

## EXECUTIVE SUMMARY

### Redline Energy Solar Installation SAHR Dairy Bricelyn, Minnesota March 19, 2009

Redline Energy is applying for grant funds to install a solar energy production system using photovoltaic panels on the SAHR Dairy farm as a pilot project. The Sahr farm will become a prototype for the state of Minnesota to demonstrate the viability of solar energy production on farms.

The SAHR Dairy is located in Southern Minnesota in the town of Bricelyn which is just East of Blue Earth and South of Interstate 90 in Faribault County. The address is 54117 90<sup>th</sup> St. Bricelyn, MN. The GPS coordinates are latitude 43°36'58.14"N, longitude 93°47'8.11"W.

#### Satellite Photo of Sahr Dairy Farm



This is a 1200 cow dairy 4<sup>th</sup> generation farm which employs 18 full-time personnel and runs 24 hours per day. Mark Sahr, the owner-operator is desperate for an alternative to buying all of his electricity from the Benco Co-op of Mankato. He is currently paying over \$6,000 per month for electricity in the winter months and over \$10,000 in the summer months. The electricity is used for milking machines and associated systems, milk cooling, water pumps, and fans. Mark also heats water for the sterilization of the milking components, laundry, and animal cleansing.

We are proposing a 350 Kilowatt (peak DC) solar photovoltaic system for the generation of electricity which would provide approximately 60% of the energy requirements of the Sahr Dairy. Ideally this would be installed on "tracker" devices that follow the sun and increase the efficiency of the panels by over 35%.

After extensive on-site study of the project dairy farm, RedLine Energy would like to outline the costs and project detail:

### Project Cost With Solar Trackers

LINE ITEM	COST (\$)	QUANTITY	EXTENDED COST (\$)	GRANT REQUEST (\$)	SAHR INVESTMENT
Solar PV Panels - 350kw	\$3.50 per watt	1,890	\$1,225,000	\$1,102,500	\$122,500
Tracker Units	\$12,820	30	\$384,600	\$346,140	\$38,460
Inverters	\$4,949	30	\$148,470	\$133,623	\$14,847
Remote Tracking Sensor			\$8,160	\$7,344	\$816
Labor & Installation			\$290,470	\$261,423	\$29,047
Freight			\$45,500	\$40,950	\$4,550
<b>TOTALS</b>			<b>\$2,102,200</b>	<b>\$1,891,980</b>	<b>\$210,220</b>

The proposed solar system consists of 1890 photovoltaic modules distributed on 30 tracking units. The peak DC output of the system would be 350,000 watts. The expected output with trackers is approximately 607,000 Kwh. This is more than 35 % higher than the output achieved without trackers for this geographic location and configuration.

The proposed solar system will produce enough energy to more than offset daytime consumption and will result in some energy being delivered back to the electric utility during the peak daylight hours.

By replacing generation from fossil power plants with energy from solar voltaic modules, there would be a substantial reduction in pollutants including sulfur dioxide, nitric oxide and carbon dioxide. The reduction in these pollutants from the proposed Sahr Dairy solar system is tabulated below:

<b>Annual Energy From Proposed Solar System (Mwh)</b>	<b>607</b>
<b>Annual Reduction in SO2 Emissions (Lbs)</b>	<b>3,213</b>
<b>Annual Reduction in NOX Emissions (Lbs)</b>	<b>1,913</b>
<b>Annual Reduction in CO2 Emissions (Lbs)</b>	<b>1,288,743</b>

### Benefits to the State of Minnesota

Minnesota has over 80,000 farms. These represent 80,000 small, medium and large businesses that all use substantial amounts of electricity.

In Europe there is a huge movement to convert farms from dependence on "dirty" electricity to the use of renewable energy to power farms.

Our partner company in France, Facilasol, has converted over 200 farms in Northern France to solar electricity in the last 2 years alone!

They have over 100 additional farms in the "pipeline" awaiting installation.

**Please consider how converting farms in Minnesota to solar electricity production can benefit the State of Minnesota.**

### **Environmental Benefits**

The Sahr Dairy farm uses more than 900,000 kWh of electricity per year.

This creates approximately 955 tons of CO2 per year.

Our solar PV installation could provide approximately 60% of the electricity the Sahr Dairy Farm needs each year.

This would reduce the Sahr Dairy carbon output to the atmosphere by approximately 60%, which equals more than 640 tons.

There will be less coal burned to make electricity.

That means less mercury and lead ending up in our air, and lakes.

The Sahr Dairy Farm is only one farm...but it is a big one.

The journey of a thousand miles begins with a single step.

The Sahr Dairy Farm is that single step, a perfect project.

We want to prove to the farmers and citizens of Minnesota, that solar electricity on farms makes sense environmentally and economically.

We need to prove that on one farm to get other farms interested and ready to make the move to solar.

### **Economic Benefits**

The Sahr Dairy Farm pays between \$6,000 and \$10,000 a month for electricity.

With the installed 350 peak DC kW solar PV system we are proposing, it is estimated that as much as 60% of the Sahr net electricity needs on a yearly basis will be met through their solar PV system.

There is an obvious economic benefit to the Sahr Dairy Farm in saving that money.

In addition, the conversion of farms in Minnesota to solar PV production will provide a steady stream of new "green" jobs in the following areas:

- Wildlife biologists
- Solar PV and Solar Thermal sales, installers, maintenance, and engineers
- Local sourcing of some of the installation and maintenance equipment

How big can this get?

Our colleague company in France, Facilasol France, employs 60 people and had sales in 2008 of approximately \$80 million USD, doubling their own forecast.

Interestingly, Northern France has about 80,000 farms, the same number that Minnesota does.

Farms have land.

Many farms could convert some of their land to solar energy production, in essence harvesting power from the sun as a crop.

It takes 7 acres of land to accommodate a 1 MW solar tracker facility.

1 MW of solar can provide the electricity for 600 homes.

Minnesota could become a state of solar "farms" throughout the state providing a clean and never-ending source of electricity.

### **Educational Benefits**

The Sahr Dairy will be a prototype that will be studied by other farmers interested in making the move to getting their electricity from renewable resources.

The Sahr farm can be a laboratory for the study of the process a farm goes through in converting to renewable and particularly solar energy production.

Solar PV energy production can be studied from an environmental, economic and stewardship point of view.

How does it benefit the environment for ALL Minnesotans?

How does it benefit the owners and users financially?

How does it lead to healthy, renewable and sustainable farming practices?

The Sahr farm can serve as an education learning center for students and teachers of all ages.

We truly believe in the adage:

" I heard and I forgot, I saw and I remembered, I did and I understood."

We would like the Sahr Farm to become a living experiment where students, teachers, other farmers, state legislators and anyone else who is interested in the future of Minnesota can come and see the promises of solar electricity production.

Anyone interested can hear, see and experience first hand a solar farm. Then...they will understand the importance of going solar in Minnesota.

### **Leadership Benefits**

With all due respect to many of our sister states...Minnesota is a very, very beautiful state. We are not just a flat plain that has been leveled for corporate farming.

We are a state with a lot at stake environmentally, with over 15,000 lakes, countless streams and the Mighty Mississippi.

**We are also a state that burns many train car loads of coal per day to produce electricity. Until recently that was the best we could do to meet the needs of our citizens.**

**Now...we know better. We know we have a global warming issue that could be catastrophic.**

We know we have limited amounts of fossil/carbon fuel to burn.

We have to start somewhere. Let's start with our farms.

Let's help our farms economically, and at the same time help them become the state's leaders in a statewide conversion to electricity production from renewable resources.

As a state let us declare to the other 49 states that **"MINNESOTA IS AMERICA'S LEADER IN CONVERTING FARMS TO RENEWABLE SOURCES OF ELECTRICITY."**

We can do this. We need to do this. Let's be the leader, not the follower. When people gather to talk about what state is leading the charge into the future of renewable energy, let's hear the name Minnesota talked about in the same breath as California.

Why not us?  
Why not now?  
Let Minnesota lead the way.

## **Conclusion**

Redline Energy is a Minnesota based corporation.  
We are a "solar integrator". We bring together all the entities necessary to produce a solar PV project from design to completion.

This includes:

- Project design
- Environmental impact
- Project benefit/cost analysis
- Project financing
- Sourcing of project equipment/ PV panels, inverters etc.
- Project installation
- Project maintenance

We are proposing to develop one significant Minnesota dairy farm into a prototype farm that converts to solar production of electricity.

We have described that farm and the associated costs and benefits above.

It is important to note that we have asked for and received substantial discounts from all suppliers on this project. As an example:

Panels and inverters: Buying direct from manufacturer, bypassing distributor mark-ups. Savings of at least 10%.

Redline Energy: Working for a 10% profit margin, instead of typical 30% profit margin.

Engineers and installers: Deep discounts from normal fees.

We are asking the State of Minnesota to partner with us to quickly bring the project from the development phase to the reality phase.

These are the specifics:

1. Total cost of Project: \$2,102,200
2. Sahr Dairy Farm contribution: \$210,220
3. Total grant request from the State of Minnesota: \$1,891,980
4. Hoped for date of commitment by the State of Minnesota: April 15
5. Plan for start date of project construction: May 25
6. Plan for completion date for project: June 26