Project Title: Blue Lake Solar (EP4-48)
Contract Number: EP4-48
Report Number: 13 – Final Report
Report Date: September 7, 2016

Reporting Period: January 26, 2015 – February 29, 2016
Progress Summary: System Construction Complete (100% complete)
Principal Investigator: Chris Wall, SunEdison (720) 630-5226
Contract Contact: Michael McCabe, Oak Leaf Energy Partners (303) 893-6945

Congressional District: Metropolitan Council – Minnesota US District 4
Congressional District: Blue Lake Solar Facility – Minnesota US District 2

"Project funding provided by customers of Xcel Energy through a grant from the Renewable Development Fund."

FINAL PROJECT REPORT

1 Executive Summary

SunEdison and Oak Leaf Energy Partners (Oak Leaf) are pleased to present the final report for the Renewable Development Fund (RDF) Project EP4-48, also known as the Blue Lake Solar Project located in Shakopee, Minnesota. The Blue Lake Solar Facility resides on a buffer zone of land immediately adjacent to the Metropolitan (Met) Council's Blue Lake Wastewater Treatment Plant (WWTP) at 6957 Highway 101, Shakopee, MN 55379.

As background, the Project was awarded to Oak Leaf as part of a competitive RFP process in the fall of 2012 by the Met Council. After evaluating numerous competing bid responses, Met Council selected Oak Leaf to build a solar facility with a total capacity of 1.25MW AC to provide electricity to its Blue Lake WWTP.

After receiving the bid award, Oak Leaf submitted a bid response to Xcel Energy's RDF RFP in April 2013 for the 1MW portion of the 1.25MW AC Blue Lake Solar Facility (hereafter, the Facility). The Facility is connected to the grid via two (2) distinct interconnection points with capacities of 970kW and 280kW. Oak Leaf's bid response was one of several energy production projects selected by the RDF Advisory Board. In January 2015, Oak Leaf and Xcel Energy signed and filed the $2,000,000.00 Grant Agreement for the 1MW portion (hereafter, the Project) of the Facility. The Project will provide approximately 10% of the WWTP's annual power usage.

The Project was installed by Mortenson Construction with the majority of on-site construction activities taking place between May and September of 2015. The Project is projected to produce 1,720,000 kWh per year to the WWTP and the will serve as a flagship project demonstrating the shared benefits of solar development when utilities and municipalities work together.

1.1 Project Goals

In the application, Oak Leaf enumerated their intent to deploy on-site, renewable energy in Xcel Energy's territory to achieve the following goals:

1) Increase the market penetration within the state of renewable electric energy resources at reasonable costs;
2) Benefit the State of Minnesota by providing below retail rate electricity (on a net present value basis) to the Met Council, a State created entity;
3) Benefit Xcel Energy ratepayers by deploying on-site, distributed generation that provides the bulk of its output during on-peak times, thereby mitigating the need to upgrade generation, distribution or transmission facilities in Xcel Energy's network;
4) Promote solar photovoltaic installers in the State of Minnesota, including the local installers who will build this PV system;
5) Illustrate how critical infrastructure facilities like the Blue Lake WWTP can employ on-site, renewable generation through dual feed designs;
6) Minimize the Total Resource Cost to Xcel Energy by providing a unique REC sharing model.

The attainment of each of these goals is described in more detail below.

1.2 Project Status

SunEdison formally joined the Project as Co-Developer in the first quarter of 2015 and assisted with financing, engineering and construction management. SunEdison hired Mortenson Construction to construct the Project in the summer of 2015 with mechanical completion achieved in September 2015. Upon mechanical completion, Xcel Energy deemed the metering cabinet on the site did not meet Xcel Energy standards. A new metering cabinet was ordered and installed by Mortenson Construction in early January 2016. Xcel Energy approved the new metering cabinet and completed their witness tests on January 21, 2016 and provided written Permission to Operate (PTO) on January 29. After performance testing by SunEdison, commercial operation (COD) was declared on March 1, 2016. The following list details significant development milestones:

Land Use Approvals & Permits

a) Conditional Use Permit	City of Shakopee
b) Wetland Determination	Army Corps of Engineers
c) Natural Heritage Data Search	Minnesota DNR
d) Building Permit	City of Shakopee
e) Grading Permit	City of Shakopee

Construction Milestones

• RDF Grant Contract signed	January 26, 2015
• Interconnection Study commenced	March 23, 2015
• Preconstruction meeting at BLWWTP	April 23, 2015
• Interconnection approved	May 5, 2015
• Formal NTP by MCES	June 2, 2015
• Construction commenced	June 8, 2015
• Ground screw installation	June 24, 2015
• Major equipment deliveries	July, 2015
• Final modules installed	August 17, 2015
• Mechanical Completion	September 17, 2015
• Final inspection approval	September 18, 2015
• System commissioning	September 21-25, 2015
• Xcel Energy witness tests	January 21, 2016
• Formal PTO from Xcel Energy	January 29, 2016
• Commercial Operation Date	March 1, 2016


Blue Lake Solar Facility: Looking east at the Blue Lake WWTP

2 Project Objectives

The objectives achieved for each of the listed goals in Section 1.1 are detailed below:

1) Increase the market penetration within the state of renewable electric energy resources at reasonable costs;

The overall Facility, as well as the 1MW portion or Project supported by the RDF grant, increased the market penetration of renewable electric energy resources. The 1.25 MW Facility is the largest behind the meter solar project in the Minnesota and represents a model for future 1MW+ distributed generation solar projects. The Project is projected to produce 1,720,000 kWh per year.

In reference to the Total Resource Cost for the Project, the RDF Oak Leaf proposal projected 2,017 MWhr/yr. The final Independent Engineer (IE) report[1] projected 2,195 MWh/yr or 2,195,000 kWh/yr from the Facility. The TRC for the Project as installed was

[1] DNV GL 2016. CONFIDENTIAL REPORT. Metropolitan Council-Enfinity-Shakopee (MN-14-00001). Design Inspection, and Energy Prediction Report, SunEdison, 3/03/2016, Final Issue B.

slightly higher than the TRC calculated from the original proposal. The TRC increased by 3% from $0.1208/kW to $0.1247/kWh. Although the construction costs of $2,673,736 were 7% lower than the proposed construction costs of $2,864,810, the estimated energy to be produced also decreased by 3.4MWh, a reduction of 12% which drove up the TRC.

2) Benefit the State of Minnesota by providing below retail rate electricity (on a net present value basis) to the Met Council, a State created entity;

There are several financial and environmental benefits resulting from the Project. The 1MW Project is projected to produce 1,720,000 kWh of energy in the first year of operation. Council officials say the clean, renewable energy produced by the system will offset more than 1,000 metric tons of carbon pollution annually. An equivalent amount of energy produced on an annual basis by the Project requires approximately 1.3 million pounds of coal to be combusted in a conventional coal-fired facility.[2]

The plant will provide approximately 10% of WWTP's annual energy needs, reducing its normal demand from Xcel Energy's local grid. The energy savings will be passed on to approximately 300,000 residents and businesses who pay the cost of wastewater treatment throughout the metro area.[3]

Lastly, siting the Project adjacent to the heavily trafficked Highway 101 will benefit public relations efforts as hundreds of thousands of vehicles during the 25-year PPA term will be able to see first-hand the Council's investment in renewable energy. Similarly, the Project offers opportunities for community and educational outreach as Met Council representatives tout the relative merits solar investment[4,5].

3) Benefit Xcel Energy ratepayers by deploying on-site, distributed generation that provides the bulk of its output during on-peak times, thereby mitigating the need to upgrade generation, distribution or transmission facilities in Xcel Energy's network;

The vast majority of the Project's energy production will occur during on-peak times which will lessen Xcel Energy's need to invest in additional generating capacity or upgrade transmission and distribution lines serving the area. This is illustrated in Section 6.0 below by overlapping the Project's diurnal production curves over Xcel Energy's peak rate period. This impact will be immediate as the PV system achieved COD on 3/1/2016. The data from COD until the end of July (7/31/2016) shows that over 89% of the operating history occurs within Xcel Energy's peak rate window for the Minnesota service area (9AM to 9PM).

[2] Energy Information Association, 2016. Greenhouse Gas Equivalences Calculator. [website accessed 9/5/2016], https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

[3] Metropolitan Council, 2015. Celebrating the Benefits of Solar Energy. [website accessed 9/5/2016], http://www.metrocouncil.org/News-Events/Wastewater-Water/Newsletters/Celebrating-the-benefits-of-solar-energy.aspx

[4] Midwest Energy News. 2015. Solar farms grow at wastewater plant in Minnesota. [website accessed 9/5/2016]. http://midwestenergynews.com/2015/08/21/the-met-councils-solar-program-takes-off/.

[5] Metropolitan Council, 2016. Council Saves Energy, Helps the Planet. [website accessed 9/5/2016]. http://www.metrocouncil.org/News-Events/Wastewater-Water/Newsletters/Council-saves-energy,-helps-the-planet.aspx.

4) Promote solar photovoltaic installers in the State of Minnesota, including the local installers who built this PV system;

SunEdison and Oak Leaf worked with local labor forces to construct the PV Facility and as many as 50 people were on site at any one time working on a variety of tasks. Although solar development may be more mature in other US markets, this experience gained as a result of the Project is invaluable for construction workers and tradespeople seeking employment in the rapidly advancing, renewable energy industry. The cumulative 10,000 man hours needed to complete the Facility represent many hours of marketable, renewable energy development experience that local union employees may not have gained otherwise.

5) Illustrate how critical infrastructure facilities like the Blue Lake WWTP can employ on-site, renewable generation through dual feed designs;

The majority of SunEdison and Oak Leaf's solar systems reside at critical infrastructure facilities such as water/wastewater plants, airports and other municipal facilities. Large-scale, power-consuming facilities, such as the Blue Lake WWTP, are often optimal locations for on-site solar energy generation in order to offset existing power consumption loads. The combined development experience of SunEdison and Oak Leaf proved beneficial as the Facility was specifically designed to interconnect to the dual feed system of the Blue Lake WWTP and the NEFCO fertilizer plant.

Also of significance is the cumulative 10,000 man hours required to complete the Project, which represent many hours of labor and experience that local union employees may not have gained otherwise.

6) Minimize the Total Resource Cost to Xcel Energy by providing a unique REC sharing model.

The Council's goal is to optimize and match the solar generation of the 1MW Project with its energy consumption loads. In reference to the Total Resource Cost for the Project, the RDF Oak Leaf proposal projected 2,017 MWhr/yr. The final Independent Engineer (IE) report[6] projected 2,195 MWh/yr or 2,195,000 kWh/yr from the Facility. The TRC for the Project as installed was slightly higher than the TRC calculated from the original proposal. The TRC increased by 3% from $0.1208/kW to $0.1247/kWh. Although the construction costs of $2,673,736 were 7% lower than the proposed construction costs of $2,864,810, the estimated energy to be produced also decreased by 3.4MWh, a reduction of 12% which drove up the TRC.

3 Construction of the Blue Lake Solar System

The Blue Lake Solar Facility is the first SunEdison project developed in Minnesota. At the onset of development, the development team was aware that the Project may pose several unique

[6] DNV GL 2016. CONFIDENTIAL REPORT. Metropolitan Council-Enfinity-Shakopee (MN-14-00001). Design Inspection, and Energy Prediction Report, SunEdison, 3/03/2016, Final Issue B.

challenges. In an effort to minimize EPC-risk, a good faith agreement was agreed upon between Oak Leaf Energy Partners and the Met Council to use union labor and SunEdison partnered with a regional contractor, Mortenson Construction, that has a long standing, solid reputation among the local electrical and labor unions. The unique weather of Minnesota caused SunEdison to reevaluate their standard design and utilize equipment able to tolerate severe winter temperatures. The site geotechnical conditions called for a racking design specifically manufactured for soils with shallow bedrock. There were many parties involved in the construction of the Facility; SunEdison, Oak Leaf Energy Partners, Mortenson Construction, Xcel Energy, and the Met Council all played significant roles in the completion of the Facility. The Project would not have gone as smoothly as it did if all the parties involved were not able to work collaboratively to meet the construction challenges.

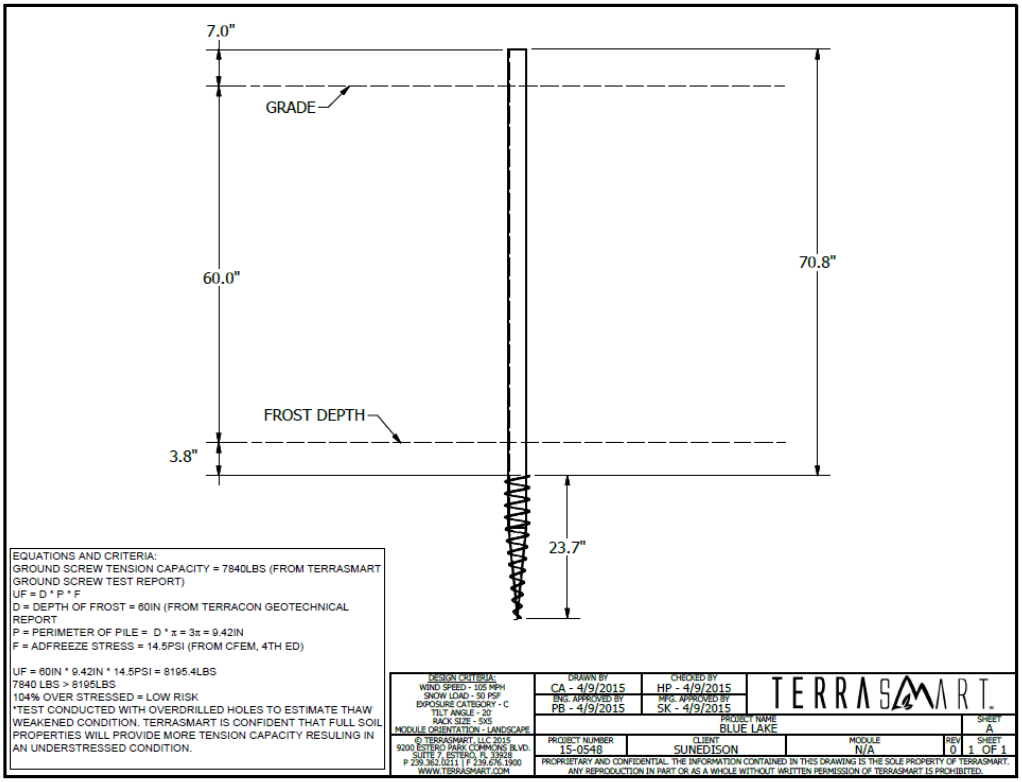
3.1 Mortenson Construction

Mortenson Construction, headquartered in Minneapolis, is the largest general contractor in the state of Minnesota. SunEdison partnered with Mortenson Construction for the construction of the Facility due to their understanding of the Minnesota labor pool and solar electrical expertise. Mortenson Construction is also listed as one of the most experienced solar installation contractors in the United States.

3.2 Equipment:

Thirty-four 28kW and two 23kW Chint Power Systems (Chint) inverters were selected for use at the Facility. These inverters were selected for several reasons. First of all, traditional central inverters did not have the ability to withstand the temperature extremes seen in the Minnesota winter so the more robust Chint string inverter was chosen. The Chint string inverter was chosen because the inverter could operate at temperatures as low as -40F. In contrast, the central inverters have an operating temperature range of -25F, which means they are unsuitable for use in the Minnesota environment. By mounting Chint string inverters to the TerraSmart racking, the design of the system was able to keep a majority of the DC and AC conductors above ground which resulted in less costly trenching and underground work. String inverters also have an advantage over central inverters because maintenance can be performed on a single inverter without the solar system experiencing significant or total power loss. In comparison, maintenance on a central inverter requires a shutdown of the entire solar system which would result in significant power production loss.

TerraSmart helical ground screws were installed as a result of the subsurface conditions on site and the potential for frost heave on the racking system. The helical ground screw is exclusive to the Florida based TerraSmart LLC and has been used in conjunction with other SunEdison projects where similar subsurface conditions existed. The geotechnical exploration and reports, provided by the St. Cloud engineering firm TerraCon, revealed shallow bedrock and large cobble throughout the site. TerraSmart was able to address the geotechnical conditions by using a rock drill to pilot drill the screw holes and then install the helical ground screws. A helical ground screw was customized to address the issue of possible frost heave on site. The helical ground screw was designed to embed the entire shank of the screw below the 5’ frost depth. This resulted in an 8’ ground screw being manufactured specifically for the Facility.



TerraSmart customized helical ground screw

SunEdison provided the 3,760 325W photovoltaic modules (or panels) used for the Facility. SunEdison modules are a mono crystalline semiconductor that is potential induced degradation (PID) free. PID is the loss of amperage and voltage from a module due to the materials used in construction such as the semi-conductor, glass, and glue. By utilizing materials shown to correct PID, the SunEdison module construction results in less performance loss and more power production over the life of the panel. The RDF support was requested for the 1MW Project of the Facility; the Interconnection final design of 970kW was confirmed after working with Xcel Energy engineers.

Construction of the Facility was not without its challenges. Geotechnical reports from TerraCon, located in St. Cloud, noted the existence of subsurface bedrock and cobble. These conditions posed a unique problem to work on site from the beginning of construction. As the site was leveled and graded for drainage many large boulders were uncovered, and needed to be removed from site. The installation of the ground screws took longer than expected because of the amount of time needed to properly pilot drill screw holes into ground. Trenching for underground wire and pipe runs also took longer than expected because of the amount of rock beneath the surface that was encountered. In addition to the subsurface bedrock and cobble, the east portion of the Project contained discarded construction waste below the surface. During the construction of the Blue Lake WWTP, the area closest to the WWTP boundary was used as a dump, which effectively made it unusable for further development, but was still a viable location to install a solar facility. Once the civil work and installation of the helical ground screws was completed the further construction of the Facility was able to move at its scheduled speed.

An example of bedrock encountered during site preparation at the Blue Lake solar facility

Geotechnical Engineering Report
Blue Lake Solar ■ Shakopee, Minnesota
January 19, 2015 ■ Terracon Project No. 41145509

Figure 5. Concrete with rebar observed at TP-7

Figure 6. Tire observed at TP-14

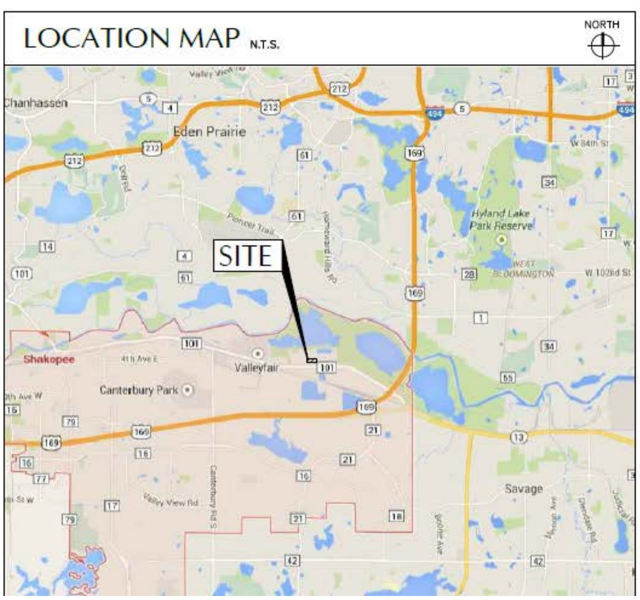
Construction debris located in the eastern portions of the Blue Lake solar facility

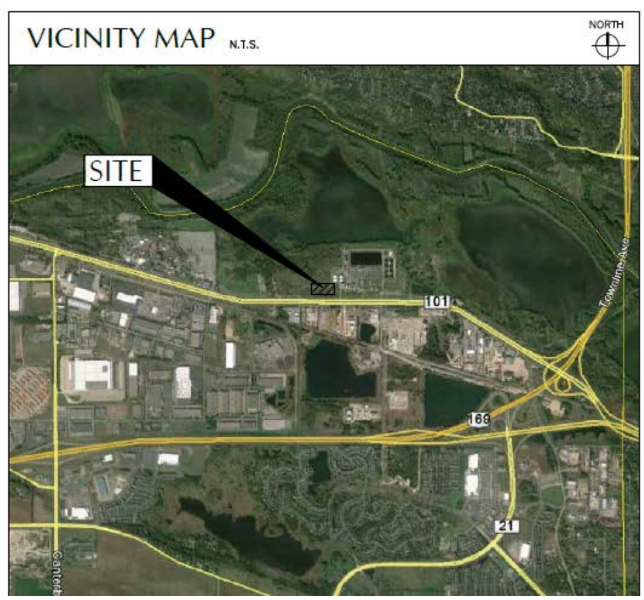
The interconnection from the equipment pad located within the Facility to the switchgear of the Blue Lake WWTP provided many challenges of its own. From the equipment pad the 970kW solar system is connected to a 1020kVA, 13.8 kV step up transformer. The medium voltage wire run from the 13.8kV transformer to the electrical building on the Blue Lake WWTP had to be buried within concrete duct bank in order to comply with Met Council protocol. The construction of this relied on heavy coordination and communication between Mortenson Construction and the Met Council in order to schedule and complete construction activities.

Medium Voltage interconnection wires encased in concrete on the Blue Lake WWTP property

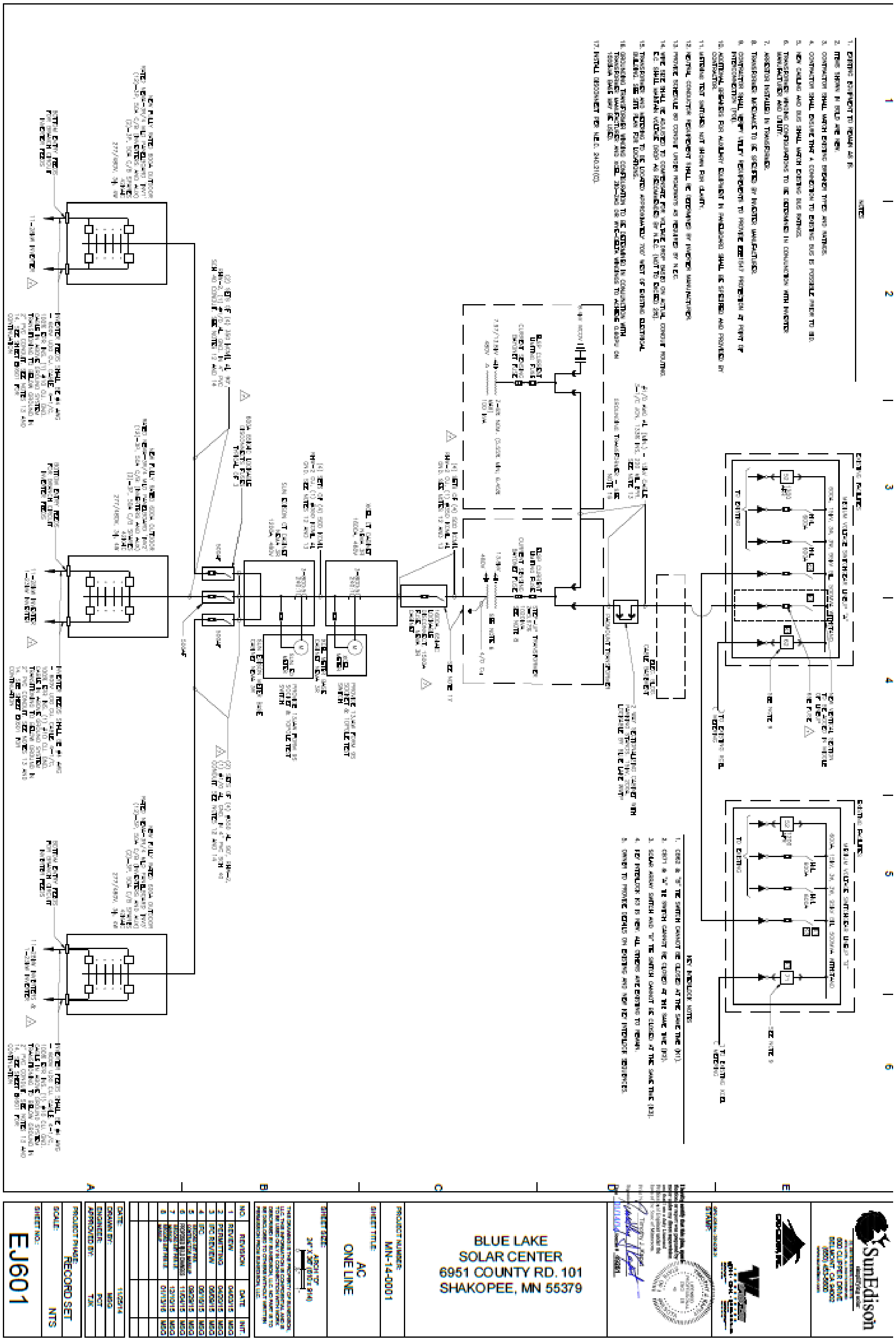
The construction of the Facility resulted in several economic benefits. At peak project construction there were 40 union craft laborers working on the project, and this labor volume was maintained for eight straight weeks. Many of these union craft laborers had never worked on a solar project before and project gave them valuable career experience to draw on in the future. In total, approximately 10,000 labor hours from local electrician and labor union employees went into the construction of the Facility. The Facility is the largest ever installed in Xcel Energy territory and the largest solar system installed for the Met Council. The construction of the Facility has resulted in improving the working relationships between Xcel Energy, The Met Council, Mortenson Construction, Oak Leaf Energy Developers, and SunEdison which will prove valuable to all parties involved as solar installations throughout Minnesota become more prevalent.

Equipment Pad: Looking east towards Blue Lake WWTP





Blue Lake Solar Facility location – Shakopee, MN



Single Line Diagram – 970kW AC Blue Lake Solar Facility

4 Lessons Learned

- **Use equipment designed for site conditions**
  Both the TerraSmart helical ground screws and Chint string inverters were deviations from the standard design for a solar system of this size. If traditional driven piles had been used for racking foundations the Project would likely have experienced extensive delays due to digging individual foundation footings. The design of the TerraSmart helical ground screw, coupled with the use of a rock drill, meant there was no additional excavation past site grading. Industry standard practice is to use central inverters on a system bigger than 500 kW, however the extreme cold temperatures of Minnesota winters had to be considered into the design. By using Chint string inverters we were able to mitigate the effects of the cold weather. An additional benefit of string inverters was that the DC and AC conductors were able to be attached to the racking system for a majority of the lengths of wire. This allowed the conductors to be in free air and reduced trenching activity in the less than favorable ground conditions on site.
- **Reclaimed land can be utilized for solar**
  The land that the Facility is located on was once used as a dumping site for debris from the construction of the Blue Lake WWTP. This land is adjacent to the WWTP and serves as a buffer zone between the WWTP and surrounding area. Due to the unique site history and current subsurface conditions, there are few applications which could effectively utilize this land in its present state.
- **Employ local contractors**
  Mortenson Construction and their relationship with local electrical and labor unions proved invaluable to the timely construction of the Facility. When the schedule needed to be sped up or more skilled labor was needed on site, Mortenson was able to provide this through their longstanding relationship with the unions.
- **Prepare for weather delays**
  Fifteen working days were lost during construction due to inclement weather. Though the area experienced more rain than usual, weather delays should always be factored into the construction schedule.
- **Consult with the utility in regards to electrical equipment**
  Xcel Energy did not accept the design of the metering cabinet on site and a new metering cabinet had to be installed. The engineer of record (EOR) did not incorporate Xcel Energy's requirements for a metering cabinet into the system design and this resulted in the need to replace the cabinet. An eight-week lead time for the new metering cabinet resulted in the metering cabinet being replaced in early January of 2016. This delay significantly impacted the idealized construction schedule of the Facility.

5 Project Benefits

Several Project benefits have been highlighted in this report. In summary, the Facility and Project will benefit Xcel Energy by offsetting the use of 1.25MW and 1.0 MW, respectively, of fossil fuel power generation and reducing the need for additional power generation infrastructure. The project will bring 2,195 MWh in year 1 of clean, renewable energy to the WWTP in Shakopee. The construction of the Facility resulted in as many as

50 jobs at any one time working on a variety of tasks. The Project will also add to the tax base by utilizing the state sales tax rate of 6.875% for energy produced in 2016. Other benefits are described in Section 5 of this report.

As stated above, only the 1 MW Project of the 1.25MW Facility is covered by the state grant monies which equates to 1,720,000 kWh of energy in the first year of operation. Power from the 1MW Project is estimated to offset an average of 1,690 metric tons of carbon dioxide emissions each year[7]. Furthermore, the EPA estimates that the annual amount of carbon dioxide emissions avoided as a result of the 1MW Project is equivalent to removing 255 passenger vehicles from the road for one year or almost 3 million miles driven by a single automobile[8]. The 1,720,000 kWh of clean, solar energy is also estimated to prevent the annual release of over 56 pounds of N20 and 90 pounds of Methane[9]. Taking into consideration the entire energy produced by the 1.25MW Facility, the annual estimated emission reductions total over 2,100 metric tons of carbon dioxide, 70 pounds of N2O and 113 pounds of Methane[10].

The Facility will provide approximately 10% of the WWTP annual energy needs, reducing its normal demand from Xcel Energy's local grid. The energy savings will be passed on to approximately 300,000 residents and businesses who pay the cost of wastewater treatment throughout the metro area[11].

In accordance with the 2016 Energy Information Association (EIA) study, the global average levelized cost of electricity (LCOE) for Solar PV technology, as is utilized at the Project, is more than 50% cheaper than other renewable energy alternatives, such as Solar Thermal or Off shore Wind facilities[12].

6 Project Usefulness

The deployment of on-peak distributed generation is useful for utility resource and infrastructure planning. Operating on-site, distributed generation that provides the bulk of its output during on-peak times mitigates the need to upgrade generation, distribution or transmission facilities in Xcel Energy's network.

The Project will produce the vast majority of its energy during on-peak times which will lessen Xcel Energy's need to invest in additional generating capacity or upgrade transmission and distribution lines serving this area due to the fact that the Facility will bring 2,195 MWh in year 1 of clean, renewable energy to the WWTP. This is demonstrated

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[7] US EPA, 2012. eGrid2012 GHG Annual Output Emission Rates. [website accessed 9/6/2016] https://www.epa.gov/sites/production/files/2015-10/documents/egrid2012_ghgoutputrates_0.pdf.

[8] Energy Information Association, 2016. Greenhouse Gas Equivalences Calculator. [website accessed 9/5/2016], https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

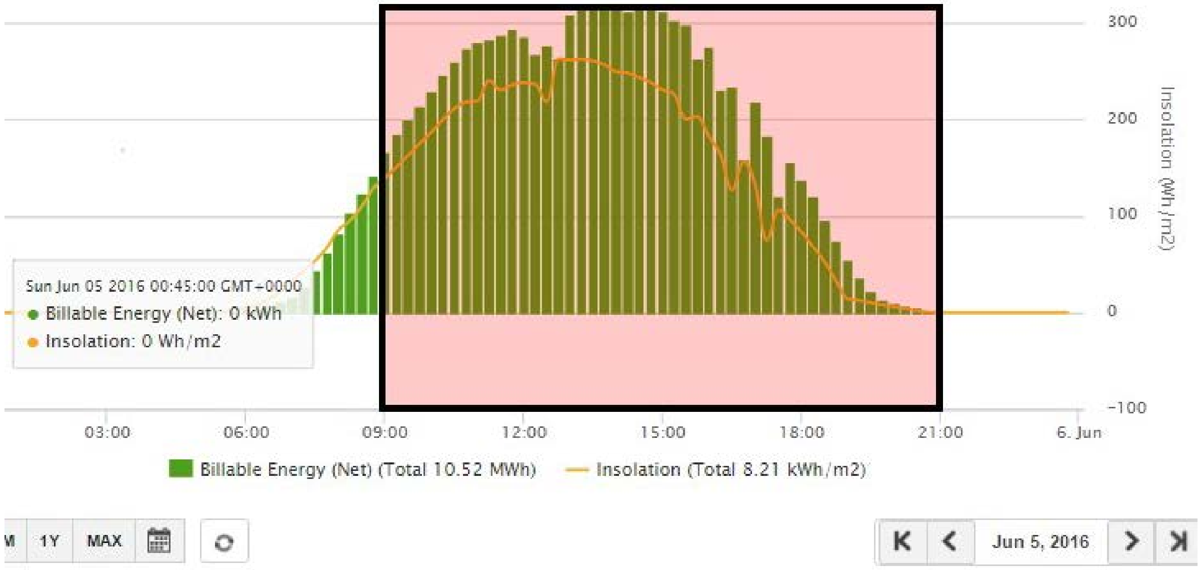
[9] US EPA, 2012. eGrid2012 GHG Annual Output Emission Rates. [website accessed 9/6/2016] https://www.epa.gov/sites/production/files/2015-10/documents/egrid2012_ghgoutputrates_0.pdf.

[10] Ibid

[11] Metropolitan Council, 2015. Celebrating the Benefits of Solar Energy. [website accessed 9/5/2016], http://www.metrocouncil.org/News-Events/Wastewater-Water/Newsletters/Celebrating-the-benefits-of-solar-energy.aspx.

[12] US Energy Information Administration. 2016. Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2016. [website accessed 9/5/2016], https://www.eia.gov/forecasts/aeo/pdf/electricity_generation.pdf.

in the below figure which shows the actual Facility production curve for a representative day (June 5, 2016) overlaying Xcel Energy's peak rate period throughout the year for Minnesota[13] (9am – 9pm; representative by the area in the highlighted box). As is evident from this figure, the vast amount of the Project's energy is generated and delivered to the grid within Xcel Energy's peak rate window for the service area.



Actual Project energy production curve for a representative day (June 5, 2016) illustrating the majority of energy is produced and delivered within Xcel Energy's peak rate window for the Minnesota service area (9am – 9pm). Xcel Energy's peak rate window is represented by the highlighted box.

Another example of the Project's usefulness is that the land that the Facility is located on was formally a dumping site for debris from the construction of the Blue Lake WWTP. This land is adjacent to the Blue Lake WWTP and serves as a buffer zone between the WWTP and surrounding area. This land likely would go under-utilized if the Facility was not constructed on it.

The Project utilized a dual feed system to independently serve loads within the plant, enabling the Council to retain electrical redundancy from Xcel Energy as well as optimize the Project's solar generation with its existing loads. The Project, by utilizing solar energy technology to offset power consumption loads at critical infrastructure facilities, will likely serve as a model for future industrial facilities looking for creative strategies to reduce their reliance on carbon based fuels.

[13] Xcel Energy 2012. Time-of-Day Service Rates and Availability. [website accessed 9/5/2016]. https://www.xcelenergy.com/staticfiles/xe/Marketing/Managed%20Documents/Res-Time-of-Day-Info-Sheet.pdf.

7 Power Production

As detailed in the IE Report[14], the entire 1.25MW Facility is expected to produce 2,195,000 kWh of energy while the 1MW Project covered by the Grant is projected to generate 1,720,000 kWh of energy in the first year of operation. As stated above, the power produced by the 1MW Project will offset 1,690 metric tons of carbon dioxide emissions each year[15].

The Actual generation of the Facility from March 1 to July 31, 2016 averaged 94% of the projected energy generation in the above table. Energy generation from the Facility can be viewed by the public at http://www.metrocouncil.org/Wastewater-Water/Projects/Energy-Conservation-Renewable-Energy.aspx.

8 Budget

RDF Grant Cost Tracker	Amount Reedemable	Actual Costs	RDF Grant Budget
Salaries & Wages	**$ 305,159.00**	$ 521,527.12	$ 544,557.00
Equipment	**$ 1,028,264.00**	$ 1,437,901.38	$ 1,834,942.00
Consultants/Sub Contracts	**$ 341,301.00**	$ 335,965.84	$ 609,053.00
Construction Materials	**$ 296,481.00**	$ 302,163.13	$ 529,072.00
Other Direct Costs	**$ 15,779.00**	$ 23,442.58	$ 28,158.00
Indirect Costs	**$ 13,016.00**	$ 52,736.13	$ 23,228.00
Totals	$ 2,000,000.00	$ 2,673,736.18	$ 3,569,010.00
System Size (per RDF Redeemable Grant):	1000kW System Size	$ 2,138.99	$ 2,855.21

Budget comparison between Actual Costs and RDF Grant Budget

As indicated in the above table, the Project finished under budget as compared to the original budget proposed to the RDF Grant committee. The majority of the savings can be attributed to the decreasing costs of solar equipment needed for construction. Many significant pieces of equipment such as inverters, disconnects, panel boards, and wiring decreased in cost since the grant budget was proposed. Another cost savings was achieved by utilizing Mortenson Construction. Mortenson Construction was able to provide a majority of the services on site which resulted in a cost savings due to a decreased usage of subcontractors.

[14] DNV GL 2016. CONFIDENTIAL REPORT. Metropolitan Council-Enfinity-Shakopee (MN-14-00001). Design Inspection, and Energy Prediction Report, SunEdison, 3/03/2016, Final Issue B.
[15] US EPA, 2012. eGrid2012 GHG Annual Output Emission Rates. [website accessed 9/6/2016] https://www.epa.gov/sites/production/files/2015-10/documents/egrid2012_ghgoutputrates_0.pdf.

9 Conclusion

The Project was successful in meeting the specific project objectives in addition to being completed under budget and ahead of schedule. The Project will provide approximately 10% of the WWTP's annual power usage. This will benefit Xcel Energy by offsetting the use of fossil fuel power generation and reducing the need for additional power generation infrastructure. Xcel Energy ratepayers will benefit by realizing savings due to decreased operating costs of Xcel Energy. The construction of the Project provided an opportunity to utilize local contractors which in turn received valuable training that these individuals may draw on later in their career. The land on which the Project was built was previously used as a dump site for construction debris and prior to construction, the land was not being utilized. Not only is this land now being used, but the proximity of the Facility to Highway 101 enables thousands of people each day can see how solar power can be a viable option in Minnesota. The Project will serve as a flagship project demonstrating the shared benefits of solar development when utilities and municipalities work together.