414 Nicollet Mall
Minneapolis, MN 55401

February 12, 2014

**—Via U.S. Mail—**

Minnesota Senate
75 & 100 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN 55155

Minnesota House of Representatives
100 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN 55155

*(See attached service list for members served.)*

RE: ANNUAL REPORT TO MINNESOTA STATE LEGISLATURE
RENEWABLE DEVELOPMENT FUND

Dear Senators and Representatives:

Pursuant to the Minn. Stat. § 116C.779, enclosed is our Renewable Development Fund Annual Report. This report itemizes actual and projected financial benefit to Xcel Energy's electric ratepayers for each project that has received an RDF project grant administered by Xcel Energy.

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

Rep. Melissa Hortman
377 State Office Building
100 Rev. Dr. Martin Luther King Jr. Blvd
St. Paul, MN 55155

Rep. Pat Garofalo
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Rep. Joe Atkins
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Rep. Joe Hoppe
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Sen. John Marty
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Sen. David M. Brown
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Legislative Reference Library
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St. Paul, MN 55155

# Xcel Energy
# Renewable Development Fund (RDF)

# Annual Report to the Minnesota State Legislature

**February 12, 2014**

## Background

The Renewable Development Fund (RDF) is a program administered by Xcel Energy with oversight by the Minnesota Public Utilities Commission. The RDF's mission was established in an October 5, 2006 Commission Order and was revised to incorporate statutory requirements from the 2012 legislature. The current RDF mission statement directs that the overall purpose of the fund is to:

- *Increase the market penetration of renewable electric energy resources at reasonable costs in the state;*
- *Promote the start-up, expansion and attraction of renewable electric energy projects and companies in the state;*
- *Stimulate renewable electric energy research and development in the state;*
- *Develop demonstration scale renewable electric energy projects of near-commercial renewable electric generation or near-commercial electric infrastructure delivery technology that enhance the delivery of renewable electric energy within the state; and*
- *Provide benefits to Minnesota citizens, businesses and Xcel Energy's electric ratepayers.*

The RDF program was authorized 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, the RDF statute initially required Xcel Energy to transfer $500,000 for each dry cask containing spent fuel to a renewable energy fund which amounted to $9 million annually. In 2003, this statute was amended to extend the life of the nuclear-waste storage at our Prairie Island plant and increased the amount to be transferred into the RDF to $16 million annually. In 2007, the statute was further amended to add an additional assessment for dry casks stored at our Monticello nuclear generating plant in Monticello, Minnesota. From 2008 to 2012 $19.5 million was set aside annually for the RDF program. In 2013 the annual set-aside increased to $24.5 million and is expected to stay at that level for the foreseeable future.

According to the RDF statute (Minn. Stat. §116C.779), Xcel Energy must submit an annual report to the chair and ranking minority member of the legislative committees with jurisdiction over energy policy about projects funded by the RDF account. This report is organized into the following sections:

- RDF Program Summary;
- Current Cycle Overview;
- RDF Projects' Benefits; and
- Conclusion.

Attachment A includes a complete list of projects that have received RDF grant awards.

## RDF Program Summary

The costs of RDF program expenses allocated to Minnesota are recovered through an adjustable surcharge on our customer bill statements as part of their monthly charges for electricity. In 2014 the RDF charge is $0.000750 per kWh. For a typical residential customer using 750 kWh per month, the RDF cost per month is $0.56.

Since its inception, the RDF program has provided $192.7 million for renewable energy initiatives including $77.4 million for Renewable Energy Production Incentive (REPI) payments, $52.7 million for legislatively-mandated projects and programs, and $2.2 million for general program support. These mandated programs included the appropriation of $25 million to the University of Minnesota for the Initiative for Renewable Energy and Environment (IREE). The balance of $60.4 million has been awarded over three grant cycles to 61 projects (see Attachment B - Financial Statement). As Table 1 shows below, 56 projects have been completed and five remain active.

**Table 1 - Summary of Project Status**

| Type | Completed | Active as of 12/31/2013 | Total |
|---|---|---|---|
| Energy Production | 16 | 2 | 18 |
| Research | 40 | 3 | 43 |
| Total | 56 | 5 | 61 |

Xcel Energy has responsibility for the day-to-day administration of the RDF. A seven-member advisory group, representing the interests of various stakeholder groups, assists Xcel Energy in evaluating and selecting grant project proposals for recommendation to Xcel Energy and the Commission. Further details on the members of the advisory group can be found in Attachment C.

## Current Cycle Overview

On February 15, 2013, Xcel Energy issued two Requests for Proposals (RFP) to fund a fourth cycle of RDF projects. One RFP focused on grant awards for energy production and research and development projects. The overall goal for these grants is to encourage the development of renewable energy projects that are otherwise unable to secure public and private financing sufficient to proceed with development and to advance new cost-effective technology.

The second RFP focused on block grants to Minnesota higher education institutions for the development of renewable electric energy research initiatives.

Xcel Energy received a total of $133,553,255 in grant requests which included 46 eligible energy production proposals, 18 eligible research proposals, and three block grant proposals. Requests for energy production grants totaled $91.8 million to install 80.2 MW of renewable electric energy generating capacity. Requests for research and development grants totaled $18.7 million. As stipulated in the RDF statute, the proposals were reviewed by the RDF advisory group which provided funding recommendations to Xcel Energy. A total of $42 million was approved by the Commission to be obligated for Cycle 4 grant awards.[1] As detailed on Tables 2, 3 and 4 below, grants are to be awarded for 20 energy production projects and six research and development projects. In addition, three block grant awards are to be directed to institutes of higher education. Finally, six projects have been designated as reserve projects that may be funded if some of the grant awards designated for the first 29 projects just described do not end up utilizing their grant funds.

**Table 2 - Cycle 4 Energy Production Awards (million $)**

| Resource Type | Awards | RDF | Leverage | Total Project Costs | Capacity (MW) |
|---|---|---|---|---|---|
| Biomass | 2 | $7.0 | $21.1 | $28.1 | 3.1 |
| Solar | 16 | $17.9 | $12.4 | $30.3 | 9.4 |
| Combination | 1 | $0.6 | $0 | $0.6 | .1 |
| Wind | 11 | $1.1 | $2.1 | $3.2 | .5 |
| Totals | 20 | $26.6 | $35.5 | $62.1 | 13.1 |

**Table 3 - Cycle 4 Research and Development Awards (million $)**

| Resource Type | Awards | Selected | Leverage | Total Project Costs |
|---|---|---|---|---|
| Biomass | 1 | $1.9 | $0.4 | $2.3 |
| Solar | 1 | $0.4 | $0.1 | $0.5 |
| Combination | 1 | $1.0 | $0 | $1.0 |
| Wind | 3 | $2.2 | $0 | $2.2 |
| Totals | 6 | $5.5 | $0.5 | $6.0 |

[1] This decision was made by the Commission in Docket No. E002/M-12-1278 at its January 23, 2014, Agenda Meeting. A written order is forthcoming.

| Table 4 - Cycle 4 Higher Education Awards (million $) | |
|---|---|
| Institution | Block Grant |
| Minnesota State Colleges and Universities | $5.5 |
| University of St. Thomas | $1.5 |
| University of Minnesota | $3.0 |
| Totals | $10.0 |

The legislature created two new programs in 2013 to receive funds from the RDF. The first program is a "Made in Minnesota" solar energy production incentive account to provide production incentives for residential (up to 10 kW) and commercial installations (up to 40 kW). According to Minn. Stat. §216C.412, this program shall be operated for 10 years beginning in 2014 with $15,000,000 allocated each year with funding from Conservation Improvement Program (CIP) and RDF revenues. The second program is a solar energy incentive program that was enacted to replace the existing Solar*Rewards program and focus on small facilities of up to 20 kW. This program shall be operated for 5 years with $5,000,000 allocated each year and will be funded exclusively with RDF revenues. Both of these programs will begin in 2014.

**RDF Projects' Benefits**

Energy Production: RDF projects that construct electric generation facilities provide a combination of environmental and economic benefits. These benefits can be seen at both the local and regional level through the purchase of goods and services as well as the expansion of employment opportunities. As shown in Table 5, the sixteen completed electric production projects that received RDF grants have resulted in the installation of nearly 23.6 MW of renewable energy nameplate capacity and have overall generated a total of 249,193 MWh of energy over the life of the facilities.

| Table 5 – Electric Production Projects | | | | |
|---|---|---|---|---|
| Type | Investment | Facilities | Installed Capacity (MW) | Energy Production (MWh) |
| Biomass | $26,623,141 | 0 | 0 | 0 |
| Hydro | $43,817,717 | 1 | 9.176 | 59,797 |
| Innovative | $10,365,621 | 0 | 0 | 0 |
| Solar | $18,537,334 | 8 | 4.463 | 16,853 |
| Wind | $10,990,338 | 4 | 9.950 | 172,543 |
| Total | $110,334,151 | 13 | 23.589 | 249,193 |

For every dollar spent from the RDF there has been an additional $2.67 spent from outside investors. Therefore, the $30.1 million investment of RDF funds for energy production has leveraged an additional $80.3 million. This total investment has resulted in the creation of 1,216 construction jobs to design and build facilities in Minnesota.

As shown in Table 6 below, the environmental benefits from these investments are recognized in marketable Renewable Energy Credits (RECs) from qualifying facilities, emission reductions, avoided costs to build conventional facilities, and avoided costs to replace the electricity generated.

| **Table 6 –Environmental Benefits** | | | | |
|---|---|---|---|---|
| **Value of REC's** | **Value Emission Reductions** | **Avoided Capacity Value** | **Avoided Energy Value** | **Total Value** |
| $219,039 | $688 | $1,798,756 | $8,308,398 | $10,326,881 |

In addition, there are indirect benefits associated with the RDF. These benefits include the fostering of new or expanded business opportunities to maintain and support the new facilities. In cases where permanent energy production facilities are constructed, RDF investments can also expand the property tax base for a community. Organizations such as the National Renewable Energy Laboratory, the U.S. Department of Energy, and the American Council for an Energy Efficient Economy have developed job calculator models to evaluate the impact of dollars spent on renewable energy and energy efficiency projects. On average, these tools indicate that 10 to 11 jobs are created and/or retained (permanent and temporary) for each $1 million invested.

Research and Development: The RDF has provided a boost to the development of new renewable electric energy concepts and designs through the investment in renewable energy research and development. 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. Nevertheless, this total investment has resulted in the need for over 494 research related jobs. Although some of these jobs were within the non-profit and commercial industry that received funding for demonstration-styled research, many of these jobs went to students within the academic world which is an investment into the next generation that will design new renewable electric energy facilities. As can be seen in Table 7, research and development projects

contributed to the development of articles, workshops, and even patent applications. In addition, research and development RDF grant dollars leveraged $0.50 for each grant dollar invested.

| Table 7 – Research and Development Projects | | | | |
|---|---|---|---|---|
| Technology | Total Investment | Published Articles | Presentations/ Workshops | Patent Applications |
| Biomass | $9,435,888 | 21 | 59 | 3 |
| Solar | $7,782,111 | 8 | 21 | 0 |
| Wind | $81,01,356 | 12 | 49 | 2 |
| Total | $45,319,355 | 41 | 129 | 5 |

It should be noted that several out-of-state projects used Minnesota contractors or project hosts located in the NSP-Minnesota service area and are not included in the previous numbers. As shown in Table 8, this project association keeps the research relevant to Minnesota and directs additional RDF funds to businesses and organizations in the state.

| Table 8 – Minnesota Hosts Activities | | | |
|---|---|---|---|
| **Grantee** | **Minnesota Host** | **Host Location** | **Host Activity** |
| Northern Plains Power Technology | Xcel Energy | Minneapolis, Minn. | Provided data to test model |
| University of North Dakota | Haubenschild Farms Dairy | Princeton, Minn. | Pilot demonstration of digester |
| Coaltec Energy USA | P & K Farms | Northfield, Minn. | Pilot demonstration of gasifier |
| University of North Dakota | University of Minnesota | Duluth, Minn. | Luiquifaction tests |
| University of Florida | American Crystal Sugar | Moorhead, Minn. | Pilot demonstration of digester |
| Gas Technology Institute | University of Minnesota | Coleraine, Minn. | Conduct gasification tests |

## Conclusion

Xcel Energy appreciates this opportunity to provide this report summarizing the projects funded by the RDF account through 2013.

| Project Name | Contract | Project Site: City | Zone | Project End Date | Status | Type | Cycle | Resource | Project Description | RDF Award | Grant Funds Disbursed | Funding: Leverage Funds | Total Costs | Deobligated Funds | Jobs | Power Development: Capacity (kW) | Power Development: Generation (MWh) | REC's | Enviro | Externalities: Avoided Capacity | Externalities: Avoided Energy | Intelectual Property: Articles | Intelectual Property: Presentations | Intelectual Property: Patent Apps |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NORTHEAST REGION** | | | | | | | | | | | | | | | | | | | | | | | | |
| University of North Dakota | RD3 - 66 | Duluth | Northeast | 4/2012 | complete | RD | 3 | Biomass | Designed and demonstrated a mobile biomass liquefaction system that can utilize high moisture wood waste. | $999,065 | $998,697 | $995,800 | $1,994,497 | $368 | 22 | | | | | | | | 1 | |
| CMEC | EP-44 | Little Falls | Northeast | 3/2011 | complete | EP | 2 | Biomass | Designed 959-kW gasification plant to utilized distillers grains and local biomass. Refractory issues prevented completion of the facility. | $2,000,000 | $400,000 | $16,462,472 | $16,862,472 | $1,600,000 | 183 | 0 | 0 | $0 | $0 | $0 | $0 | | | |
| Mesaba/Excelsior Energy | EP-43 | Taconite | Northeast | 6/2010 | complete | EP | 2 | Innovative | To design the basis of a base load Integrated Gasification Combined-Cycle (IGCC) power generation facility. | $10,000,000 | $10,000,000 | $365,621 | $10,365,621 | $0 | 113 | 0 | 0 | $0 | $0 | $0 | $0 | | | |
| West Central Telephone Assoc. | RD3 - 58 | Menahaga | Northeast | 5/2010 | complete | RD | 3 | Wind/Solar | Designed and tested configurations and specificaiotns of a hybred wind/solar power system for distributed generation in remote locations. | $137,000 | $137,000 | $0 | $137,000 | $0 | 3 | | | | | | | | | |
| University of Florida | RD-34 | Moorhead | Northeast | 5/2009 | complete | RD | 2 | Biomass | Demonstrated two-stage anaerobic digester at American Crystal Sugar in Moorhead, MN to generate methane for conversion to electricity. | $999,995 | $996,875 | $0 | $996,875 | $3,120 | 9 | | | | | | | 3 | 1 | 1 |
| Gas Technology Institute | RD-38 | Coleraine | Northeast | 10/2007 | complete | RD | 2 | Biomass | Developed a method to extract hydrogen from biomass gasification using membrane separation technologies. | $861,860 | $861,860 | $3,121 | $864,981 | $0 | 9 | | | | | | | | 1 | |
| | | | | | | | | | **Economic Benefits for Northeast Region** | **$14,997,920** | **$13,394,432** | **$17,827,014** | **$31,221,446** | **$1,603,488** | **339** | **0** | **0** | **$0** | **$0** | **$0** | **$0** | **3** | **3** | **1** |
| **STATEWIDE** | | | | | | | | | | | | | | | | | | | | | | | | |
| MN DNR | EP3 - 13 | Afton, Ft. Snellling, Lake Shetek, Lac qui | Statewide | 3/2013 | complete | EP | 3 | Solar | Installed 114 kW of solar photovoltaic generation at various state parks and developed a renewable energy strategy for future DNR facilities. | $894,000 | $878,966 | $39,312 | $918,278 | $15,034 | 10 | 114 | 315 | $279 | $1 | $12,037 | $9,212 | | | |
| | | | | | | | | | **Economic Benefits for Statewide Projects** | **$894,000** | **$878,966** | **$39,312** | **$918,278** | **$15,034** | **10** | **114** | **315** | **$279** | **$1** | **$12,037** | **$9,212** | **0** | **0** | **0** |
| **SOUTHEAST REGION** | | | | | | | | | | | | | | | | | | | | | | | | |
| Coaltec Energy USA | RD3 - 77 | Northfield | Southeast | 4/2014* | current | RD | 3 | Biomass | Demonstrated the feasibility of biomass gasification on a commercial turkey farm to generate electricity and heat. | $1,000,000 | $850,000 | $274,511 | $1,274,511 | $0 | 12 | | | | | | | | | |
| Diamond K | EP-51 | Altura, MN | Southeast | 5/2014 | current | EP | 2 | Biomass | Installation of 261 kW of biomass generation capacity at the Diamond K Dairy in Winona County, Minnesota. | $936,530 | $344,175 | $2,016,494 | $2,953,024 | $0 | 22 | 0 | 0 | $0 | $0 | $0 | $0 | | | |
| AnAerobics, Inc | AB-07 | Montgomery | Southeast | 6/2003 | complete | EP | 1 | Biomass | Was to install a 1.7 MW genset and study removal of hydrogen sulfide created during anaerobic digestion but had site control issues. | $1,300,000 | $1,100,000 | $6,300,000 | $7,600,000 | $200,000 | 80 | 0 | 0 | $0 | $0 | $0 | $0 | | | |
| | | | | | | | | | **Economic Benefits for Southeast Region** | **$3,236,530** | **$2,294,175** | **$8,591,005** | **$11,827,535** | **$200,000** | **114** | **0** | **0** | **$0** | **$0** | **$0** | **$0** | **0** | **0** | **0** |
| **SOUTHWEST REGION** | | | | | | | | | | | | | | | | | | | | | | | | |
| Outland Renewable Energy | EP3 - 10 | Slayton | Southwest | 4/2013 | complete | EP | 3 | Solar | Installed 2 MW photovoltaic facility near Slayton, MN to demonstrate the benefits of utility scale use of photovoltaics in Minnesota | $2,000,000 | $2,000,000 | $4,972,605 | $6,972,605 | $0 | 76 | 2,000 | 1,371 | $1,367 | $4 | $0 | $40,081 | | | |
| Xcel Energy | RD3 - 12 | Beaver Creek | Southwest | 12/2011 | complete | RD | 3 | Wind | Installed a 1.0 MW sodium sulfur battery adjacent a wind farm to validate the value of energy storage for greater wind energy penetration. | $1,000,000 | $1,000,000 | $3,247,181 | $4,247,181 | $0 | 46 | | | | | | | | 31 | |
| Rural Advantage | RD-27 | Luverne | Southwest | 4/2009 | complete | RD | 2 | Biomass | Demonstrated the commercial production of Miscanthus as a biomass fuel for electric generation. | $318,800 | $318,800 | $348,887 | $667,687 | $0 | 3 | | | | | | | | | 1 |
| Hilltop | EP-26 | Edgerton | Southwest | 3/2009 | complete | EP | 2 | Wind | Installed a 1.5 MW General Electric wind turbine in Lyon County with 100 percent of the electricity sold to Xcel Energy. | $1,200,000 | $1,200,000 | $2,670,126 | $3,870,126 | $0 | 42 | 2,000 | 23,428 | $73,412 | $63 | $93,163 | $645,601 | | | |
| Ag. Utilization Research Institute | RD-69 | Beaver Creek | Southwest | 9/2008 | complete | RD | 2 | Biomass | Conducted a feasibility study to couple bio-diesel and wind generation systems to “firm” wind power. | $760,000 | $760,000 | $8,829 | $768,829 | $0 | 8 | | | | | | | | | |
| St. Olaf | EP-39 | Northfield | Southeast | 4/2007 | complete | EP | 2 | Wind | Installed a 1.65 MW Micon wind turbine on campus. | $1,500,000 | $1,500,000 | $1,063,377 | $2,563,377 | $0 | 28 | 1,650 | 17,831 | $15,173 | $48 | $108,957 | $606,295 | | | |
| Project Resource Corp | AW-03 | Chandler | Southwest | 5/2006 | complete | EP | 1 | Wind | Installed 5.4 MW of wind energy with a new landowner investment model that limits development risk of communi shareholders. | $900,000 | $900,000 | $2,700,000 | $3,600,000 | $0 | 39 | 5,400 | 112,841 | $71,930 | $309 | $536,084 | $4,240,861 | | | |
| Pipestone Jasper School | AW-10 | Pipestone | Southwest | 12/2004 | complete | EP | 1 | Wind | Installed a 900 kW wind turbine adjacent to the Pipestone-Jasper Public High School. | $752,835 | $752,835 | $204,000 | $956,835 | $0 | 10 | 900 | 18,443 | $0 | $50 | $149,179 | $674,912 | | | |
| | | | | | | | | | **Economic Benefits for Southwest Region** | **$8,431,635** | **$8,431,635** | **$15,215,005** | **$23,646,640** | **$0** | **253** | **11,950** | **173,914** | **$161,882** | **$475** | **$887,384** | **$6,207,750** | **0** | **31** | **1** |
| **METRO REGION** | | | | | | | | | | | | | | | | | | | | | | | | |
| Crown Hydro | AH-01 | Minneapolis | Twin Cities | 1/2015* | current | EP | 1 | Hydro | Will install 3.2 MW of hydroelectric capacity on the Mississippi River in downtown Minneapolis. | $5,100,000 | $1,538,591 | $2,285,245 | $7,385,245 | $0 | 63 | 0 | 0 | $0 | $0 | $0 | $0 | | | |
| University of Minnesota | RD3 - 1 | Shakopee | Twin Cities | 12/2013 | complete | RD | 3 | Biomass | Development of a production, pre-processing and delivery system for biomass feedstocks from prairie and grasslands. | $992,989 | $813,626 | $1,725,867 | $2,718,856 | $0 | 29 | | | | | | | 1 | 4 | |
| University of Minnesota | RD3 - 42 | Minneapolis | Twin Cities | 8/2013 | complete | RD | 3 | Wind | Developed and tested a Virtual Wind Simulator to provide accurate wind turbulence predictions. | $999,999 | $999,598 | $286,199 | $1,286,198 | $401 | 14 | | | | | | | 11 | 13 | |
| University of Minnesota | RD3 - 28 | St. Paul | Twin Cities | 9/2013 | complete | RD | 3 | Biomass | Developed guidelines for accurate management of biomass removal and maintenance of soil quality. | $979,082 | $979,048 | $0 | $979,082 | $34 | 11 | | | | | | | 2 | 7 | |
| Lower St. Anthony Falls | EP-34 | Minneapolis | Twin Cities | 1/2012 | complete | EP | 2 | Hydro | Restored 9.176 MW hydroelectric generating capacity at the Lower St. Anthony Falls by using run-of-river technogy. | $2,000,000 | $2,000,000 | $37,993,881 | $39,993,881 | $0 | 434 | 9,176 | 59,797 | $52,234 | $170 | $406,820 | $1,531,999 | | | |
| University of Minnesota | RD3 - 25 | Minneapolis | Twin Cities | 12/2011 | complete | RD | 3 | Solar | Developed techniques for controlling microstructures of hydrogenated silicon and improving the grain size of microcrystalline silicon PV films. | $732,032 | $732,032 | $0 | $732,032 | $0 | 8 | | | | | | | 3 | 8 | |
| SarTec Corporation | RD3 - 2 | Anoka | Twin Cities | 7/2011 | complete | RD | 3 | Biofuel | Researched the growth of algae fed on CO2 from flue gas and extracted the algae oils for conversion into a marketable biodiesel product. | $350,000 | $350,000 | $0 | $350,000 | $0 | 4 | | | | | | | | | |
| Bepex International | RD3 - 4 | Minneapolis | Twin Cities | 7/2011 | complete | RD | 3 | Biomass | Demonstrated torrefaction and densification as processes to reduce transportation and storage costs associated with biomass feedstocks. | $924,671 | $924,671 | $0 | $924,671 | $0 | 10 | | | | | | | | | |
| City of Minneapolis | EP3 - 11 | Minneapolis | Twin Cities | 5/2011 | complete | EP | 3 | Solar | Installed a 600 kW photovoltaic facility on the Minneapolis Convention Center. | $2,000,000 | $2,000,000 | $1,096,756 | $3,096,756 | $0 | 34 | 600 | 2,263 | $2,149 | $6 | $82,221 | $66,195 | | | |
| freEner-g | EP3 - 12 | Metro Area | Twin Cities | 2/2011 | complete | EP | 3 | Solar | Installed 280 kW photovoltaic capacity thorugh a leasing and service package for residential and small businesses. | $1,488,922 | $1,488,922 | $777,170 | $2,266,092 | $0 | 25 | 280 | 760 | $555 | $2 | $40,004 | $22,315 | 1 | | |
| Merrick | EP3 - 2 | Vadnais Heights | Twin Cities | 12/2008 | complete | EP | 3 | Solar | Installed a roof-mounted 100 kW solar photovoltaic facility on a non-profit adult day training and habilitation center. | $735,000 | $735,000 | $52,000 | $787,000 | $0 | 9 | 100 | 377 | $223 | $1 | $22,909 | $11,798 | | | |
| Windlogics | RD-57 | St. Paul | Twin Cities | 11/2008 | complete | RD | 2 | Wind | Defined, designed, built and demonstrated a complete wind power forecasting system. | $997,000 | $997,000 | $141,437 | $1,138,437 | $0 | 12 | | | | | | | | 1 | |
| MN Dept. of Commerce | AS-05 | St. Paul | Twin Cities | 9/2008 | complete | EP | 1 | Solar | Provided rebates of up to $8,000 for small photovoltaic installations that are wired into the electrical grid. | $1,150,000 | $1,150,000 | $0 | $1,150,000 | $0 | 12 | 960 | 9,329 | $0 | $26 | $273,307 | $385,340 | | | |
| University of Minnesota | RD-29 | Minneapolis | Twin Cities | 9/2008 | complete | RD | 2 | Biomass | Researched operation of turbo-generators using biomass-derived oils. | $299,284 | $299,284 | $0 | $299,284 | $0 | 11 | | | | | | | | | |
| Center for Energy Environment | RD-94 | Minneapolis | Twin Cities | 10/2007 | complete | RD | 2 | Biomass | Developed two web-based programs for planning and development of biomass resources in Minnesota. | $397,500 | $397,500 | $42,115 | $439,615 | $0 | 5 | | | | | | | | | |
| University of Minnesota | CW-06 | Minneapolis | Twin Cities | 12/2006 | complete | RD | 1 | Wind | Designed a flywheel battery system to enhance the ability to dispatch wind energy with inertial storage. | $654,309 | $654,309 | $0 | $654,309 | $0 | 7 | | | | | | | | | 1 |
| University of Minnesota | RD-56 | St. Paul | Twin Cities | 4/2008 | complete | RD | 2 | Biomass | Developed model to evaluate options to optimize combustion and electricity generation in ethanol plants. | $858,363 | $803,246 | $0 | $858,363 | $55,117 | 9 | | | | | | | 7 | 7 | |
| Science Museum | AS-06 | St. Paul | Twin Cities | 12/2003 | complete | EP | 1 | Solar | Installed a 9 kW solar roof to demonstrate a Zero Energy Building for the Minnesota Science Museum. | $100,000 | $100,000 | $0 | $100,000 | $0 | 2 | 9 | 124 | $0 | $0 | $2,333 | $5,430 | | | |
| Sebesta Blomberg | BB-03 | Roseville | Twin Cities | 9/2003 | complete | RD | 1 | Biomass | Examined the feasibility of a gasification system using the byproducts of an ethanol facility to provide heat and power. | $738,654 | $738,645 | $184,663 | $923,317 | $9 | 10 | | | | | | | | | |
| Energy Performance Systems | BB-06 | Rogers | Twin Cities | 12/2002 | complete | RD | 1 | Biomass | Conversion design of the NSP Granite Falls coal-fired facility to a biomass system capable of utilizing whole trees. | $266,508 | $257,247 | $85,056 | $351,564 | $9,261 | 4 | | | | | | | | | |
| | | | | | | | | | **Economic Benefits for Metro Region** | **$21,764,313** | **$17,958,719** | **$44,670,389** | **$66,434,702** | **$64,822** | **712** | **11,125** | **72,649** | **$55,161** | **$206** | **$827,594** | **$2,023,078** | **25** | **40** | **1** |

| Project Name | Contract | Project Site City | Zone | Project End Date | Status | Type | Cycle | Resource | Project Description | RDF Award | Grant Funds Disbursed | Funding Leverage Funds | Total Costs | Deobligated Funds | Jobs | Power Development Capacity (kW) | Power Development Generation (MWh) | REC's | Enviro | Externalities Avoided Capacity | Externalities Avoided Energy | Intelectual Property Articles | Intelectual Property Presentations | Intelectual Property Patent Apps |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WEST CENTRAL REGION** | | | | | | | | | | | | | | | | | | | | | | | | |
| Minnesota Valley Alfalfa Producers | RD3 - 69 | Priam | West Central | 8/2014 | current | RD | 3 | Biomass | Researching application of kinetic disintegration technology to produce biomass pellets from feedstocks with varyir levels of moisture. | $1,000,000 | $162,568 | $265,704 | $1,265,704 | $0 | 5 | | | | | | | | | |
| Energy Performance Systems | RD-50 | Graceville | West Central | 2/2013 | complete | RD | 2 | Biomass | Built and demonstrated equipment for an integrated system to supply farm grown trees as a biomass feestock to a powerplant. | $957,929 | $957,929 | $1,997,606 | $2,955,535 | $0 | 32 | | | | | | | | 1 | |
| University of North Dakota | RD3 - 68 | Princeton | West Central | 4/2012 | complete | RD | 3 | Biomass | Field demonstration of a hydrogen sulfidereduction process at the anaerobic digester on the 1,000-acre Haubenschil Dairy Farm. | $970,558 | $970,479 | $0 | $970,558 | $79 | 11 | | | | | | | | 1 | |
| University of Minnesota | RD3 - 23 | Morris | West Central | 8/2011 | complete | RD | 3 | Biomass | Evaluated economic and technical issues related to biomass fuel and integrated gasification combined cycle technology. | $819,159 | $729,717 | $0 | $819,159 | $89,442 | 8 | | | | | | | 6 | 28 | |
| Best Power International | EP3 - 3 | Collegeville | West Central | 5/2010 | complete | EP | 3 | Solar | Installed a 400 kW photovoltaic facility at St. Johns's University to demonstrate commercial viability of solar power in Minnesota. | $1,994,480 | $1,994,480 | $1,188,823 | $3,183,303 | $0 | 35 | 400 | 2,315 | $1,718 | $6 | $71,741 | $68,358 | | | |
| Blattner and Sons | BW-06 | Avon | West Central | 6/2002 | complete | RD | 1 | Wind | Developed a platform that would climb the tower to eliminate that need for crane to construct very tall wind turbines. | $68,470 | $62,346 | $0 | $68,470 | $6,124 | 1 | | | | | | | | | |
| | | | | | | | | | **Economic Benefits for West Central Region** | **$5,810,596** | **$4,877,519** | **$3,452,133** | **$9,262,729** | **$95,645** | **91** | **400** | **2,315** | **$1,718** | **$6** | **$71,741** | **$68,358** | **6** | **30** | **0** |
| **OUT OF STATE** | | | | | | | | | | | | | | | | | | | | | | | | |
| Northern Plains Power Tech. | RD3 - 21 | Brookings, SD | Out of State | 11/2012 | complete | RD | 3 | Solar | Developed a loss-of-mains detection based on harmonic signature and synchrophasor data. | $493,608 | $493,608 | $240,665 | $734,273 | $0 | 8 | | | | | | | | 4 | 1 |
| Interphases Solar | RD3 - 53 | Moorpark, CA | Out of State | 7/2012 | complete | RD | 3 | Solar | Demonstrated a manufacturing process to produce lightweight, thin-film solar cells. | $1,000,000 | $1,000,000 | $666,021 | $1,666,021 | $0 | 18 | | | | | | | 1 | 5 | |
| University of North Dakota | RD3 - 71 | Grand Forks, ND | Out of State | 3/2012 | complete | RD | 3 | Biomass | Demonstrated a thermally integrated biomass gasification systems with a 30 kW low-Btu gas turbine. | $999,728 | $999,438 | $0 | $999,728 | $290 | 11 | | | | | | | 1 | 1 | |
| Production Specialties | RD-72 | Oklahoma City, OK | Out of State | 11/2009 | complete | RD | 2 | Biomass | Investigated a technology to selectively remove hydrogen sulfide (H2S) from biogas without generating a waste stream. | $228,735 | $228,735 | $263,767 | $492,502 | $0 | 5 | | | | | | | | 1 | |
| Global Energy Concepts | RD-87 | Lowell, MA | Out of State | 5/2009 | complete | RD | 2 | Wind | Analyzed and developed advanced methods for reducing uncertainty in wind power estimates. | $370,000 | $370,000 | $28,236 | $398,236 | $0 | 4 | | | | | | | | | |
| NREL-Low Band Gap-Solar | RD-107 | Golden, CO | Out of State | 12/2008 | complete | RD | 2 | Solar | Overcome limitations in organic-based solar cells by developing low band gap (red light absorbing) materials. | $1,000,000 | $944,452 | $0 | $1,000,000 | $55,548 | 10 | | | | | | | 6 | 2 | |
| Interphases Research | RD-78 | Moorpark, CA | Out of State | 11/2008 | complete | RD | 2 | Solar | Developed a concept to manufacture flexible photovoltaic modules in a continuous roll-to-roll electro-deposition process. | $1,000,000 | $1,000,000 | $821,700 | $1,821,700 | | 20 | | | | | | | | 6 | |
| NREL - Inkjet Solar Cells | RD-93 | Golden, CO | Out of State | 11/2008 | complete | RD | 2 | Solar | Designed and developed a thin-film solar cell that will use a direct-write inkjet printing process. | $1,000,000 | $949,005 | $0 | $1,000,000 | $50,995 | 10 | | | | | | | | | |
| Colorado School of Mines | CB-07 | Golden, CO | Out of State | 12/2007 | complete | RD | 1 | Biomass | Developed a fuel cell prototype for use in ambient or high temperatures. | $1,116,742 | $1,116,742 | $0 | $1,116,742 | | 12 | | | | | | | | | |
| Univ. of ND - SOFC | CB-08 | Grand Forks, ND | Out of State | 10/2007 | complete | RD | 1 | Biomass | Incorporated solid oxide fuel cells (SOFCs) and gasification into one integrated system to produce electricity. | $1,250,142 | $1,250,056 | $885,928 | $2,136,070 | $86 | 23 | | | | | | | | | 1 |
| Energy Conversion Devices | RD-22 | Rochester Hills, MI | Out of State | 10/2007 | complete | RD | 2 | Biomass | Researched processes to reform bio-ethanol and bio-methanol into hydrogen for use in a fuel cell or gas turbine to generate electricity. | $900,000 | $900,000 | $1,390,015 | $2,290,015 | | 25 | | | | | | | | 6 | |
| NREL | CS-05 | Golden, CO | Out of State | 7/2007 | complete | RD | 1 | Solar | Design and develop of solutions and techniques to use an inkjet printing process for the manuafacturing of thin-film solar cells. | $934,628 | $924,757 | $0 | $934,628 | $9,871 | 10 | | | | | | | | | |
| Iowa State University | RD-110 | Ames, IA | Out of State | 7/2007 | complete | RD | 2 | Biomass | Performance testing of a particulate filtration clean-up system for the producer gas from a biomass gasifier. | $405,000 | $98,343 | $0 | $405,000 | $306,657 | 4 | | | | | | | | | |
| Coaltec | RD-26 | Carterville, IL | Out of State | 1/2007 | complete | RD | 2 | Biomass | Studied handling, performance and emissions to assess feasibility of poultry waste as a sustainable feedstock for a fixed-bed gasifier. | $450,000 | $450,000 | $378,500 | $828,500 | | 9 | | | | | | | | | |
| Univ of ND - SCR Performance | BB-12 | Grand Forks, ND | Out of State | 6/2006 | complete | RD | 1 | Biomass | Examined the rates and mechanisms of catalyst deactivation within the emissions from a biomass co-fired utility boiler. | $60,000 | $59,973 | $340,000 | $400,000 | $27 | 4 | | | | | | | | | |
| University of ND - Cofiring | BB-09 | Grand Forks, ND | Out of State | 3/2005 | complete | RD | 1 | Biomass | Measured operational and component impacts of co-firing biomass with coal in an indirect fired combined-cycle pulverized-coal furnace. | $444,478 | $444,443 | $296,219 | $740,697 | $35 | 8 | | | | | | | | | |
| Community Power Corp. | BB-10 | Littleton, CO | Out of State | 3/2005 | complete | RD | 1 | Biomass | Designed, developed, and tested a centrifugal filter capable of removing sub micron particles and aerosols from a hc producer bio-gas stream. | $638,635 | $548,692 | $133,054 | $771,689 | $89,943 | 8 | | | | | | | | | |
| Global Energy Concepts | CW-02 | Lowell, MA | Out of State | 10/2003 | complete | RD | 1 | Wind | Translated the effects of a turbine's rotating flexible blades into a linear model for use in wind turbine design software. | $75,000 | $73,239 | $0 | $75,000 | $1,761 | 1 | | | | | | | | | |
| | | | | | | | | | **Economic Benefits for Out of State Area** | **$12,366,696** | **$11,851,483** | **$5,444,105** | **$17,810,801** | **$515,213** | **192** | **0** | **0** | **$0** | **$0** | **$0** | **$0** | **8** | **25** | **2** |
| | | | | | | | | | **TOTAL ALL PROJECTS** | **$67,501,690** | **$59,686,929** | **$95,238,964** | **$161,122,132** | **$2,494,202** | **1,711** | **23,589** | **249,193** | **$219,039** | **$688** | **$1,798,756** | **$8,308,398** | **42** | **129** | **5** |

# RENEWABLE DEVELOPMENT FUND FINANCIAL STATEMENT
## As of December 31, 2013

| | Prior to 2013<br>2003-2012 | 2013 | Since RDF Inception<br>2003-2013 |
|---|---|---|---|
| **Total RDF Credits** | **$208,500,000** | **$24,500,000** | **$233,000,000** |
| | | | |
| Excelsior | $10,000,000 | $0 | $10,000,000 |
| Energy Production Grants | $17,620,385 | $2,462,584 | $20,082,969 |
| Research Grants | $28,923,559 | $680,408 | $29,603,967 |
| **Total RDF Grant Payments** | **$56,543,944** | **$3,142,992** | **$59,686,936** |
| **Administrative Costs** | **$2,038,395** | **$178,458** | **$2,216,853** |
| **University of Minnesota** | **$25,000,000** | **$0** | **$25,000,000** |
| **REPI** | **$70,036,442** | **$7,412,901** | **$77,449,343** |
| **Solar Rebates** | **$2,190,591** | **$2,119,059** | **$4,309,650** |
| **Other Legislative Mandates** | **$13,375,011** | **$0** | **$13,375,011** |
| **Total RDF Costs** | **$169,184,385** | **$12,853,410** | **$182,037,795** |
| | | | |
| **Grant funds yet to be disbursed** | **$7,814,754** | **$0** | **$7,814,754** |
| | | | |
| **Remaining Unencumbered Funds** | **$31,500,861** | **$11,646,590** | **$43,147,451** |

## RDF Advisory Group

- Eric Jensen, energy associate
  Izaak Walton League of America
  Representing the environmental community

- Lynda Taylor, consultant
  Appointed by Fresh Energy
  Representing the environmental community

- Lise Trudeau, engineer
  Minnesota Division of Energy Resources
  Representing residential customers

- Ben Gerber, manager energy policy
  Minnesota Chamber of Commerce
  Representing commercial and industrial customers

- Heather Westra
  Representing Prairie Island Indian community

- Kevin Schwain, manager emerging customer program
  NSP-Minnesota
  Representing NSP-Minnesota

- Tami Gunderzik, senior manager product portfolio
  NSP-Minnesota
  Representing NSP-Minnesota

## RDF Administration

- Paul Lehman, program manager
  NSP-Minnesota

- Mark Ritter, grant administrator
  NSP-Minnesota