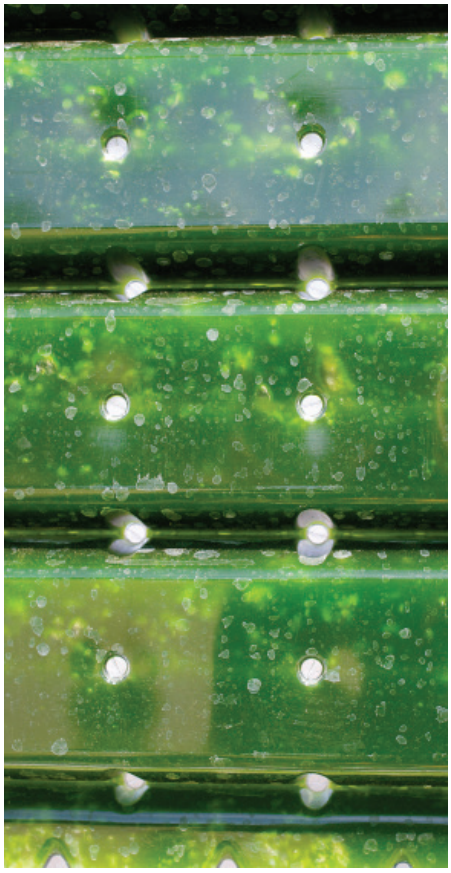
Xcel Energy's Renewable Development Fund

Biennium Report to the Minnesota State Legislature and the Minnesota Public Utilities Commission

January 1, 2015–December 31, 2016



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Xcel Energy provides the energy that powers millions of homes and businesses across eight Western and Midwestern states. Headquartered in Minneapolis, the company is an industry leader in responsibly reducing carbon emissions and producing and delivering clean energy solutions from a variety of renewable sources at competitive prices. Northern States Power Company–Minnesota, an Xcel Energy Company, provides electricity to about 1.3 million customers and natural gas to more than 450,000 customers in Minnesota.

The Renewable Development Fund (RDF) is program mandated by the Minnesota State Legislature with oversight by the Minnesota Public Utilities Commission. The RDF's mission is to increase renewable energy market penetration, assist renewable energy projects and companies, and support emerging renewable energy technology.

I. Executive summary

This 2015–2016 Renewable Development Fund (RDF) Biennium Report documents Xcel Energy's efforts to administer grants and programs mandated by the Minnesota legislature to support the development of emerging renewable electric energy technology.

During this biennium the 28.5MW of renewable energy generation capacity installed through RDF funding has generated more than 160 megawatt hours (MWh) of electricity. A complete list of RDF projects that were active during the biennium is included in the Appendix A of this report.

Seventeen new projects were initiated during the past biennium. These projects were from the RDF's fourth grant funding cycle approved by the MPUC in 2014 and included nine energy production projects and eight research and development projects.

City of Hutchinson Solar Array – recipient of 2016 Clean Energy Community Award

II. RDF program background

The RDF program was mandated by the Minnesota Legislature in 1994 in conjunction with legislation regarding the Prairie Island nuclear generating plant in Red Wing, Minnesota. As a condition of storing spent nuclear fuel in dry casks at Prairie Island, Minn. Stat. § 116C.779 initially required NSP–Minnesota, as the public utility owner of the plant, to transfer $500,000 for each dry cask containing spent fuel to a renewable energy fund after January 1, 1999, amounting to $9 million annually. In 2003, this statute was amended to extend the life of the nuclear-waste storage at Xcel Energy's Prairie Island plant and increased the amount Xcel Energy must pay to $16 million annually, of which $10.9 million annually shall be used to fund renewable small-wind, hydro and biogas incentives via the renewable energy production incentive (REPI) program administrated by the Department of Commerce. (See Section V for further discussion of REPI.)

In 2007, the statute was further amended to add an additional assessment of $350,000 for each dry cask stored at Xcel Energy's Monticello nuclear generating plant. Ten casks were filled in 2008 and continue to be stored at our Monticello plant. Starting in 2008, $19.5 million has been set-aside annually for the RDF Program. In 2013 the annual set-aside increased to $22.75 million and in 2014 and 2015 the annual set-aside was $24.6 million. A cumulative total of $301.35 million has been set-aside in the RDF since inception.

City of St. Paul Solar Array – St. Paul Saints ballpark

In 2012, the Minnesota Legislature amended the RDF Statute affecting administration of the RDF program. The 2012 amendments provided more flexibility for the Commission to disapprove or modify proposed RDF expenditures that it finds to be non-compliant with prior orders or otherwise not in the public interest. Modifications included adding language to focus funding only for development of renewable energy sources and that a preference must be given to projects located within Minnesota. Definition was given to the consulting role that an advisory group provides and clarified that Xcel Energy has full and sole authority to determine which expenditures shall be submitted to the Commission for approval. Several RDF administrative requirements that were in effect due to Commission orders were incorporated into statute. For example, reports written by grantees must include sufficient detail for technical readers as well as a clearly written summary for non-technical readers, reports must be posted online on a public website and reports must acknowledge that the project was made possible in whole or part by Xcel Energy's Minnesota electric ratepayers.

The cost of Commission-approved program expenses allocated to Minnesota is recovered through an adjustable surcharge on Xcel Energy's customer bill statements as part of their monthly charges for electricity. This surcharge mechanism is known as a "rate rider." On October 1 each year, Xcel Energy submits an RDF summary report to the Commission. This summary report contains a proposed RDF rate rider charge for the upcoming year and an annual financial report which summarizes the RDF programs past expenses and a two-year expense forecast. In 2015, the RDF charge was $0.000563 per kWh. In 2016 the RDF charge was $0.000902 per kWh. In 2016 a typical residential customer using 750 kWh per month, the RDF cost per month was 68 cents.

The RDF advisory group was established by Xcel Energy, and serves as an independent entity to assist Xcel Energy in evaluating and selecting grant project proposals for recommendation to the Company and Commission. Xcel Energy uses technical and professional consulting resources, as needed, to carry out its duties. The advisory group makes recommendations regarding the selection of projects and has seven members consisting of representatives from the following organizations:

- Environmental interests (two)
- Prairie Island Indian community (one)
- Residential customers (one)
- Commercial and Industrial customers (one)
- Xcel Energy (two)

The RDF advisory group is further detailed in the Appendix B.

Xcel Energy program staff has responsibility for the day-to-day administration of the RDF grant contracts and resources.

School Sisters of Notre Dame – 849 kW installation in Mankato was first large-scale array to use a 1,000 VDC platform in Minnesota.

III. RDF program mission and performance metric evaluation

The RDF's mission was established in Oct. 2006 through a Commission Order as an operational guideline for the fund. The 2012 amendments to the RDF Statute, Minnesota Statute section 116C.779, further clarified and supported the mission.

> *The overall purpose (mission) of the fund is to increase the market penetration within the state of renewable electric energy resources at reasonable costs, promote the start-up, expansion, and attraction of renewable electric energy projects and companies within the state, stimulate research and development within the state into renewable electric energy technologies, and 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.*

For priorities identified by the MPUS, the RDF program has established the following performance metrics for evaluating program effectiveness:

A. Expansion of knowledge base

B. Environmental benefits

C. Economic benefits

These performance metrics, detailed below, are revisited after the completion of each project to determine whether the project:

- Remained on course with its stated goals,
- Furthered RDF program objectives, and
- Was a prudent and beneficial grant award on behalf of the Company's customers.

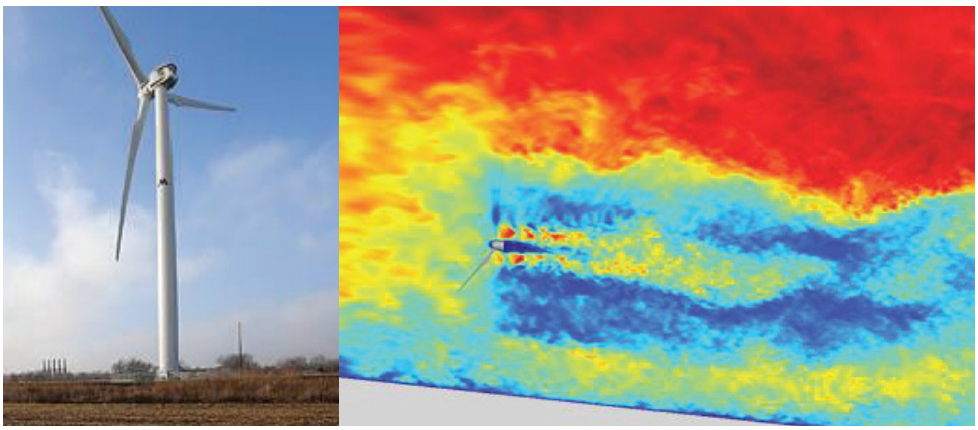
To demonstrate "net-zero" energy dairy facility, the University of Minnesota is installing solar and wind generation capacity to reduce the carbon footprint and increase the long-term profitability of Minnesota dairy farms through on-site renewable electrical generation.

A. Expansion of knowledge base. Project milestone reports and final reports submitted by grant recipients provide a public venue for the disclosure of new research breakthroughs that can stimulate the further development of new renewable technologies. These reports are available on the RDF web page at xcelenergy.com/RDF. In the past biennium the RDF webpages received 4,823 inquiries. Of these inquiries, 740 were specific to obtaining information specific for an RDF project. Inquiries related to solar were the most popular (See Table 1).

Table 1 – RDF webpages activity (2015–2016)

Project type	2015		2016	
	Inquiries	Projects	Inquiries	Projects
Biomass	n/a	47	n/a	78
Hydro	n/a	29	n/a	29
Solar	n/a	187	n/a	189
Wind	n/a	81	n/a	86
Higher education	n/a	n/a	n/a	14
Other inquires	1,621	n/a	2,389	n/a
Total	1,621	344	2,462	396

In addition, the publication of project results in scientific journals and the presentation of research activities at conferences and other forums provide another avenue to expand the academic and practical knowledge base of renewable energy technologies. During this biennium, one article was published in a scientific journal and two papers were presented at a state conferences and workshops. (See Appendix C) These publications and venues provide a critical scientific peer review of project research findings and are a basis for additional research activities or commercial efforts.



The University of Minnesota Virtual Wind Simulator simulates the wind turbulence created from a turbine blade for the development of optimal spacing of turbines to maximize power production from a wind farm.

B. Environmental benefits. The RDF's environmental contribution is the avoidance of both air pollutant and greenhouse gas emissions when compared with alternative methods of generating electricity. Installed RDF energy production projects generated 160,534 MWh of electricity during the 2015–2016 biennium. Overall, RDF projects have generated a total of 500,907 MWh of electricity produced from a renewable energy resource. (See Table 2) Since solar electricity is only generated during peak daytime periods, it can also help meet demand energy requirements.

Table 2 – Electrical generation (MW)

Type	Prior bienniums	Current biennium	Total generation
Biomass	589	2,205	2,794
Hydro	101,701	103,794	205,495
Solar	22,586	17,582	40,168
Wind	199,088	53,362	252,450
Total	323,964	176,943	500,907

Hydro, solar and wind resources create no air emissions. When compared to electrical energy produced by coal, the RDF generation has provided environmental benefits through the reduction in several primary air emission categories (See Table 3). Hydro, solar and wind-sourced electrical generation offsets the release of emissions resulting from conventional electrical power generation and helps Xcel Energy meet a goal to reduce CO_2 emissions 20 percent from 2005 levels by 2020.

Table 3 – Air emission reductions (compared to coal)

Emission	Prior to 2015 (pounds)	Biennium (2015–2016) (pounds)	Total (pounds)
CO_2	445,702	213,019	658,721
SO_2	769	386	1,155
NOX	578	272	850
VOCs	16,340	7,699	24,039
Hg	6.97	3.03	10.00
Pb	4.24	2.05	6.29

CO_2 emissions data is based on Xcel Energy's 2015 Corporate Responsibility Report

RDF projects have also generated Renewable Energy Credits (RECs) which are tradable, non-tangible energy commodities. These credits represent the environmental attributes of the power produced from renewable energy projects. RDF projects have generated 460,659 RECs which can be used to meet Xcel Energy's renewable energy goals and requirements to the benefit of its electric customers. (See Table 4)

Table 4 – Renewable Energy Credits (RECs)			
	Prior to 2015	Biennium (2015– 2016)	Total
kWh	417,786	83,121	500,907
Credits	302,206	158,453	460,659

C. Economic benefits. RDF grants for renewable energy research and energy production initiatives generate economic benefits. During the biennium RDF expenditures included nearly $12.0 million in RDF project grant reimbursements, $7.5 million in REPI payments, $7.8 million for solar rebates, and $24.6 million in funding for other special legislative projects. RDF expenditures promote and expand economic activity on both a local and regional scale through the purchase of goods and services, expansion of employment opportunities, and in some cases, fostering new or expanded business opportunities. In cases where permanent energy production facilities are constructed, RDF investments can also expand the property tax base for a community through land improvements. RDF grant funds support economic growth by providing an incentive that produces goods and services.

1. **Leveraged funds:** RDF grant awards have leveraged other funds to expand and/or enhance project activity. Since program inception, RDF grant awards have stimulated the investment of more than $183 million in renewable energy. This includes more than $130 million in construction activity, goods and services as a result of the start-up, expansion and attraction of renewable energy projects and companies in the Minnesota service territory and more than $52 million in research.

Energy production projects that have been active during the past biennium have leveraged more than $14.7 million, which is equivalent to $1.82 for every RDF dollar spent. (See Table 5)

Table 5 – Energy production funds leveraged (Active projects in 2015–2016 biennium)				
Technology	Grant	Cost share	Total costs	Leverage
Hydro	$1,538,591	$2,612,647	$4,151,238	170%
Solar	$6,497,689	$10,002,260	$16,499,949	154%
Wind	$0	$2.085,145	$2,085,145	–
Total	$8,036,280	$14,700,052	$22,736,332	182%

An additional $1.8 million has been leveraged during the past biennium for research and development which includes $1.2 million in Minnesota. Research and development projects typically do not have the extensive leverage capacity as compared to energy production because the funding is predominately applied to personnel rather than construction and material costs. (See Table 6) RDF grant dollars leverage $0.93 for every grant dollar invested based on metrics that can be measured and quantified. Other qualitative benefits may exist.

Table 6 – Research and development funds leveraged (Active projects in 2015–2016 biennium)

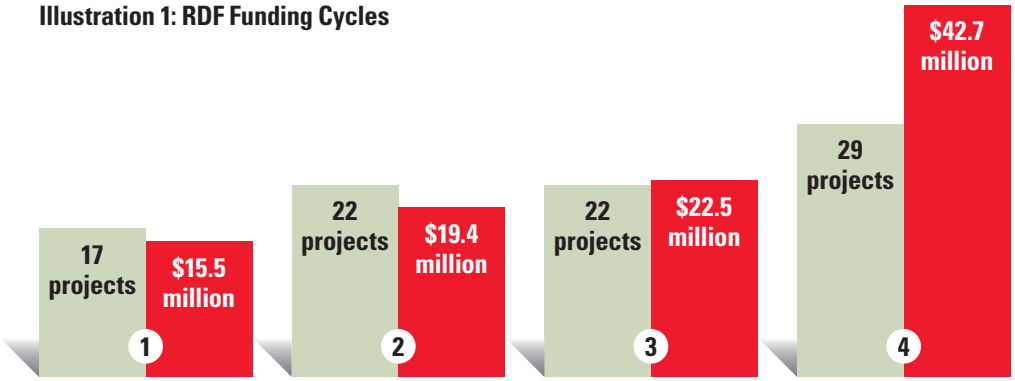
Technology	Minnesota			Outstate			Total leverage
	RDF grant	Cost share	Leverage	RDF grant	Cost share	Leverage	
Biomass	$0	$451,458	n/a	$850,000	$274,511	32%	85%
Solar	$152,730	$127,998	84%	$0	$0	n/a	84%
Wind	$500,976	$184,001	37%	$0	$0	n/a	37%
Higher education	$5,838,143	$0	0%	n/a	n/a	n/a	0%
Total	$6,491,849	$763,457	12%	$850,000	$274,511	32%	14%

Metropolitan Airport Commission – 1,471 kW installation atop the blue parking ramp at Minneapolis St. Paul International Airport.

IV. RDF Funding Activity

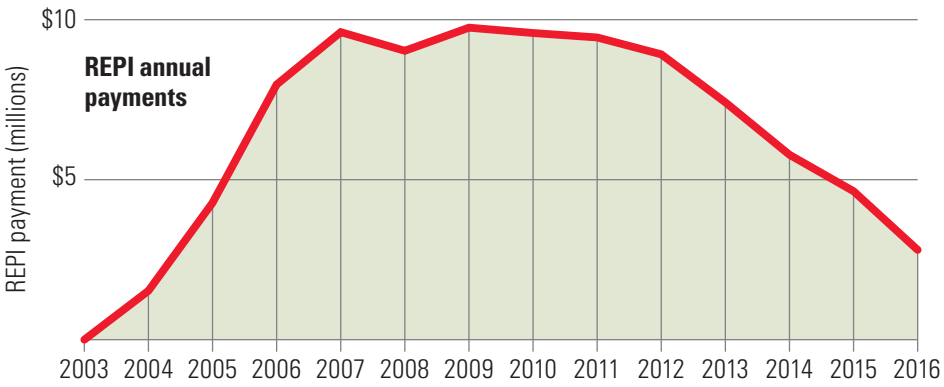
Since 2001, the RDF program has provided $276 million for renewable energy initiatives including $90.6 million for REPI payments, $100.9 million for legislatively mandated projects and programs, and $2.3 million for general program support. These mandated programs included the appropriation of $15 million ($5 million each year for 2010–2012) to the University of Minnesota for the Initiative for Renewable Energy and Environment (IREE). The balance of $100.1 million has been awarded over four grant cycles to 90 projects as follows:

Illustration 1: RDF Funding Cycles



Renewable Energy Production Incentives (REPI)

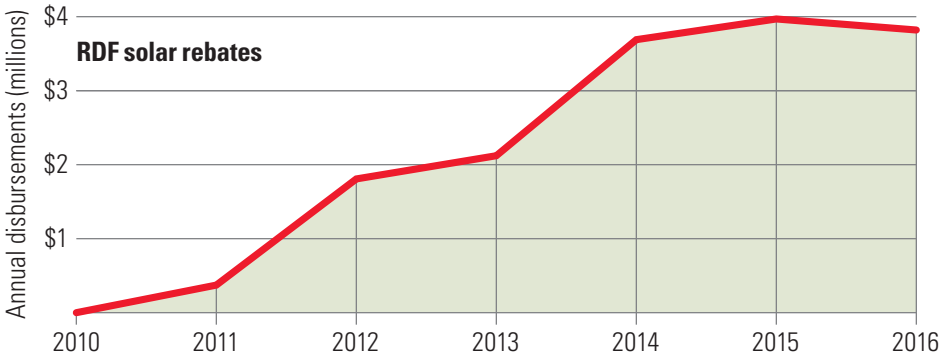
As specified by Minn. Stat. §116C.779, Subd. 2., the RDF program provides REPI payments up to $10.9 million for qualifying facilities including up to $9.4 million annually for electricity generated by wind energy conversion systems and up to $1.5 million annually for on-farm biogas recovery facilities and hydroelectric facilities. Minnesota Statute §216C.41 authorizes an incentive payment of 1.5 cents per kWh for qualified wind projects through 2018, biogas projects through 2015, and hydro projects through 2021. Approximately 225 MW of small wind facilities are subscribed in the program. REPI payments since program inception have totaled about $91.0 million.



RDF solar rebates

In 2010, the Minnesota Legislature approved a measure to utilize $21 million from the RDF program for solar rebates over the next five years ($2 million in state fiscal year 2011, $4 million in state fiscal year 2012, and $5 million per year in state fiscal years 2013–2015). The legislation specifies that Xcel Energy shall administer the RDF rebates for solar photovoltaic (PV) systems less than 40 kW installed by customers in the Company's Minnesota service territory. The RDF solar rebates are only available for systems that use solar modules manufactured or assembled in Minnesota. The amount of the RDF solar

rebate shall be the difference between the sum of all RDF rebates awarded to the applicant and $5 per watt of installed generating capacity. In addition, the amount of all rebates or other forms of financial assistance awarded to an applicant by a utility and the state, including the RDF solar rebate must not exceed 60 percent of the total installed cost of the solar PV installation net of federal income taxes at the highest applicable income tax rates.



Solar rebates were first disbursed in 2011 for the installation of 383 kW photovoltaic capacity. Since program inception, $15.8 million has been disbursed to install 6,147 kW of photovoltaic capacity in Minnesota and have all used Minnesota-made modules. In this biennium $7.8 million has been paid in rebates and 4,583 additional kW capacity has been installed.

Solar*Rewards

In 2013, Minnesota legislation approved a measure to establish a solar energy incentive program to be operated for five consecutive calendar years beginning in 2014. $5,000,000 shall be allocated for each of the five years from the RDF. With the commission of the system, a qualifying system would be paid a production incentive over the course of 10 years. In Oct. 2013 Xcel Energy filed a program proposal with the Department of Commerce seeking approval of the Company's Solar*Rewards program which was approved on March 28, 2014. Solar*Rewards incentives cannot be combined with incentives from other state and utility programs, including Made in Minnesota Solar Energy Production Incentive Account. A total of 9,936 kW of roof-top solar capacity has been installed through this program. Since program inception, $607,389 million has been disbursed. In this biennium the RDF payments to the Solar Energy Incentive Program was $551,886.

Made in Minnesota solar incentive account

In 2013 Minnesota legislation established a "Made in Minnesota" solar energy production incentive account as a separate account in the special revenue fund in the state treasury. Beginning Jan. 1, 2014 and each Jan. 1 thereafter, through 2023, for a total of 10 years each electric public utility subject to Conservation Improvement Program (CIP) requirements must annually pay to the Commissioner of Commerce five percent of the minimum amount it is required to spend on CIP. Affected utilities are Xcel Energy, Minnesota Power and Ottertail Power. Funds from the RDF, when added to the total amount paid to by the three affected utilities, totals a combined annual payment of $15.0 million. Since program inception, $36.1 million has been disbursed. In this biennium the RDF payment to the MIM Solar Incentive Account was $24.1 million.

V. Overall RDF project status

In order to maintain program transparency, the RDF administration files quarterly progress reports with the Commission (available at www.puc.state.mn.us) summarizing project activity. RDF grant recipients submit project milestone reports to the Company which provide a description of activities and findings. Milestone reports are posted on the RDF web page at xcelenergy.com/RDF. In addition, RDF grant recipients provide a final project report to the RDF advisory group.

A. Current contracts

RDF projects have contract periods of varying lengths and start dates based upon the specific variables and time requirements inherent to the project. Project duration has ranged from two months to 153 months but the typical project length is just over three years at 40 months. Some projects are dependent upon seasonal factors (i.e. wind patterns, weather, crop growth, winter construction restrictions, etc.), which require project tasks to be synchronized with calendar dates. The ability for the RDF to allow multi-year projects has been advantageous to biomass research projects that track impact parameters over the course of several growing seasons.

Of the 83 projects that have entered into RDF grant contracts since the RDF's inception, 17 projects were initiated during the biennial period. (See Table 7)

Table 7 – Summary of projects initiated (1/1/2015–12/31/2016)

	Prior to 12/31/2014	1/1/2015–12/31/2016
Cycle 1	17	0
Cycle 2	23	0
Cycle 3	22	0
Cycle 4	4	17
Total	66	17

Fifty-eight projects were completed prior to the biennial period, eight projects were completed during the biennial period and 17 remain active. (See Table 8)

Table 8 – Summary of completed projects (1/1/2015–12/31/2016)

	Prior to 12/31/2014	1/1/2015–12/31/2016	Active as of 1/1/2017
Cycle 1	16	0	1
Cycle 2	23	0	0
Cycle 3	19	2	1
Cycle 4	0	6	15
Total	58	8	17

B. Energy Production Project Status

Table 9 – Summary energy production projects (1/1/2014–12/31/2015)

Technology	Total projects	Completed projects	Installed capacity (MW)	Funds leveraged
Hydro	1	0	0	$2,612,647
Solar	15	8	4,414	$7,928,227
Totals	16	8	4,414	$10,540,874

Fourteen energy production projects were active during the biennial period of which six were completed and installed which added additional capacity of 4,414 MW. (See Table 9) Annual electrical production from this added generation capacity is projected to be 12,179 MWh. More than $6.1 million of RDF funding was awarded and obligated to these six RDF energy production projects. This investment leveraged an additional $10.5 million for project design, planning and materials for construction projects in Minnesota during this 2015–2016 biennium period.

C. Research and development project status

Eleven research and development (R&D) production projects were active during the biennial period with two completing their proposal activity during that period. (See Table 10) More than $18.7 million of RDF funding has also been awarded for these R&D projects of which $6.6 million was disbursed during the biennium. This investment has leveraged an additional $2.7 million from other sources for renewable energy research for a total of $9.3 million invested in research and development within Minnesota during this 2015–2016 biennium period.

Table 10 – Summary research development projects (1/1/2015–12/31/2016)

Technology	Total projects	Completed projects	Published articles	Scientific papers	Patent applications	Funds leveraged
Biomass	4	2	3	1	0	$2,404,111
Solar/wind	1	0	0	2	0	$255,997
Wind	3	0	0	0	0	$56,003
Higher education	3	0	1	5	1	$0
Totals	11	2	3	3	1	$2,716,111

D. Reimbursement of project costs

Grant funds are disbursed on a reimbursement basis according to project progress and milestones stipulated in each RDF grant contract. More than $13.8 million was dispersed in the biennium to reimburse project costs. (See Table 11) Some projects were completed under budget and nearly $3.3 million in savings was credited to the RDF program for future RDF grant awards.

Table 11 – Use of funds under RDF contract (1/1/2015–12/31/2016)

Cycle	Contracted RDF funds	RDF funds dispersed			Funds not utilized
		Prior to 12/31/2014	1/1/2015–12/31/2016	Balance after 1/1/2017	
Cycle 1	$15,550,401	$11,671,876	$0	$3,561,409	$317,116
Cycle 2	$29,440,996	$27,369,559	$0	$0	$2,071,437
Cycle 3	$22,510,293	$21,237,850	$826,038	$150,000	$296,405
Cycle 4	$31,746,952	$0	$12,989,538	$18,157,414	$600,000
Total	$99,248,642	$60,279,285	$13,815,576	$21,868,823	$3,284,958

E. Project benefits to NSP–Minnesota customers

The majority of RDF projects are based in Minnesota. As a result, most of the RDF dollars are also spent in Minnesota. One of the selection criteria for RDF grant projects relates to the benefits a project will bring to the Company's Minnesota customers. Therefore, research activity conducted by an entity that is not located in Minnesota needs to be applicable and transferable to the state. This is often accomplished through the use of a Minnesota site serving as a host for the development and demonstration of an RDF project. (See Table 12)

Table 12 – Minnesota hosts activities (1/1/2015–12/31/2016)

Project	Grantee	Minnesota host	Host location	Host activity
RD3-77	Coaltec Energy USA	P & K Farms	Northfield, Minn.	Pilot demonstration of gasifier
EP4-24	Bergey Windpower	Xcel Energy customers	Central and S.W. Minnesota	Install 10kW wind turbines
EP4-48	Oak Leaf Energy	Met Council	Shakopee, Minn.	Install 970 kW photovoltaic array

Appendix D details the Minnesota Congressional districts that have either hosted project activity or have had a project sponsor located within their boundaries.

VI. Conclusion

The RDF program continues to be a source of funding for renewable electric energy research, development and demonstration projects in Minnesota. Throughout the past 12 years and four grant award cycles, the RDF program has supported projects of state, regional and national significance. Yet, not all projects work out as planned, and it often takes years for research projects to be successful. There have been many lessons learned in conjunction with past RDF projects and are often applied to future efforts.

The Company looks forward to working with the Minnesota Legislature and the Minnesota Public Utilities Commission on possible revisions to the RDF Program. Further, we remain committed to making certain the RDF Program provides maximum benefits for those individuals who most directly make it possible—the Company's customers.

Appendix A – RDF projects during biennium (1/1/2015–12/31/2016)

	Contract	Project name	Grant	Type	Cycle	Category	Status	Project end date
1	RD3-1	University of Minnesota (Koda)	$992,989	RD	3	Biomass	complete	1/22/2015
2	EP4-6	Best Power Int'l – St. John's Expansion	$172,213	EP	4	Solar	complete	3/16/2015
3	RD3-69	Minnesota Valley Alfalfa Producers	$1,000,000	RD	3	Biomass	complete	7/15/2015
4	EP4-21	Farmamerica	$600,000	EP	4	Solar	canceled	8/12/2015
5	EP4-5	Best Power Int'l – SSND	$900,000	EP	41	Solar	complete	10/28/2015
6	EP4-41	City of Hutchinson	$958,369	EP	4	Solar	complete	6/1/2016
7	EP4-13	Metropolitan Airport Commissions	$2,022,507	EP	4	Solar	complete	6/10/2016
9	RD3-77	Coaltec Energy USA	$1,000,000	RD	3	Biomass	current	4/22/2017
10	EP4-15	Minnesota Renewable Energy Society	$2,661,320	EP	4	Solar	current	5/17/2017
11	EP4-34	City of St. Paul	$555,750	EP	4	Solar	current	6/9/2017
12	EP4-20	Target Corporation	$583,513	EP	4	Solar	current	7/1/2017
13	EP4-11	Innovative Power Systems	$1,850,000	EP	4	Solar	current	9/1/2017
14	RD4-11	University of Minnesota (Torrefaction)	$1,899,449	RD	4	Biomass	current	9/3/2017
15	EP4-24	Bergey Windpower	$1,106,600	EP	4	Solar	current	11/24/2017
16	EP4-29	Dragonfly Solar	$1,650,000	EP	4	Solar	current	12/8/2017
17	EP4-22	Minneapolis Park & Rec. Board	$969,741	EP	4	Solar	current	12/28/2017
18	AH-01	Crown Hydro	$5,100,000	EP	1	Hydro	current	1/20/2018
19	RD4-2	University of Minnesota (Dairy)	$982,408	RD	4	Solar/wind	current	6/2/2018
20	HE4-2	University of St. Thomas	$2,157,215	HE	4	various	current	8/12/2018
21	HE4-3	University of Minnesota (REMF)	$3,000,000	HE	4	various	current	8/20/2018
22	RD4-12	University of Minnesota (Noise)	$625,102	RD	4	Wind	current	9/2/2018
23	RD4-14	Barr Engineering	$161,081	RD	4	Wind	current	11/6/2018
24	HE4-1	MnSCU	$5,500,000	HE	4	various	current	4/11/2019
25	RD4-13	University of Minnesota (VWS)	$1,391,684	RD	4	Wind	current	6/2/2020
		Total RDF projects	**$39,839,941**					

*Project end date dependent upon anticipated completion of project activity.

Appendix B – RDF Advisory Group

- Joe Sullivan[1], manager, Strategic Relations
  Center for Energy and Environment
  Representing the environmental community
- Michelle Rosier[2], senior campaign and organizing manager
  Sierra Club North Star Chapter
  Representing the environmental community
- Lise Trudeau, engineer
  Minnesota Division of Energy Resources
  Representing residential customers
- Cam Winton[3], director, Energy and Labor Management
  Minnesota Chamber of Commerce
  Representing commercial and industrial customers
- Heather Westra
  Representing Prairie Island Indian community
- Kevin Schwain, manager, Emerging Customer Program
  Xcel Energy
  Representing Xcel Energy–Minnesota
- Tami Gunderzik, senior manager, product portfolio
  Xcel Energy
  Representing Xcel Energy–Minnesota

RDF administration

- Bria Shea, director, Regulatory and Strategic Analysis
  Xcel Energy
- Mark Ritter, grant administrator, RDF
  Xcel Energy

[1] Prior to Mr. Sullivan joining the RDF advisory group, Eric Jensen was an environmental representative on the RDF advisory group from 2012–2015.

[2] In December 2016 Ms. Rosier resigned and this position is currently vacant.

[3] Prior to Mr. Winton joining the RDF advisory group, Ben Gerber was the commercial and industrial customer representative on the RDF advisory group from 2012–2015. In December 2016 Mr. Winton resigned and this position is currently vacant.

Appendix C – Scientific articles and presentations

Scientific articles

Date	Grant #	Grantee	Article title	Journal
September 2016	RD4-13	U of M	Coherent Dynamics in the Rotor Tip Shear Layer of Utility-Scale Wind Turbines	Journal of Fluid Mechanics

Papers/presentations

Date	Grant #	Grantee	Paper Title	Conference	Location
February 2016	EP4-41	City of Hutchinson	WWTF Solar PV	Minnesota Brownfields Solar Workshop	St. Paul, MN
April 2016	EP4-41	City of Hutchinson	Hutchinson WWTF Solar PV	MN Wastewater Operators Association Central Section Meeting	Hutchinson, MN

Appendix D – Location of RDF Projects by Congressional District

RDF congressional districts (1/1/2015–12/31/2016)

	RDF contract	Grant	Type	Cycle	Renewable category	Host site		Project sponsor	
						District	Location	District	Organization
District 1	EP4-24	$1,106,600	EP	4	Solar	MN06	Lincoln, Lyon, Pipestone Co.	OK	Bergey Windpower, Norman
	EP4-29	$1,650,000	EP	4	Solar	MN01	Dodge City	MN03	Dragonfly Solar, Lakeville
	HE4-1	$5,500,000	HE	4	All	MN01	Minnesota State, Mankato	MN04	MnSCU, St. Paul
	RD4-14	$161,081	RD	4	Wind	MN01	Grand Meadows, Nobles Co.	MN05	Barr Engineering, Minneapolis
District 2	RD3-1	992,989	RD	3	Biomass	MN02	Rahr Malting, Shakopee	MN04	U of M, St. Paul
	RD3-77	$1,000,000	RD	3	Biomass	MN02	P & J Farms, Northfield	IL	Coaltec Energy USA, Carterville
	EP4-15	$2,661,320	EP	4	Solar	MN02	Northfield	MN05	MRES, Minneapolis
	EP4-34	$2,000,000	EP	4	Solar	MN02	BLWWTP, Shakopee	CO	Oak Leaf Energy, Denver
	RD4-2	$982,408	RD	4	Solar/wind	MN02	WCROTC, Morris	MN05	U of M, Minneapolis
District 3	EP4-5	$900,000	EP	4	Solar	MN01	SSND, Mankato	MN03	Best Power, Hopkins
	EP4-6	$172,213	EP	4	Solar	MN06	SJU, Collegeville	MN03	Best Power, Hopkins
	EP4-13	$2,022,507	EP	4	Solar	MN03	MAC, Bloomington	MN03	MAC, Bloomington
	EP4-48	$1,650,000	EP	4	Solar	MN01	Dodge City	MN03	Dragonfly Solar, Lakeville
District 4	EP4-11	$1,850,000	EP	4	Solar	MN04	EIC, St. Paul	MN05	IPS, Minneapolis
	EP4-20	$583,513	EP	4	Solar	MN04	Midway Superstore, St. Paul	MN05	Target, Minneapolis
	EP4-34	$555,750	EP	4	Solar	MN04	CHS Field, St. Paul	MN04	City of St. Paul
	RD3-1	992,989	RD	3	Biomass	MN02	Rahr Malting, Shakopee	MN04	U of M, St. Paul
	HE4-1	$5,500,000	HE	4	All	MN05	Century College, White Bear Lake	MN04	MnSCU, St. Paul
	HE4-2	$2,157,215	HE	4	All	MN04	UST, St. Paul	MN04	UST, St. Paul
	HE4-3	$3,000,000	HE	4	All	MN05	U of M, Minneapolis	MN04	U of M, St. Paul
District 5	AH-01	$5,100,000	EP	1	Hydro	MN05	Crown Hydro, Minneapolis	MN05	Crown Hydro, Minneapolis
	EP4-11	$1,850,000	EP	4	Solar	MN04	EIC, St. Paul	MN05	IPS, Minneapolis
	EP4-15	$2,661,320	EP	4	Solar	MN05	North Minneapolis	MN05	MRES, Minneapolis
	EP4-20	$583,513	EP	4	Solar	MN04	Midway Superstore, St. Paul	MN05	Target, Minneapolis
	EP4-22	$969,741	EP	4	Solar	MN05	MPRB, Minneapolis	MN05	MPRB, Minneapolis
	RD4-2	$982,408	RD	4	Solar/wind	MN02	WCROTC, Morris	MN05	U of M, Minneapolis
	RD4-11	$1,899,449	RD	4	Biomass	MN08	NRRI, Coleraine	MN05	U of M, Minneapolis
	RD4-12	$625,102	RD	4	Wind	MN05	U of M, Minneapolis	MN05	U of M, Minneapolis
	RD4-13	$1,391,684	RD	4	Wind	MN05	U of M, Minneapolis	MN05	U of M, Minneapolis
	RD4-14	$161,081	RD	4	Wind	MN01	Grand Meadows, Nobles Co.	MN05	Barr Engineering, Minneapolis
	HE4-3	$3,000,000	HE	4	All	MN05	U of M, Minneapolis	MN04	U of M, St. Paul
District 6	EP4-24	$1,106,600	EP	4	Solar	MN06	Stearns, Sherburne, Meeker	OK	Bergey Windpower, Norman
	HE4-1	$5,500,000	HE	4	All	MN05	St. Cloud State, St. Cloud	MN04	City of St. Paul
District 7	EP4-41	$958,369	EP	4	Solar	MN07	City of Hutchinson	MN08	City of Hutchinson
	RD3-69	$1,000,000	RD	3	Biomass	MN07	MnVAP, Priam	MN07	MnVAP, Raymond
District 8	RD4-11	$1,899,449	RD	4	Biomass	MN08	Granite Falls,	MN05	U of M, Minneapolis