Saint John's Abbey Solar Project
Facts and Information

Q: How much energy will the Saint John's solar facility produce?

A: 575,000 kilowatt-hours (575 MWh) of anticipated annual energy production. The facility will offset about 20% of Saint John's peak energy needs during the summer months and approximately 4% of their overall energy needs on an annual basis.

Solar PV facilities produce power during daylight hours which directly corresponds to time of day when energy consumption peaks. Peak power is the most expensive power to produce which makes solar power more valuable.

Q: How many homes will the system power?

A: The system provides enough annual power for the equivalent of approximately 65 homes.

Q: Does Minnesota have a good solar resource?

A: Quoting the *GREEN INSTITUTE ISSUE BRIEF ON SOLAR ENERGY, Building Minnesota's Solar Future: The Option of a "Solar Carve-Out" in the Renewable Energy Standard* (Feb 2008): "Minnesota's solar resource is very good—nearly as good as Miami, Florida—and solar resources change more gradually and linearly across distances, unlike wind energy, which is more site specific across the state, and varies with the cube of the wind speed. Solar should also be compared to the retail price of electricity, not any particular technology, since it is offsetting direct retail consumption. New Jersey has a lower solar resource than much of the country, including Minnesota, and yet has the second largest solar market in the U.S. Similarly, Germany has roughly the same solar resource as Alaska (the lowest in the country), and yet in 2006 Germany installed nearly seven times more solar electric capacity than the entire U.S."

Q: How does Minnesota's four seasons affect the production of energy in a solar facility?

A: A solar array will produce more power in the summer because of longer daylight hours and more direct sun. In winter, the solar array will produce less power due to shorter daylight hours and oftentimes cloudier conditions. Interestingly, the cold winter temperatures are actually beneficial to a solar system. A drop in temperature causes an increase in voltage, which corresponds to an increase in power production.

Q: What is the largest MN PV system currently?

A: The largest PV system in Minnesota was 100kW prior to the Saint John's PV site. The Saint John's solar field is approximately 4 times larger—the largest solar photovoltaic system in the Upper Midwest.

Q: The power field at Saint John's Abbey has a motorized tracking system. Why?

A: Having the solar panels "track" the sun increases the efficiency of the array. The modules sit on beams that rotate east to west on a horizontal axis throughout the day, following the path of the sun across the sky. This produces approximately 15% more energy than a typical static array.

Q: How long will the system last:

A: The system's life is in excess of 30 years. The solar modules are warranted to produce energy at 80% of its initial capacity after 25 years.

Q: How is the project funded?

A: Approximately $2 million dollars of construction costs come from customers of Xcel Energy through a grant from the Renewable Development Fund (RDF). The remaining funds will come from tax credit and equity investors as well as energy payments that stem from the energy produced by the facility.

Q: Why did the Renewable Development Fund support this project?

A: This project was chosen for funding this project because it would deliver 400kW of solar electrical generating capacity to the Minnesota Xcel Energy service area and provide the opportunity to scientifically test and demonstrate the feasibility of large-scale solar in Minnesota, and to test and demonstrate the technology-to-market transition. The project will:

- Familiarize Minnesotans with Minnesota's climate as a good solar resource, increasing demand for solar systems
- The 3.1-acre solar field will provide a large scale demonstration site of solar power in Minnesota.
- Demonstrate the financial feasibility of large-scale solar PV installations
- Utilize the solar resources in Minnesota to generate energy during peak demand hours, assisting Xcel Energy in cost effectively increasing the percentage of renewables in its generation portfolio and reducing costs related to purchasing peak-period energy
- Track and report on the operating performance of the system—availability, kWh production, seasonal implications, and other metrics—to begin building a foundation of knowledge regarding large-scale solar in the state

Q: Where will the energy go?

A: The solar facility will be connected to Saint John's internal grid.

Terminology

Photovoltaic (PV) Effect: When light, as photons, strikes a solar cell, it excites the silicon atoms and knocks some of their electrons loose. These loose electrons are channeled into wires where they become current—electricity.

Cell: A PV cell is the basic building block of a solar photovoltaic system. Each cell is made of a semiconductive material, typically silicon. PV cells can produce power for 30 years or longer.

Module: A module is a series of cells wired together and housed in a single frame. This is often called a solar "panel" but the industry uses the term "module" instead.

String: A string is a grouping of modules wired in series. When electrical sources are wired in series, the voltage is increased to the desired level. Groups of strings are wired in parallel.

Array: An array is the total collection of modules and strings in a given solar system.

Inverter: Solar modules produce direct current (DC) power, and the inverter converts it to alternating current (AC) power, which is used in the electrical grid and in our home.