

# **Renewable Development Fund Project EP3-12**

## **Milestone 2 Report – 12/18/09**

**PUBLIC**



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# Monthly Progress Report

An Effortless Shift to Solar

## Project Title: A Solar Electric Solution for Residential Markets

Contract Number: EP3-12

Milestone: 2

Report Date: 12/18/2009

Principal Investigator: Gerardo Ruiz  
612-605-5228

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612-605-5228

Congressional District for Corporate office: 5

Congressional Districts for Project location: Overall, across the Twin Cities, but for both installations corresponding to Milestone 2 - District 3

## Executive Summary

The goal of this project, as stated in the proposal submitted on July 17, 2007, is "to demonstrate the commercial viability of providing solar-generated electricity to homes and small businesses based on a leasing and service package". In addition, the "project will provide distribute residential solar energy through rooftop-mounted photovoltaic solar panels" and the importance of the project is to overcome pricing and capitalization barriers in this market, which have been documented to be the biggest obstacles to solar expansion.

The key objective of the project is to install 280 KW of solar capacity in approximately 30 to 40 sites distributed across the Twin Cities. The exact number of installation sites will depend on the actual number of panels in each site.

The delivery of 280 KW will be grouped into 15 milestones, with the second milestone requiring the installation of 11.2 KW in two solar residential sites.

The rest of this report will be dedicated to describe the technical details, what went well, what did not, lessons learned, etc.



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For a visualization of the two solar sites, please see enclosed pictures plus the map links below.

Site 1: <http://maps.google.com/link disabled>

Site 2: <http://maps.google.com/link disabled>

As a reference to the reader, the first install was 7.2 KW (**address withheld**, Plymouth) and the second 5.625 KW (**address withheld**, Edina), totaling 12.825 KW.



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## Technical Progress

From a technical perspective, both installations were successful with no major issues. The process begins with permit requests and equipment ordering, in particular, building permits from each City, electrical permits from the State and submittal of Xcel Interconnection Agreement. On installation day, the process entails mounting and flashing of standoffs and railings, installation of micro-inverters and panels and electrical conduits/circuits to the home's electrical service. After installation, inspections were conducted and an Xcel Area Engineer was scheduled for testing and commissioning. All inspections were conducted successfully and the resulting signed documents from Xcel are enclosed to this report in Appendix A (confidential information, given that it includes customer data).

The systems are fully monitored with the Enphase Enlighten systems. For a real time view of both, please click on the following links. Please note the panel-by-panel electricity generation display and the buttons for 'Time-lapse: Today's Power/Power Last 7 days', which are particularly insightful: <http://enlighten.enphaseenergy.com/public/systems/Jdf41862?list=1>



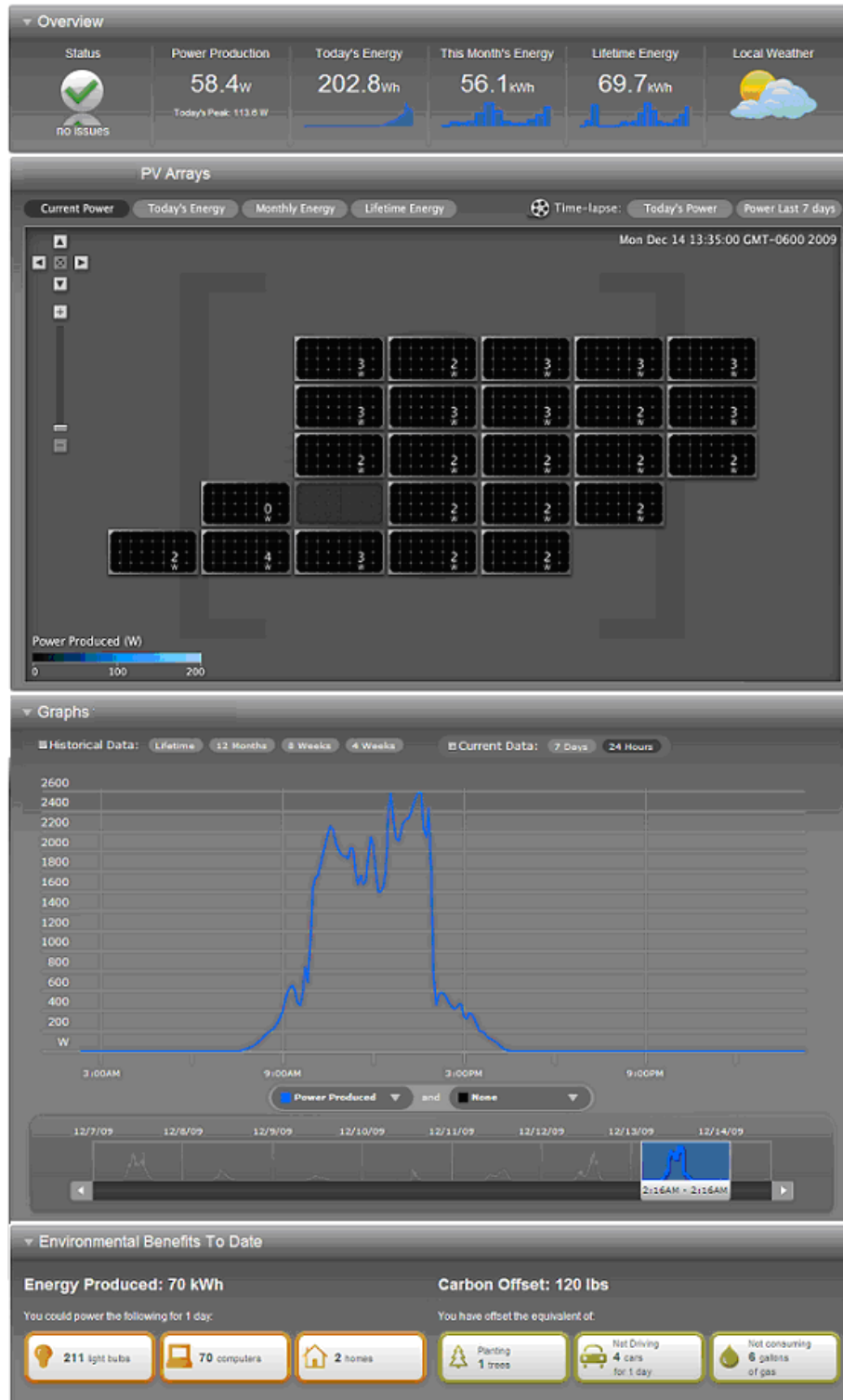
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For the second system: <http://enlighten.enphaseenergy.com/public/systems/crk22019?list=1>



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## Project Benefits

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Project benefits are:

1. Demonstration of the viability of 'solar-as-a-service'
2. Delivery of 280KW of generating capacity, which will count towards the Xcel Energy goal for Renewable Energy Standard
3. Green job generation
4. Generation of clean electricity for a minimum of 15 years

Given that 12.825 KW out of a total 280 KW have been delivered so far, the project benefits have been only partly achieved. In reference to benefit 3, green job generation, we report six Full-Time-Equivalent green jobs generated: Project Manager, Project Administrator, Project IT development and support, Crew Supervisor, and two Site Assessors/Installers. In addition, part-time electricians have been sub-contracted for each installation.

## Project Findings – what went well and what to improve on

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As we started the solar PV installation phase, the following went well:

- Permitting with the Cities of Plymouth and Edina took a few weeks but was manageable.
- Homeowners were very excited, supportive and eager to be involved where needed.
- The installation process gets faster and more efficient as the team learns to divide tasks and work in parallel where it makes sense.
- All solar components selected for the project were compatible and worked very well together: Siliken solar modules, Enphase micro-inverters, Quickmounts and HD rail.
- The Siliken Modules are high-quality and sourcing was timely and efficient.
- Roof access was not an issue and November weather was unusually conducive to outside work
- Web-based solar monitoring worked right away, impressing the customer and allowing immediate trouble shooting.

Project findings to improve upon:

- It was challenging to find a good location/connection for the Envoy device (monitoring device) due to a poor ground connection in a wall socket of the first home, which required electrical trouble shooting.
- Miscommunication with our panel and inverter suppliers as to the model of connector between the devices – problem solved with on-site with connector add-ons.

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- Slower than expected installation time of the PV QuickMounts (the 'feet' that hold the array on the roof) due to not following manufacturer installation instructions. Process was remediated on the second installation.
- Constant rain/mist made for a slippery roof for portions of the second installation.

## Project Lessons Learned

- A three person solar installation team was most efficient for an average residential site: one fewer or one more person would not be optimal.
- Flat roofs (less than 20 degrees) are roughly twice as easy as roofs with a slope greater than 30 degrees, thus impacting installation time and cost.
- During installation, lots of time spent talking to neighbors who walk up to inquire about the solar installation.
- Manufacturer's installation instructions are very valuable resource.
- So far, Cities have requested 2-3 weeks to approve a building permit, even though some will only take 2-3 days. Scheduling of installation needs to be done accordingly.
- It is difficult to source all products from one vendor and lead times vary greatly. This poses procurement challenges that require good Project Management.
- The Solar PV industry has not penetrated MN enough to allow ordering more than 10% of the supplies locally.

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## **Appendix A – Xcel Energy signed Interconnection Agreements – DELETED DUE TO CONFIDENTIAL INFORMATION**

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