
Minnesota Manufacturing Jobs: Solar Photovoltaic Module Rebate

2010

Objectives

- Create long-term manufacturing and construction jobs in Minnesota.
 - Jump start consumer and commercial solar PV installations in Minnesota.
 - Currently, 19 year pay back for solar in MN.
 - Goal: 5 year consumer pay back
 - Goal: 2 MW minimum PV solar per year installed
 - Goal: Attract new Minnesota solar PV manufacturer
 - Goal: Create new manufacturing and installation jobs
-

Minnesota Solar Investment

Considerations:

- Minnesota has installed capacity of 1 MW (US installed solar capacity is 8,775 MW). * Huge opportunity for growth.
- Minnesota's solar resource (insolation factors) are better than Germany (#1 in solar installation) and comparable to some sun belt areas (Houston).
- US is in an economic recession
 - Availability of capital
- Market growth dependent on government stimulus and incentives in the near term:
 - Continuation of Investment tax credit and US Treasury grant
 - State Incentives
 - Renewable Portfolio Standards
 - Renewable Energy Credits

Solar Photovoltaics Evolution

Early Stage

- Immature industry – multiple competing technologies.
- US Demand driven by incentive programs at federal and state levels.
- Huge ramp up in solar cell capacity and supply.
- Strong European demand due to high priced feed in tariffs.
- Grid price parity projected within 5-7 years (\$0.15/kwh), \$0.10/kwh in 10-12 years.*

5-7 years

- Likely industry shakeout from oversupply of cells.
- Technology advances and improvements in supply chain continues to reduce costs.
- Business models will focus on the installed cost/watt.
- Unlike other forms of renewable energy, potential for lower costs is substantial.
- Grid parity pricing replaces need for state and federal incentives.

* Deutsche Bank Securities, Inc. July 2009

Solar Subsidy/Performance Comparison

	Minnesota	Washington
Solar Resource: Radiation (kWh/m ² /day)	4.54	3.64
Cost of Electricity	\$0.081/kWh (Xcel, Minneapolis)	\$0.071 (Seattle Power & Light, Seattle)
Incentive:	\$2.00 to \$2.25/W (Depending on Utility)	\$0.54/kWh (production) – equal to \$5/watt
Net Metering	Up to 40 kW	100 kW
Return on Investment: (Residential)	19 yrs to never	5 yrs

Proposed Minnesota Legislation

- Rebate: up to \$5/watt installed paid out over a 5 yr period
 - Solar photovoltaic modules manufactured in Minnesota
 - Net of existing state and utility rebates
 - Maximum size: 250 kW/\$100,000 (net metering cap is 40 kW).
 - Combined with existing solar rebate programs, should produce more than 2 MW of annual solar capacity growth in Xcel territory.
 - 2500 homes over 5 year period.
-

Minnesota Residential Example

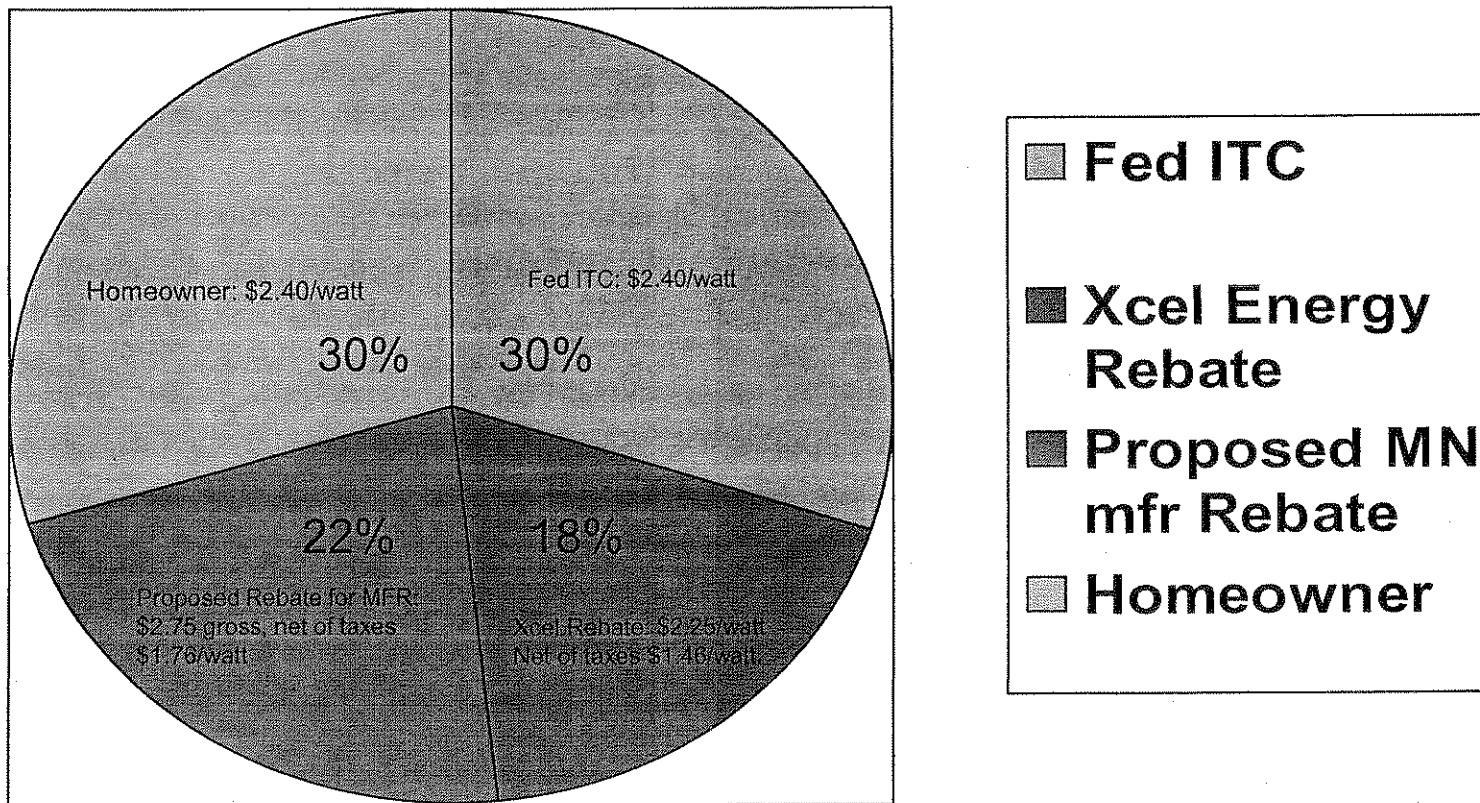
- 5 kW size
 - \$40,000 @ \$8/Watt installed cost
 - Insolation: kWh per installed kW = 1,224 hours
 - Degradation = 0.5% per year
 - Tax Credit/US Treasury Grant = 30% of installed costs: \$12,000
 - State incentive: \$5/Watt installed (combined)
 - Net metering revenues: \$0.08/kWh
 - 5 year payback with tax benefits
-

Sources of Capital: Minnesota

INSTALLED COST:	\$8.00/WATT	100%
FEDERAL INVESTMENT TAX CREDIT:	\$2.40/WATT	30%
Xcel ENERGY REBATE : \$2.25 (TAXABLE):	\$1.46/WATT	18%
PROPOSED MANUFACTURER REBATE (TAXABLE) : \$5/WATT LESS \$2.25 = \$2.75):	\$1.76/WATT	22%
HOMEOWNER:	\$2.38/WATT	30%

Assume 35% federal tax

Net after tax benefits to a Minnesota solar consumer (installed cost \$8/watt)



State Rebates cover 40% of installed cost at \$5/watt (\$3.22 net of taxes)

Minnesota 5 kW Residential Example

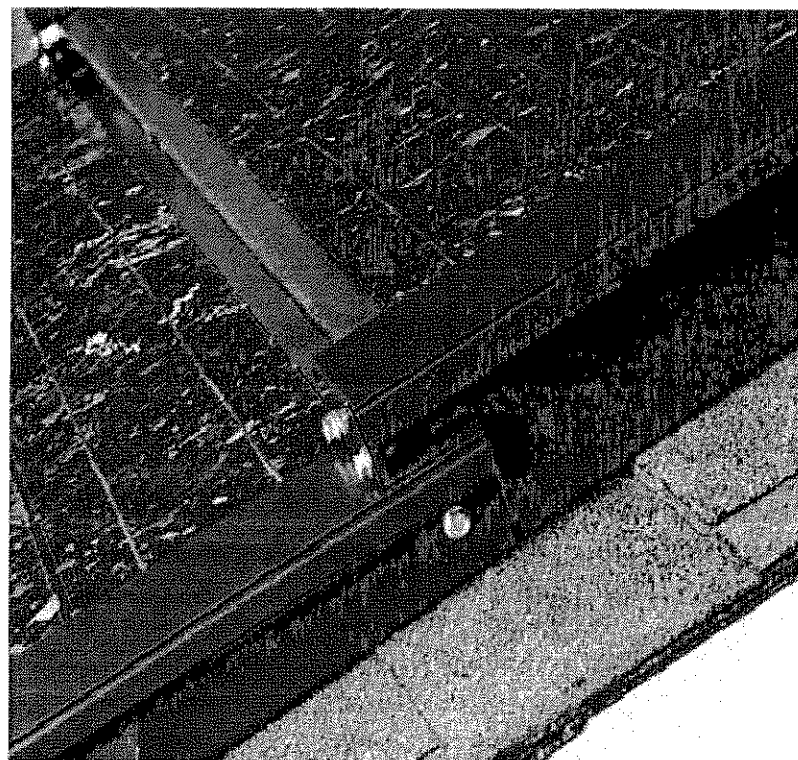
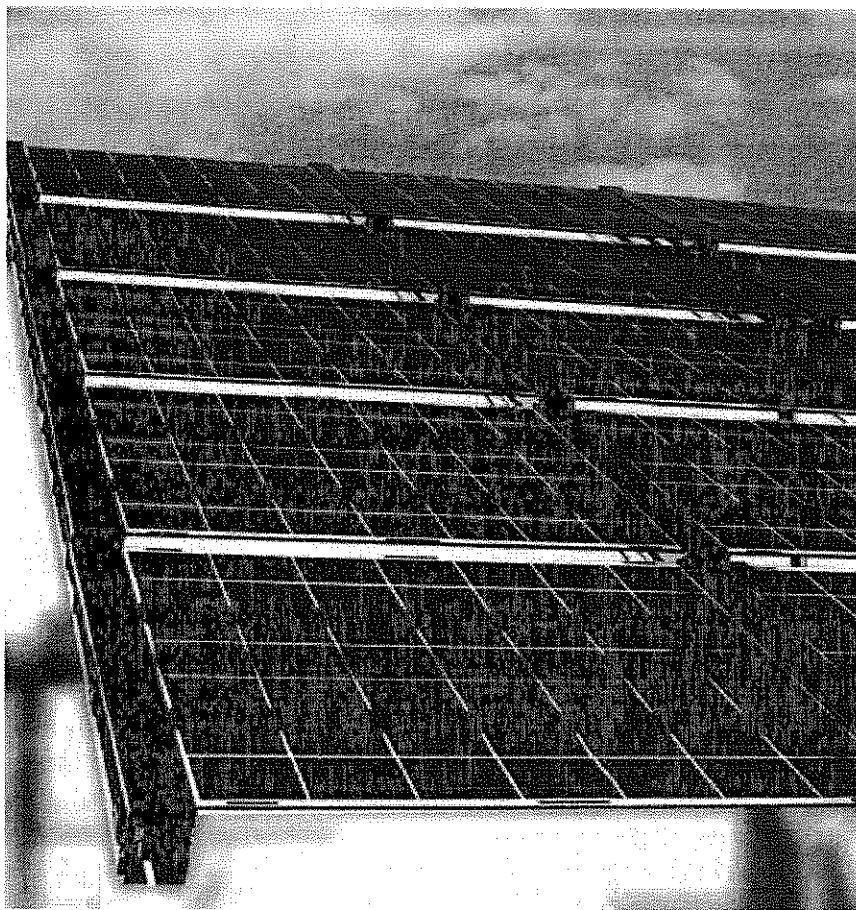
Edina

<u>Year</u>	<u>Capital Contribution</u>	<u>Tax Credit</u>	<u>Cash (PPA savings and Xcel plus 5 yr rebate)</u>	<u>Tax Savings</u>	<u>Cumulative Benefits</u>
2010	\$40,000	\$12,000	\$14880	\$9172	-\$15948
2011			\$3204	\$2687	-\$10058
2012			\$3228	\$1155	-\$5675
2013			\$3253	\$232	-\$2189
2014			\$3280	\$223	\$1314
2015			\$648	\$459	\$2420
2016			\$677	-\$237	\$2860
2017			\$707	-\$247	\$3319
2018			\$738	-\$258	\$3800
2019			\$772	-\$270	\$4301
10 yr Total	\$40,000	\$12,000	\$31,886	\$12,915	\$4,825

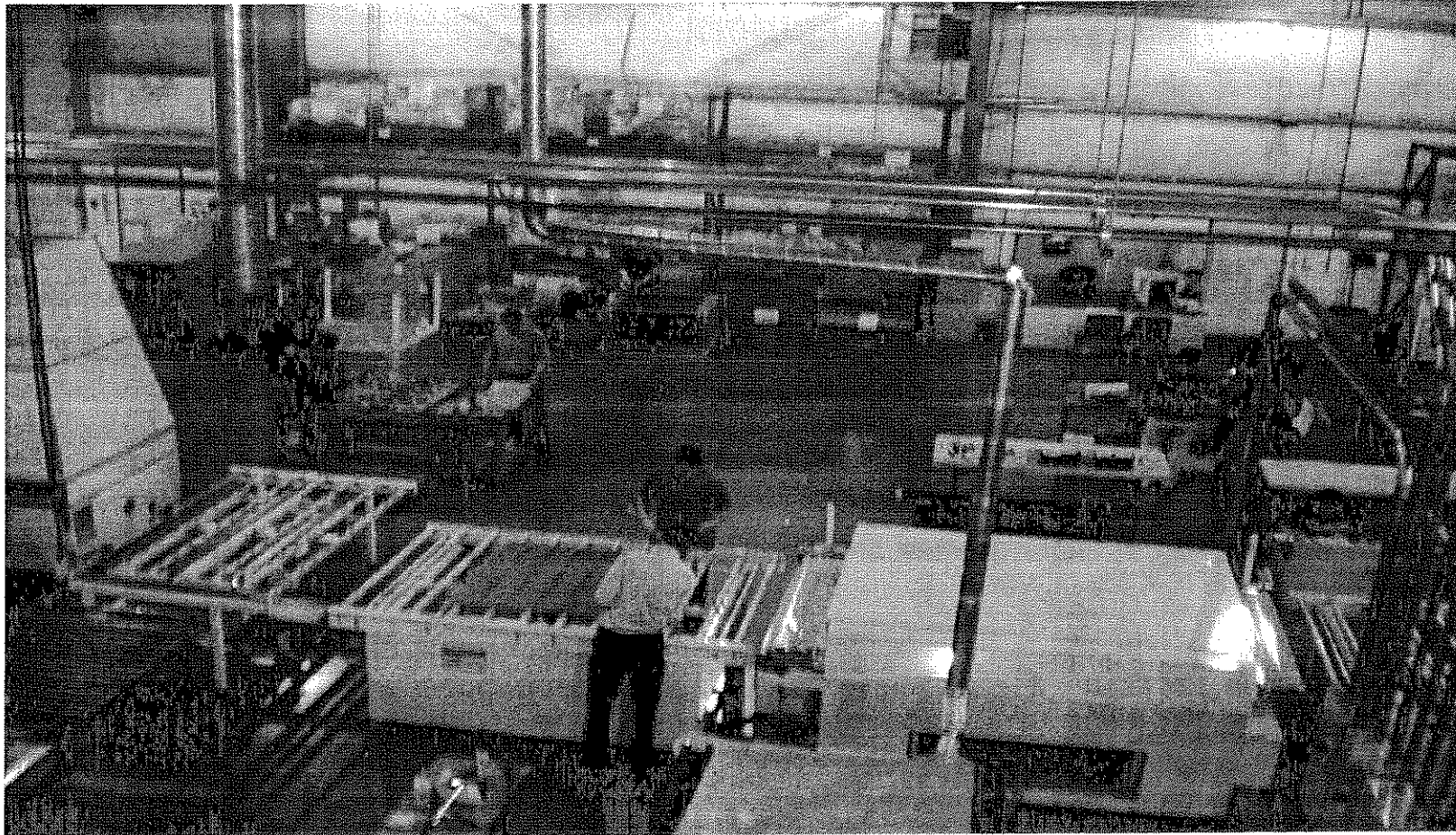
Silicon Energy

- ❑ Cascade Series PV Module
 - ❑ Polycrystalline cells
 - ❑ Robust glass on glass construction
 - ❑ Six bypass diodes per module (increased performance in shade)
 - ❑ Mounting system conceals and protects wires.
 - ❑ Various colors available.
 - ❑ Robust design with Dupont Ionomer encasing designed for harsh weather conditions
-

Silicon Energy Cascade Series



Silicon Energy Manufacturing Plant Arlington, Washington



Minnesota Solar PV Module line

- Capable of producing 10 MW of solar modules.
 - Glass washing equipment
 - Tabbing and stringing
 - Module lay up
 - Lamination, Trimming
 - Framing
 - High voltage testing

 - 17 to 22 full time employees.
 - 5 to 7 additional employees per additional shift

 - Manufacturing plant in Mt. Iron Renewable Energy Industrial Park.
-

Highlights

- Creates additional state incentives up to \$5/watt when combined with all other utility-state incentives.
 - To access the enhanced incentive, consumer must use a Minnesota manufactured solar pv panel.
 - Provides for a roughly 5 year payback period for a consumer system—all incentives to the consumer, not manufacturer.
 - Appropriates funds from the Xcel Energy RDF. Currently, \$19 million annually, in fy 2013 \$23 million annually.
 - Appropriates \$2 million in FY 2011, \$4 million in FY 2012, and \$5 million in each FY 2013, FY 2014, an FY 2015.
 - Reduces the proposed fourth grant cycle from \$15 million to approximately \$9 million and takes advantage of new revenue from increased casks.
-

