414 Nicollet Mall
Minneapolis, MN 55401

December 12, 2013

—Via Electronic Filing—

Burl W. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101

RE: REPLY COMMENTS
RENEWABLE DEVELOPMENT FUND – CYCLE 4 SELECTION REPORT
DOCKET NO. E002/M-12-1278

Dear Dr. Haar:

Northern States Power Company, doing business as Xcel Energy, submits these Reply Comments in the above-referenced matter. These Reply Comments are in response to the September 27, 2013 Comments of the Minnesota Department of Commerce, Division of Energy Resources and other comments submitted after August 13, 2013, by various stakeholders.

We have electronically filed this document, and served copies on the parties on the attached service lists.

If you have any questions regarding this filing please contact me at (612) 330-7529 or paul.lehman@xcelenergy.com.

Sincerely,

/s/

PAUL J LEHMAN
MANAGER, REGULATORY COMPLIANCE AND FILINGS

Enclosures
c: Service List
Applicants

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

Beverly Jones Heydinger	Chair
David C. Boyd	Commissioner
Nancy Lange	Commissioner
J. Dennis O'Brien	Commissioner
Betsy Wergin	Commissioner

IN THE MATTER OF A REQUEST BY XCEL ENERGY TO ISSUE RENEWABLE DEVELOPMENT FUND CYCLE 4 REQUEST FOR PROPOSALS AND PETITION FOR APPROVAL OF A STANDARD GRANT CONTRACT	DOCKET NO. E002/M-12-1278 **REPLY COMMENTS**

OVERVIEW

Northern States Power Company, doing business as Xcel Energy, submits these Reply Comments regarding our Renewable Development Fund Cycle 4 selection report. In this Reply we respond to the September 27, 2013 Comments of the Minnesota Department of Commerce, Division of Energy Resources and other comments submitted after August 13, 2013 by various stakeholders.

The comments of stakeholders are generally related to two topics – the qualitative analysis conducted by Xcel Energy and the RDF advisory group in selecting projects for funding, and the scoring discrepancies that were identified during the review of our selection report. The Company believes the recommended projects were reviewed, selected, and presented to the Commission consistent with requirements of Commission order, the procedures identified in our RDF Request for Proposals, and the Minnesota RDF statute. While we acknowledge there were some scoring errors in the original selection report, these errors have not altered the original recommendations of the RDF advisory group or our funding recommendations. We understand different stakeholders have varied opinions on specific projects. For this reason, we relied upon the recommendations of the independent evaluator Sargent & Lundy and the RDF advisory group in making informed selection recommendations.

Xcel Energy and the RDF advisory group have worked to ensure that the projects selected are of high value and benefit Xcel Energy electric customers, who provide the sole support for the fund, and the State of Minnesota. We continue to support the

recommendations the RDF advisory group and request Commission approval of the projects selected for funding and the reserve list presented in our RDF Cycle 4 selection report.

In addition to responding to comments of the stakeholders and presenting information about the Cycle 4 scoring and selection process, we first provide some background information as context for this discussion. We also note that throughout this document we have incorporated previous comments from various stakeholders to provide a more comprehensive document intended to facilitate the Commission's review of matters in this docket. Our Reply is presented in the following sections:

- *Background,* providing the development of objectives and regulations that impact the scope and characteristics of Cycle 4.
- *Selection Process,* discussing the methodology used to review projects and arrive at grant award recommendations.
- *Overall Process,* responding to comments regarding the RDF process.

REPLY

A. Background

1. Legislative Guidance

The RDF Statute provides the core guidance from the Minnesota Legislature with respect to the types of projects that may be funded as well as how the Company must select such projects to recommend to the Commission for funding. The RDF Statute provides the Company considerable discretion regarding project selection and vests full authority with the Commission for approval of the expenditure of RDF funds. Historically, the RDF Statute has provided broad guidance requiring that RDF funds be used "for development of renewable energy sources" and that "[p]reference must be given to development of renewable energy source projects located within the state." As discussed in the Company's previous filings in this proceeding, the RDF Statute was amended in 2012 and now provides more specific guidance with respect to the preferences for expenditure of RDF funds, purposes for expenditure of the funds, and the process for selection of projects to receive funding.

The RDF Statute authorizes expenditure of RDF funds for the following purposes:

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

(2) to promote the start-up, expansion, and attraction of renewable electric energy projects and companies within the state;
(3) to stimulate research and development within the state into renewable energy technologies; and
(4) 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.

These approved funding categories only identify the potential types of projects that may be funded. The RDF Statute does not direct that projects that meet these criteria must be funded. Instead, the RDF Statute provides further guidance with respect to project selection.

First, the RDF Statute requires that in "the process of determining [RFP] scope and subject and in evaluating responses to [RFPs, Xcel Energy] must strongly consider, where reasonable, potential benefit to Minnesota citizens and businesses and [Xcel Energy's] ratepayers." In addition, the Minnesota legislature has directed that the Company "must, when feasible and reasonable, give preference to projects that are most cost-effective for a particular energy source." Third, the RDF Statute requires that an independent third-party expert evaluate all proposed projects. Further, the RDF Statute directs that in making selections "[Xcel Energy] should attempt to reach agreement with the advisory group after consulting with it but the utility has full and sole authority to determine which expenditures shall be submitted to the commission for commission approval." Therefore, there are many factors that must be considered by the advisory group and Xcel Energy when selecting projects to receive funds from the RDF. These requirements provide important guidance for project selection and provide the Company with discretion in selecting projects to recommend to the Commission for funding.

The Company's initial review process is intended to help provide objective boundaries to the statutory guidance. The Cycle 4 selection methodology and scoring matrix incorporate the statutory policy guidance and were developed by Xcel Energy with input from the RDF advisory group and the Department and subsequently approved by the Commission. Through a competitive bidding process, Xcel Energy selected an independent evaluator who applied this methodology to determine technical scores that were used to aid the RDF advisory group and Xcel Energy in the identification of Cycle 4 award recommendations. The technical scoring provided by the independent evaluator gives an objective baseline from which the Company, with the guidance of the advisory group, made its ultimate funding recommendations.

The RDF Statute's policy guidance also provides discretion for qualitative evaluation of proposals. For example, the concept of cost effectiveness could be construed to mean reasonable costs for the technology or the absolute lowest cost for a technology. Lowest cost can be objectively determined, reasonable cost is a more qualitative determination. Reasonable cost is dependent on the type of technology, stage of development, location, and for the purposes of the RDF, the ability for the project to minimize the impact of nuclear storage issues. RDF project grants are intended to focus on providing an incentive for renewable electric installations that have a more innovative approach to remove some type of market barrier which may not necessarily be the lowest price, but nevertheless, a reasonable cost. Consequently, applying the policy guidance for cost-effectiveness requires qualitative judgment in addition to quantitative analysis. The same is true when applying other policy guidance required by the RDF Statute.

The RDF Statute recognizes the need to balance the quantitative and qualitative considerations by requiring the Company to attempt to reach agreement with the advisory group, which represents a broad array of RDF stakeholders. We believe the input of our stakeholders is a key factor in ensuring that the projects we recommend for funding are in accord with the RDF's mission. Further, reaching agreement with the advisory group provides validation for deviations from the objective scoring provided by the independent evaluator.

For Cycle 4, Xcel Energy is in full agreement with the RDF advisory group on the selection of all energy production (EP) and research and development (RD) proposals recommended for grant awards, the EP and RD proposals to be recommended as reserve projects, and the selection process and priority for funding projects on the reserve list. In the Selection Report, Xcel Energy proposed two tiers for reserve funding. The recommendation proposed funding Tier I projects before funding Tier II projects. Based on further discussion with the advisory group, the Company supports the advisory group recommendation to propose reserve funding in the order it ranked the projects, should funds be made available, instead of the two-tiered approach.

Although the final recommendation of projects does not coincide with the projects that received the highest scores from the independent evaluator, the advisory group and Xcel Energy used the scores for the initial identification of projects for further consideration. We then applied the various statutory criteria to select projects to receive funds from the RDF and those on the reserve list.

2. Cycle 4 RFP

On November 29, 2012, Xcel Energy filed a notice of its intent to proceed with the fourth funding cycle of the RDF. In that filing the Company provided:

- RDF background information,
- 2012 RDF Legislative actions,
- Cycle 3 Lessons Learned,
- Cycle 4 Request for Proposals for Commission approval,
- Cycle 4 Selection Process and Criteria for Commission approval, and
- Cycle 4 time schedule and series of events.

On February 13, 2013, Xcel Energy submitted detail on the scoring approach to be used by the independent evaluator. This detail included additional text to identify scoring criteria and clarify that criteria are weighted equally within an evaluation category, a scoring matrix to summarize the scoring approach and allocation of points, and additional text to clarify the total score calculation. The detail also explained that those projects qualifying for bonus points are eligible for a maximum of 15 percent of the maximum core criteria score. The Department concluded the approach was in compliance with the Commission's February 6, 2013 Order on February 14, 2013.

Consistent with the guidance provided by the RDF Statute, the Commission identified the RDF Cycle 4 procedural steps following issuance of the RFP and for the selection of projects, including:

- With input from the Advisory Group, Xcel Energy oversees the project selection process and makes a final project selection recommendation to the Commission.
- Xcel Energy utilizes an independent third-party expert to evaluate project proposals for Energy Production (EP) and Research and Development (RD) projects. The Company may also decide whether to retain an independent third-party to assist in the review of responses to the RFP for institutions of higher education.
- Within 60-90 days of receiving project proposals in response to both RFPs, Xcel Energy submits its final project selections to the Commission for approval. The final selection report shall include a detailed explanation of any deviations from the rankings for EP, RD, and Higher Education (HE) projects provided by an independent third-party evaluator or other evaluator.

The Commission's Cycle 4 Order recognized the discretion that the RDF Statute placed with the Company with respect to project selection and also provided for

project selection to deviate from the technical scores of the third party evaluator. Should such deviations occur, Xcel Energy was required to fully explain them. We believe that our selection process has complied with these requirements. We have submitted our Selection Report and several supplements to ensure a complete record is developed with respect to both our projects recommended for funding, our deviation from any technical scores, and the relative merits of our recommended projects compared to higher scored projects.

3. Cycle 4 RFP Process

Over the course of three previous funding cycles, lessons have been learned and best practices developed to ensure the selection of proposals that best meet the goals of the RDF and benefit the Xcel Energy electric customers, who support the fund. The Cycle 4 RFP process is for the most part similar to Cycle 3. Changes in the Cycle 4 RFP process primarily relate to previous lessons learned, funding priorities, and award recommendations, in addition to the application of the 2012 amendments to the RDF Statute.

Our RFP process was intended to ensure that all bidders were fully informed of the RDF's bidding criteria, evaluation process, and Cycle 4 goals. We believe we have met this requirement and have provided all bidders the opportunity to submit the best bid possible.

Our RFP appropriately notified bidders of the information required to be provided so that both an objective technical score could be calculated, as well as information that the Company, in consultation with the advisory group, deemed necessary to ensure that reasonable qualitative evaluation of the proposals could also be made. We recognize that due to the need for specific information required to develop the objective technical scores, considerably more of the RFP was devoted to ensuring such information was provided in bids. Bidders were also notified in the RFP that a qualitative review would be performed and that providing certain information in addition to the objective technical information would be helpful in that review. Such information would include a justification for higher than average funding levels (pp. 10-11), payment terms (p. 11), electricity sales pricing (p. 12), cost sharing (p. 7), and contracting details (p. 5).

The RFP also made clear that a qualitative evaluation of proposals by Xcel Energy and the advisory group would be performed:

- "In making final selections, Xcel Energy will consider the independent expert's evaluation as well as the recommendations of the RDF advisory group." (p. 13)

- "In making its funding decisions, Xcel Energy will utilize these results [technical scores], together with its own judgment and input from the advisory group concerning the mix of projects within the 4th Cycle funding portfolio." (p. 26)

- "While these evaluations [technical scoring] will inform the proposal selection process, final selection will be based on both these evaluations, and subjective recommendations from the advisory group." (p. 33)

- "While Xcel Energy has a desire to fund a diverse mix of resource types, it is not obligated to select projects solely on the basis of project rankings and it is not obligated to fund projects within every technology proposed." (p. 33)

To help ensure that potential bidders were fully informed, Xcel Energy held a question and answer forum and a summary of questions was posted on the RDF website. Additionally, after the notice of availability was released, RDF staff fielded questions regarding the Cycle 4 application process via the RDF toll free telephone number as well as through the RDF website staff contact page. Questions and Xcel Energy's responses pertaining to the funding process and application procedures from the public forum, as well as those received via email, are posted to the public RDF website as a FAQ list available to the public at http://www.xcelenergy.com/staticfiles/xe/Corporate/Corporate%20PDFs/FAQ4thCycle-2.pdf.

Given this process and the information contained in the RFP, we believe the solicitation of Cycle 4 proposals has been transparent and in compliance with the 2013 Order and the statutory criteria.

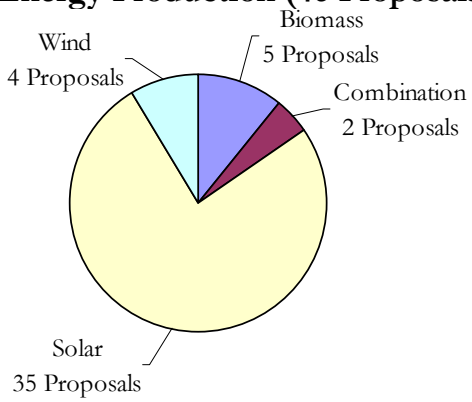
4. Cycle 4 Proposals and Resource Mix

We received a total of 71 bids for Cycle 4. In compliance with the approved Cycle 4 selection process, all proposals were screened for eligibility, which included a determination that the proposed project activity is consistent with the RDF Statute. Four proposals were identified as not meeting the eligibility criteria and were not considered for further review, leaving 67 proposals for further review. All qualified proposals evaluated for funding were consistent with the RDF Statute.

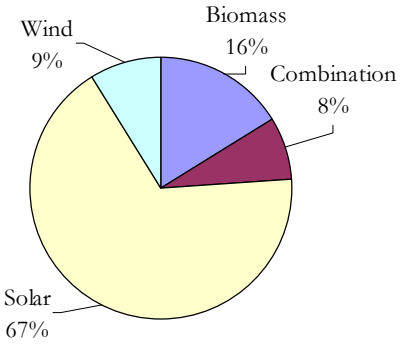
The 67 proposals were evaluated based on the project proposal and documentation presented by the applicant. Because the total amount of funding requested far exceeded the available funds of $30.0 million, there were numerous proposals that met statutory requirements and may have been deemed beneficial but did not receive award recommendations.

The Cycle 4 proposals represented a significant shift in the types of proposals and resource mix bid into an RDF RFP. As more fully described in our Second Supplement, 46 proposals – 69 percent of the project proposals received – were for energy production (compared to 14 percent in Cycle 3). Of these proposals, 35 were solar technology, representing 63 percent of the total resource mix proposed (compared to 43 percent as the largest resource proposal, biomass, in Cycle 3). Solar received a higher recommendation of grant awards; 10 of the 13 projects recommended for funding are solar. These changes in resource mix significantly impacted our reliance on qualitative criteria for funding selections in Cycle 4. The potential for a project to reduce market barriers, increase visibility, and provide benefits to our electric customers were carefully considered to provide distinctions between proposal of similar technologies.

Energy Production (46 Proposals)

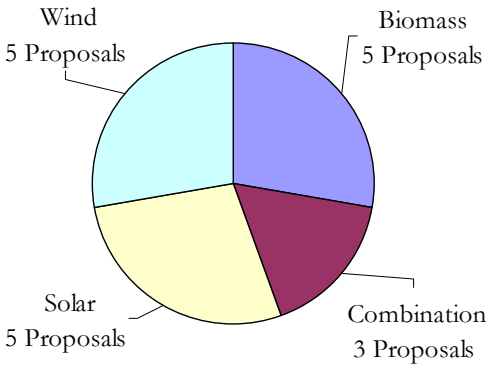


Energy Production ($91.8 million)

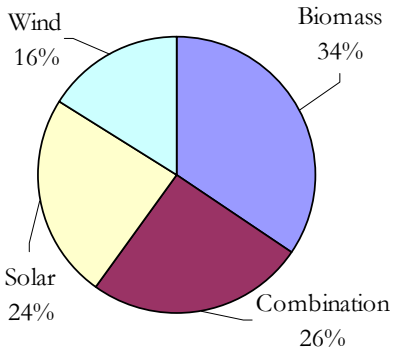


The RD proposals were more uniformly distributed between the various resource types. Of the 18 RD proposals, there were five proposals each for biomass, solar, and wind. Three proposals combined two or more technologies. Award requests for biomass research tended to be for large amounts, and requests for wind research tended to be for smaller amounts.

Research Development (18 Proposals)



Research Development ($18.7 million)



To achieve resource diversity as well as diversity in solar projects, the advisory group had to review proposals that scored lower than in previous cycles. We agree with the advisory group's judgment with respect to funding the mix of solar projects to ensure an appropriate and diverse selection of project sponsors, project location, and visibility through location or marketing of these projects to demonstrate the use of solar technology.

Further, with such a greater percentage of solar projects bid into Cycle 4, there were fewer other projects from which to ensure a diverse technology mix was available for funding. This resulted in difficult choices with respect to funding biomass projects.

The Department notes that it appears we did not adequately consider the interests of customers in one selection in the biomass category by selecting EP4-9 for a grant award and not selecting EP4-37. EP4-9, as the Department notes, received a similar but slightly higher technical score than EP4-37. While EP4-37 does not require a PPA and EP4-9 does, the total resource cost per kWh, the second highest-weighted factor for the scoring by the independent evaluator, of EP4-37 was greater than that of EP4-9; herefore, EP4-37 was awarded substantially more points for its total resource cost per kWh. The advisory group unanimously supported funding EP4-9 and was impressed with its utilization of community-wide feedstock. EP4-37 proposed to use feedstock primarily from their own facility. EP4-9 will still need to negotiate a satisfactory PPA with Xcel Energy to sell power at a price that is prudent and reasonable for Xcel Energy's customers.

B. Selection Process

1. Technical Scoring

The RDF Statute and the Commission's Cycle 4 Order require Xcel Energy to use an independent third-party to evaluate proposals submitted in response to an RFP. On January 22, 2013, Xcel Energy issued an RFP for evaluation services of Cycle 4 proposals by an independent, third-party vendor. Five vendors responded to the RFP, which closed on February 23, 2013. As a result of the RFP, Sargent & Lundy was chosen to provide RDF proposal evaluation and reporting services based on Xcel Energy's assessment of the bidders' technical competence, pricing, and experience. Subsequent to the selection, we interviewed Sargent & Lundy to confirm that they understood the work effort and had responded accurately to all criteria. On April 30, 2013, Xcel Energy contracted with Sargent & Lundy to conduct a technical evaluation of the 64 Cycle 4 proposals.[1]

a. Initial Scoring

Sargent & Lundy developed its evaluation report based on the framework and criteria outlined in the RFP. Scoring focused on proposal completeness, technical feasibility, project technical and financial risk, and benefits to Xcel Energy electric customers. The highest possible score that any project could receive was 230 points based on the following Core Criteria and Point System:

Table 1 – Core Criteria and Point System

	Maximum Possible Points	
Core Criteria	**RD Projects**	**EP Projects**
Project Method, Scope & Deliverables	20	20
Technical Requirements	70	70
Management Team, Schedule and Cost	30	30
Potential Benefits to Minnesota and Ratepayers	80	20
Total Resource Cost per kWh (EP Only)	0	60
Core Criteria Score	200	200
Maximum Bonus Points Allowed[2]	30	30
Overall Total	230	230

[1] Sixty-seven proposals were determined eligible for further review. Sixty-four of these proposals were EP or RD, and three were higher education (HE). The three HE proposals were scored by the advisory group members.

[2] Bonus points were awarded for the following preferences:

1. Projects supported by the Prairie Island Indian Community.
2. Projects located within the Energy Innovation Corridor.
3. Projects structured to receive RDF grant payment as a lump-sum amount upon completion.
4. Projects located within Xcel Energy's service territory in Minnesota and Wisconsin.
5. R&D projects that demonstrate a high likelihood of royalty return and propose a larger royalty ratio.
6. Projects sponsored by a K-12 school or local unit of government to construct a solar PV facility.
7. For anaerobic digester systems, projects that propose to use non-agricultural residue for a feedstock.

On June 11, 2013, Xcel Energy received Sargent & Lundy's technical scores and worksheets for the Cycle 4 proposals. RDF administration reviewed the scores to assure that all eligible proposals had been scored by Sargent & Lundy. On June 12, 2013, the RDF advisory group conducted an all-day meeting to discuss and reach a recommendation regarding the Cycle 4 RFP responses.

During the course of reviewing bids and through information received from public comments, some technical scoring discrepancies and errors were identified:

- Dragonfly Solar (EP4-29) – Did not have any scoring discrepancies but has had some confusion related to labeling. The electronic copy of Gelco Corporation (EP4-30) had been mislabeled as EP4-29 which was identified by the advisory group prior to their discussion on this proposal. Statements pertaining to proposed contract modifications that were applicable to EP4-30 were not part of the discussion for EP4-29 but were inadvertently recorded as part of that discussion. This labeling discrepancy did not affect the RDF advisory group decision.

- Natural Systems Utilities, LLC (EP4-37) – Received bonus points for the project site's location within Xcel Energy's service territory. The project host is Michael Food's, which is serviced by the City of Chaska. The proposal had already maximized available bonus points due to a request for lump sum financing and utilizing non-agricultural feedstocks. Therefore the technical score of 133.3 for EP4-37 is correct as originally submitted.

After these scoring discrepancies were discovered, Xcel Energy and Sargent & Lundy conducted separate reviews of the technical scores. As explained in the Cycle 4 Second Supplement Report, additional scoring discrepancies were identified for eight proposals, which impacted the technical scores for six of the proposals. These scoring discrepancies were discussed with the RDF advisory group during the advisory group meetings on September 5, 2013 and September 10, 2013.

- City of Rogers (EP4-45) – Did not receive bonus points for being proposed by a local unit of government. Preference points had been maximized so there was no impact to the original technical score and no adjustment to award recommendations was necessary. The advisory group confirmed this approach.

- Minneapolis Park and Recreation Board (EP4-22) – Did not receive bonus points for being proposed by a local unit of government. Preference points

had been maximized so there was no impact to the original technical score and no adjustment was necessary. The advisory group confirmed this approach. The project was also recommended for funding.

- City of Hutchinson (EP4-41) – Did not receive bonus points for being proposed by a local unit of government. The technical score increased by 18.97 points and moved the proposal from Sargent & Lundy's Category 2 to Category 1. The advisory group had considered the proposal for a possible award in June and also in September after the discrepancy was identified. Neither the Company nor the advisory group believes that if the proposal had a higher score it would have been selected for funding and therefore no adjustment to award recommendations was necessary. The project remains on the Reserve Funding list.

- Region Five Development Commission (EP4-44) – Did not receive bonus points for being proposed by a local unit of government. The technical score increased by 20.00 points and moved the proposal from Sargent & Lundy's Category 2 to Category 1. The advisory group had not considered the proposal for a possible award in June but it was discussed in September after the discrepancy was identified. Neither the Company nor the advisory group believes that if the proposal had a higher score it would have been selected for funding. However, it may have been selected as a reserve project and therefore was added to the Reserve Funding list.

- University of Minnesota (RD4-1) – Did not receive bonus points for being located within the Energy Innovation Corridor. The technical score increased by 14.79 points and moved the proposal from Sargent & Lundy's Category 2 to Category 1. The advisory group had not considered the proposal for a possible award in June but it was discussed in September after the discrepancy was identified. Neither the Company nor the advisory group believes that if the proposal had a higher score it would have been recommended for funding. However, it may have been selected as a reserve project and therefore was added to the Reserve Funding list.

- University of Minnesota (RD4-12) – Did not receive bonus points for being located within the Energy Innovation Corridor. The technical score increased by 19.04 points and remained in Sargent & Lundy's Category 1. The project was recommended for funding by the advisory group and by the Company. No adjustment to the award recommendation is necessary.

- University of Minnesota (RD4-13) – Did not receive bonus points for being located within the Energy Innovation Corridor. The technical score increased by 20.00 points and remained in Sargent & Lundy's Category 1. The project was recommended for funding by the advisory group and by the Company. No adjustment to the award recommendation is necessary.

- University of Minnesota Wind Project (RD4-16) – Did not receive bonus points for being located within the Energy Innovation Corridor. The technical score increased by 10.17 points and remained in Sargent & Lundy's Category 3. The advisory group had not considered the proposal for a possible award in June but it was discussed in September after the discrepancy was identified. Neither the Company nor the advisory group believes that if the proposal had a higher score it would have been selected for funding or the Reserve Funding list and therefore no adjustment to award recommendations was necessary.

b. Scoring Audit

In light of the errors identified through the Company's review and comments received, Xcel Energy engaged PricewaterhouseCoopers LLP (PwC) to assess the accuracy of scoring calculations for the Cycle 4 proposals. A copy of the revised Sargent & Luncy report is included as **Attachment A1** and a copy of the PwC audit report is included as **Attachment A2**. The work entailed the assessment of the accuracy of the scorecards used to grade the 46 EP proposals and 18 RD proposals. The audit assessed the scoring calculations completed by Sargent & Lundy for consistency with the scoring approach outlined in the Cycle 4 RFP and accuracy of calculations. The scope and approach of the audit included:

- PwC reviewed attributes, criteria, and weighting used within the Sargent & Lundy scorecards for consistency with the approved Cycle 4 RFP.
- PwC assessed the raw scores within the Sargent & Lundy scorecards for the 64 EP and RD proposals to determine whether raw scores fell within the ranges outlined within the "Xcel Energy Renewable Development Fund - 4th Cycle Evaluation Approach - Sargent & Lundy project no. 13125-001 - July 2013" report.
- PwC assessed the accuracy of calculations within the scorecards for the 64 EP and RD proposals.

Results from the PwC audit revealed that recalculated scores covering 64 proposals yielded an overall accuracy range of 99 to 100 percent. Sixty of 64 proposals contained no errors impacting the calculation of the total score. Four out of 64

proposals contained total calculation errors of 1 percent or less. All of the EP scores were correct and accurate. The four proposals that had scoring errors were RD and had no significant impact on the Sargent & Lundy ranking, and the advisory group confirmed they had no impact on its selection recommendations. Scoring errors identified that impacted the final score included:

i. University of Minnesota (RD4-2) – Criteria D6 was calculated with a weight of 3.00 rather then 3.33 which required an additional 1.00 points to be added for a final score of 124.67. The correction did not change the overall proposal rank. The proposal had already been recommended for funding and therefore the increase in score had no impact.

ii. AF-Energy Corporation (RD4-6) – Scores were included for Criteria B7 when it was not relevant to RD. Criteria C4 was calculated with a weight of 1.50 rather than 0.75. Criteria D3 was calculated with a weight of 3.00 rather than 3.33. Criteria F was calculated as 15 percent of the combined core criteria score. The cumulative affect of these errors required a subtraction of 1.34 points for a final score of 131.77. The correction did not change the overall proposal rank. The proposal had not been recommended for funding and therefore, the advisory group and Company agree that the decrease in score had no impact.

iii. University of Minnesota (RD4-12) – Criteria D6 was calculated with a weight of 3.00 rather then 3.33. Criteria F was calculated as 15 percent of the combined core criteria score. The cumulative affect of these errors required an additional 1.53 points to be added for a final score of 147.49. The correction did not change the overall proposal rank. The proposal had already been recommended for funding and therefore the advisory group and Company agree that the increase in score had no impact.

iv. Solar Cell & LED Technology (RD4-21) – Criteria C4 was calculated with a weight of 1.00 rather than 0.75 which required a subtraction of 0.75 points for a final score of 108.42. The correction lowered the overall proposal rank by one spot and reduced the proposal from Sargent & Lundy Category 1 to Category 2. The proposal had not been recommended for funding and therefore the advisory group and Company agree that the decrease in score had no impact.

The progression of the identification and affect of errors on proposal scores has been documented in **Attachment B** for EP proposals and in **Attachment C** for RD proposals. These attachments include all EP and RD proposals in the original descending score order.

Findings from the PwC audit were reviewed by the RDF advisory group during the regular advisory group meeting on November 12, 2013. We have corrected the technical scores for any evaluation errors and omission for all EP and RD projects. **Attachment D** shows the final, corrected scores and funding recommendations in descending score order for all EP proposals and **Attachment E** shows the final, corrected scores and funding recommendations in descending score order for all RD proposals. Attachments D and E are revised Tables 5 and 6 from our August 9, 2013 Supplement to Selection Report.

The corrected rankings in descending order within each resource type are provided in **Attachment F** for EP proposals and in **Attachment G** for RD proposals.

The advisory group concurred that the findings support that the technical evaluations were consistent with the Cycle 4 RFP and the scoring errors identified had no impact on the selection process or recommendations. The technical scoring of Cycle 4 proposals has been conducted in accordance and in compliance with the Cycle 4 Order, the Cycle 4 RFP, and statutory criteria.

Costs to perform the independent audit will not be charged to customers or recovered through the RDF rate rider. The Company will discuss payment of these audit costs with Sargent & Lundy pursuant to the terms of the Professional Services Agreement.

2. Qualitative Evaluation

The RDF Statute requires Xcel Energy to consult, and attempt to reach agreement with, an advisory group that includes, among others, representatives of its ratepayers with respect to projects to recommend for funding.[3] Xcel Energy worked with the advisory group to ensure a thorough review of proposed projects by its stakeholder representatives.

First, copies of all eligible proposals were distributed to the RDF advisory group after they were opened and the initial eligibility determination was completed. To assure all

[3] The Commission defined the representation within this group through an October 23, 2006 order (Docket No. E002/M-00-1583) to be two representatives from the environmental sector, one representative from the Prairie Island Indian Community, one representative from Xcel Energy's commercial/industrial customers, one representative from Xcel Energy's residential customers, and two representatives from Xcel Energy. In the same 2006 Order, the Commissions required Xcel Energy to incorporate recommendations on performance measurements from stakeholder groups that included evaluating the impact of RDF expenditures on the State of Minnesota.

proposals were reviewed by a minimum of two RDF advisory group members, proposals were randomly assigned to two members for in-depth review.

We note that advisory group members, who represent our RDF stakeholders, are also involved with the renewable energy community. Consequently, care was taken to not assign any proposals to advisory group members for whom there might be a perceived conflict of interest. For example, the two proposals submitted by Xcel Energy were not assigned to either of the two Company advisory group members. Each advisory group member completed detailed review of 20 to 22 EP and RD proposals. Additionally, each advisory group member reviewed all three of the HE block grant requests. After receiving the randomly-allocated proposal review assignments, RDF advisory group members informed Xcel Energy of any potential conflicts of interest and requested a reassignment. Assignment restrictions included:

- Lynda Taylor – EP4-5 (Best Power, Int'l, LLC), EP4-6 (Best Power, Int'l, LLC), EP4-46 (Geronimo Energy).
- Kevin Schwain – EP4-15 (MN Renewable Energy Society), EP4-12 (Xcel Energy Services, Inc.), RD4-4 (Xcel Energy Business Systems).
- Mike Bull[4]– EP4-12 (Xcel Energy Services, Inc.), RD4-4 (Xcel Energy Business Systems), EP4-15 (MN Renewable Energy Society).
- Eric Jensen – EP4-15 (MN Renewable Energy Society).

On June 12, 2013, the RDF advisory group conducted an all-day meeting to discuss the proposals and reach a Cycle 4 RDF funding recommendation. Representatives from the independent evaluator, Sargent & Lundy, were in attendance to respond to technical questions and comments regarding their technical scores. All RDF advisory group representatives were in attendance. The advisory group used the technical scores as an initial screening tool from which to begin its overall evaluation of the EP and RD proposals.

Upon the completion of the presentation of each individual proposal, the advisory group members stated their level of support for the proposal. A proposal was considered to have strong support for funding if there was no opposition to a funding recommendation. If some advisory group members recommended a proposal for funding and there was no advisory group member opposed to funding, these

[4] Mike Bull was an Xcel Energy Advisory Group representative through June 9, 2013. Tami Gunderzik became Xcel Energy's Advisory Group representative on June 10, 2013 and was Xcel Energy's representative during the selection meeting on June 12, 2013. Mike Bull did not represent Xcel Energy during the selection meeting but was present to provide comments and observations as a reviewer for the proposals assigned to him during the term of his representation on the Advisory Group.

proposals were recommended for funding by the advisory group. If a proposal did not receive support or a recommendation for funding from any of advisory group member it was neither recommended for a grant award nor placed on the Reserve Funding list. If a proposal received a mixed review, whereby some advisory group members supported funding and some advisory group members opposed funding, it was considered to be favored by the advisory group and placed on the Reserve Funding list. After the lists were created, the advisory group reviewed them and reached a consensus on the recommendations that had developed as a result of this process.

During this all-day review session, the advisory group members analyzed projects based on qualitative attributes that conform to the RDF's mission and the interests in funding an appropriate mix of projects. The advisory group used these attributes as a way to differentiate the many similar proposals received in RDF Cycle 4. Using these attributes as a guide, the advisory group began the evaluation process by identifying projects that may have received a low score from the independent evaluator but, in an advisory group member's opinion, possessed one or more of the desired attributes. Where such projects were identified, the advisory group agreed to discuss that project in more depth during the discussion part of the selection meeting. Similarly, advisory group members identified projects they reviewed that might have had a higher score from the independent evaluator score, but that the advisory group member did not believe did a good job relative to other projects of satisfying the goals of the RDF. In those instances, the identified proposal was moved down the ranking list, and as long as members were in agreement that it should not be carried forward, was not discussed further for funding. Because these were qualitative criteria, we relied on the judgment of the advisory group to weigh these criteria against each other. We acknowledge that such reliance on a conditional review has raised concerns with several bidders. However, reliance on the judgment of the RDF's stakeholder representatives on the advisory group is an appropriate methodology to ensure the mission of the RDF is carried out in each funding cycle.

Using this process, nearly $90.0 million in funding requests were identified for in-depth discussion by the advisory group, three times the $30 million of available funds. The list of projects for further discussion is provided in **Attachment H** and the list of projects not selected for further discussion is provided in **Attachment I**. Once this re-ordering by the advisory group was complete and a list of proposals for further discussion was identified, the process of evaluation and discussion began with the project that received the highest technical score and continued in descending score order. Upon the completion of the presentation of each individual proposal, Xcel Energy asked the advisory group for the level of support for a proposal. Proposals that did not receive any opposition were considered to have strong advisory group

support and were recommended for a grant award. Proposals that received a mixed review with a majority of advisory members in support were considered to be favored and were recommended to be placed on the Reserve Funding list. Proposals that did not receive a majority of advisory representatives in support were not recommended for an award or placed on the Reserve Funding list. This process is similar to that which was utilized in Cycle 3.

The advisory group considered the independent expert's evaluation as well as observations from within the group that represents various stakeholders of the RDF. Given that 63 percent of proposals submitted were for solar initiatives, the technical score ranking heavily reflected the total resource cost component of the various bids. However, this total resource cost calculation, while a marker of cost effectiveness, does not consider other factors, including incremental cost to our customers through a PPA or net metering arrangement that increases the amount of support our customers must provide to a particular project. Consistent with the RDF selection process, the advisory group was not obligated to select projects solely on the basis of technical rankings but can make selections to ensure a diverse mix of resource types.

The advisory group, as a result of its evaluation and consideration of the independent evaluator's scoring, recommended a total of $30,122,346 in grant awards for 13 EP proposals, four RD proposals, and funding levels for three HE block grants. **Attachment J** shows the advisory group's recommendation for funding for the EP proposals.

EP proposals selected by the advisory group to receive grant awards deviated from the numerical order of the technical scores based upon various attributes identified and discussed by the group. Deviations from the technical scores for EP proposals and the reason for the deviation have been summarized in **Attachment K**.

Attachment L shows the advisory group's recommendation for funding for the RD proposals.

RD proposals selected by the advisory group to receive grant awards deviated from the numerical order of the technical scores based upon various attributes identified and discussed by the group. Deviations from the technical scores for RD proposals and the reason for the deviation have been summarized in **Attachment M**.

Three proposals for block grant awards were received totaling $14,557,515. **Attachment N** shows the recommendations for $9.0 million in HE block grant funding levels. Although the RDF advisory group recommended a $4.5 million limit in the block grant award, the Company is proposing Commission approval of MnSCU's

full request for $5.5 million. The Company believes MnSCU's proposal is exemplary and their grant request should be fully funded. If the Commission approves a grant award for MnSCU, we will then enter into a RDF grant contract with the institution and submit it to the Department of Commerce for review and approval.

Subject to Commission approval, we will hold in abeyance an amount of approximately $3.5 million available for block grants to the University of Minnesota and the University of St. Thomas. We wish to work with both institutions to address the concerns of the RDF advisory group. If we are able to reach an agreement regarding the terms and amount of a grant award during our 120-day negotiation period, we will notify the Commission and submit an RDF grant contract to the Department for review and approval. If we are unable to reach an agreement, we will also notify the Commission and use those dollars to move forward with funding reserve projects as possible with available funds.

The RDF advisory group initially proposed a Reserve Funding list of 13 projects (combined EP and RD) in the event a recommended project cannot or does not come to fruition. During the course of receiving public comments and additional quality control reviews, certain scoring errors were brought to the attention of the advisory group for consideration. On September 5, 2013 and September 10, 2013, the advisory group met to review the revised technical scores and discuss whether there were any impacts to recommendations because of the six projects with scoring errors that affected the Sargent & Lundy categorization. The advisory group initially discussed whether the revised scoring would have impacted the list of recommended projects. The advisory group reaffirmed its selection of EP and RD projects for funding and determined that it would request no changes to the recommended funding list provided in the Selection Report filed on July 29, 2013. The advisory group reached this conclusion by first affirming that each project they originally placed on the list for funding was still appropriate to keep on the list. This combined with a limit of $30 million of available award funds results in the list of projects to be funded remaining the same.

The advisory group then turned to the list of projects for reserve funding to determine if any revisions were appropriate given the revised scoring. After a detailed discussion of each of the remaining four proposals (two of the eight were not discussed as they were already recommended for funding; the other two were not discussed because the scoring error did not impact the project's score), the advisory group reached a consensus that it was appropriate to add the Region Five Development project (EP4-44) and the University of Minnesota Large Wind Plant Maintenance project (RD4-1) to the reserve funding lists.

The RDF advisory group developed a single Reserve Funding list for the 15 proposals in the event a recommended project cannot or does not come to fruition. To determine a priority for selecting proposals from the Reserve Funding list, each advisory group member ranked the 15 proposals in order of preference. Preferences of the seven members were averaged to derive the final Reserve Funding list. The advisory group and the Company both support this recommended Reserve Funding list and the ranking of reserve projects for funding should a selected funded project not come to fruition. **Attachment O** shows the Reserve Funding list and ranking.

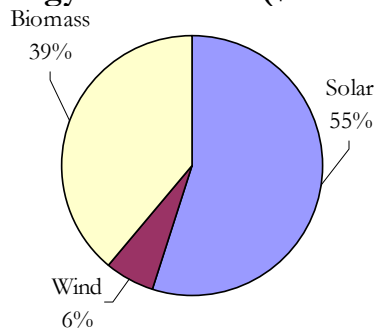
With this opportunity to revisit the list of reserve projects, the advisory group also reiterated its view that there should be one shared Reserve Funding list for EP and RD projects. After this review and final recommendation was completed by the advisory group, Xcel Energy undertook review of the recommendation to determine if any changes were warranted before submitting the Selection Report to the Commission.

3. Xcel Energy Recommendations

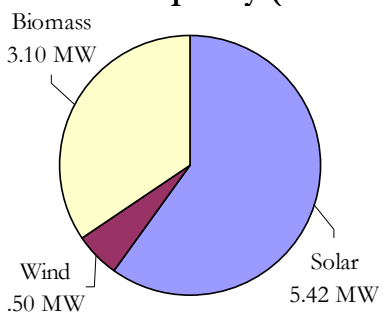
As stated in our July 29, 2013 selection report, the Company recommended, without changes, approval of the list of projects the RDF advisory group recommended for funding. Our recommendations include:

- $6,030,221 for seven solar PV projects to be used for self-generation
- $3,825,250 for three solar PV projects with the output sold to the Company
- $1,106,600 for one small wind project with output to be used for self-generation
- $7,000,000 for two biomass projects with the output to be used for self-generation or sold to the Company
- $3,160,275 for four research and development projects
- $9,000,000 for three higher educational institution block grants

Energy Production ($18.0 million)



Installed Capacity (9.0 MW)



We are also recommending an additional 15 projects to be placed in reserve status for a possible RDF grant award as recommended by the advisory group. In the original selection report, the Company proposed a two-tier strategy for selection of reserve projects. Based on advisory group feedback to the approach for selection of projects from the Reserve Funding list, the Company no longer proposes the two-tier structure, and instead supports the advisory group recommendation to fund reserve projects in the order of the rank identified in **Attachment O**. The advisory group was informed of the Company's intent to support the advisory group recommendation to fund reserve projects on December 3, 2013.

We intend to use any funds available for reserve projects for the "next in line" proposal, regardless of whether it is an EP project or an RD project. In other words, if a proposal that did not move forward was an EP project and those grant dollars can be used for a reserve project, those dollars may be used for another EP project or an RD project. The Company is open to additional recommendations on the most effective approach for selecting projects from the Reserve List. An example of one approach would be if available funds are not sufficient to fund the highest ranked proposal on the reserve list, the available funds would be allocated to the highest proposal that has a funding request less than or equal to the funds available. The Company also recommends that fund that become available be held and accumulated for a reasonable amount of time (six months or a year) before attempting to fund a project on the reserve list. No reserve project will be funded if there are not sufficient unobligated funds to provide a full grant award. Information on specific proposal goals, benefits, descriptions, and selection comments for all proposals evaluated have been included with this report in **Attachment P**.

C. Overall Process

As described, we believe our project selection process is consistent with the RDF Statute, the Commission's Cycle 4 Order, the terms of the RFP, and past practice from previous RDF funding cycles. However, given the visibility of the RDF due to the increased interest in solar development, some bidders have raised concerns with our selection process. As discussed previously, given the increased interest in the RDF and the limited funds available, it was not possible to fund all qualified projects proposed in Cycle 4. Our process was intended to recommend for funding those projects that could best meet the goals of the RDF as set forth in the RDF Statute.

We acknowledge that due to additional solar projects proposed in this cycle, greater emphasis was placed on qualitative criteria in this funding cycle than in previous cycles. This was necessary to ensure a reasonable mix of solar projects was selected and that a reasonable mix of other renewable resource types was also selected. We

recognize that Sargent & Lundy's errors in calculating technical scores have called into question the integrity of our selection process. However, we have worked with our stakeholder representatives on the advisory group to ensure that notwithstanding these issues, and notwithstanding these new challenges for Cycle 4, our recommended proposals continue to represent an appropriate mix of projects to be funded.

We have been transparent throughout our selection process. Our filings in this docket have informed the record with respect to the selection process, the advisory group's review of projects, and our ultimate funding recommendations. We have informed all potential bidders and other stakeholders through our RFP that the objective technical scores are one input into determining which projects to recommend for funding. Our Selection Report and Supplements have provided significant detail with respect to why certain projects were recommended for funding and the process undertaken to make those determinations. Given this process and the information included in the record, we do not agree with comments requesting a contested case to provide more transparency to our process. We believe a contested case would add additional time and expense to this process but would not develop a more complete record. After thorough review and significant consultation with the advisory group, we continue to believe that our recommended projects represent a reasonable set of projects.

Finally, we note that concerns about transparency and our selection process have provided valuable lessons that we can incorporate into future funding cycles. Similarly, Cycle 4 represents a shift in the RDF funding requests that we did not anticipate, but will likely continue in the future. We intend to incorporate these lessons learned into subsequent RDF cycles.

CONCLUSION

Xcel Energy appreciates the comments and input of stakeholders throughout this process. We believe our Cycle 4 selection process is in compliance with the Commission's Order, and our recommended projects meet the approved goals and preferences for Cycle 4. We also believe the process and all Cycle 4 award recommendations are in compliance with the RDF Statute. As such, the Company requests that the Commission approve the award recommendations and Reserve Funding list as selected by the RDF advisory group and the Company.

In addition, the Company appreciates the Department's conclusion that the funding levels for the higher education block grants followed the processes approved by the Commission. The Company requests that the Commission approve the proposed HE block grants.

Docket No. E002/M-12-1278
Reply Comments
Attachment List

Attachment A1	Sargent & Lundy Report-revised
Attachment A2	PwC Audit Report
Attachment B	EP Scoring Adjustment Progression
Attachment C	RD Scoring Adjustment Progression
Attachment D	EP Proposals (Revised Table 5 from 8/9/13 Supplement)
Attachment E	RD Proposals (Revised Table 6 from 8/9/13 Supplement)
Attachment F	EP Proposals (Technology)
Attachment G	RD Proposals (Technology)
Attachment H	Cycle 4 Proposals Selected for RDF Advisory Group Review
Attachment I	Cycle 4 Proposals Not Selected for RDF Advisory Group Review
Attachment J	EP Award Recommendations
Attachment K	EP Proposals (Award Recommendations and Scoring Deviations)
Attachment L	RD Award Recommendations
Attachment M	RD Proposals (Award Recommendations and Scoring Deviations)
Attachment N	HE Block Grant Recommendations
Attachment O	Reserve Projects
Attachment P	Proposal Summaries • Recommended EP Proposals • Recommended RD Proposals • HE Proposals • Reserve Proposals • EP Proposals Not Funded • RD Proposals Not Funded

Xcel Energy Renewable Development Fund
4th Cycle Evaluation Approach
Sargent & Lundy project no. 13125-001
September 2013

SUMMARY

Sargent & Lundy, L.L.C. (Sargent & Lundy) conducted an evaluation of the proposals that were submitted to Xcel Energy seeking funding from Xcel Energy's Renewable Development Fund (RDF) in the 4th funding cycle. We developed an evaluation approach based on a framework developed by Xcel Energy, performed numerical scoring of each of the Energy Production (EP) and Research and Development (RD) proposals, and ranked the proposals. The following report describes the tasks performed to complete our evaluation.

Approach

The following broad tasks were conducted during the evaluation process of the EP and RD proposals:

- Task 1: Prepare Scoring and Evaluation Methodology
- Task 2: Technical Evaluation and Scoring of Proposals
- Task 3: Ranking of Proposals
- Task 4: Recommendation of Proposals

TASK 1: PREPARE SCORING AND EVALUATION METHODOLOGY

Based on the evaluation metrics and scoring framework found in the RDF Program's 4th Cycle Request for Proposals (RFP) issued February 15, 2013, Sargent & Lundy developed a set of objective scoring interpretations that focused on proposal completeness, technical feasibility and completeness, project technical and financial risk, and benefits to Xcel Energy ratepayers. The following core criteria areas and maximum point values are shown in Table 1. More details on the metrics that make up each core criteria and bonuses are found in Xcel Energy's RFP.

Table 1 — Core Criteria and Point System

Core Criteria	Maximum Possible Points	
	RD Projects	EP Projects
Project Method, Scope, and Deliverables	20.00	20.00
Technical Requirements	70.00	70.00
Management Team, Schedule, and Cost	30.00	30.00

Core Criteria	Maximum Possible Points	
	RD Projects	EP Projects
Potential Benefits to Minnesota and Ratepayers	80.00	20.00
Total Resource Cost per kWh (EP only)	0.00	60.00
Core Criteria Score	**200**	**200**
Maximum Bonus Points Allowed	30	30
Overall Total	**230**	**230**

Xcel Energy provided numerical scoring ranges, point value descriptions, and weighting factors for each metric. The following figure shows the point value descriptions used to evaluate each metric.

Figure 1 — Description of Metric Ratings and Points

Metric Ratings	Evaluation Definitions	Points Awarded
Superior	Demonstrates exceptional level of performance and provides something extra or innovative	4
Excellent	Effective response that can achieve all requirements. No obvious risks or issues.	3
Good	Response minimally supports the requirement, some issues exist that may impact results.	2
Fair	Contains weakness that will limit achievement of requirement or poor plan to mitigate risk.	1
Unsatisfactory	Cannot be achieved due to a critical issue or no response.	0

The Sargent & Lundy project team reviewed and discussed the ratings prior to scoring to establish a common understanding; for example, we used the rating of "excellent" for evaluation criteria that had no issues or risks; this rating served as our 'starting point'. For any evaluation criteria in which we identified flaws or critiques, we assigned a rating (and respective points) of "good", "fair", or "unsatisfactory" depending on the risk significance and/or lack of response. We decided to use ratings of "superior" on responses that were above expectations and/or contained extra levels of detail. To simplify the granularity of scoring, only whole number points were awarded during evaluation. These rating decisions were

adopted by the Sargent & Lundy evaluation team so as to evaluate using a high level of objectivity and consistency. All but two of the metrics were evaluated on a proposal-by-proposal basis (i.e. the awarded points did not depend on the outcome of the other proposals). The cost sharing metric and total resource cost (on a $/kWh basis for EP proposals) were evaluated as a group of either EP or RD proposals (discussed further in the following pages).

Several metrics required a different type of scoring system. For these cases, supplemental definitions of each rating were developed in order for consistent evaluation across technologies and evaluators. For example, the metric that covers "the extent to which the proposed project financing is based on sources of debt and equity" was given the following supplemental rating definitions shown in the following table:

Figure 2 — Sample of Supplemental Rating Definitions for Project Financing Risk

Points Awarded	Description
4	Complete lump sum RDF grant disbursement at end of project completion
3	Grant amount is disbursed throughout the project after demonstrated project milestone completions, and percentage of payment is reasonable with the milestone completed.
2	Grant amount is disbursed throughout project after demonstrated project milestone completions but percentage is not reasonable with milestones completed.
1	Grant amount is disbursed throughout project before completion of project milestones
0	Lump sum grant disbursement requested up front.

The metrics for cost sharing and total resource cost (TRC) were appraised as a group (either within EP or RD) on a quantitative basis. The comparison of cost sharing and TRC of the entire group gave the resulting distinction between the awarded points for these metrics.

Cost sharing, as a percentage of total project (construction and equipment) cost funded by sources other than the RDF grant, was evaluated where higher cost sharing resulted in higher awarded points (i.e. 0% cost sharing was awarded 0 points and higher percentages of cost sharing were awarded from 1 up to 4 points). More details on the point breakdown are found in the Task 3 Section of this write-up.

Total resource cost, as a measure of the levelized cost of energy on a $/kWh basis over the project development, construction and operation, was calculated for each EP proposal. The contributors to the TRC are: development, construction, and equipment costs; PPA costs (measured as the difference between PPA price and market energy price); emissions costs (for biomass proposals); and operations and

maintenance costs. A discount rate of [redacted] and a marginal energy price of [redacted] per MWh were used as directed by Xcel Energy. A 15 year evaluation period was used because nearly all of the proposals requested 15 year PPAs. Several proposals requested shorter PPA durations, but the maximum allowed PPA under this evaluation was 15 years.

The difference between the requested PPA energy price and the marginal energy price was evaluated based on the generation of the project and percentage of energy sold to Xcel Energy. Operating costs, when included in a proposal, were levelized over the PPA duration. When operating costs were not included in a proposal, O&M costs as shown in Table 2 were assumed for a project and applied over the PPA duration. The O&M costs shown in Table 1 are from publicly available studies/reports and were inflated to 2013 dollars based on the Gross Domestic Product Implicit Price Deflator.[1] Emissions costs (for biomass proposals) were evaluated based on the submitted emissions rates (lb/kWh) found in the grant application and the emissions costs ($/ton) found in Table A of the Xcel Energy RFP.

Table 2 — O&M Costs by Technology Type

Technology Type	Fixed O&M (2013$/kW-yr)	Variable O&M (2013$/MWh)	Source
Biomass		98.58	(1)
Solar	24.73		(2)
Wind	20.54		(3)

1. USDA. October 2007. An Analysis of Energy Production Costs from Anaerobic Digestion Systems on U.S. Livestock Production Facilities
2. U.S. Department of Energy. February 2012. SunShot Vision Study.
3. American Wind Energy Association. 2011 U.S. Small Wind Turbine Market Report.

All components of the TRC were levelized, summed, and evaluated over the amount of generation expected during the PPA. A resulting TRC per kWh allows for comparison amongst all EP proposals.

Each of the five bonus criteria (worth 20 points each) were evaluated and given either a “yes” or “no”. The total bonus score was summed according to the RFP where a proposal could receive a maximum score that was lesser of 15% of the core criteria score or the sum of the bonuses.

[1] Gross Domestic Product: Implicit Price Deflator. U.S. Department of Commerce: Bureau of Economic Analysis. May 30, 2013

TASK 2: TECHNICAL EVALUATION AND PRELIMINARY SCORING

All proposals were evaluated and scored by the Sargent & Lundy team using the evaluation methodology described in Task 1. The six members of the Sargent & Lundy project team are all degreed engineers, most of who are also licensed Professional Engineers (in Illinois). The biomass and wind proposals were evaluated by our biomass expert and wind expert, respectively. The remaining solar proposals were split amongst the team. Daily discussions and periodic internal meetings were held during the several week evaluation period to fine-tune the scoring methodology to achieve consistency in the evaluations. To further ensure objectivity and quality of work, one of the Sargent & Lundy team members independently evaluated and scored several proposals that had already been scored. All evaluation scores and comments were tracked in a common model so all evaluators could view completed proposal evaluations and compare the individual metric scores. Final scoring that includes the impact of cost sharing and total resource cost is discussed in Task 3.

TASK 3: FINAL SCORING AND RANKING OF PROPOSALS

We compiled the level of cost sharing and total resource cost of all of the proposals into a database and evaluated these criteria by sorting and ranking them. The cost sharing and total resource cost metrics were awarded points based on where they fell in the distribution of the values.

The cost sharing metric for EP proposals was awarded points according to the following breakdowns in Table 3. The breakdowns were based on reasonable groupings of proposals in the cost sharing ranges as shown.

Table 3 — Scoring of Cost Sharing for EP Proposals

Cost Sharing Range	Points Awarded	Number of Proposals
70% or greater cost sharing	4	6
45% – 70%	3	21
25% – 45%	2	9
10% – 25%	1	4
0% – 10%	0	6

The cost sharing metric for RD proposals was awarded points according to the following breakdowns in Table 4. The breakdowns were based on reasonable groupings of proposals in the cost sharing ranges as shown.

Table 4 – Scoring of Cost Sharing for RD Proposals

Cost Sharing Range	Points Awarded	Number of Proposals
70% or greater cost sharing	4	1
45% – 70%	3	2
15% – 45%	2	3
1% – 15%	1	2
0% – 1%	0	10

The total resource cost metric for EP proposals was awarded points on the difference between the respective proposal's TRC and the average TRC of the group. The points were awarded based on standard deviations from the average as shown in Table 5. The average (excluding several outliers) TRC for the EP proposals was $0.187 per kWh.

Table 5 — Scoring of Total Resource Cost for EP Proposals

Total Resource Cost Range ($ / kWh)	Standard Deviation Range	Points Awarded	Number of Proposals
0 – 0.137	-2 to -1	4	4
0.138 – 0.188	-1 to 0	3	21
0.189 – 0.246	0 to 1	2	8
0.247 – 0.298	1 to 2	1	6
0.299+	2+	0	7

The final TRC values from lowest to highest are shown in the following table with the awarded point score.

Table 6 — Total Resource Cost Results

Points Awarded	TRC ($/kWh)
4	0.089
4	0.121
4	0.127
4	0.128
4	0.128
4	0.133
3	0.138
3	0.142
3	0.146
3	0.149
3	0.152
3	0.154
3	0.156
3	0.157
3	0.160
3	0.164
3	0.166
3	0.168
3	0.169
3	0.171
3	0.174
3	0.180
3	0.180
3	0.186
2	0.189
2	0.193
2	0.195
2	0.197
2	0.198
2	0.198
2	0.196
2	0.225
2	0.232
2	0.247
1	0.252
1	0.260
1	0.271
1	0.277
1	0.286
0	0.299
0	0.341
0	0.504
0	0.563
0	0.966
0	3.064
0	3.775

Once we completed the scoring, we ranked the EP and RD proposals by overall score. The final scoring distributions for EP and RD proposals are shown in Figure 3 and Figure 4, respectively.

Figure 3 — Final Scoring Distribution for EP Proposals

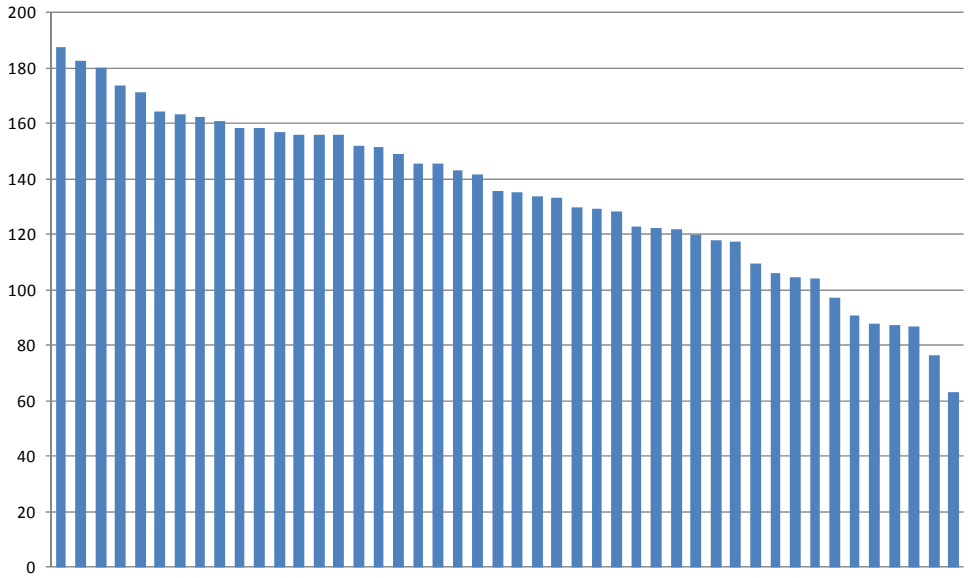
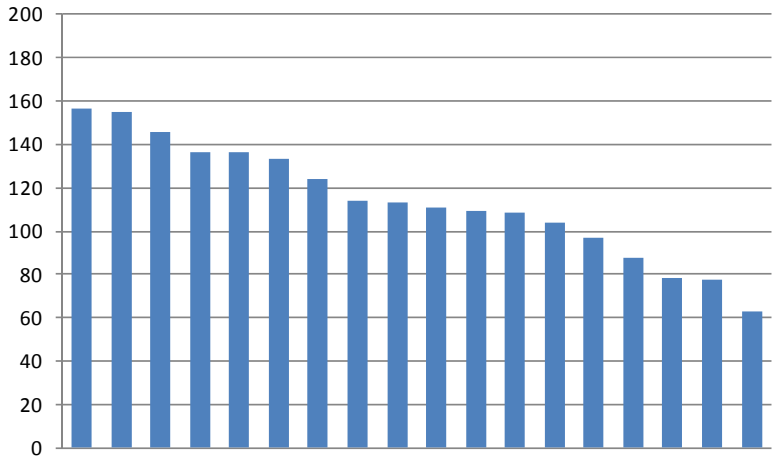


Figure 4 — Final Scoring Distribution for RD Proposals



TASK 4: RECOMMENDATION OF PROPOSALS

The overall scores provide an objective means to rank the proposals. We also categorized the proposals as "top tier" and "lower tier". The top tier list includes proposals that Sargent & Lundy believed to be reasonably complete in project scope and definition, technically sound, financially viable, and consistent with the RDF program goals and requirements. The lower tier list includes proposals that scored poorly. The most common causes of poor scores were: uncompetitive pricing; low portion of cost sharing; and poorly defined project approach, scope, or deliverables.

Sargent & Lundy ensured that the order of final proposal ranking also was consistent with the our recommendations (i.e., the final proposal ranking order from largest score to smallest score also lined up with the order from "top tier" to "lower tier").

Xcel Energy

Renewable Development Fund (RDF)
4th Funding Cycle - Scoring Assessment

November 2013

pwc

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Note: Our Services were performed and this Report was developed in accordance with our statement of work dated October 15, 2013 and are subject to the terms and conditions included therein. Our Services were performed in accordance with Standards for Consulting Services established by the American Institute of Certified Public Accountants ("AICPA"). Accordingly, we are providing no opinion, attestation or other form of assurance with respect to our work and other than procedures described in this report we did not verify or audit any information provided to us. Our work was limited to the specific procedures and analysis described herein and was based only on the information made available through November 2013. Accordingly, changes in circumstances after this date could affect the findings outlined in this Report. This information has been prepared solely for the use of Xcel Energy and its subsidiaries. PwC disclaims any contractual or other responsibility to others based on its use and, accordingly, this information may not be relied upon by anyone other than Xcel Energy.

Background

Renewable Development Fund Background

The Renewable Development Fund (RDF) was established in 1994 by the Minnesota legislature. Project funding is provided solely by Minnesota and Wisconsin electric customers of Xcel Energy. Expenditure of RDF funds is authorized by the Minnesota Public Utility Commission ("MPUC") and administered by Xcel Energy. On February 15th, 2013, Xcel Energy published a 4th Funding Cycle Request for Proposal (RFP) with the overall goal of funding near commercial-scale demonstration projects that produce and/or deliver renewable electric energy; renewable energy projects that will increase the market penetration of renewable electric energy in the state at a reasonable cost; and projects to stimulate research and development into renewable energy technologies within the state.

Proposal Evaluation Process

Xcel Energy engaged Sargent & Lundy, L.L.C. (Sargent & Lundy) to conduct an evaluation of the proposals submitted to Xcel Energy seeking funding from Xcel Energy's Renewable Development Fund (RDF) in the 4th funding cycle. Sargent & Lundy developed an evaluation approach based on a framework developed by Xcel Energy, performed numerical scoring of each of the Energy Production (EP) and Research and Development (RD) proposals, and ranked the proposals.

Review of Proposal Evaluation Calculation Accuracy

Xcel Energy engaged PwC to conduct an audit of scoring calculations completed by Sargent & Lundy (S&L) for awarding Renewal Development Fund grants. This report summarizes our assessment of the accuracy of the scorecards used to grade each proposal.

Objective, Scope and Approach

Objective

To audit the scoring calculations completed by Sargent & Lundy (S&L) for consistency with the scoring approach outlined in the 4th Funding Cycle RFP and accuracy of calculations.

Audit Scope and Approach

- PwC reviewed attributes, criteria, and weighting used within the Sargent & Lundy (S&L) scorecards for consistency with the Renewable Development Fund Request for Proposal (RFP) issued by Xcel Energy on February 15, 2013.
- PwC assessed that raw scores within the S&L scorecards for the 64 project proposals submitted to determine if raw scores fell within the ranges outlined within the "Xcel Energy Renewable Development Fund - 4th Cycle Evaluation Approach - Sargent & Lundy project no. 13125-001 - July 2013" report.
- PwC also assessed the accuracy of calculations within the scorecards for the 64 project proposals submitted.

The assessment did ***not*** entail evaluating whether scoring applied was reasonable based on the content of project proposals submitted.

Summary Audit Results

Audit Results

- PwC reviewed attributes, criteria, and weighting used within the Sargent & Lundy (S&L) scorecards for consistency with the Renewable Development Fund Request for Proposal (RFP) issued by Xcel Energy on February 15, 2013.
- PwC assessed the accuracy of scoring calculations performed by S&L for the 64 project proposals submitted by testing the following attributes in the scoring calculations:
  - Weight matches RFP.
  - Score falls within the range identified within the RFP for each criteria.
  - Recalculated weighted score for each criteria is correct.
  - Total spreadsheet score is correct.
- Overall, the total spreadsheet scores recalculated by PwC covering the 64 proposals yielded errors in 6 scorecards - only four had calculation errors.
  - 58 out of 64 proposal scorecards contained no errors.
  - 2 out of 64 proposal scorecards contained errors that did not impact the calculation of the total score.
  - 4 out of 64 proposal scorecards contained errors that impacted the calculation of the total score though the impact was 1% or less *(See Appendix B – "Detailed Audit Results" for additional explanation of the errors and their impact on results)*.

Appendix A – Detailed Audit Procedures

Appendix A – Detailed Audit Procedures

Test Description
PwC reviewed attributes, criteria, and weighting used within the Sargent & Lundy (S&L) scorecards for consistency with the Renewable Development Fund Request for Proposal (RFP) issued by Xcel Energy on February 15, 2013.
PwC reviewed each of S&L scorecards for the 64 project proposals submitted to determine if score weights matched weights outlined within the (RFP) issued by Xcel Energy on February 15, 2013.
PwC reviewed each of S&L scorecards for the 64 project proposals submitted to determine if scores given fell within the ranges outlined within the "Xcel Energy Renewable Development Fund - 4th Cycle Evaluation Approach - Sargent & Lundy project no. 13125-001 - July 2013" report.
PwC reviewed each of S&L scorecards for the 64 project proposals submitted to determine if the weighted score for each criteria was calculated correctly.
PwC reviewed each of the S&L scorecards for the 64 project proposals submitted to determine if the total scores were calculated correctly.
PwC recalculated the S&L scorecards to achieve a revised total score.

Appendix B – Detailed Audit Results

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
EP4-001	Yes	Yes	Yes	100%	133.50	133.50	0	No exceptions noted	
EP4-002	Yes	Yes	Yes	100%	151.32	151.32	0	No exceptions noted	
EP4-003	Yes	Yes	Yes	100%	141.64	141.64	0	No exceptions noted	
EP4-004	Yes	Yes	Yes	100%	129.09	129.09	0	No exceptions noted	
EP4-005	Yes	Yes	Yes	100%	149.02	149.02	0	No exceptions noted	
EP4-006	Yes	Yes	Yes	100%	162.15	162.15	0	No exceptions noted	
EP4-007	Yes	Yes	Yes	100%	151.80	151.80	0	No exceptions noted	
EP4-008	Yes	Yes	Yes	100%	135.51	135.51	0	No exceptions noted	
EP4-009	Yes	Yes	Yes	100%	135.03	135.03	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
EP4-011	Yes	Yes	Yes	100%	158.32	158.32	0	No exceptions noted	
EP4-012	Yes	Yes	Yes	100%	109.63	109.63	0	No exceptions noted	
EP4-013	Yes	No	Yes	100%	163.25	163.25	0	Exception noted	-A score was input for Criteria B4 “avoids duplication of prior efforts” when it was not applicable to the scoring of Energy Production (EP) proposals. The total proposal score was not impacted as a weighting of 0% was applied to Criteria B4.
EP4-014	Yes	Yes	Yes	100%	143.17	143.17	0	No exceptions noted	
EP4-015	Yes	Yes	Yes	100%	90.66	90.66	0	No exceptions noted	
EP4-016	Yes	Yes	Yes	100%	104.27	104.27	0	No exceptions noted	
EP4-017	Yes	Yes	Yes	100%	97.08	97.08	0	No exceptions noted	
EP4-018	Yes	Yes	Yes	100%	155.92	155.92	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
EP4-019	Yes	Yes	Yes	100%	87.59	87.59	0	No exceptions noted	
EP4-020	Yes	Yes	Yes	100%	182.85	182.85	0	No exceptions noted	
EP4-021	Yes	Yes	Yes	100%	106.28	106.28	0	No exceptions noted	
EP4-022	Yes	Yes	Yes	100%	122.95	122.95	0	No exceptions noted	
EP4-023	Yes	Yes	Yes	100%	76.28	76.28	0	No exceptions noted	
EP4-024	Yes	Yes	Yes	100%	129.57	129.57	0	No exceptions noted	
EP4-025	Yes	Yes	Yes	100%	117.20	117.20	0	No exceptions noted	
EP4-026	Yes	Yes	Yes	100%	104.75	104.75	0	No exceptions noted	
EP4-027	Yes	Yes	Yes	100%	121.80	121.80	0	No exceptions noted	
EP4-028	Yes	Yes	Yes	100%	86.73	86.73	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
EP4-029	Yes	Yes	Yes	100%	156.78	156.78	0	No exceptions noted	
EP4-030	Yes	Yes	Yes	100%	119.79	119.79	0	No exceptions noted	
EP4-031	Yes	Yes	Yes	100%	122.57	122.57	0	No exceptions noted	
EP4-032	Yes	Yes	Yes	100%	63.06	63.06	0	No exceptions noted	
EP4-033	Yes	Yes	Yes	100%	173.75	173.75	0	No exceptions noted	
EP4-034	Yes	Yes	Yes	100%	117.97	117.97	0	No exceptions noted	
EP4-035	Yes	Yes	Yes	100%	87.11	87.11	0	No exceptions noted	
EP4-036	Yes	Yes	Yes	100%	164.25	164.25	0	No exceptions noted	
EP4-037	Yes	Yes	Yes	100%	133.30	133.30	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
EP4-038	Yes	Yes	Yes	100%	187.45	187.45	0	No exceptions noted	
EP4-039	Yes	Yes	Yes	100%	160.71	160.71	0	No exceptions noted	
EP4-041	Yes	Yes	Yes	100%	145.47	145.47	0	No exceptions noted	
EP4-042	Yes	Yes	Yes	100%	155.92	155.92	0	No exceptions noted	
EP4-043	Yes	Yes	Yes	100%	171.45	171.45	0	No exceptions noted	
EP4-044	Yes	Yes	Yes	100%	158.50	158.50	0	No exceptions noted	
EP4-045	Yes	Yes	Yes	100%	145.47	145.47	0	No exceptions noted	
EP4-046	Yes	Yes	Yes	100%	155.73	155.73	0	No exceptions noted	
EP4-047	Yes	Yes	Yes	100%	128.22	128.22	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
EP4-048	Yes	Yes	Yes	100%	180.17	180.17	0	No exceptions noted	
RD4-001	Yes	Yes	Yes	100%	113.37	113.37	0	No exceptions noted	
RD4-002	No	Yes	No	99%	123.67	124.67	1.00	Exception Noted	-Criteria D6 “clearly defines and supports emission reductions and environmental benefits” was calculated with a weight of 3 rather than 3.33.
RD4-003	Yes	Yes	Yes	100%	108.58	108.58	0	No exceptions noted	
RD4-004	Yes	Yes	Yes	100%	103.92	103.92	0	No exceptions noted	
RD4-005	Yes	Yes	Yes	100%	136.37	136.37	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
RD4-006	No	No	No	99%	133.11	131.77	(1.34)	Exception Noted	-Score was input for Criteria B7 "demonstrates understanding of interconnection costs and requirements" when it was not applicable to the scoring of Research & Development (RD) proposals. -Criteria C4 "describes strategy for appropriate project oversight and performance evaluation" was calculated with a weight of 1.5 rather than 0.75. -Criteria D3 "provides clear support for job creation projections" was calculated with a weight of 3 rather than 3.33. -Criteria F "bonus preferences" was calculated as 15% of the combined core criteria score. The previous errors had a cumulative effect on this calculation.
RD4-007	Yes	Yes	Yes	100%	156.83	156.83	0	No exceptions noted	
RD4-008	Yes	Yes	Yes	100%	113.75	113.75	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
RD4-009	Yes	Yes	Yes	100%	110.75	110.75	0	No exceptions noted	
RD4-011	Yes	No	Yes	100%	136.37	136.37	0	Exception Noted	-A score was input for Criteria F4 "located in MN and WI service territories of Xcel Energy (EP only)" when it was not applicable to the scoring of RD proposals. The total proposal score was not impacted as a weighting of 0% was applied to Criteria F4.
RD4-012	No	Yes	No	99%	145.95	147.49	1.54	Exception Noted	-Criteria D6 "clearly defines and supports emission reductions and environmental benefits" was calculated with a weight of 3 rather than 3.33. -Criteria F "bonus preferences" was calculated as 15% of the combined core criteria score. The previous error had a cumulative effect on this calculation.
RD4-013	Yes	Yes	Yes	100%	155.08	155.08	0	No exceptions noted	
RD4-014	Yes	Yes	Yes	100%	63.00	63.00	0	No exceptions noted	

Proposal	Weight matches RFP	Score within RFP range for criteria	Recalculated weighted scores correct	Recalculated total score % accuracy	S&L total score	Recalculated total score	Correction needed	Conclusion	Notes
RD4-016	Yes	Yes	Yes	100%	78.01	78.01	0	No exceptions noted	
RD4-017	Yes	Yes	Yes	100%	87.50	87.50	0	No exceptions noted	
RD4-018	Yes	Yes	Yes	100%	97.17	97.17	0	No exceptions noted	
RD4-019	Yes	Yes	Yes	100%	77.91	77.91	0	No exceptions noted	
RD4-021	No	Yes	No	99%	109.17	108.42	(0.75)	Exception Noted	-Criteria C4 “describes strategy for appropriate project oversight and performance evaluation” was calculated with a weight of 1 rather than 0.75.

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EP Scoring Adjustment Progression												
ID Number	Applicant	Type	Supplemental I (8/9/2013)		Supplemental II (9/13/2013)		+/- Difference		Final Audit (12/12/2013)		+/- Difference	
			S&L Score	S&L Category	S&L Score	S&L Category	Score	Category	S&L Score	S&L Category	Score	Category
EP4-38	Minnesota Go Solar, LLC	Solar	187.45	1	187.45	1	0.00	0	187.45	1	0.00	0
EP4-20	Target Corporation	Solar	182.85	1	182.85	1	0.00	0	182.85	1	0.00	0
EP4-48	Oak Leaf Energy Partners Ohio, LLC	Solar	180.17	1	180.17	1	0.00	0	180.17	1	0.00	0
EP4-33	PowerWorks Wind Turbines	Wind	173.75	1	173.75	1	0.00	0	173.75	1	0.00	0
EP4-43	Cornerstone Group	Solar	171.45	1	171.45	1	0.00	0	171.45	1	0.00	0
EP4-36	City of Austin	Biomass	164.25	1	164.25	1	0.00	0	164.25	1	0.00	0
EP4-13	Metropolitan Airports Commission	Solar	163.25	1	163.25	1	0.00	0	163.25	1	0.00	0
EP4-6	Best Power, Int'l, LLC	Solar	162.15	1	162.15	1	0.00	0	162.15	1	0.00	0
EP4-39	Goodwill Solar, LLC	Solar	160.71	1	160.71	1	0.00	0	160.71	1	0.00	0
EP4-44	Region Five Development Commission	Solar	138.50	2	158.50	1	20.00	-1	158.50	1	0.00	0
EP4-11	Innovative Power Systems, Inc.	Solar	158.32	1	158.32	1	0.00	0	158.32	1	0.00	0
EP4-29	Dragonfly Solar, LLC	Solar	156.78	1	156.78	1	0.00	0	156.78	1	0.00	0
EP4-42	Aurora St. Anthony Limited, LLC	Solar	155.92	1	155.92	1	0.00	0	155.92	1	0.00	0
EP4-18	Gustavus Adolphus College	Solar	155.92	1	155.92	1	0.00	0	155.92	1	0.00	0
EP4-46	Geronimo Energy	Solar	155.73	1	155.73	1	0.00	0	155.73	1	0.00	0
EP4-7	Anoka Ramsey Community College	Solar	151.80	1	151.80	1	0.00	0	151.80	1	0.00	0
EP4-2	City of Hopkins	Solar	151.32	1	151.32	1	0.00	0	151.32	1	0.00	0
EP4-5	Best Power, Int'l, LLC	Solar	149.02	1	149.02	1	0.00	0	149.02	1	0.00	0
EP4-45	City of Rogers	Solar	145.47	1	145.47	1	0.00	0	145.47	1	0.00	0
EP4-41	City of Hutchinson	Solar	126.50	2	145.47	1	18.97	-1	145.47	1	0.00	0
EP4-14	Murphy Warehouse Company	Solar	143.17	1	143.17	1	0.00	0	143.17	1	0.00	0
EP4-3	Minneapolis Public School	Solar	141.64	1	141.64	1	0.00	0	141.64	1	0.00	0
EP4-8	Salvation Army	Solar	135.51	2	135.51	2	0.00	0	135.51	2	0.00	0
EP4-9	Mondovi Energy Systems	Biomass	135.03	2	135.03	2	0.00	0	135.03	2	0.00	0
EP4-1	ECOCORP	Biomass	133.50	2	133.50	2	0.00	0	133.50	2	0.00	0
EP4-37	Natural Systems Utilities, LLC/Michael Foods Biomass	Biomass	133.30	2	133.30	2	0.00	0	133.30	2	0.00	0
EP4-24	Bergey Windpower Co	Wind	129.57	2	129.57	2	0.00	0	129.57	2	0.00	0
EP4-4	SGE Partners LLC	Biomass	129.09	2	129.09	2	0.00	0	129.09	2	0.00	0
EP4-47	North Central Regional Council of Carpenters	Solar	128.22	2	128.22	2	0.00	0	128.22	2	0.00	0
EP4-22	Minneapolis Park and Recreation Board (MPRB)	Solar	122.95	2	122.95	2	0.00	0	122.95	2	0.00	0
EP4-31	Heliacal, LLC	Solar	122.57	2	122.57	2	0.00	0	122.57	2	0.00	0
EP4-27	Positive Energy Alternatives	Solar	121.80	3	121.80	3	0.00	0	121.80	3	0.00	0
EP4-30	Gelco Corporation d/b/a GE Fleet Services/Dragonfly Solar	Solar	119.79	3	119.79	3	0.00	0	119.79	3	0.00	0
EP4-34	City of St. Paul	Solar	117.97	3	117.97	3	0.00	0	117.97	3	0.00	0
EP4-25	Hince Farms, Inc.	Solar	117.20	3	117.20	3	0.00	0	117.20	3	0.00	0
EP4-12	Xcel Energy Services, Inc.	Solar	109.63	3	109.63	3	0.00	0	109.63	3	0.00	0
EP4-21	Farmamerica	Solar/Wind	106.28	3	106.28	3	0.00	0	106.28	3	0.00	0
EP4-26	Positive Energy Systems, LLC	Solar	104.75	3	104.75	3	0.00	0	104.75	3	0.00	0
EP4-16	OSEMI, Inc.	Solar	104.27	3	104.27	3	0.00	0	104.27	3	0.00	0
EP4-17	MN Department of Natural Resources (DNR)	Solar	97.08	3	97.08	3	0.00	0	97.08	3	0.00	0
EP4-15	MN Renewable Energy Society	Solar	90.66	3	90.66	3	0.00	0	90.66	3	0.00	0
EP4-19	Adonis Eco-Housing	Solar	87.59	3	87.59	3	0.00	0	87.59	3	0.00	0
EP4-35	Revier Cattle Company	Other	87.11	3	87.11	3	0.00	0	87.11	3	0.00	0
EP4-28	Future Force Inc.	Wind	86.73	3	86.73	3	0.00	0	86.73	3	0.00	0
EP4-23	Green Peak Solar LLC	Solar	76.28	3	76.28	3	0.00	0	76.28	3	0.00	0
EP4-32	Emerald H2, LLC (in partnership with Norfolk Wind Energy)	Wind	63.06	3	63.06	3	0.00	0	63.06	3	0.00	0

Project recommended for funding
Tier 1 Reserve Project
Tier 2 Reserve Project
Reserve Project

RD Scoring Adjustment Progression												
ID Number	Applicant	Type	Supplemental I (8/9/2013)		Supplemental II (9/13/2013)		+/- Difference		Final Audit (12/12/2013)		+/- Difference	
			S&L Score	S&L Category	S&L Score	S&L Category	Score	Category	S&L Score	S&L Category	Score	Category
RD4-7	InterPhases Solar	Solar	156.83	1	156.83	1	0.00	0	156.83	1	0.00	0
RD4-13	Regents of the University of Minnesota	Wind	135.08	1	155.08	1	20.00	0	155.08	1	0.00	0
RD4-12	University of Minnesota	Wind	126.92	1	145.96	1	19.04	0	147.49	1	1.53	0
RD4-5	University of Florida	Biomass	136.37	1	136.37	1	0.00	0	136.37	1	0.00	0
RD4-11	Regents of the University of Minnesota	Biomass	136.37	1	136.37	1	0.00	0	136.37	1	0.00	0
RD4-6	AF-Energy Corporation	Solar/Wind	133.11	1	133.11	1	0.00	0	131.77	1	-1.34	0
RD4-2	Regents of the University of Minnesota	Solar/Wind	123.67	1	123.67	1	0.00	0	124.67	1	1.00	0
RD4-8	City of Red Wing	Biomass	113.75	1	113.75	1	0.00	0	113.75	1	0.00	0
RD4-1	Regents of the University of Minnesota	Biomass	98.58	2	113.37	1	14.79	-1	113.37	1	0.00	0
RD4-9	Small Wind Technologies, LLC	Wind	110.75	1	110.75	1	0.00	0	110.75	1	0.00	0
RD4-3	Angel Alternative Energy	Solar	108.58	2	108.58	2	0.00	0	108.58	2	0.00	0
RD4-21	Solar Cell & LED Technology	Solar	109.17	1	109.17	1	0.00	0	108.42	2	-0.75	1
RD4-4	Xcel Energy Business Systems	Solar	103.92	2	103.92	2	0.00	0	103.92	2	0.00	0
RD4-18	Open Access Technology International	Solar	97.17	2	97.17	2	0.00	0	97.17	2	0.00	0
RD4-17	University of Minnesota - Morris	Other	87.50	2	87.50	2	0.00	0	87.50	2	0.00	0
RD4-16	Regents of the University of Minnesota	Wind	67.83	3	78.00	3	10.17	0	78.00	3	0.00	0
RD4-19	Community Energy Solutions	Biomass	77.91	3	77.91	3	0.00	0	77.91	3	0.00	0
RD4-14	Barr Engineering Co.	Wind	63.00	3	63.00	3	0.00	0	63.00	3	0.00	0

Project recommended for funding
Tier 1 Reserve Project
Tier 2 Reserve Project
Reserve Project

EP Proposals (*REVISED TABLE 5 from 8/9/2013 Supplement)*				
ID Number	**Applicant**	**Type**	**S&L Score**	**S&L Category**
EP4-38	Minnesota Go Solar, LLC	Solar	187.45	1
EP4-20	Target Corporation	Solar	182.85	1
EP4-48	Oak Leaf Energy Partners Ohio, LLC	Solar	180.17	1
EP4-33	PowerWorks Wind Turbines	Wind	173.75	1
EP4-43	Cornerstone Group	Solar	171.45	1
EP4-36	City of Austin	Biomass	164.25	1
EP4-13	Metropolitan Airports Commission	Solar	163.25	1
EP4-6	Best Power, Int'l, LLC	Solar	162.15	1
EP4-39	Goodwill Solar, LLC	Solar	160.71	1
EP4-44	Region Five Development Commission	Solar	158.50	1
EP4-11	Innovative Power Systems, Inc.	Solar	158.32	1
EP4-29	Dragonfly Solar, LLC	Solar	156.78	1
EP4-42	Aurora St. Anthony Limited, LLC	Solar	155.92	1
EP4-18	Gustavus Adolphus College	Solar	155.92	1
EP4-46	Geronimo Energy	Solar	155.73	1
EP4-7	Anoka Ramsey Community College	Solar	151.80	1
EP4-2	City of Hopkins	Solar	151.32	1
EP4-5	Best Power, Int'l, LLC	Solar	149.02	1
EP4-45	City of Rogers	Solar	145.47	1
EP4-41	City of Hutchinson	Solar	145.47	1
EP4-14	Murphy Warehouse Company	Solar	143.17	1
EP4-3	Minneapolis Public School	Solar	141.64	1
EP4-8	Salvation Army	Solar	135.51	2
EP4-9	Mondovi Energy Systems	Biomass	135.03	2
EP4-1	ECOCORP	Biomass	133.50	2
EP4-37	Natural Systems Utilities, LLC/Michael Foods Biomass	Biomass	133.30	2
EP4-24	Bergey Windpower Co	Wind	129.57	2
EP4-4	SGE Partners LLC	Biomass	129.09	2
EP4-47	North Central Regional Council of Carpenters	Solar	128.22	2
EP4-22	Minneapolis Park and Recreation Board (MPRB)	Solar	122.95	2
EP4-31	Heliacal, LLC	Solar	122.57	2
EP4-27	Positive Energy Alternatives	Solar	121.80	3
EP4-30	Gelco Corporation d/b/a GE Fleet Services/Dragonfly Sola	Solar	119.79	3
EP4-34	City of St. Paul	Solar	117.97	3
EP4-25	Hince Farms, Inc.	Solar	117.20	3
EP4-12	Xcel Energy Services, Inc.	Solar	109.63	3
EP4-21	Farmamerica	Solar/Wind	106.28	3
EP4-26	Positive Energy Systems, LLC	Solar	104.75	3
EP4-16	OSEMI, Inc.	Solar	104.27	3
EP4-17	MN Department of Natural Resources (DNR)	Solar	97.08	3
EP4-15	MN Renewable Energy Society	Solar	90.66	3
EP4-19	Adonis Eco-Housing	Solar	87.59	3
EP4-35	Revier Cattle Company	Other	87.11	3
EP4-28	Future Force Inc.	Wind	86.73	3
EP4-23	Green Peak Solar LLC	Solar	76.28	3
EP4-32	Emerald H2, LLC (in partnership with Norfolk Wind Energ	Wind	63.06	3

	Project recommended for funding
	Reserve Project

RD Proposals (*REVISED TABLE 6 from 8/9/2013 Supplement)*				
ID Number		**Type**	**S&L Score**	**S&L Category**
RD4-7	InterPhases Solar	Solar	156.83	1
RD4-13	Regents of the University of Minnesota	Wind	155.08	1
RD4-12	University of Minnesota	Wind	147.49	1
RD4-5	University of Florida	Biomass	136.37	1
RD4-11	Regents of the University of Minnesota	Biomass	136.37	1
RD4-6	AF-Energy Corporation	Solar/Wind	131.77	1
RD4-2	Regents of the University of Minnesota	Solar/Wind	124.67	1
RD4-8	City of Red Wing	Biomass	113.75	1
RD4-1	Regents of the University of Minnesota	Biomass	113.37	1
RD4-9	Small Wind Technologies, LLC	Wind	110.75	1
RD4-3	Angel Alternative Energy	Solar	108.58	2
RD4-21	Solar Cell & LED Technology	Solar	108.42	2
RD4-4	Xcel Energy Business Systems	Solar	103.92	2
RD4-18	Open Access Technology International	Solar	97.17	2
RD4-17	University of Minnesota - Morris	Other	87.50	2
RD4-16	Regents of the University of Minnesota	Wind	78.00	3
RD4-19	Community Energy Solutions	Biomass	77.91	3
RD4-14	Barr Engineering Co.	Wind	63.00	3

Project recommended for funding
Reserve Project

EP Proposals (Technology)				
ID Number	**Applicant**	**Type**	**S&L Score**	**S&L Category**
BIOMASS				
EP4-36	City of Austin	Biomass	164.25	1
EP4-9	Mondovi Energy Systems	Biomass	135.03	2
EP4-1	ECOCORP	Biomass	133.50	2
EP4-37	Natural Systems Utilities, LLC/Michael Foods Biomass	Biomass	133.30	2
EP4-4	SGE Partners LLC	Biomass	129.09	2
SOLAR				
EP4-38	Minnesota Go Solar, LLC	Solar	187.45	1
EP4-20	Target Corporation	Solar	182.85	1
EP4-48	Oak Leaf Energy Partners Ohio, LLC	Solar	180.17	1
EP4-43	Cornerstone Group	Solar	171.45	1
EP4-13	Metropolitan Airports Commission	Solar	163.25	1
EP4-6	Best Power, Int'l, LLC	Solar	162.15	1
EP4-39	Goodwill Solar, LLC	Solar	160.71	1
EP4-44	Region Five Development Commission	Solar	158.50	1
EP4-11	Innovative Power Systems, Inc.	Solar	158.32	1
EP4-29	Dragonfly Solar, LLC	Solar	156.78	1
EP4-42	Aurora St. Anthony Limited, LLC	Solar	155.92	1
EP4-18	Gustavus Adolphus College	Solar	155.92	1
EP4-46	Geronimo Energy	Solar	155.73	1
EP4-7	Anoka Ramsey Community College	Solar	151.80	1
EP4-2	City of Hopkins	Solar	151.32	1
EP4-5	Best Power, Int'l, LLC	Solar	149.02	1
EP4-45	City of Rogers	Solar	145.47	1
EP4-41	City of Hutchinson	Solar	145.47	1
EP4-14	Murphy Warehouse Company	Solar	143.17	1
EP4-3	Minneapolis Public School	Solar	141.64	1
EP4-8	Salvation Army	Solar	135.51	2
EP4-47	North Central Regional Council of Carpenters	Solar	128.22	2
EP4-22	Minneapolis Park and Recreation Board (MPRB)	Solar	122.95	2
EP4-31	Heliacal, LLC	Solar	122.57	2
EP4-27	Positive Energy Alternatives	Solar	121.80	3
EP4-30	Gelco Corporation d/b/a GE Fleet Services/Dragonfly Solar	Solar	119.79	3
EP4-34	City of St. Paul	Solar	117.97	3
EP4-25	Hince Farms, Inc.	Solar	117.20	3
EP4-12	Xcel Energy Services, Inc.	Solar	109.63	3
EP4-26	Positive Energy Systems, LLC	Solar	104.75	3
EP4-16	OSEMI, Inc.	Solar	104.27	3
EP4-17	MN Department of Natural Resources (DNR)	Solar	97.08	3
EP4-15	MN Renewable Energy Society	Solar	90.66	3
EP4-19	Adonis Eco-Housing	Solar	87.59	3
EP4-23	Green Peak Solar LLC	Solar	76.28	3
OTHER				
EP4-21	Farmamerica	Solar/Wind	106.28	3
EP4-35	Revier Cattle Company	Other	87.11	3
WIND				
EP4-33	PowerWorks Wind Turbines	Wind	173.75	1
EP4-24	Bergey Windpower Co	Wind	129.57	2
EP4-28	Future Force Inc.	Wind	86.73	3
EP4-32	Emerald H2, LLC (in partnership with Norfolk Wind Energy)	Wind	63.06	3

Project recommended for funding
Reserve Project

RD Proposals (Technology)				
ID Number	**Applicant**	**Type**	**S&L Score**	**S&L Category**
BIOMASS				
RD4-5	University of Florida	Biomass	136.37	1
RD4-11	Regents of the University of Minnesota	Biomass	136.37	1
RD4-8	City of Red Wing	Biomass	113.75	1
RD4-1	Regents of the University of Minnesota	Biomass	113.37	1
RD4-19	Community Energy Solutions	Biomass	77.91	3
SOLAR				
RD4-7	InterPhases Solar	Solar	156.83	1
RD4-3	Angel Alternative Energy	Solar	108.58	2
RD4-21	Solar Cell & LED Technology	Solar	108.42	2
RD4-4	Xcel Energy Business Systems	Solar	103.92	2
RD4-18	Open Access Technology International	Solar	97.17	2
OTHER				
RD4-6	AF-Energy Corporation	Solar/Wind	131.77	1
RD4-2	Regents of the University of Minnesota	Solar/Wind	124.67	1
RD4-17	University of Minnesota - Morris	Other	87.50	2
WIND				
RD4-13	Regents of the University of Minnesota	Wind	155.08	1
RD4-12	University of Minnesota	Wind	147.49	1
RD4-9	Small Wind Technologies, LLC	Wind	110.75	1
RD4-16	Regents of the University of Minnesota	Wind	78.00	3
RD4-14	Barr Engineering Co.	Wind	63.00	3

Project recommended for funding
Reserve Project

Cycle 4 Proposals Selected for RDF Advisory Group Review				
Proposal	**Applicant**	**Grant Request**	**Score**	**Category**
Energy Production Proposals				
EP4-38	Minnesota Go Solar	$7,439,000	187.45	1
EP4-20	Target Corporation	$583,513	182.85	1
EP4-48	Oak Leaf Energy Partners Ohio	$2,000,000	180.17	1
EP4-33	PowerWorks Wind Turbines	$1,998,416	173.75	1
EP4-43	Cornerstone Group	$310,310	171.45	1
EP4-36	City of Austin	$3,565,000	164.25	1
EP4-13	Metropolitan Airports Commission	$2,022,507	163.25	1
EP4-6	Best Power, Int'l (St. John's)	$172,213	162.15	1
EP4-39	Goodwill Solar	$1,075,250	160.71	1
EP4-11	Innovative Power Systems, Inc.	$1,850,000	158.32	1
EP4-29	Dragonfly Solar (Dodge Center)	$1,650,000	156.78	1
EP4-42	Aurora St. Anthony Limited	$398,000	155.92	1
EP4-18	Gustavus Adolphus College	$480,000	155.92	1
EP4-46	Geronimo Energy	$1,503,000	155.73	1
EP4-7	Anoka Ramsey Community College	$828,900	151.8	1
EP4-2	City of Hopkins	$708,204	151.32	1
EP4-5	Best Power, Int'l, (Sisters of Notre Dame)	$900,000	149.02	1
EP4-45	City of Rogers	$1,470,544	145.47	1
EP4-41	City of Hutchinson	$958,369	145.47	1
EP4-14	Murphy Warehouse Company	$2,016,118	143.17	1
EP4-3	Minneapolis Public School	$917,250	141.64	1
EP4-9	Mondovi Energy Systems	$2,000,000	135.03	2
EP4-37	Natural Systems Utilities	$2,000,000	133.3	2
EP4-24	Bergey Windpower Co.	$1,106,600	129.57	2
EP4-4	SGE Partners LLC (Sanimax)	$5,000,000	129.09	2
EP4-22	Minneapolis Park and Recreation Board	$969,741	122.95	2
EP4-34	City of St. Paul	$555,750	117.97	3
EP4-12	Xcel Energy Services	$10,800,000	109.63	3
EP4-21	Farmamerica	$600,000	106.28	3
EP4-17	MN Department of Natural Resources	$641,000	97.08	3
EP4-15	MN Renewable Energy Society	$2,661,320	90.66	3
	Total Energy Production Proposals	**$59,181,005**		

Research & Development Proposals				
RD4-7	Interphases Solar	$1,000,000	156.83	1
RD4-13	U of M (VWS)	$1,391,684	155.08	1
RD4-12	U of M (Noise)	$625,102	147.49	1
RD4-11	U of M - NRRI (Torrefaction)	$1,899,499	136.37	1
RD4-5	University of Florida	$1,109,538	136.37	1
RD4-6	AF-Energy Corporation	$1,573,680	133.11	1
RD4-2	U of M (Dairy)	$982,408	124.67	1
RD4-8	City of Red Wing	$1,999,500	113.75	1
RD4-9	Small Wind Turbines, LLC	$446,944	110.75	1
RD4-21	Solar Cell & LED Technology	$1,000,000	109.17	1
RD4-4	Xcel Energy Business Systems	$390,000	103.92	2
RD4-1	U of M (Gasification)	$999,999	98.58	2
RD4-18	Open Access Technology International	$1,945,223	97.17	2
RD4-19	Community Energy Solutions	$250,000	77.91	3
RD4-16	U of M (Wind Tunnel)	$299,472	67.83	3
RD4-14	Barr Engineering	$161,081	63.00	3
	Total Research & Development Proposals	**$16,074,130**		
Higher Education Proposals				
HE4-1	MnSCU	$5,500,000	145.01	N/A
HE4-3	University of St. Thomas	$2,157,215	120.00	N/A
HE4-2	University of Minnesota	$6,900,300	117.96	N/A
	Total Higher Education Proposals	**$16,074,130**		
	Total Proposals for Group Discussion	**$89,812,650**		

Cycle 4 Proposals Not Selected for RDF Advisory Group Review				
Proposal	**Applicant**	**Grant Request**	**Score**	**Category**
Energy Production Proposals				
EP4-44	Region Five Development Commission	$1,993,659	138.5	2
EP4-8	Salvation Army	$460,000	135.51	2
EP4-1	ECOCORP	$2,000,000	133.5	2
EP4-47	North Central Region Council of Carpenters	$1,102,395	128.22	2
EP4-31	Heliacal, LLC	$1,999,481	122.57	2
EP4-27	Positive Energy Alternatives	$2,000,000	121.8	3
EP4-30	Gelco Corporation	$3,129,400	119.79	3
EP4-25	Hince Farms, Inc.	$350,000	117.2	3
EP4-26	Positive Energy Systems, LLC	$2,000,000	104.75	3
EP4-16	OSEMI, Inc.	$1,750,000	104.27	3
EP4-19	Adonis Eco-Housing	$2,046,673	87.59	3
EP4-35	Revier Cattle Company	$6,756,225	87.11	3
EP4-28	Future Force Inc.	$2,778,400	86.73	3
EP4-23	Green Peak Solar LLC	$2,300,000	76.28	3
EP4-32	Emerald H2	$1,984,977	63.06	3
	Total Energy Production Proposals	**$32,651,210**		
Research & Development Proposals				
RD4-3	Angel Alternative Energy	$593,604	108.58	2
RD4-17	University of Minnesota - Morris	$2,078,708	87.5	2
	Total Research & Development Proposals	**$2,672,312**		
	Total Proposals Not Selected for Discussion	**$35,323,522**		

EP Award Recommendations					
Independent Evaluator Rank	**ID Number**	**Applicant**	**Type**	**Amount Recommended [1]**	**Total Project Cost**
2	EP4-20	Target Corporation	Solar (350 kW)	$583,513	$1,060,933
5	EP4-43	Cornerstone Group	Solar (152 kW)	$310,310	$705,250
7	EP4-13	Metropolitan Airport Commission	Solar (1,180 kW)	$2,022,507	$4,189,000
9	EP4-39	Goodwill Solar, LLC	Solar (700 kW)	$1,075,250	$1,525,250
10	EP4-11	Innovative Power Systems, Inc.	Solar (967 kW)	$1,850,000	$2,698,200
12	EP4-42	Aurora St. Anthony, LLC	Solar (252 kW)	$398,000	$911,798
15	EP4-7	Anoka Ramsey Community College	Solar (458 kW)	$828,900	$1,825,976
17	EP4-5	Best Power Int'l, LLC	Solar (907 kW)	$900,000	$1,811,857
20	EP4-3	Minneapolis Public School	Solar (485 kW)	$917,250	$1,949,002
23	EP4-9	Mondovi Energy Systems	Biomass (2,000 kW)	$2,000,000	$13,220,683
26	EP4-24	Bergey Windpower Co	Wind (500 kW)	$1,106,600	$3,191,745
27	EP4-4	SGE Partners, LLC	Biomass (1,100 kW)	$5,000,000	$14,847,764
30	EP4-22	Minneapolis Park & Recreation Board	Solar (200 kw)	$969,741	$1,119,133
			Total	**$17,962,071**	**$49,056,591**

[1] The RDF advisory group and the Company recommend fully funding the amounts requested for projects instead of only a portion of the requested funding.

EP Proposals (Award Recommendations and Scoring Deviations)					
ID Number	**Applicant**	**Score**	**Recommendation**	**S&L Category**	**Deviation**
EP4-38	Minnesota Go Solar, LLC	187.45	No Award	1	Was disfavored by the advisory group as it would require too large of a portion of the funds anticipated to be awarded to EP projects (over a third of available funds). The energy price per kWh was high relative to other EP proposals and the locations for constructing the facilities were still open, which adds uncertainty. From prior experience, RDF proposals that do not have specific sites identified or a very clear plan to identify sites have significant project delays. Further, the overall timeline proposed for the project was not long enough based on the Company's prior experiences negotiating power purchase agreements for projects of the scale proposed.
EP4-20	Target Corporation	182.85	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.
EP4-48	Oak Leaf Energy Partners Ohio, LLC	180.17	Reserve	1	The advisory group was unable to reach a consensus given identified, but likely surmountable, contract issues and that there were other available rooftop solar projects to select from. The advisory group also recognized value in a municipal partner who has successfully developed an RDF project, and added this proposal to the reserve list.
EP4-33	PowerWorks Wind Turbines	173.75	No Award	1	The advisory group disfavored the proposal to use refurbished turbines given history of mixed results in service and reliability. The advisory group identified a preference to introduce new wind technology by supporting the introduction of new models versus funding the older technology.
EP4-43	Cornerstone Group	171.45	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.
EP4-36	City of Austin	164.25	Reserve	1	The advisory group noted that the City of Austin would experience reduced wastewater costs because of the project. The overall funding request was on the higher end of submitted proposals. In balancing funding for biomass proposals, the advisory group reached a funding consensus on two proposals based in the Xcel Energy service territory. The advisory group added this proposal to the reserve list.
EP4-13	Metropolitan Airports Commission	163.25	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.
EP4-6	Best Power, Int'l, LLC	162.15	Reserve	1	The advisory group identified this project as an enhancement of a prior RDF cycle project. The advisory group was unable to reach a consensus since the project was mainly an expansion of a prior-funded solar installation, and added this proposal to the reserve list.
EP4-39	Goodwill Solar, LLC	160.71	**Award**	1	Elevated to 4th preference due to credibility of developer and the highly visible location in a diverse community

EP Proposals (Award Recommendations and Scoring Deviations)					
ID Number	**Applicant**	**Score**	**Recommendation**	**S&L Category**	**Deviation**
EP4-44	Region Five Development Commission	158.50	Reserve	1	After accounting for corrected scoring error, the advisory group considered the project again and was unable to reach a consensus on recommending the project for funding. The advisory group noted that the proposal was lacking in the areas of innovativeness, and benefits to enhancing the renewable market penetration. The advisory group reached agreement that the project should be added to the reserve list.
EP4-11	Innovative Power Systems, Inc.	158.32	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.
EP4-29	Dragonfly Solar, LLC	156.78	Reserve	1	The advisory group identified this proposal as one that would use modules considered the next generation technology with only recent application in the United States market. The overall concept, however, is not novel. The advisory group was not able to provide unanimous support for the project, so it was added to the reserve list.
EP4-42	Aurora St. Anthony Limited, LLC	155.92	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.
EP4-18	Gustavus Adolphus College	155.92	No Award	1	The advisory group identified other similar proposals with both higher and lower technical scores (EP4-5 and EP4-6), although close. The advisory group determined that other similar projects in the Xcel Energy service territory would provide greater benefits to Xcel Energy ratepayers. The advisory group did not recommend this project for funding.
EP4-46	Geronimo Energy	155.73	No Award	1	The advisory group noted many rooftop solar proposals were received during the funding cycle. Other projects received higher technical scores and are similar installation proposals (EP4-39, for example). The advisory group did not recommend the project for funding.
EP4-7	Anoka Ramsey Community College	151.80	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.
EP4-2	City of Hopkins	151.32	No Award	1	The advisory group noted that several solar installations on government buildings were proposed during this RDF cycle. Also, many rooftop solar proposals were received. The advisory group found the overall proposal not as well developed as others, which weighed against the advisory group's qualitative analysis. The advisory group agreed not to recommend the project for funding.
EP4-5	Best Power, Int'l, LLC	149.02	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.

EP Proposals (Award Recommendations and Scoring Deviations)					
ID Number	**Applicant**	**Score**	**Recommendation**	**S&L Category**	**Deviation**
EP4-45	City of Rogers	145.47	No Award	1	The advisory group noted that several solar installations on government buildings were proposed during this RDF cycle. Also, many rooftop solar proposals were received. The project has notable attributes but the advisory group's qualitative evaluation in the areas of innovativeness, enhancing market penetration, overall visibility, and balance of projects to receive funding weighed against the project. The advisory group agreed not to recommend the project for funding.
EP4-41	City of Hutchinson	145.47	Reserve	1	The advisory group acknowledged the innovative opportunity to develop a solar energy resource on a closed landfill. The advisory group also acknowledged that many solar installations were proposed this funding cycle. The advisory group was unable to reach a consensus on funding this project. The advisory group agreed to add the project to the reserve list.
EP4-14	Murphy Warehouse Company	145.47	No Award	1	The advisory group noted many rooftop solar proposals were received during the funding cycle. The advisory group noted a low cost share (5 percent versus up to 50 percent) and inconsistencies in the proposal including a discrepancy between total demand versus proposed size, that could not be reconciled with submitted materials. The advisory group did not recommend the project for funding.
EP4-3	Minneapolis Public School	141.64	**Award**	1	Advisory group concurred with Sargent & Lundy categorization.
EP4-8	Salvation Army	135.51	No Award	2	While the advisory group felt the proposal was intriguing, it focused on emergency preparedness instead of every day operations. The advisory group was unable to reach a consensus on funding this project or on adding it to the reserve list. The advisory group did not recommend this project for funding.
EP4-9	Mondovi Energy Systems	135.03	**Award**	2	The advisory group noted that this proposal included the use of wastes from the community fro generation. The advisory group unanimously supported recommending this project for funding.
EP4-1	ECOCORP	133.50	No Award	2	The project is larger on a capacity basis than other biomass projects recommended for funding. The advisory group, however, was concerned about the power purchase agreement price and overall lack of innovativeness for waste material processing. The advisory group unanimously agreed to not recommend this project for funding.

EP Proposals (Award Recommendations and Scoring Deviations)					
ID Number	**Applicant**	**Score**	**Recommendation**	**S&L Category**	**Deviation**
EP4-37	Natural Systems Utilities, LLC	133.30	No Award	2	The advisory group noted the higher total resource cost for this project compared to other biomass submissions. Also, the advisory group felt some technical aspects were not fully developed and the project proposed to use self-created waste. The project, however, would not require a power purchase agreement. The advisory group was unable to reach a consensus on funding or adding the project to the reserve list. The advisory group did not recommend this project for funding.
EP4-24	Bergey Windpower Co	129.57	**Award**	2	The advisory group identified the project as one that could help demonstrate small wind viability. The advisory group also noted the uniqueness of the proposal. The advisory group reached a consensus to recommend the project for funding.
EP4-4	SGE Partners LLC	129.09	**Award**	2	The advisory group noted that this project proposed an anaerobic digestion facility in an urban setting that would use wastes from various sources. The project would also deliver gas to the pipeline grid. The advisory group reached a consensus to recommend the project for funding.
EP4-47	North Central Regional Council of Carpenter	128.22	No Award	2	The advisory group noted many rooftop solar proposals were received during the funding cycle. Other projects received higher technical scores and are similar installation proposals. The advisory group did not recommend th project for funding.
EP4-22	Minneapolis Park and Recreation Board	122.95	**Award**	2	The advisory group noted the high visibility of the proposed project and the public interpretive and educational program. No power purchase agreement would be required. The advisory group reached a consensus to recommend the project for funding.
EP4-31	Heliacal, LLC	122.57	No Award	2	The advisory group noted many rooftop solar proposals were received during the funding cycle. Other projects received higher technical scores and are similar installation proposals. The advisory group did not recommend th project for funding.
EP4-27	Positive Energy Alternatives	121.80	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-30	Gelco Corporation /Dragonfly Solar	119.79	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-34	City of St. Paul	117.97	Reserve	3	The advisory group noted that the proposal lacked some detail regarding total project costs but that it would have high visibility and provide public observation opportunities. The advisory group reached a consensus to add this project to the reserve list.
EP4-25	Hince Farms, Inc.	117.20	No Award	3	Advisory group concurred with Sargent & Lundy categorization.

EP Proposals (Award Recommendations and Scoring Deviations)					
ID Number	**Applicant**	**Score**	**Recommendation**	**S&L Category**	**Deviation**
EP4-12	Xcel Energy Services, Inc.	109.63	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-21	Farmamerica	106.28	Reserve	3	The advisory group noted that the project would combine both wind and solar technologies. The advisory group reached a consensus to add this project to the reserve list.
EP4-26	Positive Energy Systems, LLC	104.75	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-16	OSEMI, Inc.	104.27	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-17	MN Department of Natural Resources	97.08	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-15	MN Renewable Energy Society	90.66	Reserve	3	The advisory group noted the project could serve as a demonstration of an alterative to renewable energy ownership in Minnesota. The advisory group felt the community concept and structure identified was the best that had been proposed. The proposal lacked some detail, including omitting interconnection costs from the budget. The advisory group reached a consensus to add the project to the reserve list.
EP4-19	Adonis Eco-Housing	87.59	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-35	Revier Cattle Company	87.11	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-28	Future Force Inc.	86.73	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-23	Green Peak Solar LLC	76.28	No Award	3	Advisory group concurred with Sargent & Lundy categorization.
EP4-32	Emerald H2, LLC	63.06	No Award	3	Advisory group concurred with Sargent & Lundy categorization.

RD Award Recommendations					
Rank	**ID Number**	**Applicant**	**Type**	**Amount Recommended**	**Total Project Cost**
4	RD4-13	U. of Minnesota	Wind	$1,391,684	$1,391,684
6	RD4-12	U. of Minnesota	Wind	$625,102	$625,102
7	RD4-2	U. of Minnesota	Wind/Solar	$982,408	$982,408
18	RD4-14	Barr Engineering	Wind	$161,081	$161,081
			Total	**$3,160,275**	**$3,160,275**

RD Proposals (Award Recommendations and Scoring Deviations)					
ID Number	**Applicant**	**Score**	**Recommendation**	**S&L Category**	**Deviation**
RD4-7	InterPhases Solar	156.83	Reserve	1	The advisory group was unable to reach a consensus to recommend this project for funding, for several reasons, including that the proposer continued to rely on the RDF instead of finding an industry partner. Its high technical score and post investment from the RDF allowed the advisory group to unanimously recommend it be added to the reserve lists.
RD4-13	University of Minnesota	155.08	**Award**	1	The advisory group concurred with Sargent & Lundy categorization.
RD4-12	University of Minnesota	147.49	**Award**	1	The advisory group concurred with Sargent & Lundy categorization.
RD4-5	University of Florida	136.37	Reserve	1	In the prior RDF cycle, contract negotiations were an issue with this proposer. Also, the grant request was in excess of $1 million, and the proposal did not explain the justification for the larger request. The advisory group was unable to reach a consensus to recommend the project for funding, but was intrigued by the development of a mobile digester. The high technical score and unique proposal resulted in the advisory group adding it to the reserve list.
RD4-11	University of Minnesota	136.37	Reserve	1	The advisory group was unable to reach a consensus to recommend this project for funding, identifying that the proposal did not include royalty sharing and a grant request in excess of $1 million without explaining the justification, as concerns. The advisory group was, however, able to reach a consensus to recommend the project for the reserve list.
RD4-6	AF-Energy Corporation	131.77	No Award	1	The advisory group expressed concern there was no justification for the grant request (fifth highest) in excess of $1 million. The advisory group was unable to reach a consensus for funding or the reserve list, so the project was not recommended for funding.
RD4-2	University of Minnesota	124.67	**Award**	1	The advisory group concurred with Sargent & Lundy categorization.
RD4-8	City of Red Wing	113.75	Reserve	1	The proposal included some justification for why a higher award was requested. The advisory group was unable to reach a consensus to recommend it for funding, primarily due to the qualitative evaluation of refuse as a renewable fuel. The advisory group was able to reach a consensus to recommend the project be added to the reserve list.
RD4-1	University of Minnesota	113.37	Reserve	1	The advisory group reconsidered this project for funding after a scoring error was corrected by Sargent & Lundy. The advisory group was unable to reach a consensus on funding due to the applicability of this type of gasification, but was able to agree to add it to the reserve list.
RD4-9	Small Wind Technologies, LLC	110.75	No Award	1	The advisory group expressed concern over the applicability of the proposed research to the local market. Further, the proposal did not identify the methodology that would be used to select and identify the micro turbines. The advisory group was unable to reach a consensus on funding or the reserve list, so the project was not recommended for funding.
RD4-3	Angel Alternative Energy	108.58	No Award	2	The advisory group was unable to reach a consensus on funding or the reserve list, so the project was not recommended for funding.
RD4-21	Solar Cell & LED Technology	108.42	No Award	2	The proposal included limited information on the project and lacked details on responsiblities for research activities and outcomes. The advisory group agreed to not recommend the project for funding.
RD4-4	Xcel Energy Business Systems	103.92	Reserve	2	The advisory group identified that other sources of funding for the project were available but, if funded through the RDF, the finding would be publically available through milestone reports. The advisory group reached a consensus to add it to the reserve list.
RD4-18	Open Access Technology International	97.17	No Award	2	The advisory group reached a consensus that, due to a relatively low technical score and no justification within the proposal to explain the greater than average grant request, the project should not be recommended for funding.
RD4-17	University of Minnesota - Morris	87.50	No Award	2	The advisory group reached a consensus that, due to a relatively low technical score and no justification within the proposal to explain the greater than average grant request, the project should not be recommended for funding.
RD4-16	University of Minnesota	78.00	No Award	3	The advisory group concurred with Sargent & Lundy categorization.
RD4-19	Community Energy Solutions	77.91	No Award	3	The advisory group concurred with Sargent & Lundy categorization.
RD4-14	Barr Engineering Co.	63.00	**Award**	3	The advisory group identified several qualitative attributes to overcome a low technical score. The results of the project would help develop a more user friendly product than what is currently available. This could result in a tool with commercial value. The advisory group reached a consensus to recommend the project for funding.

HE Block Grant Recommendations					
Project ID	**Institution**	**Grant Request**	**Score**	**Advisory Group Recommendation**	**Xcel Energy Recommendation**
HE4-1	MnSCU	$5,500,000	145.01	$4,500,000	$5,500,000
HE4-2	U. of St. Thomas	$2,157,215	120.00	$1,500,000	$1,500,000
HE4-3	U. of Minnesota	$6,900,300	117.96	$3,000,000	$2,000,000
			Total HE Awards	$9,000,000	$9,000,000

Reserve Projects					
Funding Priority	**Proposal ID**	**Applicant**	**Technology**	**Grant Award**	**S & L Score**
1	EP4-34	City of St. Paul (Saints Stadium)	Solar	$555,750	117.97
2	EP4-48	Oak Leaf Energy Partners Ohio, LLC	Solar	$2,000,000	180.17
3	EP4-15	MN Renewable Energy Society	Solar	$2,661,320	90.66
4	EP4-29	Dragonfly Solar, LLC (Dodge Center)	Solar	$1,650,000	156.78
5	RD4-11	U of M - NRRI (Torrefaction)	Biomass	$1,899,499	136.37
6	EP4-21	Farmamerica	Solar/Wind	$600,000	106.28
7	RD4-4	Xcel Energy Business Systems	Solar	$390,000	103.92
8	EP4-41	City of Hutchinson	Solar	$958,369	126.50
9	EP4-6	Best Power, Int'l, LLC (St. John's)	Solar	$172,213	162.15
10	EP4-36	City of Austin	Biomass	$3,565,000	164.25
11	EP4-44	Region Five Development Commission	Solar	$1,993,659	158.50
12	RD4-8	City of Red Wing	Biomass	$1,999,500	113.75
13	RD4-5	University of Florida	Biomass	$1,109,538	136.37
14	RD4-7	Interphases Solar	Solar	$1,000,000	156.83
15	RD4-1	U of M (Gasification)	Biomass	$999,999	113.37

Recommended EP Proposal Summaries

EP4-3 Minneapolis Public Schools

Title: Edison High School Green Campus Solar Project

Overall Rank: 20 Technology Rank: S-18

Total Score (out of 230): 141.64

Preferences Received: Located in MN and WI service territories of Xcel Energy
Sponsored by K-12 school/local government

RDF Funding requested: $917,250 Total Project Costs: $1,949,002

Installed Capacity: 485 kW_{DC}

Project Goal: To develop a green campus demonstration model by serving as a hands-on "classroom" that will be integrated with the school's science, math, and technology curricula.

Project Description: Thomas Edison High School in Northeast Minneapolis will construct and operate a comprehensive solar energy project as part of its "green campus" initiative that also includes demonstrations of other sustainability measurers, such as urban storm water management. This project will significantly advance Edison's leadership role as the green campus demonstration model among Minneapolis public schools and K-12 schools around the state. The solar facility will serve as hands-on "classrooms" that will be integrated with the school's science, math and technology curricula and will also be a public demonstration of solar energy technology in the Holland Neighborhood of Minneapolis. Edison High is an inner-city public school with a high percentage of students form lower-income and students of color. Often, these students are less likely to be exposed to hands-on demonstrations of advanced technologies such as solar energy. As an educational and research component of this project, Edison will work closely with tenKsolar to demonstrate the unique fire safety features of the latest tenKsolar technology. Over the life of the project, in addition to educating students and the public about solar energy, these solar energy installations will save operating costs for school facilities and contribute net revenues to the school budget. Electricity generated will be consumed on site.

The photovoltaic (PV) facility will include a 300 kW roof-mounted array that uses tenKsolar panels, two 20-watt solar electric vehicle charging station demonstrations with energy storage, a 50 kW roof-mounted array on the Firemen's Museum on the

school campus, and a 112 kW that will be incorporated into awnings on school buildings. Edison will negotiate a design-build contract with Sundial Solar Consultants which will guarantee system performance and perform all operation and maintenance on the system for at least the first five years. Sundial will establish a project-specific limited liability corporation for the project in conjunction with a tax equity partner that will facilitate the project's access to federal tax incentives for solar energy installations.

Anticipated Benefits: The project has been specifically designed to evaluate the ability of solar, and in some cases electric energy storage, to be integrated with a school's facility. This knowledge will be transferable to other school facilities in Minnesota. As a community institution in Northeast Minneapolis, Edison is in a strong position to educate the general public, as well as its students, about the solar energy and renewable electric utilization.

- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions

Measurable Outcomes:
- Certification of 485 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation: The RDF advisory group strongly supported this project due to Edison High School is an inner-city high school with focus on sustainability and also a good math and science curriculum. Incorporating photovoltaic panels into the awnings is expensive, which resulted in a lower technical score, but is a unique feature for the project as well as using electric vehicle charging stations as an energy storage concept.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-4 SGE Partners LLC

Title: South St. Paul Anaerobic Digestion and Electrical Generation

Overall Rank: 27 Technology Rank: B-5

Total Score (out of 230): 129.09

Preferences Received: Located in MN and WI service territories of Xcel Energy
Grant award disbursed as single, lump sum payment
Utilizes non-agricultural residues for a feedstock

RDF Funding requested: $5,000,000 Total Project Costs: $14,847,764

Installed Capacity: 1.1 MW_{AC}

Project Goal: To design, engineer, construct, and commission a commercial anaerobic digester and generator to convert biogas to electricity which will demonstrate the viability of an urban biodigester utilizing nonagricultural residue.

Project Description: Sanimax Industries Inc. (Sanimax) and Green Energy Partners Inc. (GEP) have partnered to form SGE Partners LLC (SGE) for the construction and operation of a commercial anaerobic digestion in South St. Paul, Minnesota, adjacent to the existing Sanimax rendering facility. The anaerobic digester will be based on existing technologies and will be designed to process approximately 150,000 tons per year of non-agricultural source separated organic materials from the rendering process as well as organic waste from restaurants and food processors within the metropolitan area. Following the biological digestion, approximately 400,000 dekatherms per year of pipeline quality, green natural gas will be produced. Using a 1.1 MW generator, a portion of the biogas will be converted to electricity while the remaining biogas will be processed and delivered to the pipeline grid and to the Sanimax rendering facility to be used in the rendering process. Electricity generated will be sold to Xcel Energy.

The facility will be relatively large in scale compared to many anaerobic digester projects and have notable flexibility in the range of materials it is capable of processing and the range of end uses for biogas it is capable of supporting. The facility will be designed to aggressively control emissions and odor by keeping indoors and under reverse air flow all feedstock storage, loading, and unloading. The scale, urban setting, and anticipated diversity of feedstock materials will require a tailored design. SGE plans to use a "mixed plug-flow" type digester. This is a proven

technology that has been widely deployed in facilities around the world. With this type of design, material is continuously added at the inlet of the digester, while effluent is continuously pumped at the outlet. Contrary to a "continuous mixing" type digester, there is little to no agitation inside the plug flow reactor and the new material added to the digester pushes material through the digestion process. Throughout this process, biogas is collected from the top of the reactor to be cleaned and compressed.

SGE will be using the 1,110 KW Waukesha genset recovered from the Cycle 1 project AB-07 which Xcel Energy will be donating to the project. The disposition of this equipment in this manner is anticipated to achieve anticipated power generation, REC's, and emission reductions benefits to ratepayers which are similar to the original project location at the Seneca facility in Montgomery.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Provide baseload renewable electric generation
- Emission reductions
- Improve air quality
- Utilizes variety of feedstocks that are available within the community
- Scalable model for future anaerobic installations
- Incorporates 1,100 kW genset from cycle one

Measurable Outcomes:
- Certification of 1.1 MW_{AC} installed capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation: The RDF advisor group strongly supported this proposal because it was an innovative urban biogas project that may prove to be a future model for urban waste reduction and energy needs. The project would also be a significant urban biomass initiative that could provide good visibility for sustainable renewable energy development. The project will foster long-term job creation and enhance the tax base in South St. Paul.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-5 Best Power Int'l, LLC

Title: School Sisters of Notre Dame Solar Park Project

Overall Rank: 17 Technology Rank: S-15

Total Score (out of 230): 149.02

Preferences Received: Located in MN and WI service territories of Xcel Energy
Grant award disbursed as single, lump sum payment

RDF Funding requested: $900,000 Total Project Costs: $1,811,857

Installed Capacity: 907 kW_{DC}

Project Goal: To provide an increased knowledge of solar by installing a photovoltaic facility that will utilize 1,000 Vdc platform, versus a 600 Vdc platform, which will provide a process for local electrical inspectors to understand the 1,000 Vdc system

Project Description: A ground-mounted photovoltaic (PV) facility will be constructed on the School Sisters of Notre Dame (SSND) campus in Mankato, MN. The Mankato campus of the Central Pacific Province of the SSND, located on Good Counsel Hill in Mankato, Minnesota is where the proposed solar park would reside. The campus has strongly pursued sustainability for many years. They have a "Green Habit Campaign" which is an initiative of the SSND Green Team to recognize and promote sustainable living practices. By having a large-scale solar park built on their campus, they could not think of a better way to lead and teach sustainability to their local community. The campus is located near the northwest quadrant of US Highway 14 and North Victory Drive. Best Power Int'l, LLC (BPI), will lease approximately five acres of land from SSND over a 20-year agreement. BPI will own, operate, and maintain the system. Electricity generated will be sold to Xcel Energy.

The Solar Park will consist of approximately 3,020 polycrystalline silicon PV panels. The panels will be supported by a foundation consisting of driven galvanized steel piles. The racking will be fixed, facing at an angle of 190 degrees from north to increase the amount of energy produced in the afternoon that will provide more benefit to Xcel ratepayers than a South facing array. The Solar Park will be the first large-scale solar project to be implemented utilizing a maximum operating voltage of 1,000 Vdc. By switching to a 1,000 Vdc platform, from the typical 600 Vdc platform, savings in wire size, other BoS components, as well as installation time will help drive down the cost of solar in the industry.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions
- Introduction of new 1,000 Vdc technology
- Availability of production data and cost data for educational and research opportunities

Measurable Outcomes:
- Certification of 907 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity
- Cost benefit analysis of a 1,000 Vdc solar system over a 600 Vdc solar system
- Post-construction interview with local electrical inspector

Recommendation: The RDF advisory group strongly supported this project based on the price of energy and a certain degree of novelty. The 1000 Vdc technology has been promising in other places (i.e.California, Europe, and Canada) and this facility may help move the regional solar industry into new areas and possibly contribute to higher efficiencies. The location in Mankato would also provide high solar energy visibility.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-7 Anoka Ramsey Community College (ARCC)

Title: Research Coordinated Solar PV Demonstration Project

Overall Rank: 15 Technology Rank: S-13

Total Score (out of 230): 151.80

Preferences Received: Located in MN and WI service territories of Xcel Energy
Sponsored by K-12 school/local government

RDF Funding requested: $828,900 Total Project Costs: $1,825,976

Installed Capacity: 458.38 kW_{DC}

Project Goal: To demonstrate three types of solar energy deployment which will be a living, hands-on laboratory for research and skills development.

Project Description: AARC will be installing two photovoltaic (PV) arrays, a unique ground-mount array and a roof-mounted array on its Training Center, as well as a solar electric vehicle (EV) charging station that is integrated with a carport outside its main administrative building. The solar arrays and the EV charging station will be monitored for performance data and will also be hands-on laboratories integrated with solar energy related coursework and energy research activities at ARCC. The training center itself will self-generate about 70 percent of the building energy demand from the roof-mounted solar array. The Solar EV charging station will demonstrate a stand-alone model for recharging electric vehicles by integrating energy storage with PF generation. The facility will be used in the evaluation of the possible development of a micro-grid renewable energy system for the campus. Electricity generated will be consumed on site.

The largest of the PV arrays will be a 355.88 kW_{DC} ground-mounted array adjacent to the ARCC Training Center at the main entrance to the campus which is often the first stop for new students and visitors to the campus. A roof-mounted array of 77.08 kW_{DC} will be installed on the roof of the Training Center. The solar EV charging station will be located on the parking lot immediately adjacent to the ARCC's main administration building and will include 25.42 kW_{DC} capacity. One EV charger and two 9.2 Silent Power energy storage units will also be integrated into the carport structure. The ground-mount and roof-mount arrays will include standard Solar Log monitoring systems linked to computers in the Training Center for tracking of real-time and historical output from the facility. There may be an opportunity, working with tenKsolar, to orient some or all of the ground-mounted panels west or east of

due south or "off-azimuth" in order to measure shifts in time-of-day production form the systems and impacts on total output. This off-azimuth positioning could be changed periodically to test different models of solar shifting. ARCC will use Titan solar modules released tenKsolar in April 2014 and are rated at 410-watts and 440-watts. These panels, when combined with the reflective gain from the integrated reflective racking system manufactured by 3M Company will give modules some of the highest output in the industry. Standard Solar Log monitoring systems will collect time-of-day production for research and analysis purposes.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Demonstrate demand management from distributed solar generation
- Renewable electric generation during periods of peak power
- Emission reductions
- Support better workforce training and evaluate the cost-effectiveness of various solar technologies in Minnesota
- Provide a practical and applied component. to ARCC training initiatives

Measurable Outcomes:
- Certification of 458.38 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation: With the exception of to clarify that the curriculum development consists of how to integrate students, training development, and to utilize the charging station in education; the RDF advisory group strongly supported this project. Of the proposals that use tenKsolar, the community college facilities has the greatest opportunity to provide a solar awareness platform.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-9 Mondovi Energy Systems

Title: Installation of a Community Based Anaerobic Digester in Mondovi, Wisconsin

Overall Rank: 23 Technology Rank: B-2

Total Score (out of 230): 135.03

Preferences Received: Located in MN and WI service territories of Xcel Energy
Utilizes non-agricultural residues for a feedstock

RDF Funding requested: $2,000,000 Total Project Costs: $13,220,683

Installed Capacity: 2.0 MW_{AC}

Project Goal: To divert various community organic wastes from landfills and be converted to usable products that can offset waste management costs.

Project Description: Mondovi Energy Systems, LLC is planning the installation of a new community-based anaerobic digester and co-fermentation biogas plant to utilize organic wastes to generate electricity and heat. The City of Mondovi and its environs have several sources of substrates that will be used as feedstock for co-fermentation at the Biogas Plant. This includes a wastewater treatment plant, manure from several large dairy farms, a pet food palatability company, several meat processing plant, a dairy processing plant, bakeries, restaurants, grocery stores, a hospital, nursing home, cheese processing plant, meat processing plant, food processing plant, milk packaging plant, several schools, and several other businesses that produce food waste. There is a garbage collection service in the city that can be utilized to collect the food waste and other input substrates from businesses each day for delivery to the Biogas Plant. Electricity generated will be sold to Xcel Energy.

After sorting or screening to remove inorganic or hazardous materials such as metals and plastics, the material to be processed will be shredded or minced to increase the surface area available to microbes in the digesters and hence increase the speed of digestion. Manure and other input substrates are combined at a predetermined ratio and mixed together in a holding tank from where the mixture is automatically pumped directly into the digesters. Automated feeding regulates input of material to ensure optimal digestion and reduces labor required for operating the system. The biogas facility will have four cylindrical reinforced-concrete digesters with heating pipes embedded in the walls and floor. The concrete tanks are cost effective and have an indefinite lifespan. The walls are insulated and clad with weatherproof panels. The digesters are built above ground to reduce costs and facilitate maintenance, and their

cylindrical shape ensures maximum engineering and thermal soundness. The retention time of the mixture in the tank is approximately 60 – 90 days at 95 degrees Fahrenheit. During this process several sets of bacteria work to breakdown the biodegradable waste, in the absence of oxygen, into biogas. Mondovi is hoping to not only generate electricity with the Biogas Plant, but to also utilize the heat that is produced at the plant for nearby factory buildings. The waste from the digester will be separated into liquid and solid by a separator. The solid and liquid manure from the separator will be rich with nutrient sand will be sold as organic fertilizer. Mondovi will be able to generate significant quantities of carbon offset credits tradable to companies or individuals that wish to reduce their carbon footprint.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Distributable renewable electric generation
- Emission reductions
- Produce several marketable products that can be utilized in the community (i.e. fertilized, bedding for cattle, potting soil, etc.)
- Reduce surface and groundwater contamination
- Improve air quality
- Utilizes variety of feedstocks that are available within the regional community
- Demonstration of technology to industry groups, educational institutions, and elected officials.

Measurable Outcomes:
- Certification of 2.0 MW_{AC} installed capacity
- Certification of appropriate interconnections
- Generation of electricity
- Number of marketable products created from waste residue

Recommendation: The RDF advisor group strongly supported this proposal since it is rather cost effective for biomass and the facility has the ability operate when needed during peak-demand. The technology and location are unique for RDF and may help Minnesota learn more about the biogas industry. It also will be the first RDF energy production project in Wisconsin.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-11 Innovative Power Systems, Inc.

Title: Green Line Solar Corridor

Overall Rank: 10 Technology Rank: S-8

Total Score (out of 230): 158.32

Preferences Received: Project located within the Central Corridor
Located in MN and WI service territories of Xcel Energy
Grant award disbursed as single, lump sum payment

RDF Funding requested: $1,850,000 Total Project Costs: $2,698,200

Installed Capacity: 967.27 kW_{DC}

Project Goal: This project will demonstrate a development process for solar energy through a public-private tax equity investment structure, performance monitoring to build a baseline for solar project financing, and demonstrate that these benefits can be achieved using locally-manufactured products.

Project Description: The project will include five photovoltaic power systems, roof-mounted on commercial buildings within the Energy Innovation Corridor. Power produced by each PV system will be fed into the host building's electrical service with surplus generation supplied to the grid. The equipment chosen for this project is the latest generation of RAISwave™ photovoltaic (PV) system manufactured by tenKsolar in Bloomington, MN. Revenue-grade metering and performance monitoring equipment supplied by Solar-Log will compare data from a variety of solar installations against total building demand as a way to measure the aggregate impact of solar PV. Electricity generated will be consumed on site.

All five buildings have flat roofs, which make them perfect candidates for the tenKsolar RAIS-WAVE solar array with its added reflected illumination from a technology developed jointly by tenKsolar and 3M. Power generated by each PV array will be fed into the electrical service of its host building, with inverters for each system sized to match the specific phase and voltage available at the building. At some of the buildings, a service upgrade will be necessary to accommodate the output of the PV array. Three of the solar arrays will face approximately 30º west of south, due to the orientation of three of the buildings to University Avenue, as it runs west-northwest from Fairview Avenue to the western boundary of Saint Paul. Based on research supplied by tenKsolar, this "off-azimuth" positioning will be advantageous for provide more solar capacity later in the day when peak loads occur. A significant

barrier to the larger-scale deployment of photovoltaic power systems in Minnesota are the high installed cost, relative to other energy sources. This project will utilize the new, larger tenKsolar modules, rated at 410 or 440 watts, which more than doubles the DC rating per module, and significantly reduces the labor and hardware costs to install the system.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Demonstrate demand management from distributed solar generation
- Renewable electric generation during periods of peak power
- Emission reductions
- High-visibility area for Twin Cities' residents and visitors that will have access to performance data through host websites, lobby kiosks at the participating buildings, city visitor centers, schools, and other gathering areas.

Measurable Outcomes:
- Certification of 967.27 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation: The RDF advisory group strongly supported this project due to the high project visibility for data collection.

Company Perspective: The Company concurs with the advisory group funding recommendation and prefers the use of four different contractors at five different sites.

EP4-13 Metropolitan Airport Commission (MAC)

Title: Solar PV Parking Ramp Peak Production Project

Overall Rank: 7 Technology Rank: S-5

Total Score (out of 230): 163.25

Preferences Received: Located in MN and WI service territories of Xcel Energy

RDF Funding requested: $2,022,507 Total Project Costs: $4,189,000

Installed Capacity: 1,180 kW_{DC}

Project Goal: The facility is to serve as a prototype for future solar projects at the airport which showcase energy innovations at the airport and focus pubic awareness. The MAC also seeks to continue as a leader among major airports on sustainability issues and innovation.

Project Description: Install roof-mounted photovoltaics on the upper deck of the Gold Parking Garage at Terminal One of the Minneapolis-St. Paul International Airport. The solar equipment will be installed on structural support so as to maintain current parking spaces on the upper deck. It will be configured for future integration with energy storage, EV charging and other demand management technologies. MAC experiences significant time-of-day and seasonal peak energy loads at Terminal One (Lindbergh) resulting in large demand charges on its energy bills. Solar PV on the Gold Ramp will be designed to maximize the economic value of its power production to the MAC by targeting production to reduce these peak loads. It will also benefit the larger grid system serving MSP and surrounding area by producing solar energy during the peak period defined by Xcel Energy as 9 a.m. to 9 p.m. on non-holiday weekdays. Electricity generated will be consumed on site.

The solar equipment will be built on a structural support that raises it about the surface of the roof deck and allows parking on that level to be maintained. A standard panel configuration would likely be positioned facing directly south or towards the azimuth to achieve maximum annual power production. However, based on the production based incentive for peak power that is a key part of this proposal, panels will be placed "off-azimuth" to shift as much of the system's output as possible to the most critical period for peak power demand. Analysis of interval use data indicates that the most critical peaks occur at early morning and early evening, which is generally consistent with peak load factors across the grid system. Positioning some of the solar panels with more of a southeast orientation and some more southwest may

be the most cost-effective strategy for shifting solar output to those periods. MAC will retain control of the solar assets developed at MSP and receive the full benefit of the energy production. However, the MAC also expects to enter into a 20-year agreement with a to be chosen solar developer for development and operation of the solar projects, and structure that agreement to allow the solar developer to access the federal tax benefits for installation of solar energy.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Immediate market for replication
- Model to analyze impacts of demand management
- Renewable electric generation during periods of peak power
- Emission reductions
- Potential integration of charging stations for electric vehicles at the Gold Ramp encourages the use of hybrid or all-electric vehicles.

Measurable Outcomes:
- Certification of 1,180 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation: The RDF advisory group strongly supported this project due to the highly visible location at the MSP and that it can serve as a prototype future solar projects. This project may be the first of several at MSP that may be designed for future integration of energy storage, advanced metering, EV charging, and other demand side management strategies.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-20 Target Corporation

Title: 350 kW Target Midway Solar PV Project

Overall Rank: 2 Technology Rank: S-2

Total Score (out of 230): 182.85

Preferences Received: Project located within the Central Corridor
Located in MN and WI service territories of Xcel Energy

RDF Funding requested: $583,513 Total Project Costs: $1,060,933

Installed Capacity: 350 kW_{AC}

Project Goal: To maximize on-site renewable energy production during peak hours at Target's Midway Saint Paul retail location; to construct an energy-dense, cost-efficient solar array in Minnesota; to educate the community on the benefits of commercial-scale solar; and to reduce Target Midway's greenhouse gas footprint.

Project Description: Installation of a roof-mounted photovoltaic (PV) facility at the SuperTarget Midway store on University Avenue in St. Paul. Electricity generated will consumed on site. The facility would be first solar array for Target in Minnesota, and one of the largest solar installations in the state. The array will be located in the Energy Innovation Corridor along the light rail line. Target will own and operate the array which is estimated to produce 591 MWh of electricity in its first year of production and 8,599 MWh over 15 years of operation. Electricity generated will be consumed on site.

The solar array will feed power to two inverters which will be interconnected with the store's existing power distribution system. One inverter will be a Solectria SGI 300 and the second will be a Solectria PVI 50. The facility has been sized to meet the electric load of the store and is optimally designed to avoid exporting power to Xcel Energy. The solar field will be comprised of 1,638 Suniva MVX 255W solar modules. The modules are 60-cell polycrystalline units mounted on a fixed racking system. The system will be oriented due south at a 30° tilt with a racking system manufactured by Sunlink.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance.
- Emission reductions

- Renewable electric generation during periods of peak power
- Generation of applied data on the potential of developing commercial facilities that incorporate both high energy efficient designs and on-site distributed generation.
- Serve as a showcase facility on the EIC website and aligns Target with the larger green initiatives fostered by the EIC and has the opportunity to reach many in the local community who have had little to no contact with solar energy.

Measurable Outcomes:
- Certification of 350 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation: The RDF advisory group strongly supported this project. Although the concept was not especially innovative the facility uses proven technology and will have a lot of visibility. Midway Target serves a diverse, inner-city customer base and is one of the most visible roof tops in the Corridor, with high visibility from light rail. This is the first Target store solar installation, if it is successful, they will probably do more. Educational programs and displays at store will increase solar awareness

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-22 Minneapolis Park and Recreation Board (MPRB)

Title: Minneapolis Park and Recreation Board Solar Commercial Solar Demonstration Project

Overall Rank: 30 Technology Rank: S-23

Total Score (out of 230): 122.95

Preferences Received: Located in MN and WI service territories of Xcel Energy
Grant award disbursed as single, lump sum payment

RDF Funding requested: $969,741 Total Project Costs: $1,119,133

Installed Capacity: 200 kW_{DC}

Project Goal: To install a demonstration scale photovoltaic system, to utilize Minnesota Made solar panels, to demonstrate the effectiveness of alternative solar designs such as carports and canopies when roof-mounted designs are not feasible, and promote solar power through educational and interpretive programs.

Project Description: 200 KW solar PV installations on rooftops and sun shade canopies at municipal parks owned by the Minneapolis Park and Recreational Board. A 150 kW system will be roof mounted on either MRPB Parade Ice Garden (600 Kenwood Parkway, MRPB's headquarters (2117 West River Road) or MRPB's maintenance facility (3800 Bryant Avenue South). The technology used will be a Minnesota Made panel from either tenKsolar or Silicon Energy, depending on the location and type of application. The additional five projects will be chosen utilizing a solar assessment tool developed in conjunction with park board staff, a solar consulting firm, and community advisory committee input. These facilities will demonstrate the effectiveness of alternative solar designs such as carports and outdoor restaurant seating canopies when roof mounted solar systems are not feasible due to structural, historical, or other barriers to traditional solar installations. Electricity generated will be consumed on site.

The 150kW array will consist of 376 Minnesota Made Titian 410 watt panels from tenKsolar. Sustainable Energy will manufacture the 27 inverters and the solar energy data monitoring equipment will be a Solar Log 500 or equivalent. The additional 50 kW installations will use either tenKsolar or Silicon Energy panels, depending on the location and type of application. TenKsolar panels will be used in flat roof applications while the Silicon Energy panels will be used for pitched roof and canopy applications.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance.
- Emission reductions
- Renewable electric generation during periods of peak power
- Development of assessment tool that can be adopted by other public and private organizations. This tool may save time and money on future solar installations.
- Education outreach to lower income and minority youth who are less likely to be exposed to solar PV systems and the benefits provided.

Measurable Outcomes:
- Certification of 200 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity
- Creation of Solar Assessment tool
- Public interpretive and education program

Recommendation for Funding: The RDF advisory group strongly supported this project. Solar PV roof installation will showcase to the community the benefits and feasibility of roof mounted solar devices. Project will include community member participation to help in decision making which will increase education of renewable sources in the community. An emphasis will be on placing PV systems in high traffic park facilities to showcase solar again increasing recognition in the community.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-24 Bergey Windpower Co.

Title: Minnesota Clustered Small Wind Project

Overall Rank: 26 Technology Rank: W-2

Total Score (out of 230): 129.57

Preferences Received: Located in MN and WI service territories of Xcel Energy

RDF Funding requested: $1,106,600 Total Project Costs: $3,191,745

Installed Capacity: 500 kW_{AC}

Project Goal: To increase the market penetration of small wind turbines within Minnesota, to expand the business activities of an established Minnesota small business and provide market momentum for future growth, to create an easily accessible public database of actual system performance, to promote American-built small wind turbines with critical components built in Minnesota, and to restore confidence in small wind products and vendors.

Project Description: Installation of fifty 10 kW wind turbines in Stearns, Benton and Meeker Counties. The turbines will be installed on 120 ft Guyed-Lattice towers with sub-surface "deadman" anchors. The 120 ft. GL tower is the tallest tower in common usage in the small wind industry. Excel 10 wind turbines have a 23-ft blade diameter and 120-ft hub height and begins producing power at 5 mph and reaches 10 kW at 26 mph. Peak power is over 14 kW. The turbines are projected to produce an average of 15,500 kWh per year each, for a project total of 775,000 kWh per year. The turbines are expected to produce power 82% of the time. Electricity generated will be consumed on site.

Each system will be monitored using a web-enabled APRS World PS2Tap system that will provide the owners with real time and historical performance data. The data will also be posted in real time to a publicly accessible project web site.

Anticipated Benefits:
- Development of best practices and policies for small wind in Minnesota.
- Minnesota is home to three small wind manufacturers, so a successful project could potentially see increased local sales.
- Emission reductions

Measurable Outcomes:
- 50 commissioned 10 kW wind turbines
- Certification of 129.57 kW_{AC} installed wind capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation for Funding: The RDF advisory group strongly supported this project. Small wind has some image problems in Minnesota and Bergey would provide the proper image and quality product for possible small wind in Minnesota. Funding a wind energy production project would provide some diversification of the project types funded from the 4^{th} cycle.

Company Perspective: The Company concurs with the advisory group funding recommendation.

Recommended EP Proposal Summaries

EP4-39 Goodwill Solar, LLC

Title: Goodwill Solar Project

Overall Rank: 9 Technology Rank: S-7

Total Score (out of 230): 160.71

Preferences Received: Project located within the Central Corridor
Located in MN and WI service territories of Xcel Energy

RDF Funding requested: $1,075,250 Total Project Costs: $1,525,250

Installed Capacity: 700 kW_{DC}

Project Goal: To develop a photovoltaic generating system at a the lowest cost possible to deliver capacity and energy to the Xcel Energy grid while simultaneously providing data that will aid in the research and development of accurate energy and capacity pricing for solar technologies.

Project Description: The project is the installation of a roof-mounted photovoltaic (PV) facility that will be located at the Goodwill Easter Seals corporate headquarters in Saint Paul, Minnesota. The Goodwill site consists of a large commercial building and parking lot area with over 150,000 sq. ft of usable roof area. The primary components of the system include approximately 2,400 photovoltaic modules and associated racking. The balance of system components consist of electrical conduit, wire, ballast, and a central inverter system located within the distribution center. The project site has multiple options for interconnection due to its proximity to Xcel Energy's Prior Substation. The project will either connect directly to the substation or the feeder line located just south of the project site. Final determination of the point of interconnection will be made during final engineering. Electricity generated will be sold to Xcel Energy.

Goodwill Solar, LLC, is a special purpose entity that will own and operate the solar facility and will be the grant recipient. Geronimo Energy will be an owner and the managing member of Goodwill Solar, LLC. Both parties have agreed to the terms and length of the lease agreement. Geronimo Energy will negotiate a power purchase agreement (PPA) and obtain an interconnection agreement with Xcel Energy for the project.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance.
- Provides an innovative financial vehicle that will efficiently monetize the Federal Income Tax Credit and MACRS depreciation Emission reductions
- Emission reductions
- Pricing hedge against fossil fuels

Measurable Outcomes:
- Completion of a Installed Capacity Test to certify 700 kW_{DC} capacity
- Certification of appropriate interconnections
- Point-In-Time Verification test
- Generation of electricity

Recommendation for Funding: The RDF advisory group strongly supported this project. The project cost is very reasonable for a solar facility of this size and the proximity to an Xcel Energy substation would minimize interconnection concerns. The location within the Innovation Corridor would provide good visibility within a diverse community that show strong support for the project. The proposal is also technically very sound.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-42 Aurora St. Anthony Limited, LLC

Title: Old Home Plaza Solar Energy Project

Overall Rank: 12 Technology Rank: S-10

Total Score (out of 230): 155.92

Preferences Received: Project located within the Central Corridor
Located in MN and WI service territories of Xcel Energy

RDF Funding requested: $398,000 Total Project Costs: $911,798

Installed Capacity: 252 kW_{DC}

Project Goal: To demonstrate the contribution that on-site solar energy generation can make to permanent affordability housing.

Project Description: The project is the installation of a roof-mounted photovoltaic (PV) facility that will use tenKsolar panels and be located at the Old Home Milk Dairy property on the Central Corridor LRT line at Western Avenue in St. Paul. Aurora is renovating 30,000 ft^2 of the former Old Home Milk Dairy and adding 96,000 ft^2 of new constriction to create 57 units of rental housing, commercial space, and parking. Seven units will be used to serve the long-term homeless. Electricity generated will be consumed on site

The facility will utilize the fifth generation Titan solar modules from tenKsolar which are rated from 410 watts to 440 watts. At the core of this technology is the proprietary RAIS-WAVE module architecture where cells in each module are interconnected in a mesh rather than series. When combined with a digital control algorithm and embedded, low-voltage redundant electronics the module virtually eliminates serial constraints present in conventional modules. The Old Home Plaza project will specifically demonstrate designs and ownership structure for solar energy that can be integrated with affordable housing projects and urban redevelopment projects generally.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance.
- Emission reductions
- Financing structure will bring federal tax incentive monies into Minnesota

- Evaluate the ability of solar to enhance permanent affordability for publicly – supported housing projects.

Measurable Outcomes:
- Certification of 252 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation for Funding: The RDF advisory group strongly supported this project. The location within the Energy Innovation Corridor provides high visibility for solar awareness and it can be used as a model for future solar implementation in similar setting. Installation of solar project designed for maximum energy density at an urban redevelopment site will be an effective test to contribute to market data that will increase market readiness of the next generation of solar equipment. The group also liked the concept to demonstrate solar energy with the integration of solar tax credits and federal tax credits as a strategy for affordable housing. Redevelopment of the site in conjunction with affordable housing and historic renovation provides a good story for integrating renewable energy resources in urban development. Also, the proposal is technically sound.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-43 Cornerstone Group

Title: Lyndale Gardens Solar Project

Overall Rank: 5 Technology Rank: S-4

Total Score (out of 230): 171.45

Preferences Received: Grant award disbursed as single, lump sum payment.
Located in MN and WI service territories of Xcel Energy

RDF Funding requested: $310,310

Total Project Costs: $705,250

Installed Capacity: 152 kW_{DC}

Project Goal: To showcase holistic sustainable development with a solar installation with a solar installation as its most-visible touchstone.

Project Description: To be located at the former Lyndale Garden Center, this facility will be a component of a redevelopment project to create a long-sought Town Center for Richfield by combining retail, mixed income housing, and an expansive public place connected to Richfield Lake Park. A roof-mounted photovoltaic facility will be installed as well as a solar carport to demonstrate a "gas station of the future" with energy storage and an electric vehicle charging station. The array will utilize Titan solar modules from tenKsolar. Electricity generated will be consumed on site

The components of this solar energy project include 112 kW array on the roof of multi-family housing and 40 kW integrated as the solar carport. The system will also include Solar Log monitoring technology. At the core of the tenKsolar PV technology is the RAIS-WAVE module architecture where cells in each module are interconnected in a mesh rather than series. When combined with a digital control algorithm the module virtually eliminates serial constraints present in conventional modules. The RAIS-WAVE module control technology and stepped-pulse transformer technology are ideal configurations for integrating energy storage directly into the system without additional electronics or infrastructure. The modules deliver a controlled voltage to the storage and The Cornerstone Group will negotiate a design-build contract with Sundial Solar Consultants who will also perform all operation and maintenance on the system for at least the first five years. All components of the solar facility will be owned by Cornerstone, or an entity established by Cornerstone and its projects partners for ownership of Lyndale Gardens.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance.
- Emission reductions
- Electricity generated is strategically position to meet peak energy demand
- Financing structure will bring federal tax incentive monies into Minnesota

Measurable Outcomes:
- Certification of 152 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation for Funding: The RDF advisory group strongly supported this project. As part of a large redevelopment effort, the location provides a high project visibility for solar awareness. The project is a creative attempt to integrate solar technology in both commercial and residential urban settings and could serve as model or provide lessons learned for future installation in similar settings. The cost is not reasonable and the location is very good. Any risk is associated with the success of the redevelopment.
Company Perspective: The Company concurs with the advisory group funding recommendation.

Recommended RD Proposal Summaries

RD4-2 University of Minnesota

Title: Optimizing Renewable Electric Energy Generation on Minnesota Dairy Farms

Overall Rank: 7 Technology Rank: C-2

Total Score (out of 230): 124.67

Preferences Received: None

RDF Funding requested: $982,408 Total Project Costs: $982,408

Project Goal: To increase renewable electric energy generation on Minnesota dairy farms by establishing a model "net-zero" energy dairy parlor.

Project Description: The research will focus on effective methods to integrate and control on-site small wind and solar photovoltaic (PV) generation, conduct economic feasibility and life cycle analysis, and then disseminate the results through the web, regional meetings, sand a hands-on statewide workshop and tour. To conduct performance testing two on-site generation facilities will be designed and installed, a 20 kW small wind turbine and a 54 kW PV array. To allow for time shifting of the wind generation, solar generation, and control systems; these systems will be integrated with a thermal storage tank combined with a heat pump. The hybrid wind/solar PV energy system will be all mounted on an innovative, self-raising monopole to be tested and evaluated. The tower uses an assembled foundation that can be installed in one day without a poured concrete foundation. The tower can also be easily folded down for turbine maintenance. Life cycle analysis will be performed on conventional and new generation systems within the dairy.

The research will be conducted at the dairy operation of the University of Minnesota West Central Research and Outreach Center (WCROC) in Morris, Minnesota. The Center milks between 150 and 200 cows twice daily and is representative of a mid-size Minnesota dairy. This location provides an ideal testing opportunity to evaluate and demonstrate the effect of renewable energy generation on fossil fuel consumption and greenhouse gas emissions. The milking parlor currently consumes about 110,000 kWh per year in electricity and 4,000 therms per year in natural gas. One of the unique features is storing electricity as hot water using a heat pump. Small wind turbines generate a sizable portion of their electricity at night when it is not needed. The excess electrical energy can be sent to the grid, but it may not be needed there either. Shifting energy output to the time it is most needed could improve the economic performance of a small-scale wind turbine, especially if time of day pricing for electricity is in effect. A similar situation exists with solar generated electricity. Excess electricity generated

between milkings can either be sold to the grid or converted to heat. If time of day pricing is in effect the electricity can be sold to the grid when it is most valuable and less expensive off-peak electricity can be purchased at night to run the heat pump.

Anticipated Benefits:
- Integration of small-wind, solar PV, and thermal storage will increase the cost effectiveness of both generation technologies.
- Large potential for replication of model at other dairies and Minnesota farms
- Minimal management of solar and wind, compared to anaerobic digestion, does not take farmers away from their core business
- Renewable energy training of four under-graduate interns
- Renewable electric generation during periods of peak power
- Emission reductions

Measurable Outcomes:
- Certification of 20 kW_{AC} installed wind capacity and 54 kW_{DC} installed PV capacity
- Optimization variables to achieve "net-zero" energy consumption
- Scalability of findings from Life Cycle Analysis

Recommendation for Funding: The RDF advisory group strongly supported this project due to the ability to have high visibility with placement at WCROC which will be beneficial to market deployment. Targeting dairy farms provides a level of novelty due since they are typically associated with biomass. The combination of pairing solar and wind into a demonstration is favored as well as the model is applicable to many farms, not just dairy. The research component also appears to be very solid.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-12 University of Minnesota

Title: Wind Turbine Generated Sound: Targeted Research to Improve Measurement, Analysis, and Annoyance Thresholds Based on Measured Human Response

Overall Rank: 6 Technology Rank: W-2

Total Score (out of 230): 147.49

Preferences Received: None

RDF Funding requested: $625,102 Total Project Costs: $625,102

Project Goal: The main goal is to quantify infrasound annoyance and better understand noise emissions from wind turbines to identify potential health concerns effects and provide a basis for regulatory and permitting requirements.

Project Description: Among the many public concerns about wind turbines is the annoyance from low-frequency sound and infrasound, the latter of which humans cannot hear, although it may potentially cause imbalance in some people. The main issue is not loudness, but rather the annoyance from modulating audible frequencies of sound and potentially from infrasound. Few studies have been completed to date on either the exact sources or quality of turbine sound or on the thresholds or mechanisms for potential health impacts on humans. The research will first analyze and characterize low-frequency sound and infrasound from data gathered at the University of Minnesota's research wind turbine site at UMore Park and at selected Minnesota winds turbine farms. This data will be used to recreate the audible sound and infrasound in the laboratory and measure the physical, emotional and psychological responses of human subjects. The study will expose participants to simulated turbine audible sound and infrasound and measure physical and emotional responses.

An expert panel, consisting of regulators, industry experts and laymen, will monitor and help guide this entire process to provide the wind-energy industry, regulators, and the public with the information they need to understand how the research was completed and to better assess potential health concerns. Public opposition raises permitting costs and constitutes a long-term barrier to the growth of the wind energy industry. If public opposition is not addressed, costs associated with permitting delays, additional financing and additional monitoring by the Minnesota Public Utilities commission will be transferred to ratepayers.

Anticipated Benefits:

- Provide providing better information, in a public forum, about the sources, impacts, and potential mitigation of turbine sound--and improved public awareness of the science.
- Provide a better understanding of the impact of turbine generated noise on humans and provide science-based guidelines for how to effectively monitor and protect humans from these impacts.

Measurable Outcomes:

- Provide guidelines for noise monitoring and human impacts of acoustic and infrasound noise
- Qualification of turbine sounds characteristics that are most negative for listeners
- Policy and regulatory recommendation for sound abatement and mitigation strategies

Recommendation for Funding: The RDF advisory group strongly supported this project due to the ability to help the industry understand the characteristics of turbine sounds and better respond to the public about potential health concerns. There is value to reduce the barrier of public opposition to wind farms by educating public on effects of noise emissions on humans. This research could be very helpful when deciding on sites for turbines and will also inform debate on turbine noise. Currently there is a lot of research on sound but it is poor quality. The Minnesota Health Department did a literature search and review, and most studies on turbine noise and vibrations were anecdotal without any test environment. S&L: wind developers are hungry for this kind of research. The results would help in developing set-back regulation, distance requirement, and night-time shutdown rules.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-13 University of Minnesota

Title: Virtual Wind Simulator with Advanced Control and Aeroelastic Model for Improving the Operation of Wind Farms

Overall Rank: 4 Technology Rank: W-1

Total Score (out of 230): 155.08

Preferences Received: None

RDF Funding requested: $1,391,684 Total Project Costs: $1,391,684

Project Goal: Goal to develop, demonstrate and transfer into practice an industry-leading numerical simulation model for optimization of performance, financial decision making and operational planning.

Project Description: This project will leverage and build upon research findings from the recently completed Cycle 3 RDF project RD3-42 "Development of a High Resolution Virtual Wind Simulator for Optimal Design of Wind Energy Projects" which developed and validated the Virtual Wind Simulator software (VWS). Research in the 4th funding cycle will extend the capabilities of this first generation modeling tool to include the ability to simulate aeroelastic loading of the blades and incorporate current industry standards and advanced turbine control methods and technologies. The University will demonstrate these capabilities via comparisons with data from utility-scale wind turbines and farms. The resulting VWS+ modeling tool will thus be able to be used in practice to improve wind farm performance and reduce operational costs. Further, near the end of the development phase of this project, support documentation on the modeling tool will be developed and will be transferred to public/private industry partners through a series of training workshops.

The VWS will be enhanced by incorporating blade aeroelastic models and advanced wind turbine controls. This involves development of new advanced modeling techniques in which fluid flow models are coupled together with dynamic structural models to accurately simulate the bending and twisting of rotating blades in turbulent air flow (i.e. aeroelastic modeling). The enhanced VWS will be tested and validated against utility-scale field and performance data collected at the University of Minnesota's EOLOS facility in Rosemount. The Eolos turbine will be upgraded by replacing the existing turbine control unit with a programmable PLC-based controller. This upgrade will provide the necessary flexibility to implement and evaluate various advanced control algorithms. Environmental field data (wind speed, direction, turbulence, etc) as well as operational and structural data from sensors embedded in

the blades of the EOLOS turbine will be collected under both basic control as well as advance control strategies. Performance data will be used to validate the accuracy of the VWS+ model. Data from an Xcel Energy wind farm will also used to further validate the model and demonstrate the potential of VWS+ A specific wind farm will be selected in collaboration with Xcel Energy. Candidate wind farms are the *Grand Meadow* and the *Nobles* facilities.

Anticipated Benefits:

- Provide detailed information on the relationships between wind conditions, sensing and control strategies, turbine loads, and power output to recommend performance adjustments to reduce operation and maintenance costs of wind farms
- Detection method to reduce unsteady loads and blade deformation at new wind farm locations that will lead to reduce noise and environmental impacts
- Will enable efficient testing of new sensor technologies, such as LIDAR, and new turbine control algorithms that take advantage of these sensors to quantify how different sensing and control strategies impact both power output and loadings to the drive train and structure of a wind turbine.

Measurable Outcomes:

- The accuracy and predictive capabilities of VWS+ by detail comparison with data from the EOLOS 2.5 MW wind turbine and the Xcel Energy wind farm
- The accuracy improvement in predicting power increase and blade load reduction in the EOLOS wind turbine using the advanced control algorithm relative to the existing control.
- The increase in the productivity (energy output) of wind farms using the VWS+, compared with that obtained using simpler, standard models.

Recommendation for Funding: The RDF advisory group strongly supported this project due to the research may provide a useful strategy to reduce unsteady loads and blade deformation at new wind farm locations that will lead to reduce noise and environmental impacts. The project is about practical implementation of a detailed simulation model to model performance and turbulence in wind farms. This has real applications, since the computer simulator will be used at the UMN wind turbine and also at Xcel Energy's wind farm.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-14 Barr Engineering Co.

Title: Development of Health Assessment Tools for Utility-Scale Wind Turbine Towers and Foundations

Overall Rank: 18 Technology Rank: W-5

Total Score (out of 230): 63.00

Preferences Received: None

RDF Funding requested: $161,081 Total Project Costs: $161,081

Project Goal: The goal of this project is to reduce the cost of wind energy by giving wind farm owners and operators a cost-effective means of assessing the health and life expectancy of towers and foundations.

Project Description: Barr Engineering proposes to develop a simpler, portable version of an existing sensor system that will be easily deployable on wind-turbine towers and foundations. The system is portable enough to be moved from foundation to foundation with relative ease and efficiency. The sensors will measure strain and tilt which are used to assess the turbine health and life expectancy. Strain measurements enable researchers to characterize the behavior of the turbine tower and the loads it exerts on the foundation under a variety of conditions. Barr will first develop an economically viable, deployable system of sensors that can take the measurements required for foundation and tower health assessments. These would include rotational stiffness, overturning moment, and foundation load. Next Barr would develop a method of interpreting these measurements to estimate the health and remaining useful life of the wind turbine tower and foundation. The sensor system and estimation methods would first be tested on the University of Minnesota's Eolos Research Wind Turbine which is currently instrumented with a robust tower-and-foundation-performance measurement system. The system will then be tested on wind turbines in Xcel Energy's Grand Meadow and Nobles wind farms. The knowledge and findings would be published in a report detailing the methods of measurement and health assessment

When wind turbine foundations are designed, engineers are given design loads by the wind turbine manufacturer. The engineers are also given a tolerance of how much the foundation is allowed to rotate under an applied load. This tolerance is called the rotational stiffness of the foundation. The minimum rotational stiffness of the foundation is provided by the turbine manufacturer and must be met by the

foundation design. Measurements of the overturning moment applied by the tower to the foundation can be measured using strain gauges applied to the steel in the turbine tower. Strain gauges measure how much the steel stretches due to an applied load. If the thickness of the steel in the tower, the diameter of the tower, and the type of steel are known, it is possible to use strain measurements to compute the load that was applied to the tower to create that strain. This load can then be used to compute the overturning moment that is applied to the foundation. The strain gauges can also be used to assess the health of the steel tower. The tower behavior is dominated by static and dynamic loads. The dynamic loads manifest themselves as a periodic tower oscillation at the resonant frequency of the tower. The strain that results from these oscillations can be significant and are the primary cause of tower fatigue.

Anticipated Benefits:
- Provide a tool that can effectively estimate the remaining useful life of wind turbine foundations and towers
- Increase the probability that wind farms will be able to be utilized for their full design life
- Proper monitoring will help protect the health of the large investment in wind energy projects

Measurable Outcomes:
- Publication of findings in a scientific periodical
- Peer reviewed product
- Certification of measurement accuracies

Recommendation for Funding: The RDF advisory group strongly supported this project due to the results would be user-friendly and a better product then what is currently available. A wind farm owner would buy one sensor, and move it from turbine to turbine. Many turbines in Minnesota are currently 20 years old so the timing is good. The technical scores were low because they did not give enough data and background information and the definition of deliverables was not very strong

Company Perspective: The Company concurs with the advisory group funding recommendation.

HE Proposal Summaries

HE4-1 Minnesota State Colleges and Universities (MnSCU)

Block Grant Request: $5,500,000

Block Grant Recommendation: $5,500,000

Score: 145.01

The goal of the MnSCU block grant proposal is to solicit and select high quality research projects that will ensure the growth, development, and delivery of renewable electric energy technologies throughout the State of Minnesota. Research proposals will be solicited from MnSCU's 31 institutions including 24 two-year colleges and seven state universities. Proposals will distributed through two funding cycles over three years with the intent of funding up to a maximum of 14 research projects. All proposals will be reviewed by a Peer Review Committee (PRC) and a Merit Committee (MC) established by MnSCU. The PRC provides a comprehensive review of a proposal for eligibility and responsiveness to the program goals and objectives. The MC evaluates the proposals for intellectual and research merit and impact. MnSCU's Minnesota Energy Center (MnEC), established in the fall of 2012, will select, oversee, and implement the block grant program within the MnSCU system. Based on the research interests of the colleges and universities, MnSCU has the potential to focus on a wide variety of renewable electrical energy technologies such as wind, solar, biomass and range from feasibility initiatives to generating algorithmic tools for diagnostics and prognostics of energy generation facilities.

The RDF advisory group strongly supported providing a $4.5 million block grant for the MnSCU proposal. Xcel Energy has recommended that MnSCU is to be funded at the full $5.5 million request. The RDF advisory group believes the proposal has the potential for the development of a coordinated and well-managed program to solicit research projects that are relevant to Minnesota and also the ability to have the research incorporated into a jobs training program. The statewide aspect is very attractive and the proposal anticipates beneficial partnerships/linkages between academics, industry, agriculture, existing workforce specialists, students currently enrolled in workforce training programs, and local community stakeholders. The program also allows researchers at smaller campuses to compete for funds.

HE4-2 University of St. Thomas (UST)

Block Grant Request: $2,157,215

Block Grant Recommendation: $1,500,000

Score: 120.00

The goal of the University of St. Thomas block grant proposal is to install a sustainable 0.25 MW peak, multi-purpose micro grid at the Gainey Conference Center in Owatonna, Minnesota. The primary objective of the facility will be to promote the collaboration between private industry and the academic community in the design/build/testing and validation of near commercial concepts in the field of electricity generation and micro grid/substation control. In the second and third year of the program, an RFP will be issued for industry/academic collaboration using an Engineering Senior Design Clinic model. The Clinic has a record of success in the design/build/testing of major equipment for industry in the region, as well as assisting with several new business starts. An ancillary benefit of the project is that it provides a platform for power systems engineering education for undergraduate and graduate students in the School of Engineering.

The RDF advisory group strongly supported RDF funding of $1.5 million on the condition that the project location is moved to a location within Xcel Energy's service territory. The RDF advisory group and the Company believe a micro-grid project on our system would provide more direct benefits to Xcel Energy ratepayers.

HE4-3 University of Minnesota (U of MN)

Block Grant Request: $6,900,300

Block Grant Recommendation: $2,000,000

Score: 117.96

The goal of the University of Minnesota block grant proposal is to support a three-year research initiative which will strengthen and expand the renewable energy industry in Minnesota that will benefit Xcel Energy ratepayers now and in the future. The proposal is designed to directly satisfy the statutory requirements of the Renewable Development Fund, especially the directive to "stimulate research and development within the state into renewable electric energy technologies" and "promote the start-up, expansion, and attraction of renewable electric energy projects and companies within the state." The program would be managed by the Institute on Environment (IonE). IonE will solicit detailed proposals from University of Minnesota faculty for three-year research projects in one or more of the following renewable electricity fields:

- Wind generation
- Hydropower generation
- Photovoltaic generation
- Alternative biofuels
- Power electronics, power systems and transmission
- Thermal generation
- Energy storage
- Legal and policy barriers to renewable energy generation and integration

Proposals will be evaluated by peer researchers outside the University of Minnesota and funds will be awarded on the basis of their recommendations. Renewal after the first and second years will be subject to researchers meeting strict criteria determined by IonE in conjunction with an advisory board. IonE expects that many of the proposals competing for funding will be built upon past and current research funded by the RDF program. However, IonE stated in their proposal that any projects supported by an RDF block grant will explore new avenues and will not be simply a continuation of prior funded activities. The University of Minnesota did not offer to share any portion of potential patent royalties. The University indicated royalty sharing was not

possible due to the Universities Minnesota Innovation Partnerships Program, which handles the Universities intellectual property, does not offer similar arrangements with other partners. Therefore, the University indicated royalty sharing would not be fair and equitable to other research sponsors. In addition, since the University is not charging their full indirect rate for this project, the University argues it is in effect subsidizing the research.

The RDF advisory group strongly supported RDF funding for the University of Minnesota at $3 million on the condition that patent royalty issues can be resolved and that funding will not be used for general policy work, the review efforts of the peer review group, and speaker/travel costs. Xcel Energy has recommended funding of $2 million.

Reserve Proposal Summaries

EP4-6 Best Power Int'l, LLC

Title: St. John's Solar Farm Expansion Project

Overall Rank: 8 Technology Rank: S-6

Total Score (out of 230): 162.15

Preferences Received: Located in MN and WI service territories of Xcel Energy
Grant award disbursed as single, lump sum payment

RDF Funding requested: $172,213 Total Project Costs: $414,033

Installed Capacity: 198 kW_{DC}

Project Goal: To expand the Saint John's Solar Farm and incorporate an on-site side-by-side comparison of competing solar technologies, linear axis tracker technology currently in place and fixed tilt technology of the new array.

Project Description: A static, ground-mounted photovoltaic (PV) facility will be constructed adjacent to the existing St. John's Solar Farm in Collegeville, MN. The project will be an expansion of an existing 400 kW_{DC} PV facility that was funded from the 3rd RDF cycle and was completed in 2009. The array will utilize approximately 660 panels which will be mounted on racking supported by driven galvanized steel piles. The new array will utilize the existing interconnect agreement and existing PPA with Xcel Energy. These agreements as well as the and existing inverter were all originally planned and permitted to deliver a maximum power rate of 500 kW_{AC}. The existing capacity is currently 400 kW_{DC} or 320 kW_{AC}. The incremental capacity added to the system will be 198 kW_{DC} or 158 kW_{AC} which will result in a total installed capacity of 478 kW_{AC} when the addition is completed.

The St. John's Solar Park will continue to be owned, operated and maintained by Best Power Int'l, LLC (BPI). BPI has a 20-year lease in place with St. John's Abby. BPI currently has a valid PPA with Xcel Energy which will expire in 2030 to sell the energy produced by the entire facility up to 500 kW. Data obtained from the two arrays will be made public such that researchers and developers can determine which technology is best suited for energy needs and constraints of a particular interconnection.

Anticipated Benefits:

- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions

Measurable Outcomes:
- Certification of 198 kW_{DC} installed PV capacity
- Generation of electricity
- Comparative production data from linear axis tracker technology and fixed tilt technology

Recommendation: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. Existing PPA, lease agreements and interconnection minimizes risks but the concept of a facility expansion is not particularly innovative. The technology should provide a good comparison to the technology on the Minneapolis Convention Center and there will be good public awareness through data sharing via the website.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-15 Minnesota Renewable Energy Society (MRES)

Title: Minnesota Solar Garden Project

Overall Rank: 41 Technology Rank: S-18

Total Score (out of 230): 90.66

Preferences Received: Located in MN service territories of Xcel Energy

RDF Funding requested: $2,661,320 Total Project Costs: $4,036,420

Installed Capacity: 1,000 kW_{DC}

Project Goal: To provide the opportunity for homeowners or business owners who cannot have solar on their roofs participate in solar power generation and to research best practices for Community Solar in Minnesota through a demonstrable, replicable and scalable pilot project.

Project Description: There are many people who would like to participate in renewable electric energy generation but are unable to purchase and install solar on their residence or business. Reasons a solar system on-site may not be viable may include physical factors like shading, lack of roof space, poor roof orientation. Other factors include lack of upfront financing, non-ownership or living in a multi-family housing that make it difficult to install a system on a shared roof. To overcome these barriers the MRES will build solar community garden modeled after the Solar Gardens in Colorado. This would be a large installation in Xcel Energy Territory that would allow the community to purchase solar panels from a community solar array and receive a discount on their utility bill. Electricity generated will be sold to Xcel Energy.

The photovoltaic facility that will consist of approximately 4,000 250 watt panels. Equipment details such as the panel manufacturer will be determined upon award of this project MRES will work in partnership with Clean Energy Collective (CEC). CEC will control initial ownership of the installation and the energy produced by before it is sold to the public. As the subscribers begin to buy-in, ownership will transfer to the individual purchasers of energy, so the project will truly be a cooperative ownership system. As subscribers wish, they may resell their panels to other Xcel Energy customers or donate them so continuing the cooperative ownership model.

The concept of a solar garden relocates the panels from a residence or business to a centralized, and possibly remote, location. MRES would like to explore the urban versus rural aspect of solar gardens to determine what barriers to market acceptance arise when the panels get more distanced from a large market. Investigating if this is a barrier, and if so, how to overcome this barrier will be an important part of the work as the first large scale community solar project in Minnesota. MRES will first survey people interested in community solar to determine barriers and identify solutions.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance.
- Emission reductions
- Development of "Best Practices" for future community solar initiatives in Minnesota
- Demonstrate an alternative financing and ownership structure for solar energy in Minnesota

Measurable Outcomes:
- Certification of 1,000 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity
- 100% of facility capacity subscribed by community ownership

Recommendation for Funding: The RDF advisory group favored this project. The project can serve as a model that demonstrates another alternative to renewable energy ownership and participation in Minnesota. The community concept and structure identified was also the best that had been proposed. The partnership is established and best practices can be established for the future. The proposal scored poorly due to limited detail; the scope and definition were light; and there were no interconnection costs in budget. A concern is that there is no site specified which has the potential to create delays and increase project costs. Also, there was a concern whether the RDF is the right structure to fund this type of ownership incentive.

Company Perspective: The Company concurs that there are some deficiencies in how the proposal was defined but these can be resolved during the due diligence process. The concept would be the first for Minnesota but since the project is modeled on the Solar Gardens approach in Colorado, the Company is familiar with the implementation requirements and process.

EP4-21 Farmamerica

Title: Combined Solar, Wind and Battery for Energy Self-Sufficiency Project

Overall Rank: 37 Technology Rank: C-1

Total Score (out of 230): 106.28

Preferences Received: Located in MN service territories of Xcel Energy
Grant award disbursed as single, lump sum payment

RDF Funding requested: $600,000 Total Project Costs: $600,000

Installed Capacity: 120 kW_{DC}

Project Goal: To achieve a net zero non-combustion based energy production system at the Farmamerica interpretive center and significantly reduces the facilities carbon footprint.

Project Description: This project is to install two different solar electric arrays, a fixed array of approximately 50 kW and a tracker array of approximately 40 kW. A small wind turbine of between 10 kW to 20 kW will also be erected. Access electricity that can not be consumed on site will be stored in a 20 kW to 30 kW battery bank in the form of an electric vehicle charging station. The design of this facility is to control the energy usage and demand to stay within the production levels of the renewable energy system. The electricity produced from this renewable system will be consumed at Farmamerica. There our not many battery based demand and energy systems that are visible to the public nor are there many solar tracker and solar fixed array comparisons that are visible to the public. Through the internet the public will have access to the facility monitoring and datalogger showing the comparison of PV tracker to PV fixed to small wind turbine charging a battery bank.

Through a combination of photovoltaic and small wind technology, at least 100 kW_{AC} would be installed at the Farmamerica agricultural interpretive center near Waseca, MN. The facility would operate in conjunction with a 20 kW to 30 kW battery bank to store power that can not be consumed on site. .installation with the combination of solar, wind, and battery bank technologies. The facility will serve as a demonstration for area school districts and local governments to consider as a feasible alternative to reduce utility costs. There will be a web based monitoring system for organizations and communities to follow the energy production results. This project will involve a "request for

bids" process to local area renewable energy contractors, installers, and students from Riverland College that are in the Electrical Construction program. Green Energy Products of Springfield, MN is the recommended provider of solar tracker devices. It is intended that Minnesota manufacturers will be the provider of the PV panels. Midwest wind turbine manufacturers will also be the preferred supplier.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions
- Public accessibility to performance data to asses the value of a full tracker designed system and/or the combination of trackers and fixed solar arrays
- Provide a better strategy for utility load control through the use of battery banks

Measurable Outcomes:
- Certification of 80 kW_{AC} installed PV capacity and 20 kW_{AC} installed wind capacity
- Generation of electricity
- Comparative production data from fixed PV technology and PV tracker technology

Recommendation: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. The proposal received a low technical score due to very limited information on the desired battery technology, as well limited technical information on wind turbines and solar PV system. The specific technology that will be installed will be commercially available so the functionality of the equipment is not a critical limitation. The combination of multiple renewable energy generation technologies and storage provides an interesting approach to putting these technologies into practice. The rural but visible location of the interpretive center will provide good visibility for this demonstration of how various technologies work together.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-29 Dragonfly Solar, LLC

Title: Solar Addition to Existing Dodge Center Wind Farm Project

Overall Rank: 11 Technology Rank: S-9

Total Score (out of 230): 156.78

Preferences Received: Located in MN service territories of Xcel Energy
Grant award disbursed as single, lump sum payment

RDF Funding requested: $1,650,000 Total Project Costs: $2,650,000

Installed Capacity: 997.5 kW_{DC}

Project Goal: To take advantage of existing interconnection and construction costs by installing a solar photovoltaic facility on an existing wind farm.

Project Description: A ground-mounted photovoltaic (PV) facility will be constructed near the northern edge of the existing GM Solar wind farm near Dodge Center, MN. The array will utilize approximately 3,990 Solar World panels which will be mounted racking supported by metal piers. Solar Edge optimizers and inverterers are to be used and a step-up transformer will be installed to bring the facility voltage up to the line voltage of 34.5 kV. The facility will utilize web based monitoring. The racking design will allow for an increased pitch for snow sloughing and lower sun angles as well as a higher elevation from the ground to avoid snow cover and any risk of spring flooding.

GM Solar would retain ownership and Dragonfly Solar assumes project design and implementation control in concert with GM Solar. The existing turbines are connected with a 34.5 kV collector system owned by GM Transmission which connects to a substation that is also owned by GM Transmission. GM Transmission has an interconnection agreement with MISO and NSP for the existing wind project at the Dodge Center substation. It is expected that the current interconnection agreement is sufficient to accommodate the additional solar energy expected, although MISO may need to study the proposed additional power.

Anticipated Benefits:
- Utilizing existing collection system and interconnection of wind farm can serve as an example for lower costs when integrating renewable systems.
- Renewable electric generation during periods of peak power

- Emission reductions
- Improved stability of output from facility as compared to only wind generation

Measurable Outcomes:
- Certification of 997.5 kW_{DC} installed PV capacity
- Generation of electricity
- Demonstration of lower installed cost per kW

Recommendation: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. All though the concept is not so novel the lower installation cost and collocation with existing facilities would limit possible risks. There is some innovative to use newer modules which is the next generation technology and the first application in the United States. Utilizing an existing collection system and interconnection with a wind farm can serve as an example of potential for lower costs when integrating renewable systems. MISO may need to study proposed additional power.

Company Perspective: The Company concurs with the advisory group funding.

EP4-34 City of St. Paul

Title: Lowertown Ballpark Solar Project

Overall Rank: 34 Technology Rank: S-27

Total Score (out of 230): 117.97

Preferences Received: Project located within the Central Corridor
Located in MN service territories of Xcel Energy
Sponsored by K-12 school/local government

RDF Funding requested: $555,750 Total Project Costs: $741,000

Installed Capacity: 104.5 kW_{DC}

Project Goal: To maximize solar energy production during peak hours, to hedge against electric costs and reduce peak electric demand, to promote the benefits of solar through direct engagement with Ballpark spectators, and to reduce the Ballpark's greenhouse gas and pollution footprint.

Project Description: The project will consist of constructing two separate photovoltaic (PV) arrays. One array will be a 20 kW Shade Pavilion over a group spectator terrace which can be seen by visitors throughout the Ballpark and the second will be an 80kW array on a Car Canopy over a parking lot adjacent to the Ballpark. Both arrays will produce a combined total of 134,369 kWh of electricity in its first year of production and 1,947 MWh over 15 years of operation. The facility has an estimated lifetime of 25 years. Electricity generated will be consumed on site.

The solar array will be integrated into the new 7,000 seat regional ballpark located in Lowertown, Saint Paul. The location of the new ballpark is currently a polluted former industrial site that will be cleaned up as part of the ballpark project. The Car Canopy array will have solar modules flush-mounted on a 20-degree solar rack attached to a shade structure over the parking lot northeast of the Ballpark field. To maintain design efficiency and cost effectiveness, the array will be oriented with the angle of the parking lot so that the array is facing southwest at a 34-degree azimuth angle. That will prove to be the most efficient installation for 80% of the array. The Shade Pavilion array will be over a portion of the spectator seating with solar modules mounted in rows angled at a 20 degree tilt to maintain module efficiency and minimize wind loading stresses. The modules will face due south.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance.
- Emission reductions
- Renewable electric generation during periods of peak power
- Public awareness to a local community who have had little to no contact with solar energy

Measurable Outcomes:
- Certification of 104.5 kW_{DC} installed PV capacity
- Certification of appropriate interconnections
- Generation of electricity

Recommendation for Funding: The RDF advisory group favors this project. There us high public awareness due to the visibility in a high traffic recreational facility which can capture ratepayer attention. This awareness is enhanced further by displaying details of the PV facility on the scoreboard between innings. The advisory group was concerned about the high cost, which lowered the overall technical score, but attributed this to racking for canopy installations are more expensive then the simpler racking associated with ground or roof mounted arrays.

Company Perspective: The Company strongly supports this project due to the value associated with the public awareness and visibility of the facility siting.

EP4-36 City of Austin

Title: Austin Wastewater Treatment Facility Biogas Renewable Energy Project

Overall Rank: 6 Technology Rank: B-1

Total Score (out of 230): 164.25

Preferences Received: Utilizes non-agricultural residues for a feedstock

RDF Funding requested: $3,564,000 Total Project Costs: $6,545,000

Installed Capacity: 1,000 kW_{AC}

Project Goal: To install two 500-kW internal combustion engines which will be fueled by biogas generated from the existing anaerobic digester at the City of Austin Wastewater Treatment Facility which reduces the carbon footprint of the facility and reduces the facility's power cost to produce savings to the City's rate payers.

Project Description: In 2012, the City of Austin received funding from the Saint Paul Port Authority (SPPA) to evaluate the feasibility of alternative energy generation via anaerobic digestion from the waste streams produced by the Municipal Wastewater Treatment Facility (MWWTF). The feasibility study identified improvements needed to the existing municipal anaerobic digesters to maximize anaerobic digestion (AD) and biogas production. The feasibility study also analyzed renewable energy generation through a combined heat and power (CHP) generation system using biogas as a fuel source and recommended utilization of two 500-kW internal combustion (IC) engines. Because the generation potential is less than the total demand at the facility, the power generated would be used on site and not sold back to the utility. The engines will also produce 3 MMBbtu/hr of thermal energy which will be utilized to heat the digesters. Excess biogas will be flared.

The WWTF consists of two wastewater treatment plants located on the same site, a municipal facility which treats domestic wastewater and an industrial facility which treats wastewater from a pork-processing facility owned by Hormel Foods. Biogas production will be increased by improvements to the existing digester heating and mixing systems. With improved heating and mixing, the City is expected to increase their biogas production from 28,500 cf/d to 31,800 cf/d. Also important is fixing leaks which are estimated to be approximately 12,000 cf of biogas per day. In addition to the anaerobic digester

improvements, two 500-kW IC engines will be installed as well as biogas clean up equipment required to reduce the hydrogen sulfide concentration of the biogas and remove moisture.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions

Measurable Outcomes:
- Certification of 1,000 kW_{AC} installed PV capacity
- Generation of electricity
- Increased production in biogas production and capture
- Production of power at a cost below the cost of retail electricity

Recommendation: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. Since the project will not be in Xcel Energy's service area there will not be a loss of sales but Xcel Energy's ratepayers will benefit by receiving all the REC's generated. Because of the feasibility study, a lot of the initial ground work and planning has been completed. The concept should reduce wastewater treatment costs which have applications throughout the State. The size of the grant award is significant so funding can only be possible if adequate funding were available.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-41 City of Hutchinson

Title: Municipal Landfill Solar Energy Demonstration Project

Overall Rank: 29 Technology Rank: S-22

Total Score (out of 230): 145.47

Preferences Received: None

RDF Funding requested: $958,369 Total Project Costs: $1,742,123

Installed Capacity: 401.8 kW_{AC}

Project Goal: This project will be a model in Minnesota for how to cost effectively develop a significant solar energy resource on a landfill that would otherwise have little or no economic value to the City.

Project Description: A ground-mounted photovoltaic (PV) facility that uses tenKsolar RAIS Wave equipment and panels will be constructed on a capped municipal landfill site adjacent to the City's Wastewater Treatment Plant in Hutchinson, MN. This project would be the first of its kind in Minnesota on a closed landfill site. TenKsolar's unique system design will allow the system to be built without any penetrations into the surface of the landfill, which will be a model for other landfill sites in the state that may wish to develop a similar solar energy installation. Fifth generation Titan solar modules will be installed. The redundant cell architecture used in RAIS-WAVE modules enables the efficient construction of larger modules with an anticipated corresponding reduction in labor hours for installation. The modules, when combined with the reflective gain from the reflective panels manufactured by 3M Company, make the tenKsolar models some of the most powerful production modules offered in the industry. Standard Solar Long monitoring will be included at the site for recording output data.

The solar project will be owned by the City of Hutchinson subject to a long-term capital lease with a project-specific limited liability corporation that will be established by Ameresco. This structure will facilitate the ability of the project to access substantial federal tax incentives for solar energy--federal support that would otherwise not be available to the City as a non-taxpaying entity. Operation and Maintenance of the systems during the 12-year period of the capital lease will be the responsibility of Ameresco. The City of Hutchinson owns and has site control of the landfill location that has been identified for

this project. The City and Ameresco have also verified that despite use restrictions on the site, no further environmental assessment will be required by the MPCA, which has evaluated the project as part of its Voluntary Investigation and Cleanup (VIC) program for landfills. The ballasted design of the solar system will not require penetration of the existing grade, which allows system construction and operation to occur without disturbing any of the waste material in the landfill.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions
- Capturing the lessons learned to share with other communities that may wish to develop solar energy project on closed landfill sites.
- Leverage federal tax incentives to stimulate local economy

Measurable Outcomes:
- Certification of 401.8 kW_{DC} installed PV capacity
- Generation of electricity
- Demonstration of lower installed cost per kW

Recommendation: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. Although the proposal technical score was low, the advisory group considered the proposal for discussion due to the utilization of a municipal landfill site which may have applications for other landfill sites in Minnesota. Although there may be some financing concerns, the project would demonstrate how to use a capped landfill in a positive way. Landfills are typically a wasted property and a huge problem. If this is intended to show how not to penetrate to the capped portions of landfills, it is an interesting project and technically feasible.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-44 Region Five Development Commission

Title: Regional Schools Solar PV Demonstration

Overall Rank: 10 Technology Rank: S-8

Total Score (out of 230): 158.50

Preferences Received: Sponsored by K-12 school/local government

RDF Funding requested: $1,993,659 Total Project Costs: $5,864,614

Installed Capacity: 1,493 kW_{DC}

Project Goals: To install $1,493_{DC}$ kW of solar capacity that will serve as a model in Minnesota for how to cost-effectively manage multiple projects among several school districts and multiple jurisdictions.

Project Description: Region Five Development Commission (R5DC) is seeking an RDF grant to install tenKsolar photovoltaic systems on the roofs of eight public school buildings across a five county area of Central Minnesota served by R5DC. This will include four public school districts and at Leech Lake Community College on the Leech Lake Reservation. A demonstration of energy storage will be done at two of the school sites.

Region Five is proposing to use newly manufactured fifth generation Titan solar modules that will be released by tenKsolar in April 2014 and are rated at 410 and 440 watts. The redundant cell architecture used in the RAIS® modules enable the efficient construction of larger modules with corresponding reduced labor hours for installation. Standard Solar Long monitoring systems will be included at each school site. Demonstration of the Silent Power OnDemand Energy Appliance storage system will be incorporated at two school sites. The installation of large-scale solar energy systems on school buildings, combined with demonstrations of energy storage at two sites, will be specifically evaluated for its ability to reduce relatively high demand charges that are typical of the monthly electric bills for school buildings--even during non-summer months.

All of the solar facilities will be owned by the school districts but will be subject to long-term capital leases with a project-specific limited liability corporation that is controlled by Region Five and its tax equity partner. This structure will facilitate the ability of the projects to access substantial federal tax incentives

for solar energy--federal support that would otherwise not be available to public school districts as non-taxpaying entities.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions
- Data on energy storage and the impact on demand charges

Measurable Outcomes:
- Certification of 1,493 kW_{DC} installed PV capacity
- Generation of electricity

Recommendation for Funding: During the advisory group's initial selection of proposals on June 12, 2013, this proposal had not received bonus points for being proposed by a local unit of government. Correcting for this scoring error would have moved the proposal from Category 2 to Category 1. The advisory group agreed that a higher score would not have resulted in a funding recommendation but it may have been identified as reserve proposals and therefore recommended EP4-44 to be placed on the reserve funding as an alternate if funding is available. This proposal was one of many solar installations that included energy storage demonstrations submitted as part of RDF Cycle 4. The advisory group believed that this project has notable technical attributes that were reflected in the Sargent & Lundy score such as serving schools and visibility.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP4-48 Oak Leaf Energy Partners Ohio, LLC

Title: Blue Lake Wastewater Treatment Plant Solar Project

Overall Rank: 3 Technology Rank: S-3

Total Score (out of 230): 180.17

Preferences Received: Located in MN service territories of Xcel Energy
Grant award disbursed as single, lump sum payment

RDF Funding requested: $2,000,000 Total Project Costs: $2,864,810

Installed Capacity: 1,000 kW_{AC}

Project Goal: To install a photovoltaic (PV) array at the Metropolitan Council's Blue Lake Wastewater Treatment Plant (WWTP) located in Shakopee, Minnesota.

Project Description: Oak Leaf will use 5,220 Yingli 295 watt, 72 cell polycrystalline modules on a Schletter, 30 degree fixed tilt racking system. The array will be designed to have 10 modules per string and 25 strings per combiner box. Advanced Energy's 250kW and 500kW inverters will be utilized which have historically performed exceptionally well in colder climates. A Cooper transformers will step up the voltage to Xcel Energy's interconnection of 13.8kV at this location. The racking structure will consist of pre-manufactured, pre-galvanized tables mounted on driven piers. The typical useful life for most components in the ecosystem is 25 years although some items, such as modules, will last 35 years or more. Inverters, however, typically require upgrades every 12-15 years. An O&M plan includes twice yearly preventive maintenance visits to analyze power plant output, verify connections via thermal imaging, clean modules as necessary and test inverter throughput. The system is monitored 24/7 via the internet so technicians can be dispatched if the power plant experiences problems.

This project will be the largest demonstration of a behind the meter solar farm in the State of Minnesota. The venture is a public/private partnership between Oak Leaf, the owner of the solar farm, and Metropolitan Council, the buyer of the electricity. Because the Blue Lake WWTP is a critical infrastructure facility, it is electrically served by two Xcel Energy feeders. For that reason, 750kW_{DC} of the array will feed one side of the WWTP and 500kW_{DC} will feed the other side. Oak Leaf indicates that this methodology for supplying critical

infrastructure facilities is unique and will act as a model for future distributed generation systems in Xcel Energy's territory. The proposal also includes a turnkey, remote data acquisition/monitoring solution that will provide comprehensive data to monitor, analyze and display historical and live solar electricity data. For public outreach and education purposes, the monitoring solution will provide password free access to system performance through a web-based solution. Oak Leaf will operate and maintain the monitoring system.

Anticipated Benefits:
- Economic benefits through the creation of jobs during construction and for operation and maintenance
- Renewable electric generation during periods of peak power
- Emission reductions
- Illustrate how critical infrastructure facilities like the Blue Lake WWTP can employ on-site, renewable generation through dual feed designs

Measurable Outcomes:
- Certification of 1,000 kW_{AC} installed PV capacity
- Generation of electricity
- Public access to large scale solar farm performance data

Recommendation: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. The scope is clear and complete, deliverables are defined in the schedule, and milestone performance measurements are specific. The financing/ownership model is similar to the structure for the Minneapolis Convention Center which received Cycle 3 funds. The project will reduce the costs of waste water services which will benefit the City of Shakopee. There are likely to be some contractual issues that will need to be resolved when negotiating the RDF grant contract.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-1 Regents of the University of Minnesota

Title: Developing Gasification Technology from Solid Waste

Overall Rank: 9 Technology Rank: B-4

Total Score (out of 230): 113.37

Preferences Received: Project located within the Central Corridor

RDF Funding requested: $999,999 Total Project Costs: $999,999

Project Goal: The goal of this St. Paul, Minnesota-based project is to enable distributed/decentralized generation of electricity from biomass and other solid wastes on sites where biomass and solid wastes are generated. The project would develop fast gasification electricity generation technology, based on microwave heating, by converting solid feedstock to a combustible gas that can fuel steam generators or gas turbines.

Project Description: The University will investigate and develop a gasification method based on microwave heating to raise the process temperature and increase the heating rate. This new process will improve the conversion efficiency, syngas quality, and cleanness. The heart of the proposed microwave based heating method is the implementation of microwave subsectors (MWS). The first two years of the project will study the behavior of a series of MWS and their relationships to biomass gasification performance. Equipped with his knowledge, in the third year the University will develop and demonstrate a prototype system consisting of a fast microwave assisted gasification module and a gas turbine generator.

Anticipated Benefits:
- Gasification technology that is 25% more efficient and cleaner then combustion processes.
- A scalable and portable technology

Measurable Outcomes:
- Identification of operation temperature levels
- Identification heating rates
- Develop biomass to syngas conversion efficiencies
- Develop syngas cleanness parameters and characteristics
- Generation of electricity with a prototypic microwave assisted gasifier

Reserve Proposal Summaries

Recommendation for Funding: During the advisory group's initial selection of proposals on June 12, 2013, this proposal had not received bonus points for being located in the Energy Innovation Corridor. Correcting for this scoring error would have moved the proposal from Category 2 to Category 1. The advisory group agreed that a higher score would not have resulted in a funding recommendation but it may have been identified as reserve proposals and therefore recommended RD4-1 to be placed on the reserve funding as an alternate if funding is available.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-4 Xcel Energy

Title: IT Infrastructure Development to Enable Community Solar Gardens

Overall Rank: 12 Technology Rank: S-4

Total Score (out of 230): 103.92

Preferences Received: None

RDF Funding requested: $390,000 Total Project Costs: $505,000

Project Goal: Develop the information technology which will allow customers to view on their billing statement the energy produced from their share of a solar garden, track unsubscribed energy produced and credit the solar garden operator for that energy, and automatically verify subscriber eligibility as outlined in governing legislations or regulations.

Project Description: An information technology (IT) system will be developed and tested that will logically link community solar garden production and the associated economic benefits for subscribers back to the subscriber's energy use and billing statement. The system will resolve issues associated with non-automated verification of subscriber eligibility and will enable potential customer participation in several community solar gardens while ensuring that any and all subscriber and solar garden requirements and regulations are met.

The IT system will be tested and verified across all the metering, tariff, and customer service variables to enable an accurate system interaction for solar garden operators and subscribers across a variety of customer glasses. Building and testing an IT system with early pilot community gardens will lay the necessary foundation for Xcel Energy to support a solar garden model of energy generation on a larger scale.

Anticipated Benefits:
- Cost effective means for Xcel Energy to support solar gardens
- Improved efficiency and reduction in errors associated with non-automated billing practices

Measurable Outcomes:
- Verification that the system is accurate and usable
- Completion of training with solar garden users
- Final product is an IT system capable of connecting individual's shares of a community solar garden to their electric bills

Recommendation for Funding: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. The cost for IT development would also be eligible for cost recovery through rates. With the development of more solar gardens, utilities will need the ability to account for these customer billing needs and the legislative mandates for more renewable solar energy will increase the needed technology. The proposal includes a billing system, integration and testing to be associated with new renewable mandates but there will be no increase in rates if funded through RDF. Funding the IT development with RDF funds would be a transparent way to pay for solar through the regulatory process. Xcel Energy is trying to set the best practice for an initiative that may be an administratively burdensome challenge to track and verify.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-5 University of Florida

Title: A Mobile, Self-contained, Pilot Anaerobic Digester Facility for conversion of Non-Agricultural Residues in Minnesota to Electricity

Overall Rank: 2 (tie) Technology Rank: B-1 (tie)

Total Score (out of 230): 136.37

Preferences Received: Utilizes non-agricultural residues for a feedstock

RDF Funding requested: $1,109,538 Total Project Costs: $1,109,538

Project Goal: To promote the uptake of anaerobic digestion technologies for non-agricultural biomass residues by extended demonstration of a pilot –scale anaerobic digester.

Project Description: The project would be the design and demonstrate a mobile, self-contained, flexible design, pilot-scale digester that will be used to demonstrate biogasification of organic wastes from two sites. One site would be the SunOpta Grains and Food facility in Alexandria, MN and the other demonstration site would be the Denco II corn ethanol facility in Morris, MN. The mobile unit will have the capability of handling both solid and liquid feedstock. The feedstock for the digester will be the waste streams from each of the processing facilities. At each site the unit will be operated for a year to subject the digester to seasonal variations in feedstock quality and characteristics. This demonstration at industrial sites will complement laboratory studies. Based on the outcomes of the operation of the mobile digester, a design for a full-scale commercial system will be developed and estimates of capital and operating costs established.

The digester facility will include a feed storage tank, pumps for moving materials between feed tanks and digester, and an effluent storage tank. Heating jackets will maintain an ideal temperature in the digester for biomass growth. A screen will be installed prior to the digester to remove solids in feedstocks. Based on laboratory scale studies on the feedstocks to be tested, the digester will be operate ether at a mesophilic temperatures of 38° C or a thermophilic temperature 55° C. On line pH measurement and biogas metering devices will be incorporated into the system. All pumps and valves will be remotely operable forma control room. A biogas clean up system will be incorporated into the biogas storage tank. The facility will be operated by a standalone diesel/biogas generator and the electrical energy consumption of the system

monitored. Biogas produced by the system will be used as a fuel for electricity generation, to assess how much diesel can be displace. The biomass residues will be in the form of a compost material. The operation of the pilot plant will be complemented by laboratory scale studies on the feedstock. The studies will assess the methane potential of the feedstocks and the best temperature for operating the system. As part of the project, workshops and forum will be conducted in Minnesota to disseminate outcomes of the project and technology.

Anticipated Benefits:
- Reduce costs associated with the disposal of process byproducts in the form of biomass
- Provides a fuel that can be converted to electric power as needed
- Potential for producing a revenue stream from the resultant organic compost.

Measurable Outcomes:
- Digester methane yields and methane content
- Operating stability of digester and labor requirements
- Energy requirements and affordability to operate plant
- Reduction in wastes and environmental impacts

Recommendation for Funding: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. There is some concern regarding the practicality of mobility but these units can be beneficial under the proper circumstances and affordability. It is beneficial that the University will partner with Enterprise MN to identify markets and to market the product to users.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-7 InterPhases Solar

Title: New CIS Solar Cells with All-Solutions-based Roll-to-roll Processing

Overall Rank: 1 Technology Rank: S-1

Total Score (out of 230): 156.83

Preferences Received: High likelihood of royalty returns and large royalty ratio

RDF Funding requested: $1,000,000 Total Project Costs: $1,095,000

Project Goal: To advance the production of thinfilm manufacturing outcomes achieved from a RDF 3rd cycle project to the next stage on the market by simplifying the manufacturing process and also improve the efficiency of the PV cells.

Project Description: This project builds upon research and development achievements achieved from RDF funded in Cycle 2 and further developed in Cycle 3. Moving forward in Cycle 4, alternate copper indium selenide (CIS) based device structures will be developed to incorporate and deposit all the necessary single step electrodepostion (SSE) processes for the photovoltaic (PV) device components into a single roll-to-roll (R2R) manufacturing line. The line will include a new fast flow R2R plating tank for SSE of CIS, an ultrafast laser recrystallization tool, and spray deposition systems, all customized for efficient and cost-effective production of solar cells. The approach will lead to an endless flexible PV roll that can be cut and directly integrated in products or made into modules of variable shapes, sizes, and electrical outputs.

Having established the R2R manufacturability and scalability of electrodeposited CIS solar absorbers in Cycle 3, the Cycle 4 proposal addresses the next logical and necessary steps on the path to the overall technology's technical success and commercial use to develop and implement the new tools, procedures and device configurations. It will include R2R spray-coating processes for special oxides, such as graphene oxide (GO). The materials will serve as electrode contacts and transparent conducting oxide (TCO) top layers in new solar cell structures. Precursor solutions or suspensions of the oxides will be prepared by new sol-gel methods to be developed in this project. At the same time, a high speed flow cell for CIS SSE will be installed in the R2R line to better synchronize with other processes. The processes will be combined into a single R2R line capable of depositing all the cell component layers, an

ultrafast laser annealing tool will also be installed in line to recrystallize CIS films.

Anticipated Benefits:
- Module cost of $0.32/W at 15% efficiency
- 2% of sale revenue from solar modules for 15 years as royalty to Xcel Energy
- Lead to a sustainable solar industry and foster a robust local manufacturing base for Minnesota-made solar panels

Measurable Outcomes:
- Large area uniformity of greater then 90%
- Repeatable CIS film morphology & composition
- Decomposition and film integrity similar to industry standards
- 50% increase in photocurrent
- Cost reduction of more then 30% compared to vacuum manufacturing process
- Annealing rate greater then 3 meter^{2}per minute
- Continuous operation of the R2R manufacturing for more the five 5 hours
- Functional flexible PV modules (6 in x 6 in)

Recommendation for Funding: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. The quality of the proposal and performance parameters is very good and the group appreciated that the work continued to enhance and develop prior RDF funded research. There is also a high likelihood of royalty returns which would be based on net revenue which are easy to track. But the value to Minnesota is minimized if the concept is not put into practice by a Minnesota manufacturer.

Company Perspective: The Company concurs with the advisory group funding recommendation.

RD4-8 City of Red Wing

Title: City of Red Wing Refuse Derived Fuel Production Facility

Overall Rank: 8 Technology Rank: B-3

Total Score (out of 230): 113.75

Preferences Received: None

RDF Funding requested: $1,999,500 Total Project Costs: $6,896,939

Project Goal: To demonstrate production of a cleaner refuse derived biomass fuel which will recover more recyclables, remove fuel contaminates, and reduce fuel hauling costs.

Project Description: The City of Red Wing's will add dual-stage, shear-shredding equipment to the existing facilities and equipment at the City's Waste Campus to produce refuse derived fuel for the Xcel Red Wing generation station. A primary shredder will be installed to size reduce solid wastes to 12 to 18 inches and open garbage bags, providing access to more recyclables and fuel contaminants. This will allow the City recover a higher percentage of recyclable sand wastes that contaminate the fuel, such as electronics. A secondary shredder will also be installed to properly prepare and size the fuel to been Xcel Energy specifications for the generation station. The fuel will then be delivered to the generation station. The improved facility at the Red Wing Waste Campus will reduce transportation of the fuel from an 80 mile round trip from Newport, MN to only an 8 mile round trip.

The two stage, slow-speed, shear shredding of the solid wastes will include the use of mechanical and manual sorting for the removal of potential fuel contaminants such as metals, electronic wastes, and recyclable materials that are of greater value being recycled rather than combusted. Some of the recyclables include plastics containing chlorine compounds that contribute to acid gases during combustion. After all material has been homogenized, the operational focus is on recovering ferrous and non-ferrous metals from the shredded solid waste which leaves some contamination in the fuel produced.

Anticipated Benefits:
- Elimination of hauling fuel to Newport for processing should result in a cost savings of approximately $8 to $9 per ton of biomass.

- Improve the economies of scale for Xcel Energy at the Red Wing Generation Station and improve efficiency due to reduced down time due to lack of fuel which occasionally occurs.
- Enable the City of Redwing to implement energy recovery initiatives over land filling
- Eliminate need for water treatment and emissions chemicals and supplies
- Eliminate need for annual emissions and stack testing
- Increase in the recovery of recyclable materials thereby decreasing land filling and a reduced potential for groundwater contamination

Measurable Outcomes:
- Percentage improvement in weight and types of recyclables recovered
- Percentage improvement in weight and types of electronics and other potential fuel contaminants recovered
- Percentage reduction in weight of fines delivered to the landfill for disposal
- Reduction in transportation costs and delivery of fuel to Xcel Energy

Recommendation for Funding: The RDF advisory group favored this project due to the end use product will be directly beneficial to the Xcel Energy Red Wing station. City is utilizing a renewable waste resource to promote renewable power. The project could serve as an example for the conversion of converting municipal solid waste into refuse-derived fuel with a low technological risk. Instead of burning waste on-site, Red Wing is proposing to process and shred waste on-site and then haul to Xcel Energy's burning station. There was some concern that this is not novel or new idea and that the quality where is the research is minimal.

Company Perspective: The Company acknowledges advisory group concerns the uses of refuse derived fuel as the feedstock and the research value but supports the project since if will directly benefit Xcel Energy ratepayers and it provides proficiencies into feedstock processing. The project is a full-scale demonstration of the technology

RD4-11 University of Minnesota

Title: Demonstrating the Potential for Distributed Power Generation Using Converted Biomass

Overall Rank: 2 (tie) Technology Rank: B-1 (tie)

Total Score (out of 230): 136.37

Preferences Received: Project located within the Central Corridor

RDF Funding requested: $1,899,449 Total Project Costs: $2,345,502

Project Goal: To develop effective and efficient solid biofuel that has potential for direct, stand-in use at power generation facilities large and small and to develop distributed generation in rural environments to boost base load power supply using rural biomass as fuel.

Project Description: The University proposes a bifurcated approach: development of an integrated biomass conversion system and a modern steam-based electricity generator. This combined research process will include the development of a 7 ton per day biomass conversion reactor and a 100 kW steam-electric generator. The demonstration-scale system will be designed to be contained on three separate skids: a feed handling skid, a conversion reactor skid, and a product handling skid. The conversion reactor skid will also house any necessary heat exchangers and other ancillary equipment. The three skids of equipment will be erected at the Natural Resources Research Institute's (NRRI's) Coleraine research facility. NRRI will work with SynGas Technology, LLC (ST) in equipment assembly and in equipment commissioning. NRRI possesses the necessary equipment to supply the conversion reactor with dried biomass material as well as move products to the densification circuit for final production of fuel agglomerates.

Once commissioned, the conversion technology will be fully characterized in processing various biomass materials under different conditions of time and temperature. The results of this work will establish processing conditions for steady state operation. Once optimum conditions are identified, various campaigns will be conducted to produce fuel products in bulk quantities for use in the biomass boiler generator system that will also be located in Coloraine. A high-efficiency steam-electric boiler generator system will be constructed to utilize the densified fuel. The prototype will be an automated, 100 kW boiler

system capable of burning raw biomass and processed, solid, liquid or gaseous biofuels.

Anticipated Benefits:
- Research is not on the "lab" scale, rather it is pre-production and prototype in nature
- Development of a low-noise, steam-based electricity generating system
- Reduced biomass grinding energy as compared to green or dry wood materials
- Reduced ash generation and favorable ash chemistry compared to traditional biomass and coal
- Increased energy efficiency on a per-kg fuel-usage basis
- Improved combustion reactivity

Measurable Outcomes:
- Achieve a thermal efficiency greater than 90% for the biomass reactor
- Establish operational control for a variety of raw material inputs
- Determine emissions profiles while at steady-state operation of both the conversion reactor and boiler-generator system
- Demonstrate that the new system can be operated cost effectively through modern process automation and control techniques

Recommendation for Funding: The RDF advisory group favored this proposal and recommended that the proposal be placed as an alternate if funding is available. This proposal develops an innovative biomass boiler and densification system which is linked to an electric generator, the adaption of South-American technology to the United States. The mobility of the unit can be marketed to the Minnesota forestry industry and agriculture although it may have limited practicality. Much of the project costs are associated with the equipment to build the boiler and steam-run generator. Limited royalty sharing will also limit the possibility of tangible benefits to the ratepayers.

Company Perspective: The Company concurs with the advisory group funding recommendation.

EP Proposals Not Recommended for Funding

EP Proposals Not Recommended for Funding

EP4-1 EcoCorp

Title: Sleepy Eye Biogas Energy Facility

Overall Rank: 25 Technology Rank: B-3

Total Score (out of 230): 133.50

Preferences Received: Located in Xcel Energy service area
Utilizes non-agricultural residues for feedstock

RDF Funding requested: $2,000,000 Total Project Costs: $2,500,000

Installed Capacity: 14.4 MW

This 14.4 MW waste-to-energy project, developed by ECOCORP, would generate biogas during the process of converting industrial food processing organic wastes (from canneries and breweries), production organic wastes (from paper mills), animal manures (from turkeys), and crop residues (from corn and wheat), all generated in Minnesota, into organic bio-fertilizers to be sold to Minnesota farmers for corn, sugar beets, and other crops.

The project is larger on a capacity basis than other biomass projects recommended for funding by the advisory group. The advisory group, however was concerned about the price proposed for the power purchase agreement and overall lack of innovativeness regarding the project's processing of waste material.

EP Proposals Not Recommended for Funding

EP4-2 City of Hopkins

Title: Municipal Solar Energy

Overall Rank: 17 Technology Rank: S-15

Total Score (out of 230): 151.32

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area
Sponsored by local government

RDF Funding requested: $708,204 Total Project Costs: $1,629,554

Installed Capacity: 475 kW

This 475 kW solar PV project, located in Hopkins, Minnesota, would utilize Minnesota-based tenKsolar RAIS Wave equipment with panels rated at 410 watts on four major Hopkins facilities (Public Works, Fire Station, Pavilion Ice Arena, and Hopkins Center for the Arts). Additionally, the project would utilize energy storage integrated with solar PV at the Hopkins Fire Station to serve as a backup power supply source.

The advisory group provided favorable comments on the proposal by a government entity within the Xcel Energy service territory and the lower cost. The advisory group, however, found the overall proposal not as well developed as others submitted, which weighed against the subjective attributes related to the proposal. Given that it was not significantly different than other solar proposals that scored higher and to provide a balance and mix of project types by avoiding duplicative projects, the advisory group decided not to pursue this proposal further. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-8 Salvation Army

Title: Solar Project on Facilities in Maplewood and St. Paul

Overall Rank: 23 Technology Rank: S-21

Total Score (out of 230): 135.51

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $460,000 Total Project Costs: $1,075,362

Installed Capacity: 250 kW

This 250 kW solar PV project would utilize Minnesota-based tenKsolar equipment with panels rated at 410 watts with integrated energy storage capability of 100 kW on two Salvation Army facilities, one in Maplewood and one in St. Paul. This project would demonstrate solar energy's ability to serve as a backup power supply during an emergency or grid failure.

While the advisory group felt that the Salvation Army proposal was intriguing, it focused on emergency preparedness instead of every day operations. The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-12 Xcel Energy

Title: Buy All/Sell All Solar*Rewards Program

Overall Rank: 36 Technology Rank: S-29

Total Score (out of 230): 109.63

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $10,800,000 Total Project Costs: $10,960,000

Installed Capacity: 9.0 MW

This program will utilize funding from the Renewable Development Fund to provide incentives to Xcel Energy customers to invest in solar PV systems and to improve Xcel Energy's Solar*Rewards program.

The advisory group did not recommend this proposal for funding based on a low technical score and limited detail describing project implementation. While the proposal presented an interesting opportunity to fund solar investment the overall project cost was disfavored by the advisory group as it would require too large a portion of the funds anticipated to be awarded to EP projects (over a third of available funds). As stated on page 10 of the RFP, grant awards larger than average amounts should include specific information that support why a larger grant award is justified. Overall, however, the advisory group felt that Solar*Rewards could be funded through other mechanisms.

EP Proposals Not Recommended for Funding

EP4-14 Murphy Warehouse Company

Title: Innovation Corridor Solar Array

Overall Rank: 21 Technology Rank: S-19

Total Score (out of 230): 143.17

Preferences Received: Located in Central Corridor
Located in Xcel Energy service area

RDF Funding requested: $2,016,118 Total Project Costs: $2,122,229

Installed Capacity: 650 kW

This 650 kW solar PV project, located near the Central Corridor Stadium Village Light Rail Transit Station in southeast Minneapolis, would utilize a Minnesota-based tenKsolar PV array at Murphy Warehouse Company's warehouse. The solar PV array is intended to generate 75 percent of Murphy Warehouse Company's energy needs and to test the effectiveness of solar PV panels facing southwest to lessen the energy demand curve during peak demand hours.

The overall cost share of the project identified in the proposal was only five percent. The advisory group noted that other similar proposals included cost shares up to 50 percent. Further, the advisory group identified inconsistencies in the proposal, including a discrepancy between the total demand versus the proposed size of the array, that it was unable to reconcile with the submitted materials. Given that it was not significantly different than other solar proposals that scored higher and to provide a balance and mix of project types by avoiding duplicative projects, the advisory group decided not to pursue this proposal further. As a private company, the applicant could be eligible for federal tax credits to fund a solar installation. The project is also potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-16 OSEMI Inc.

Title: Concentrated Photovoltaic Solar Electric Power Plant

Overall Rank: 39 Technology Rank: S-31

Total Score (out of 230): 104.27

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $1,750,000 Total Project Costs: $1,750,000

Installed Capacity: 100 kW

This solar PV project would build a photovoltaic power plant designed for Minnesota's climate and for storing and generating electricity 24/7. OSEMI would manufacture and install 0.1 MW, 1 MW, 10 MW, and 25 MW solar PV systems at solid waste facilities, metro transit facilities, public utilities, and private businesses.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-17 Minnesota Department of Natural Resources (DNR)

Title : EV Charging Stations

Overall Rank: 40 Technology Rank: S-32

Total Score (out of 230): 97.08

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $641,000 Total Project Costs: $962,150

Installed Capacity: 84 kW

This solar PV project would install at least 84 kW of solar PV capacity to be utilized at electric vehicle charging stations at eight to ten Minnesota Department of Natural Resources sites in Minnesota. These charging stations would create a chain of facilities through Minnesota from Iowa to Canada. The charging stations will prevent approximately 13,800 metric tons of carbon emissions over a 30-year period.

The advisory group appreciated the management of the last Department of Natural Resources RDF project and the public education aspect of this particular proposal. The electric energy cost was high due to many of the project costs pertained to the installation of equipment for the charging station. The advisory group decided to not provide funding due to the focus on energy consumption (i.e. charging stations) with only 84 kW of additional energy capacity.

EP Proposals Not Recommended for Funding

EP4-18 Gustavus Adolphus College

Title: 336 kW DC Solar Project

Overall Rank: 14 Technology Rank: S-12

Total Score (out of 230): 155.92

Preferences Received: Grant distributed as a lump sum

RDF Funding requested: $480,000 Total Project Costs: $875,071

Installed Capacity: 226 kW

This 336 kW_{DC} (269 kW_{AC} project) solar PV project located at Gustavus Adolphus College in St. Peter, Minnesota, would be a collaborative venture between Best Power Int'l, LLC and Gustavus Adolphus College. The facility would generate a portion of the college's electrical load at a cost that is no more than what the college currently pays for electricity.

Utilizing a holistic approach, the advisory group identified this project as similar to other behind-the-meter solar installations at institutions of higher education such as the Sisters of Notre Dame Project (EP4-5) and the second phase of the St. John's University Project (EP4-6). Because the proposal is not within the Xcel Energy service territory the advisory group determined that other similar projects would provide greater benefits to Xcel Energy electric ratepayers. Further, the advisory group could not identify any innovative aspects of the proposal. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-19 Adonis Eco-Housing

Title: Statewide Affordable Solar Homes

Overall Rank: 42 Technology Rank: S-34

Total Score (out of 230): 87.59

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $2,046,673 Total Project Costs: $14,346,673

Installed Capacity: 200 kW

This 200 kW solar PV project would consist of small solar systems for approximately 200 affordable homes dispersed across urban and rural Minnesota. The system would be built of modules that individually convert direct current electricity into alternating current electricity at each panel.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-23 Green Peak Solar LLC

Title: Cooperative-Community Solar "Block Club"

Overall Rank: 45 Technology Rank: S-35

Total Score (out of 230): 76.28

Preferences Received: Located in Central Corridor
Located in Xcel Energy service area

RDF Funding requested: $2,300,000 Total Project Costs: $2,300,000

Installed Capacity: 312 kW

This is a 312 kW solar PV project. The project would form a cooperative to organize and conduct an initial test market to design, finance, market, construct, administer and operate the nation's first urban Solar Farm via a Community Solar "Block Club" business model. This project would site one hundred, pole-mounted 3.12 kW solar PV trackers in inner-city backyards. The trackers would be connected into Xcel Energy's existing utility grid. The project would secure a power purchase agreement for the energy with Xcel Energy and standard utility interconnection agreements. Each solar tracker would also provide 10 kW of dispatchable battery storage that can be used during Xcel Energy's peak demand. This project would demonstrate that this system can successfully deliver volume installations at significantly reduced costs over the project's lifetime.

As stated on page 10 of the RFP, grant awards larger than average amounts should include specific information that support why a larger grant award is justified. The proposal did not explain the justification for a grant award that exceeded the average energy production award. The advisory group did not recommend this proposal for funding based on a very low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion.

EP Proposals Not Recommended for Funding

EP4-25 Hince Farms, Inc.

Title: Installation of a Solar Photovoltaic System on the Hince Farms, Inc.

Overall Rank: 35 Technology Rank: S-28

Total Score (out of 230): 117.2

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $350,000 Total Project Costs: $425,415

Installed Capacity: 100 kW

This 100 kW solar PV project will be located at Hince Farms, Inc. in Plum City, Wisconsin. The farm conducted an electrical engineering assessment of its electrical usage that showed with lighting retrofitting, equipment retooling, proper insulation, and the inclusion of a renewable energy system, the farm can eliminate its cost for electricity. The excess electricity will be sold to Xcel Energy.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-26 Positive Energy Systems, LLC

Title: Solar PV project at Brownfield in Olivia (EP4-26)

Overall Rank: 38 Technology Rank: S-30

Total Score (out of 230): 104.75

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $2,000,000 Total Project Costs: $3,849,112

Installed Capacity: 1.0 MW

This 1.0 MW solar PV facility would be located at a Brownfield site in Olivia, Minnesota. The Brownfield site is a former dump site that was used for garbage disposal and composting.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-27 Positive Energy Systems, LLC

Title: Installation of a Solar Photovoltaic System at the Dunn County Judicial Center

Overall Rank: 32 Technology Rank: S-25

Total Score (out of 230): 121.80

Preferences Received: Located in Xcel Energy service area
Sponsored by local government

RDF Funding requested: $2,000,000 Total Project Costs: $3,849,112

Installed Capacity: 1.0 MW

This is a 1.0 MW solar PV project located at the Dunn County Judicial Center in Menomonie, Wisconsin. Excess electricity would be sold to Xcel Energy.

The advisory group did not recommend this proposal for funding based on a low technical score, the concept was not significantly different than other solar proposals that scored higher (for example, EP4-39 Goodwill Solar, LLC) and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion.

EP Proposals Not Recommended for Funding

EP4-28 Future Force Inc.

Title: Wind Energy Production Proposal

Overall Rank: 44 Technology Rank: W-3

Total Score (out of 230): 86.73

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $2,778,400 Total Project Costs: $2,778,400

Installed Capacity: 90 kW

This project would refurbish an existing 440 kW wind turbine system with Zero Contact Transmission (ZCT) technology to increase its capacity by 90 kW. The location of the project is yet to be determined. The ZCT technology would increase the wind turbine system's availability by reducing repair activities, eliminating maintenance related to the gear box, and expanding low wind operation.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion.

EP Proposals Not Recommended for Funding

EP4-30 Dragonfly Solar in partnership with GE Capital, Fleet Services

Title: Solar Installation at GE Capital Fleet Services Headquarters

Overall Rank: 33 Technology Rank: S-26

Total Score (out of 230): 119.79

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $3,129,400 Total Project Costs: $3,129,400

Installed Capacity: 753 kW

This 753.345kW solar PV project would be installed at the headquarters of GE Capital, Fleet Services in Eden Prairie, Minnesota. This project represents a commercial scale solar PV installation using a campus wide mix of site integrated solar, roof mounted solar and multi-use solar support structures. This technology moves the maximum power tracking technology from the inverter to the individual solar modules.

The advisory group did not recommend this proposal for funding based on a low technical score, the concept was not significantly different from other solar proposals that scored higher (for example, EP4-13 Metropolitan Airports Commission and EP4-39, Goodwill Solar, LLC) and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-31 Heliacal, LLC

Title: 15-20 Solar Roof-Leasing Projects along Energy Innovation Corridor

Overall Rank: 31 Technology Rank: S-24

Total Score (out of 230): 122.57

Preferences Received: Located in Central Corridor
Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $1,999,481 Total Project Costs: $2,896,000

Installed Capacity: 750 kW

This 750kW (AC) solar PV proposal, developed by Heliacal, LLC, will encompass 15 to 20 solar roof-leasing agreements with businesses along the Energy Innovation Corridor (EIC). The project will also create a portal or web link on the EIC website for displaying the real-time performance of the system, to support the EIC goal of demonstrating innovative energy technologies.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-32 Emerald H2, LLC

Title: Emerald H2 Commercial Scale Wind to Hydrogen Integration Project

Overall Rank: 46 Technology Rank: W-4

Total Score (out of 230): 63.06

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $3,855,000 Total Project Costs: $38,755,663

Installed Capacity: 10.0 MW

The project proposed the installation of a 1-MW fuel cell as a utility peaking resource powered by hydrogen produced from a 10-MW wind farm

The advisory group did not recommend this proposal for funding based on a low technical score and the wind energy generation was not grant eligible since it exceeded the allowable size of wind energy production projects.

EP Proposals Not Recommended for Funding

EP4-33 PowerWorks Wind Turbines

Title: Ten 100 kW Refurbished Wind Turbines

Overall Rank: 4 Technology Rank: W-1

Total Score (out of 230): 173.75

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $1,998,416 Total Project Costs: $2,237,488

Installed Capacity: 1.0 MW

This proposal was to install 10 remanufactured PowerWorks 100 kW wind turbines to provide 1,000 kW additional capacity in Xcel Energy's Minnesota service territory. The wind turbines would collectively generate approximately 2,000,000 kWh per year to Xcel Energy's grid.

A proposal to utilize refurbished turbines was disfavored by the advisory group. The use of refurbished turbines has had mixed results pertaining to service and reliability within the State of Minnesota. The advisory group would prefer introducing new wind technology by supporting the introduction of new model's versus funding the older technology.

EP Proposals Not Recommended for Funding

EP4-35 Revier Cattle Company

Title: Anaerobic Digester

Overall Rank: 43 Technology Rank: C-2

Total Score (out of 230): 87.11

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $6,756,225 Total Project Costs: $10,394,192

Installed Capacity: 2.0 MW

This project proposes an anaerobic digester for Revier that will transform manure into renewable energy, along with a solar photovoltaic system that will capture energy for use on its farm and feed lot operations to help the Company become self-sustaining. The project would consist of a shade structure for the operation's cattle pens that covers up to 60,000 square feet of surface area.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-37 Natural Systems Utilities

Title: Natural Systems Utilities' Northern Star Co. Renewable Energy Project

Overall Rank: 26 Technology Rank: B-4

Total Score (out of 230): 133.30

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area
Utilizes non-agricultural residues for feedstock

RDF Funding requested: $2,000,000 Total Project Costs: $9,138,278

Installed Capacity: 542 kW

This project proposes an anaerobic digester to treat Michael Foods, Inc.'s Chaska, Minnesota facility's (potato processing plant) wastewater and produce electricity for its operations. The project's combined heat and power system is estimated to generate 13,000 kWh/d or 3,445,000 kWh/yr. The renewable energy generated would be consumed on site, replacing power that is currently being purchased from the City of Chaska.

The overall cost associated with this proposal was quite high, as noted by Sargent & Lundy in its review. Additionally, the project is not within the Xcel Energy service territory and there were some technical aspects that were not fully developed. The advisory group determined that the project was similar to other biomass projects proposed and had higher costs compared to other proposals. Given that it was not significantly different than other biomass proposals that scored higher and to provide a balance and mix of project types by avoiding duplicative projects, the advisory group decided not to pursue this proposal further.

EP Proposals Not Recommended for Funding

EP4-38 Minnesota Go Solar, LLC

Title: 20 1.0 MW Alternating Current Solar PV Facilities

Overall Rank: 1 Technology Rank: S-1

Total Score (out of 230): 187.45

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $7,439,000 Total Project Costs: $57,200,000

Installed Capacity: 20.0 MW

This project proposed to construct 20 1.0 MW alternating current solar photovoltaic generating facilities in Xcel Energy's service territory. Solar installations would be located near sufficient load centers in small and medium sized cities throughout southeast and southwest Minnesota.

While the proposal presented an interesting opportunity through solar renewable energy credits, the overall project cost was disfavored by the advisory group as it would require too large a portion of the funds anticipated to be awarded to EP projects (over a third of available funds). As stated on page 10 of the RFP, grant awards larger than average amounts should include specific information that support why a larger grant award is justified. One of the objectives the advisory group identified for RDF Cycle 4 was a desire for a diverse set of grant opportunities. The project's focus on the development of a solar renewable energy credit market was identified by some advisory group members as not very compelling within the mission of the RDF. As stated earlier in this document, the advisory group sought to fully fund grant requests and preferred to have a diverse portfolio of projects for RDF Cycle 4. Additionally, the energy price per kWh was high relative to other EP proposals and the locations for constructing the facilities were still open, which adds uncertainty. From prior experience, RDF proposals that do not have specific sites identified or a very clear plan to identify sites have significant project delays. Further, the overall timeline proposed for the project was not long enough based on the Company's prior experiences negotiating power purchase agreements for projects of the scale proposed.

EP Proposals Not Recommended for Funding

EP4-45 City of Rogers

Title: Solar Energy Project

Overall Rank: 19 Technology Rank: S-17

Total Score (out of 230): 145.47

Preferences Received: Located in Xcel Energy service area
Sponsored by local government

RDF Funding requested: $1,470,544 Total Project Costs: $3,215,622

Installed Capacity: 631 kW

This project would install approximately 631 kW of nameplate tenKsolar equipment and 28 kW of energy storage Silent Power units on four municipal buildings. The installation would be used to demonstrate use of solar energy and storage as a strategy for reducing peak energy demands at municipal liquor stores. All generated electricity would be consumed on-site.

The advisory group observed that other proposals similar to this proposal were received and that the project lacked innovation. The advisory group looked at this project, given it was similar to other proposals that were scored higher by Sargent & Lundy, against all the subjective attributes the group identified. Although this project has notable technical attributes, the advisory group's evaluation in the areas of innovativeness, benefits to enhancing the renewable market penetration, overall visibility, and balance of projects that would receive funding in this cycle weighed against the project and ultimately resulted in the advisory group moving this project to the list of projects for which funding was not recommended. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-46 Geronimo Energy

Title: Slumberland Solar Proposal

Overall Rank: 15 Technology Rank: S-13

Total Score (out of 230): 155.73

Preferences Received: Grant distributed as a lump sum
Located in Xcel Energy service area

RDF Funding requested: $1,503,000 Total Project Costs: $2,150,000

Installed Capacity: 1.0 MW

This 1 MW rooftop racking system solar project would be located on the roof of the Slumberland distribution center in Little Canada, Minnesota, and the energy generated would be used onsite. The project is backed by Geronimo Energy's strategic partner Enel Green Power.

The advisory group identified that many rooftop solar proposals were received during this funding cycle and sought to ensure a diverse mix of project types to receive funding based on a more qualitative evaluation. The advisory group identified that the Slumberland Solar proposal was similar to those of other proposals (EP4-39, for example, which was scored higher by Sargent & Lundy) and that those other proposals better met the advisory group's subjective attributes notwithstanding their lower score. The project is potentially eligible to receive funding through other solar initiatives that are available.

EP Proposals Not Recommended for Funding

EP4-47 North Central Regional Council of Carpenters

Title: Solar Array on Roof of Office and Training Facility

Overall Rank: 29 Technology Rank: S-22

Total Score (out of 230): 128.22

Preferences Received: Located in Xcel Energy service area

RDF Funding requested: $1,102,395 Total Project Costs: $2,328,062

Installed Capacity: 478 kW

This proposal involved the installation of a tenKsolar system with a nameplate capacity of 478.47 kW positioned slightly west of true north. The positioning is intended to shift system output and demonstrate the array's ability to reduce peak energy use and demand charges on the roof of the North Central Regional Council of Carpenters' office and training facility located near the State Capitol and the Innovation Corridor.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or that contained elements of interest to the advisory group had been identified for discussion. The project is potentially eligible to receive funding through other solar initiatives that are available.

RD Proposals Not Recommended for Funding

RD Proposals Not Recommended for Funding

RD4-3 Angel Alternative Energy

Title: Development of an Organic Rankine Cycle Power Engineer for Residential Concentrated Solar Power Systems

Overall Rank: 11 Technology Rank: S-2

Total Score (out of 230): 108.58

Preferences Received: High likelihood of royalty returns/large royalty ratio

RDF Funding requested: $593,604 Total Project Costs: $593,604

This project seeks to design a solar power system capable of producing both heat and electricity. In East Grand Forks, Minnesota, Angel Alternative Energy will test and quantify components for a residential sized organic Rankin cycle power engine that can be seamlessly integrated into an existing solar thermal system as a packaged product to convert a solar thermal system into a co-generation system.

The advisory group did not recommend this proposal for funding based on a low technical score and a significant amount in funding requests with higher scores or contained elements of interest to the advisory group had been identified for discussion.

RD Proposals Not Recommended for Funding

RD4-6 AF-Energy Corporation

Title: Accelerator™ Vertical Axis Wind Turbine and a Universal Hybrid Solar/Wind Controller

Overall Rank: 6 Technology Rank: C-1

Total Score (out of 230): 131.77

Preferences Received: High likelihood of royalty returns/large royalty ratio

RDF Funding requested: $1,573,680 Total Project Costs: $1,573,680

AF Energy Corporation's project, located in Minnetonka, Minnesota, would develop two new technologies – an Accelerator™ Vertical Axis Wind turbine and a universal hybrid solar/wind controller. The goal of the project is to offer a portable, rugged, low cost method for providing grid-connected or off-grid renewable electric energy, and will take advantage of wind resources not applicable to other technologies, in urban environments and ground-level wind.

As stated on page 10 of the RFP, grant awards larger than average amounts should include specific information that support why a larger grant award is justified. The advisory group did not recommend this proposal for funding because there was no explanation for a grant award that exceeded the average RD award.

RD Proposals Not Recommended for Funding

RD4-9 Small Wind Turbines, LLC

Title: Comparative Field Tests of Small Wind Turbine Generator Technology

Overall Rank: 10 Technology Rank: W-3

Total Score (out of 230): 110.75

Preferences Received: none

RDF Funding requested: $446,944 Total Project Costs: $1,055,215

The project would conduct comparative field tests of a small wind turbine generator technology at Central Lakes College in Staples, Minnesota. The goal of the project is to demonstrate that the small wind turbine system offers a higher level of torque-to-weight efficiency over a conventional system. The lower cost, smaller alternative to conventional systems could offer a highly competitive wind turbine system in the power production range from five to 100 kilowatts.

The advisory group did not recommend this proposal for funding because of concern over the general applicability of the research proposed to be completed to the local market and the lack of scientific rigor for testing the turbines. The proposal did not include a methodology for selection and identification of the 10 kW, 20 kW, and 40 kW microturbines.

RD Proposals Not Recommended for Funding

RD4-16 Regents of the University of Minnesota

Title: Preventive and Corrective Maintenance for Large Wind

Overall Rank: 16 Technology Rank: W-4

Total Score (out of 230): 78.00

Preferences Received: Located within the Central Corridor

RDF Funding requested: $288,472 Total Project Costs: $299,472

This research and experiment project, located at the University of Minnesota's Atmospheric Wind Tunnel at St. Anthony Falls Laboratory, seeks to provide a decision tool to wind power plant operators which allows them to optimize response strategies to faulty turbine units, and offer preventative maintenance strategies for operational turbines. The project aims to reduce the Levelized Cost of Energy, increase efficiency of wind power plants, minimize the risk of damages and malfunctions within power plants, and provide optimal response to turbine failures that cannot be tested in real scale wind farms.

The advisory group did not recommend this proposal for funding based on a low technical score and limited information on industry partners and project personnel. The advisory group was concerned that modeling would be performed only in a wind tunnel.

RD Proposals Not Recommended for Funding

RD4-17 University of Minnesota – Morris

Title: Advanced Distribution Generation Platform

Overall Rank: 15 Technology Rank: C-3

Total Score (out of 230): 87.50

Preferences Received: none

RDF Funding requested: $2,078,708 Total Project Costs: $2,236,324

The research project would examine the advanced distributed generation platform at University of Minnesota's Morris Campus, which is the result of investments made in energy efficiency, wind generation, combined heat and power, and micro grids. The research would consider the intermittency of wind and the cyclic production trends of wind in relation to behind the meter land and peak demand issues at the point of interconnection.

As stated on page 10 of the RFP, grant awards larger than average amounts should include specific information that support why a larger grant award is justified. The advisory group did not recommend this proposal for funding because there was no explanation for a grant award that exceeded the average research and development award and a relatively low technical score.

RD Proposals Not Recommended for Funding

RD4-18 Open Access Technology International

Title: Software for Solar Installations

Overall Rank: 14 Technology Rank: S-5

Total Score (out of 230): 97.17

Preferences Received: none

RDF Funding requested: $1,945,223 Total Project Costs: $2,590,598

This project would deploy Open Access Technology International, Inc.'s Software as a Service technology with a solar installation. The project would demonstrate a coordinating forecasting, scheduling, and economic dispatch and control system for battery-equipped solar systems along with Demand Response and Distributed Energy Resources at the company's main campus in Minneapolis and secondary campus in Bloomington using tenKsolar equipment.

As stated on page 10 of the RFP, grant awards larger than average amounts should include specific information that support why a larger grant award is justified. The advisory group did not recommend this proposal for funding because there was no explanation for a grant award that exceeded the average research and development award and a relatively low technical score.

RD Proposals Not Recommended for Funding

RD4-19 Community Energy Solutions

Title: First Light Biogas Generator

Overall Rank: 17 Technology Rank: B-5

Total Score (out of 230): 77.91

Preferences Received: Utilizes non-agricultural residues for a feedstock

RDF Funding requested: $250,000 Total Project Costs: $466,300

This project proposes to build an organic waste-to-energy conversion system using the latest technologies and a new innovative design to maximize the efficiency of energy production per ton of feedstock. The project would use the First Light system, which utilizes proprietary bacteria and other unique processes and produces as much as 60% more biogas. In addition, Community Energy Solutions would incorporate a new infrared dryer technology to more efficiently dry out the waste sludge to create its dried fertilizer product.

The advisory group did not recommend this proposal for funding based on a low technical score and limited information pertaining to the detail and explanation of how the technology will be demonstrated.

RD Proposals Not Recommended for Funding

RD4-21 Solar Cell & LED Technology

Title: Development of High Efficiency and Low Cost Thin Film Solar Cells

Overall Rank: 12 Technology Rank: S-3

Total Score (out of 230): 108.42

Preferences Received: none

RDF Funding requested: $1,000,000 Total Project Costs: $1,000,000

This project proposes to develop high efficiency, light weight, flexible plastic, low cost, thin film solar cells. The thin film solar cells are next generation photovoltaics, which replace silicon family solar cells to reduce cost. The low cost and high efficiency thin film solar cells on flexible sheets with solar to electric conversion efficiency greater than 25 percent will be competitive in the renewable energy market.

The advisory group did not recommend this proposal for funding because of concern over limited information in the proposal that lacked details on responsibilities for research activities and outcomes.

CERTIFICATE OF SERVICE

I, SaGonna Thompson, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States mail at Minneapolis, Minnesota

xx electronic filing

Docket No. E002/M-12-1278 and
Special Service List-4th Cycle List

Dated this 12th day of December 2013

/s/

SaGonna Thompson
Records Analyst

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