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## **A STEP INTO THE FUTURE:**

### **GRID TIE SOLAR PHOTOVOLTAIC DEMONSTRATION SYSTEM**

Guyana usually receives abundant sunshine, and has for many years been using solar photovoltaic panels for a number of applications, primarily in remote areas without access to a grid.

The Guyana Energy Agency, with support from GIZ and the Austrian Development Cooperation, has recently completed installation of an 8.46kW Grid Tie Solar Photovoltaic Demonstration Project.

Conceptualized some two years ago, the GEA worked with GIZ during 2011 to design the system and secure financing, which has been graciously provided by the Austrian Development Co-operation.

As the overarching objectives, the system was installed to:

- a) promote the use of renewable energy in Guyana;
- b) gain understanding of grid tie opportunities; and
- c) demonstrate the use and application of solar photovoltaic grid tie technology.

#### **What exactly is this Grid Tie Solar Photovoltaic demonstration system?**

The system is made up of 36 panels, each rated at 235 watts which have been mounted on the shed in the compound of the GEA, for a total installed capacity of 8.46kW.

The solar photovoltaic panels convert the sun's energy into DC electrical energy which is then converted to AC voltage by a grid-tie inverter system.

The grid-tie inverter is the interface between the solar panel, the building's load and supply from the grid or Guyana Power and Light in this case.

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The power supplied from the solar panels is about 20% of the power demand of the load from the building, so during a regular business day, the grid-tie inverter senses the amount of energy coming from the solar panels; measures the amount of energy being consumed by the building and then takes the difference from the grid.

On holidays and weekends when the load of the building is less than the power supplied from the solar panels, most of the energy is supplied to the grid.

The system should generate approximately 13,895 kWh of renewable energy per year and would result in savings of G\$914,429 per year.

While the total cost of this demonstration project was G\$7.4 million, if one were to remove the costs associated with demonstration, monitoring and education, the simple payback for the project, based on a capital cost of G\$6.3 million would be just under 7 years. Solar panels usually have a lifetime of between 15 to 25 years depending on care and maintenance.

For those who would like to size their own systems, this translates into an average cost of G\$745 per watt installed.

The estimated energy production of 13,895 kWh per year from renewable energy would result in the reduction of 11,116 kg carbon dioxide emissions per year.

Currently, the system is operating on a net metering arrangement with GPL using the existing iron meter. A module upgrade was sourced and installed, allowing the existing meter to now read energy received from the grid, energy supplied to the grid and net energy.

To assist in achieving the project objectives, the system was complemented with a forty-inch monitor that displays the operational data, including actual power production in kW, accumulated energy production in kWh and avoided carbon dioxide emissions in kg. Real time power generation and energy consumption can be viewed from the GEA website [www.gea.gov.gy](http://www.gea.gov.gy). The benefits of this display are



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valued in terms of promoting awareness to the public and understanding the accumulated savings over time in a reader friendly format.

GEA has been working closely with a number of key stakeholders to explore the opportunities and gain experience related to the operation of the grid-tie system. Since September 2011, the GEA commenced dialogue with Guyana Power and Light Inc., Public Utilities Commission, Government Electrical Inspectorate, Office of the Prime Minister-Hinterland Electrification Unit, Environmental Protection Agency and University of Guyana- Faculty of Technology.

Dialogue with these stakeholders provided valuable insight for the project and helped inform many of the outcomes that were finally realized.

Responding to invitations to oversee and learn from the installation and operation of the grid-tie PV system, a final-year Electrical Engineering student from the University of Guyana has modeled the system for his final-year project.

While there are two examples of solar PV connected to isolated mini-grids at Port Kaituma and Mahdia, for the first time in Guyana, this Grid-Tie Solar Photovoltaic Demonstration Project provides a working example for the incorporation of renewable energy technology into the *national* electric grid using grid feed-in technology.

This arrangement serves as a basis for continued dialogue in areas such as legislation, tariff considerations, standards and policy implementation.

GEA would like to encourage private sector to seriously consider the incorporation of similar systems and would be more than willing to provide advice to interested parties.