniforth. (2011, May 10). Solar Project Highlight: Pioneer Union Elementary School District. Retrieved from <http://www.enfinitycorp.com/blog/2011/05/pioneer-elementary/>; and Bridget Jones. (2011, October 30). Auburn district's new solar project expected to save \$3.5 million. *Auburn Journal*. Retrieved from <http://auburnjournal.com/detail/191809.html>; and Susan DeFreitas. (2011, February 18). Solar Panels To Dot Colorado Schools. *Earth Techling*. Retrieved from <http://www.earthtechling.com/2011/02/solar-panels-to-dot-colorado-schools/>

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For more information about the Solar Works for Minnesota coalition, visit <http://www.solararmn.org>

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