OVERVIEW

Special focus: tracker optimization
Installer: Vigor Clean Tech
Installation date: June 2011
Location: Caledon
Average irradiance: 1486kWh/m²
Installed capacity: 10kWp
Modules: 54 x LDK 190W
Inverters: 2 x SE5000US
String design: 27 modules for each inverter configured in 2 strings of 14 and 13.

A 10kW PV system was installed on a tracker near Caledon in Ontario, Canada, in June 2011. This case study reveals many of the challenges faced in the photovoltaic field today. When designing PV systems, whether with or without trackers, efficiency, maintenance procedures and safety standards for PV personnel are all issues that must be addressed.

Energy efficiency: The Canadian MicroFIT program applies to systems of up to 10kWp. Parties are looking for ways to increase efficiency and to harvest the maximum amount of energy possible within the 10kWp limit. A common way to do this is installing tracking systems which expose the modules to as much sunlight as possible throughout the day. SolarEdge power optimizers increase the energy output of PV systems using tracking systems, just like they do for any other PV system, by mitigating energy losses resulting from module manufacturing mismatch, soiling, partial shading and module aging. SolarEdge eliminates these losses with per module MPPT performed by the power optimizers. This ensures each module is performing at its optimal point at all times, regardless of the performance of other modules in the system. This results in maximum energy harvesting. In addition, irradiance conditions are constantly changing. For example, fast moving clouds make it difficult for traditional inverters with centralized MPP tracking algorithms to adjust their MPP rapidly enough. The SolarEdge per-module MPPT algorithm is distributed to each module and quickly adapts to dynamic irradiance and thus mitigates power losses. In tracking systems that use concentrated PV, the increased system efficiency causes power losses resulting from mismatch and dynamic weather conditions to be amplified.

Operation and Maintenance: Performing maintenance on a large tracker is both cumbersome and time consuming. With traditional inverter monitoring alone it is very difficult to detect a problem and to analyze its source and may require many hours in the field and on the tracker. For example, if the system output is lower than expected, the source may equally be a malfunctioning module or a simple change in weather, and isolating the reason takes time. With SolarEdge, monitoring on the module-level enables the installer to detect and analyze irregularities in module output via the online monitoring portal and troubleshoot the system efficiently. This in turn saves time and reduces maintenance costs.

Safety: In tracking systems maintenance staff is required to climb and work at heights which demand new precautionary measures from the system provider. Every series connection of several modules exposed to sunlight generates a voltage which is dangerously high and can be life-threatening. The SolarEdge system includes automatic shut-off of DC voltages whenever the AC supply is turned off and eliminates dangers that can threaten maintenance staff. Beginning with the installation process the installer is safe because instead of the module’s Voc every optimizer outputs merely 1V. For a 10kW system like this one, the total voltage anywhere between the modules and the grid, as long as the AC is disconnected, is 27V, because there are 27 modules. The advantage of maintaining 1 Volt per module is to allow the installer to verify that every module is operational.

Summary: SolarEdge optimizers improve energy output, operation, maintenance and safety of PV installations. They are particularly helpful when using tracking systems where increasing efficiency is a major goal and where drawbacks of traditional inverters may be amplified.

“The SolarEdge system we installed has produced the highest daily total output for any of our trackers ever.”
Brian Unrau, VP Finance, Vigor Clean Tech