COMMUNITY ASSISTANTSHIP PROGRAM

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The Solar Coaster: Putting Solar on Schools in Northern Minnesota Means More Than Energy

Prepared in partnership with
The Region Five Development Commission and supported by the University of Minnesota Extension Central Regional Sustainable Development Partnership.

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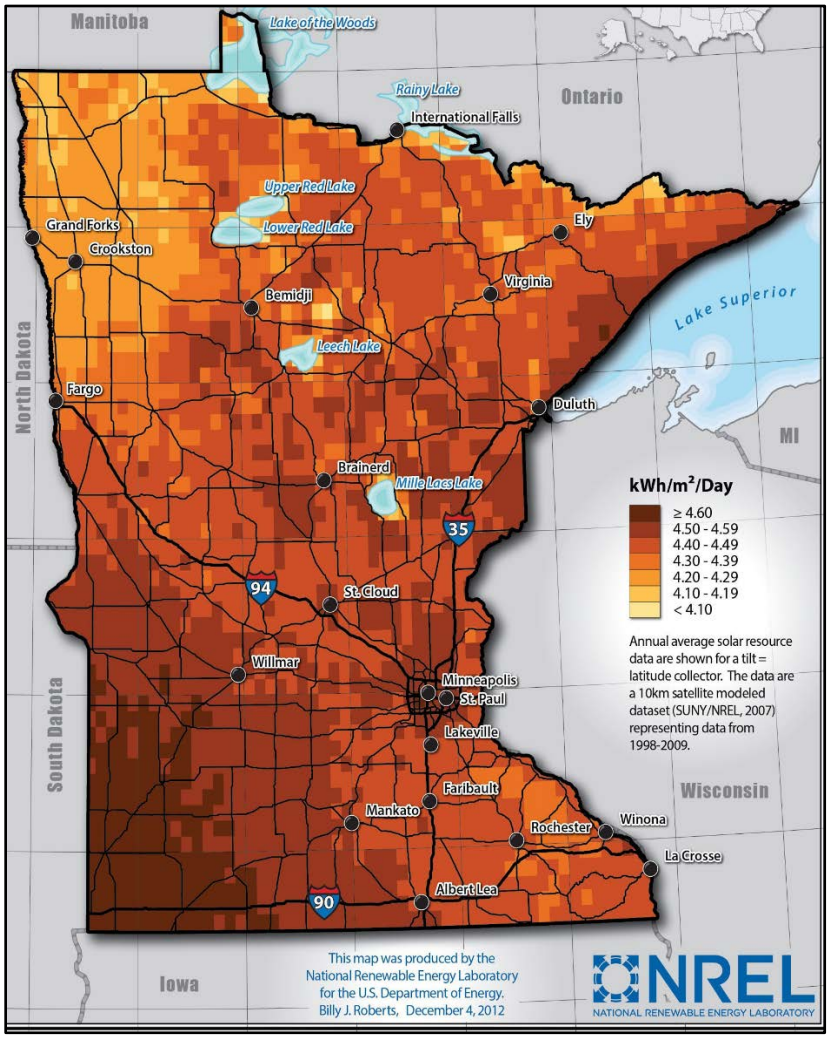
Executive Summary

In 2013, the Region Five Development Commission applied for a grant from Xcel Energy to help fund solar photovoltaic installations on schools within its five-county territory in northern Minnesota. The intent was to help the schools around the Brainerd-region save money on their electric bills, perform job training for a local Native American tribal college, and create STEM curriculums for the host schools.

Xcel Energy offered the opportunity to Region Five enter into a grant agreement in December 2015, after two years of waiting. From the onset of the project, Region Five faced numerous challenges with project ownership, financing, and interconnection rules, along with capacity building and partner education.

This paper takes a look at how Region Five and its partners responded to these challenges, and what policy and project opportunities they found could better promote similar projects in the state of Minnesota.



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- Cheryal Hills, Region Five Development Commission
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- Paul Helstrom, Minnesota Power
- Andrea Lauer, Mayor of Royalton, MN
- Tom Lillehei, Mayor of Breezy Point, MN
- Sheldon Monson, Wadena County Commissioner

The Region Five Development Commission is one of several regional development commissions (RDC) in the state of Minnesota. The purpose of a RDC is "to ensure the orderly and harmonious coordination of state, federal and local comprehensive planning and development programs for the solution of economic, social, physical and governmental problems of the state and its citizens…". RDCs provide a variety of technical assistance services to the local units of government based on the individual needs of their region. They partner with numerous state and federal agencies, obtaining and administering grants for programs and projects at the local level, and are recognized for their fiscal responsibility and capabilities in professional program management. Visit regionfive.org for more information.

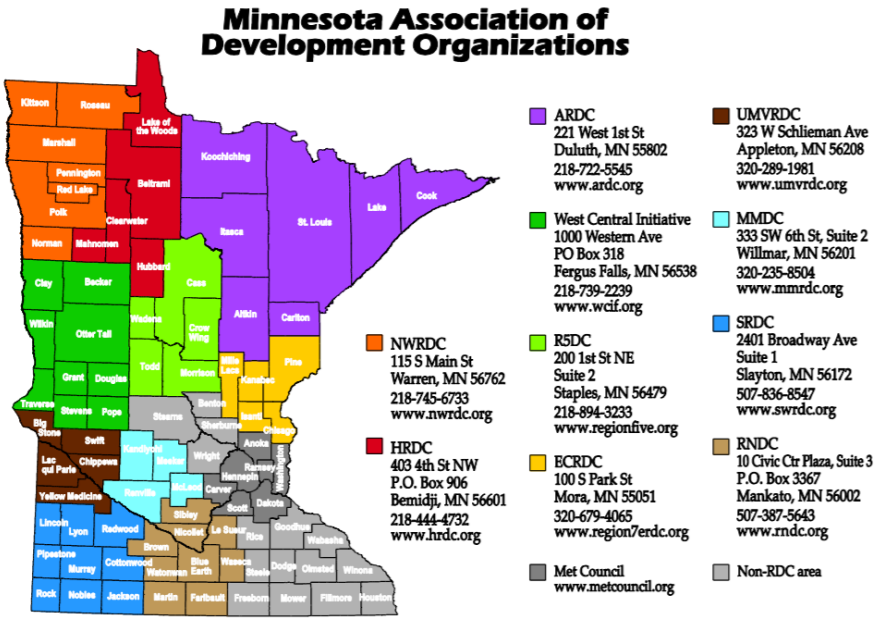
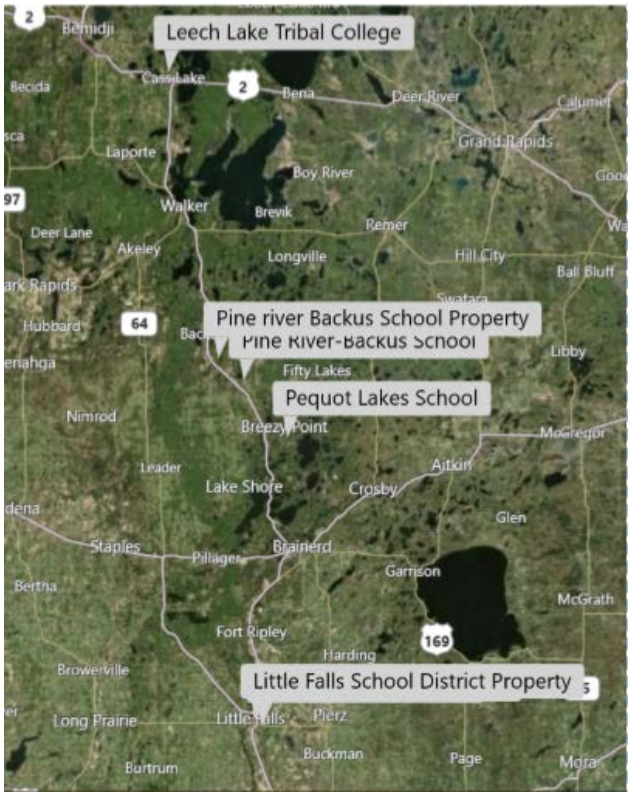


Table 1: Solar Schools Projects, Solar Capacity (*kilowatts*), Location	
Leech Lake Tribal College	*39.36* Cass Lake
Pequot Lakes High School	*371.46* Pequot Lakes
Little Falls High School	*596.14* Little Falls
Little Falls Middle School	*110.7* Little Falls
Little Falls Lindberg Elementary School	*34.85* Little Falls
Little Falls Lincoln Elementary School	*86.1* Little Falls
Pine River-Backus School Properties	*254.2* Backus



Introduction

"We're the top of the pyramid," the investor said. "I don't think you understand."

Cheryal Hills, executive director of the Region Five Development Commission, dropped the cell phone from her ear and stared at its screen.

How could these investors and project partners insist they're the "top of the pyramid"? How, three years after the initial grant was applied, could the solar panels still be so far from installation on the schools? How is solar energy so complicated?

The stakes of the **Solar Schools Project** were high. Schools were expecting the energy savings and new educational materials from the project. Both Region Five and the project's construction manager, the Rural Renewable Energy Alliance (RREAL), depended on project cash flow to satisfy interim loans buoying the Solar School project.

At the outset in 2013, the Solar Schools Project was meant to be innovative, a way to simplify the process of getting solar on schools. Using grant money from Xcel Energy's Renewable

Development Fund, Region Five and the Rural Renewable Energy Alliance (RREAL) would develop 1.493 megawatts of solar on several school buildings, with distributed energy storage at several project sites (listed in Table 1).

The added benefits of the project were apparent. Region Five and RREAL's capacity for planning and developing projects would offer opportunities for future projects to be scalable and replicable, more so than if these projects were individually procured. Building on local expertise from RREAL, the project would grow the capacity of local workforce from the Leech Lake Tribal College. Using Minnesota-made panels and Minnesota labor and finance, it would be a model for other schools and projects in the state to expand built, financial and individual assets within the growing renewable energy industry.

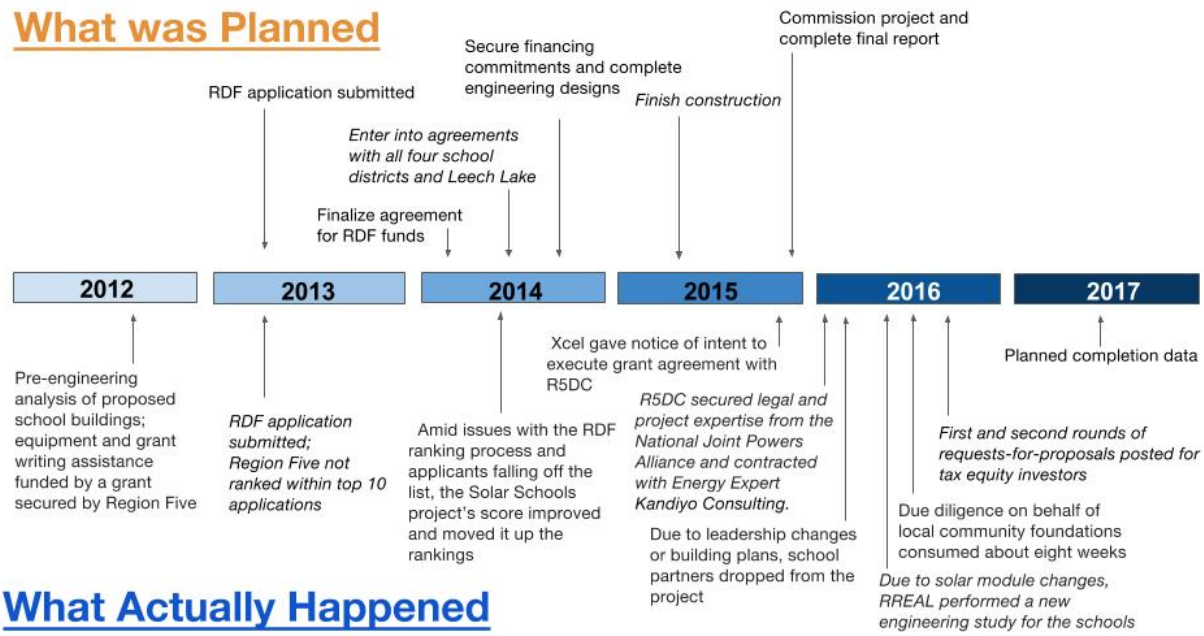
Yet the process has been difficult. Schools dropped out. Contract requirements constrained progress. Potential investors proved incompatible. The report that follows is an attempt to catalogue the outdated rules, complex partner education and relationship building, and other project obligations such as financing and zoning, that went into the Solar Schools Project. The hope is that other schools, nonprofits, and governmental organizations can learn from Region Five's experience and their workaround solutions.

After interviewing project partners and studying reports and project materials, five main **Barriers and Opportunities** (Table 2) were listed, and will be examined in further detail in correspondingly named sections in this report. Figure 1 (below Table 2) shows the **Timeline of the Solar Schools Project**, both as it was *Planned* and in *Reality*.

Table 2: Five Barriers and Opportunities for the Solar Schools Project

Barriers	Opportunities
Xcel Energy's Renewable Development Fund helped fund this and many other renewable energy projects in Minnesota. However, the grant due diligence process and the RDF's standard grant contract was too rigid for the process of project development.	Contract changes and project developments were possible, but a more-streamlined and open RDF process could allow easier project development process for projects in and outside of Xcel Energy territory. Suggestions are included in the report on **page 13**.
Educating project partners was more necessary than expected. School superintendents came and went, and other community partners were skeptical of solar technology that was unproven in their eyes.	Region Five helped school and community partners understand the risks and rewards of this project. Communication and trust were key. Suggestions to improve the partner education process are included in the report on **page 15**.
Building local capacity for energy projects was misunderstood at the outset. Checking insurance, knowing the physical limits of the installation, and generally doing due diligence didn't forecast some of the requirements of the project.	Region Five now understands that precautions have to be taken with every project, including forecasting conservative timelines, doing due diligence on engineering, and being open to changes along the way. Suggestions are included on **page 16**.
Financing economic development: Tax equity investors drove the ship, demanding which construction firms to use, and changes in the scale and intent of the project. What constituted economic development, and for whom, was not easily answered.	Region Five became more open about the wants and needs of project participants to financiers, reaching out to more local financiers in the process. Suggestions for financing solar are included on **page 19**.
Minnesota's energy rules don't entirely reflect the rise of distributed generation in Minnesota and don't allow easy renewable energy growth.	Region Five shifted project specs based on utility interconnection parameters, third-party ownership rules, and physical treatment of energy. Future policy change recommendations are included on **page 21**.

Figure 1: Planned vs. Real Timelines of the Solar Schools Project



First: The Case for Putting Solar on Schools

Solar energy means renewable energy, but also -- if you're in the right location, with the right project set-up -- energy savings and a more predictable electric bill

Region Five wasn't the first entity to recognize the potential of putting solar on schools, even in Minnesota. In 2010, the Minnesota legislature looked at the feasibility third-party owned solar with schools in the state (Office of Energy Security, 2010). The primary advantage to allowing third-party owned solar, as opposed to the schools directly owning solar, was the third party's ability to use substantial federal tax credits to offset the initial investment. Building off case studies, the report concluded if electricity prices were to rise, and if solar costs were to fall, "[d]eploying statewide third party financed PV [solar photovoltaic] installations at schools could be a job creation mechanism spurring a market not only for PV, but also for energy audits and energy efficiency that could be bundled as part of PV projects."

In 2011, the Minnesota Renewable Energy Society released a step-by-step guide to putting solar on schools. Including case studies of schools around the state as well as examples of educational curricula, the study lays out the possibilities and realities for many schools that have installed solar and the additional co-benefits that are possible.

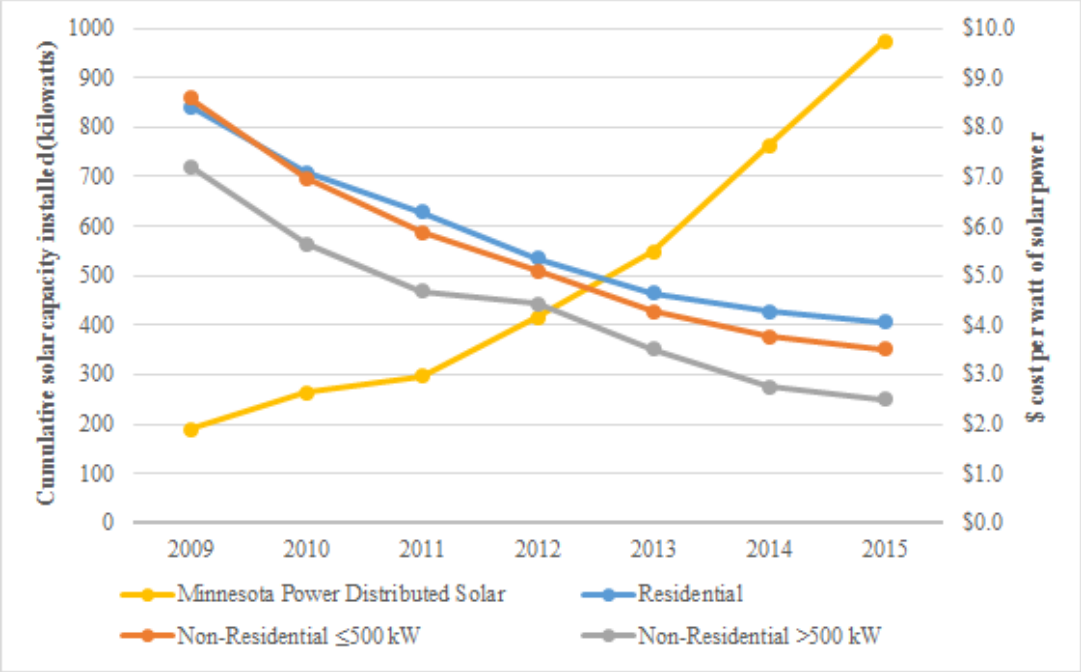
In 2012, another study found that Minnesota schools had enough roof space to supply 30 percent of their energy needs from solar (Mills and Farrell, 2012). The study highlighted solar-on-school

benefits that included saving money on the electric bill, saving taxpayer money, and promoting economic development through clean energy jobs. One of the policy suggestions from the study, the Solar Energy Standard, was adopted by Minnesota in 2013, compelling investor-owned utilities in Minnesota to derive 1.5 percent of their energy sales from solar by 2020 and setting a target goal of 10 percent solar (Eleff, 2013).

Solar's potential on schools across the nation has been studied heavily. Two years ago, the Solar Foundation surveyed the nation for schools that had put solar on their roofs or schoolgrounds. They found 3,752 such schools, with 72,000 more that could cost-effectively install solar on their rooftops. The main challenges they found included: financing, procurement, community and school board engagement, and regulatory requirements.

In northern Minnesota, the solar market remains nascent, despite the cost of residential solar (at a median size of about six kilowatts) nationwide dropping more than 50 percent over the past six years (Barbose and Dargouth, 2016). With 1.453 megawatts of new solar capacity in Minnesota Power territory, the Solar Schools Project would more than double the close-to-one megawatt of solar capacity present in the region (Figure 2). The project coincides with Minnesota Power's request for proposals for one to 300 megawatts of new solar in their territory, which would make for a more than tenfold increase of solar in the region (Minnesota Power, 2016).

Figure 2: Cumulative Installed Solar in Minnesota Power Territory vs. Falling Median Costs of Residential and Non-residential Solar, Nationally (Source: Data from Minnesota Public Utilities Commission dockets and Lawrence Berkeley National Laboratory).



Amid falling costs and increasing renewable energy supplies, the Solar Schools Project comes during a time of change for energy in northern Minnesota. The barriers and opportunities the project has found so far are detailed below.

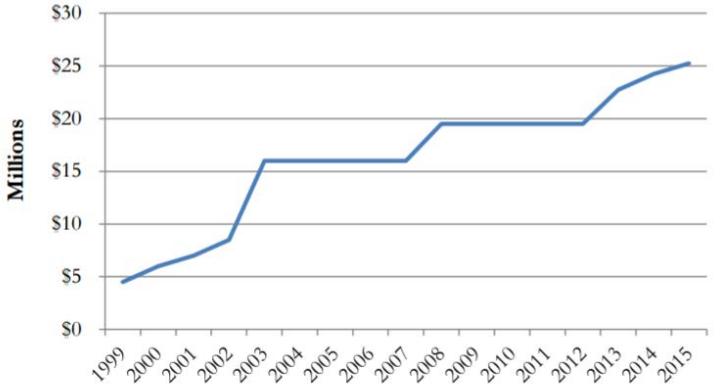
Section 1: Xcel Energy's Renewable Development Fund

The Solar Schools Project began with an application in 2013 to its primary funding source, the Renewable Development Fund, managed by Xcel Energy. The fund's history starts in the late 1980s, when Northern States Power Company had nowhere to put its nuclear waste (Minnesota Legislative Reference Library, 2016). With Yucca Mountain still under study as a national waste repository site, the power company (later known as Xcel Energy, after a merger in 1999) petitioned the Minnesota Public Utilities Commission to relicense its plants and allow it to store more waste onsite at the Prairie Island Nuclear Generating Station on Prairie Island, located on the Mississippi River, next to the Prairie Island Indian Community.

The 1994 state legislation and ensuing legislation granted the power company its request, but added conditions of the state's own. For every dry cask of nuclear waste held onsite, the company must contribute $500,000 toward an account for the research and deployment of renewable energy within the state. Nuclear waste storage also compelled the Minnesota legislature to order Xcel Energy to meet a wind energy standard and, eventually, a more stringent renewable energy standard than other electric utilities in the state.

Since its inception in 1998, the Renewable Development Fund (RDF) has set aside $271 million, cumulatively (Figure 3). The amount has trended up as nuclear waste stored onsite increased at Prairie Island and, since 2007, Xcel Energy's Monticello Nuclear Generation Station. Xcel Energy recovers all charges that go into the RDF through a surcharge on their customer's monthly bills. For an average residential customer, that charge is about $0.68 per month.

Figure 3: Annual Funding Obligation to Renewable Development Fund (Source: Xcel Energy, 2016)



In April 2012, the Minnesota Legislature enacted a bill (S.F. 2181) to clarify the purpose of the RDF and create reporting requirements (North Carolina Clean Energy Technology Center, 2015). Funds in the RDF may only be used for the following purposes:

- To increase the market penetration of renewable electric energy resources in Minnesota at reasonable costs
- To promote the start-up, expansion, and attraction of renewable electric energy projects and companies within Minnesota
- To stimulate in-state research and development into renewable electric energy technologies
- To develop near-commercial and demonstration scale renewable electric projects or near-commercial and demonstration scale electric infrastructure delivery projects if those delivery projects enhance the delivery of renewable electric energy

Region Five submitted a proposal for funding in the fourth cycle of the RDF in 2013. After the application was received in March 2013, Region Five waited until Xcel's RDF advisory group scored the projects that summer. When the scores came back, it turned out Xcel Energy and its advisory board had made scoring errors on the initial applications (Xcel Energy, 2013). Subsequent changes in scoring moved up Region Five's project in ranking, but it wasn't enough to fund the project initially. Throughout 2014 and 2015, other projects dropped from the RDF's considerations.

In December 2015, Region Five was given notice by Xcel Energy of its intent to execute a grant agreement for RDF funds. Since 2013, however, some school partners had dropped off the list due to changing superintendents or school district experiences with solar developers (more about this in Section 2). The equipment specified in the original grant from tenKsolar in Bloomington was no longer being manufactured. Sites were shifting from grounds to roofs and even to offsite locations. In two-and-a-half years, from when the project was first organized, the solar industry in Minnesota and many other things had changed.

With Xcel Energy's notice of intent, Region Five still had to determine the project scope in context of the RDF standard grant contract terms. Some project changes, which would have to be signed off by Xcel Energy's advisory board, did not fit any standardized language or any of Xcel Energy's committed processes. Xcel's grant program generally fit the legislative intent of 2012 changes, but grant requirements did not reflect how quickly the renewable energy market was changing.

One particular clause of the RDF contract gave Xcel the right to any solar renewable energy credits, or SRECs, produced by the project. The interconnecting utilities for Region Five, Minnesota Power or Beltrami Electric Cooperative, would normally have the rights to buy the SRECs under projects within their territory.

To have Xcel Energy investing in energy facilities in Minnesota Power territory wasn't unprecedented, but "it's unusual," says Paul Helstrom, Renewable Energy Lead with Minnesota Power.

The fact that Minnesota Power couldn't negotiate for the solar renewable energy credits (SRECs) produced with each megawatt-hour of solar energy produced from its territory "was the biggest stumbling block for Minnesota Power," says Helstrom. "If we could've gotten a hold of those RECs, we probably would've helped finance that project. It might already be underway."

"**Third-party financing**" refers to a third-party owner (TPO) installs the solar system on the customer's property, pays for the upfront costs, and receives any tax benefits associated with the project. The customer hosts the solar system on their property and pays the TPO only for the electricity they use. Through the financing agreement – called a third-party Power Purchase Agreement (PPA) – the owner passes along part of the tax benefit savings to the customer. That way, both the owner and the customer benefit.

The grant agreement also does not contemplate third-party ownership. As tax-exempt entities, schools and Region Five lack the ability to directly access the benefits of federal tax credits and accelerated depreciation. A third-party ownership and finance model is often key to the economic viability of the project (more about this in Section 4). Region Five will have to ask Xcel to allow third-party ownership in the contract, a tough proposition for the company.

"Between the interests of [Xcel Energy] of protecting their ratepayers, the legislative intent of the RDF grant, and the financiers who wouldn't otherwise touch this project," says Michael Krause, financing the project was difficult.

While the Renewable Development Fund is not designed for money to simply be handed over to a private entity that was not part of the RDF process, says Dan Listug, market conditions are otherwise. In all, the current standard contracting process is overly cumbersome.

"I would suggest that a one-size-fits-all approach is not serving the policy goals of the program," says Listug.

Recommendations for the Renewable Development Fund:

- Xcel Energy and regulators should revisit its contract and contracting timeline for the Renewable Development Fund.
    - One suggestion is to have a post-award, pre-due diligence review and regular update meetings where the grantee can work with Xcel to make sure the contract and process fits the project.

- At the least, RDF standard contracts should be amended to include language allowing mixed- and third-party ownership, to allow for accommodations to a rapidly changing renewable energy market.
- For contracts executed for projects outside of Xcel Energy territory, renewable energy credit rights should be available for purchase by the new utility

Section 2: Partner Education

"Think logistically. You have to work through four or five school boards. The tribal college has a governing body. Region Five's got an elected body, you have to get all those entities to support the project, understand the project, and ultimately commit to doing the project... Translating the technical nature to a policymaker's perspective, that's a difficult challenge."

- Dan Listug, Phone Interview on November 1, 2016

At last count, Cheryal Hills estimated close to 30 different people had to review the project at some point. "I wish it could be closer to ten," she says.

But as the grant specified solar on school sites in two different utility territories, a gaggle of people was burdensome at times, if entirely necessary. It was also a boon, if partners were communicated to clearly and in a timely manner.

For example, early school partners dropped off from the project. One, having been solicited prior by a solar developer with an unscrupulous track record, decided they wanted nothing to do with the project. Another was in the process of changing out superintendents, and did not want the incoming personnel to deal with an uncertain, potentially hefty project. This district also had mostly older roofs that may not have been suitable for solar.

Andrea Lauer says she remembers an early meeting with the school districts. The schools were disappointed with Region Five's inability to give them hard numbers, as those would only come after commitments, financing, and final grant provisions became available. Trust in Region Five to be open about the risks and benefits were tremendous assets during the early stages of the project.

Most cities in this region have attorneys and engineers that deal with roads and sewers, some energy efficiency, but never solar energy. "Even understanding what the possibilities might be," says Lauer, "it's a learning curve."

Region Five realized early on its responsibility was to convene and shield its school partners from risk. An overarching theme here was aggregation of risk management and legal work. The schools aggregated their legal needs under one lawyer, and Region Five secured the services from Dan Listug with a regional partner; the National Joint Powers Alliance to simplifying the legal back-and-forth between partners and electric utilities. Having Region Five, a governmental entity, act as the single negotiator of the grant on behalf of the schools saved a lot of time and money for the school districts in having to get project partners trained in on what to know. And using Rural Renewable Energy Alliance to singly design and construct the projects meant an easier accounting of grant money.

One of the first pivots for the Solar Schools Project was the addition of the Leech Lake Tribal College as a partner in the project, replacing school partners that had dropped out. “It became an extremely advantageous opportunity to improve relationships with a very important partner in the region who we have not been able to previously interact with in a mutually beneficial manner,” says Hills.

“The most important thing is that schools or governments are interested,” says Dan Listug, “that they get the support and educate their board or commission or council very early on and keep them informed and let them know it’s a roller coaster type of a ride.”

Recommendations for Partner Education:

- Identify all stakeholders in the project
- Get in early and communicate the risks and benefits of the project, knowing that there will be ups and downs
- Be as open and transparent as possible
- Bring hard numbers, when you can

Section 3: Building Your Own Capacity

“It becomes a model,” says Andrea Lauer. “Having solar for schools across the five counties is one thing. When you think about the cooperative or collaborative efforts that have taken place so far, that’s huge.”

It doesn’t happen overnight. While Region Five had developed multi-million dollar projects, they had never developed an energy project before. The Rural Renewable Energy Alliance has installed hundreds of solar systems across the region and nation, but they had never built a scattered site project aggregated to this much capacity. The schools themselves had never supported solar energy on their own roofs or grounds.

“One of the goals of this grant is to build the region’s capacity,” says Michael Krause, “but that does mean it takes a little longer.”

Jason Edens of RREAL says things typically take twice as long as you expect them to. Such was the case of the Solar Schools Project, due to the fact that it was everybody’s first renewable energy dance. Edens gives attributes needed for this type of new-frontier project: “patience, persistence, tenacity, and gumption.”

RREAL, for instance, will have to ramp up its construction schedule in the spring, assuming that financing is in place. They have a fine line to hold: not hiring too many workers in the case the project doesn’t go through, but also hiring enough experienced workers to complete the Solar Schools Project in a timely manner, while still focusing on other jobs.

You have to be ready to pivot. Cheryal Hills says as the school partners dropped from 12 to eight, and one partner decided its roof space was lacking, they had to find room for more solar panels to fit the requirements of the RDF grant. They got creative: turning to RREAL’s building, they asked if, technically, RREAL could be considered a “school.” It turned out that as RREAL was performing education for private sector development.

“As a result of how much the utilities will pay for each kilowatt, we intend to put all of the energy on the schools themselves and not use RREALs offsite generation location,” says Hills, “but it this was this kind of creative thinking that is required to make a project possible.”

There are things the Region Five team wished they would’ve known at the beginning. For instance, Hills wishes they would’ve known how much load the schools’ roofs could support, or which schools would remain with them through the entire two years of uncertainty with the RDF grant.

Hills also wishes they would’ve known that the process to develop a project could be so lengthy. She had believed the grant agreement would be executed within six months and could not fathom why it should take longer. She now understands that the financing of rural solar projects is the biggest barrier. Had the Region Five team surmised the financing would be so difficult to secure, they would have started that solicitation process earlier.

Recommendations for Building Capacity:

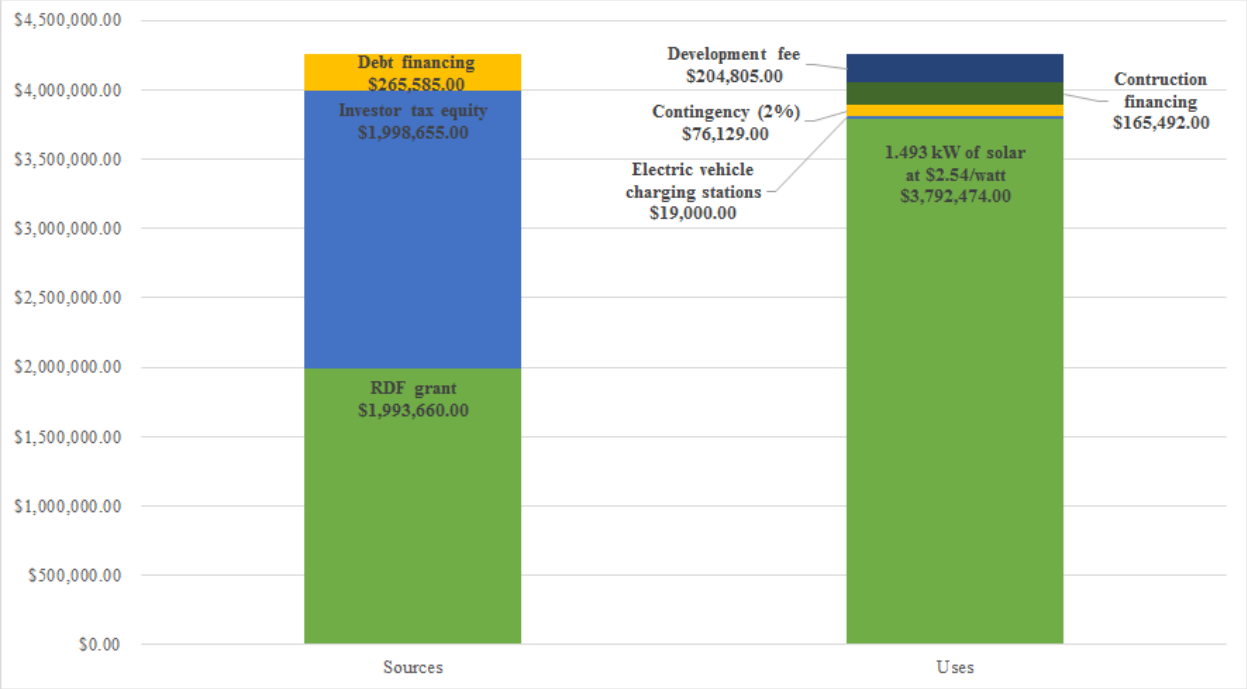
- Be ready for the process to take longer than expected
- Take advantages of pivot points as chances to get creative
- Understand that it is about learning as much as it is about actually producing solar energy

Section 4: Financing Your Economic Development

From the beginning, Region Five intended the solar projects to be owned by the schools. But before anything could be permitted or built, Region Five had to take advantage of the federal investment tax credits and accelerated depreciation for renewable energy, which represent up to 50 percent of the project's total costs and would mean significant potential energy savings to the school districts.

Region Five needed to find a tax equity investor who would agree to work through all the project needs, partners, and specifications. Once RDF grant funds were awarded in 2015, the project team worked toward a Request for Proposals for a tax equity investor to fund the project. Early results, based on a tax equity need of nearly $2 million (Figure 4), were not promising.

Figure 4: Solar Schools Project Funding Sources and Uses



"We got our quotes on financing," says Tom Lillehei, "but I think our approach, we missed the mark on direct contributors." Most early responses were basically from brokers, middlemen who coordinate investors.

The brokers made demands. One, described in the Introduction, said that he was "the top of the pyramid." Others demanded the project use developers other than RREAL, and solar arrays other than TenK's, both of which Region Five backed as trusted local partners and original partners in the RDF grant application. Another potential investor told Region Five that they were unwilling to participate if the Leech Lake Tribal College was involved in the project, because the tribal

members would not have the experience necessary to complete the solar installations and the sovereign status of tribal governments was a complication.

“This was a way for individuals to build skills on their resume in ways that they otherwise wouldn’t be able to,” says Hills. “It wasn’t a value we could compromise. So we asked them to keep their investment and we moved on.”

After sending out a second request-for-proposals in the fall of 2016, clarifying what they were looking for in an investor, Region Five began going directly to the investors themselves, some of whom were very willing to invest in a socially-minded project based on schools.

Jason Edens of RREAL says the grant requirements and funding needs of the project have left the development of the project constrained at times. Investors have balked at the cost estimate of $2.54 per watt of solar panel installed, expecting instead about $1.70 per watt, given the total capacity installed of the project. Edens says the additional cost can’t easily be conveyed on paper: each school has a separate electrical subsystem, so economies-of-scale for solar don’t exist as well for these distributed, aggregated projects.

RREAL, as the engineering and construction partner in the project, is expected to give a guarantee on the energy produced from the panels. RREAL’s production guarantee is directly tied to the dependability of TenK products, and is a statutory requirement needed to exempt the project from competitive bidding requirements. That the solar inverters are part of the TenK package but not manufactured by TenK, and the panels are currently being considered for the Bloomberg Tier rating system but have not secured the Tier One classification, gave additional concern from investors and schools.

Tax equity itself offers a discount on solar, but does come with its own hang-ups. Tax equity from investment tax credits and depreciation, can only be used to offset taxes on passive income earned from investments. This tax rule tends to favor really big projects and really big investors. The Solar Schools Project exists in a sort of between-grounds for most renewable energy tax equity investors, of which it’s estimated that there are less than 30 in the United States today (Massachusetts DOER, 2013). “Most of the finance groups want to work with a minimum of $10 million and up,” says Michael Krause. “Their costs add up. It’s not cost effective for them.”

“It’s too big for local regional banks,” says Sheldon Monson, “too small for large investors.”

In the end, the Solar Schools Project will have to monetize the tax benefits, satisfy investors’ needs for return on investment, give the schools a 10 to 15 percent discount from the retail electricity rate on their solar electricity, and fulfill the conditions of the RDF grant. The project’s ownership form is still undetermined.

As the project will require a third party tax equity investor, it may end up needing a power purchase agreement or a tax equity partnership flip, where ownership of the solar projects is donated to the schools after depreciation and the investment tax credits have been exhausted. These sorts of investment mechanisms can confuse many schools without the technical and financial expertise, especially in Minnesota, where third-party energy project ownership rules remain nebulous and investors have yet to find a thriving solar market.

“It’s like Bob Dylan said,” says Krause. “Money doesn’t talk. It swears.”

Still, as explored in Section 5, there are projects similar to the Solar Schools Project coming together all over the state.

Recommendations for Project Finance:

- If the host is a nontaxable entity, take advantage of tax credits with third-party tax equity investment. But know that tax equity investors come with some costs
- Be clear to project stakeholders and in request-for-proposals about financing requirements and project goals from the beginning
- Project and funding size will affect what financing is available; plan accordingly
- Requests-for-proposals should include the project's guiding principles and should be directed to investors
    - The Interstate Renewable Energy Council, cited in this report’s bibliography, has a helpful guide on making power purchase agreements for public buildings
- If there are legal gray areas, push for clarity from relevant parties before diving in

Section 5: Minnesota’s Changing Energy Rules

“It’s not too complicated to hook up a solar array and to interface it with the grid,” says Tom Lillehei, an electrical engineer, retired from Xcel Energy. “It’s all the things that happen behind the scenes that make it so difficult. Furthermore, because of the financing, because of all the parties were dealing with… that’s not a technical thing, that’s a Cheryal-thing [Cheryal Hills being the administrative and political point person].”

Solar energy is getting cheaper, the laws are changing, but just maybe not fast enough to keep up with the growing, morphing markets. The Solar Schools Project touches on a few of these: namely, **third-party financing**, **interconnection standards**, and **net metering**.

While **third-party financing** is legally feasible, in Minnesota a lack of clarity to date has limited third-party owned and financed projects in the state (Environmental Law and Policy Center, 2015). It does appear, in addition, that schools around the state have signed power purchase

agreements with third-party providers, approaching them on a case-by-case basis, or even signing contracts with community solar garden developers within Xcel Energy territory as an alternative to onsite solar systems (Adler, 2015).

For utilities such as Minnesota Power, the analysis of third-party ownership tends to lead down a slippery slope: if a solar developer or Xcel Energy started selling energy to all of their customers, the utility would earn less revenue, and costs would shift onto remaining customers.

Fortunately, Minnesota Power was creative and helpful in handling the third-party ownership of the project, says Cheryal Hills. As long as the agreement exists behind-the-meter -- that is, as long as the power purchase agreement occurs only with electricity used on the property and not exported out to Minnesota Power's grid -- then the interconnection agreement can be passed with the school. "It really will be of benefit to other future projects," says Hills. "It solidifies the importance of good relationships… good relationships are vital."

Minnesota's **interconnection standards** haven't been updated since 2004. Interconnection standards outline the procedures of connecting to the grid. They place a limit on system capacity, establish technical fees, screening procedures, and grant a standard agreement form that is used between the utility and the customer. Once financing is secured for the Solar Schools project, it will affect its interconnection to Beltrami Electric Cooperative's and Minnesota Power's grids. These standards are currently being discussed at the Minnesota Public Utilities Commission.

"**Avoided costs**" are the marginal costs borne by a utility to produce a kilowatt-hour (kWh) of electricity for a customer. This cost is typically 3-4 cents per kWh which is a fraction (more than half) of the total kWh retail rate.

"**Net metering**" refers to power that is fed back to the electrical grid above and beyond what is being used on site. State law requires utilities to buy back this energy at full retail rates, but only for systems up to 40 kW of capacity.

Net metering rules currently limit projects that receive retail rates (8 to 9 cents per kilowatt-hour of energy) to 40 kilowatts in size. The Minnesota Legislature raised the cap on net metering to 1,000 kilowatts in 2013, but allowed utilities to recover costs for maintaining their system, thereby lowering the reimbursement rate. The particulars of the state's net metering policy are still being debated before the Minnesota Public Utilities Commission.

The large installations of the Solar Schools Project need net metering rates to operate financially and offer the schools a discount on their electricity; yet, Minnesota Power cannot easily go against state rules limiting net metered projects to 40 kilowatts. As of the writinsg of this piece, Minnesota Power and Region Five were still hashing out ways for the project to receive a rate for

excess energy above 40 kilowatts that is used onsite, above the avoided cost for the utility, about three to four cents per kilowatt-hour, close to half of net metering rates.

“Utilities have a central role in energy, reliability, security, delivering the lifestyle and comforts,” says Helstrom. “More and more, these distributed sources will play a role in the overall societal needs. Exactly what that looks like is unclear.”

Utilities just can’t accept all solar electricity at their net metered, or retail, rates. It’s almost like walking into Target and demanding they pay five dollars for the same pair of socks that they’re selling for five dollars. The economics don’t pan out.

Yet from the Solar Schools standpoint, there are values here that aren’t reflected in net metered rates or avoided costs. According to solar energy advocates, distributed solar energy also has system benefits for the utility, reducing costly peak electricity demand and the costs to operate and maintain the electrical grid.

“We have to figure out how it all works together,” says Helstrom.

Recommendations for Energy Rules:

- Building off the 2010 legislative report on allowing third-party financed solar on schools, the Minnesota legislature should commission a follow-up report to ascertain the benefits and drawbacks of third-party owned solar
- The legislature and utilities commission should inspect and update interconnection and net metering rules that might be updated to better reflect the value of distributed energy projects

The Upshot

The Solar Schools project is meant to be a model for other Regional Development Commissions, schools, nonprofits, and other governmental entities to install solar on their buildings. Yet to be installed, the project will provide even more lessons from project partners and stakeholders that will be elaborated upon as solar energy proliferates in the region and in Minnesota.

The benefits of the project go beyond energy and electricity bill savings. Paul Helstrom, Renewable Energy Lead for Minnesota Power, was excited about the educational opportunities of the project. “I spoke to two 6th grade classes [at another school with solar],” he says, “and taught them the word photovoltaic. We talked about photons and energy and we went out and looked at their solar panels and showed them how the solar cell works. We looked at all the little wires on the solar cell and how it all gets routed to the inverter. We watched as a cloud passed

and the inverter showed us how much energy jumped up... just really solid tangible learning about how the sun is producing energy. It will pay dividends on the back end."

The project serves as a springboard for future opportunities in energy, particularly with schools. "That's one of our roles is to facilitate opportunities that otherwise would not happen without our involvement," says Cheryal Hills.

The process has undoubtedly been complicated. "If it was one location," says Tom Lillehei, "if it was one interfacing utility, it would've been easier. It's multiple school districts, multiple utilities, multiple design standards… The administration becomes a nightmare.

"But the benefit is tremendous," says Lillehei

Andrea Lauer, longtime mayor of Royalton, agrees.

"If you don't try, you're never going to get it done."

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