The Birthplace of Evolution
From fossil fuels to renewable energy in the Galapagos

Summary

Renewable energy systems are coming into their own as substitutes where fossil fuels are creating special problems, and in places where electricity has never been available.

Our objective is to bring to light the potential for renewable energy in remote parts of the world within both of these settings. One of our roles is to benchmark progress towards sustainability by employing remote monitoring technology and wireless communications. One such project is happening in the Galapagos Islands.

Background

In 2000 we brought photovoltaics to a place where electricity was virtually non-existent, a remote village in the heart of the Amazon. The solar system we and local residents installed became the only consistent source of electricity available to the entire village of 500 people. In 2003 we began working in the Galapagos Islands, where Charles Darwin discovered evolution, and where we discovered that fossils dominate the energy equation. Fuel oil is delivered by boat to produce electricity, at a 50% discount sponsored by the government of Ecuador.

After the Jessica oil tanker wreck of 2001, a commitment was made to use renewable energy to speed evolution of human society and stop extinction of endemic species threatened by more oil spills, (oil-powered) tourism and (oil-powered) overfishing. Time is short, as oil scarcity looms on the horizon. (Ecuador has total oil reserves equivalent to 4 months of current global oil consumption. Dependent on the income from oil exports, the country's internal oil consumption is also threatened.)

Implementing the Clean Development Mechanism ("CDM") of the Kyoto Protocol

Under the rules for implementing the CDM Mechanism of the Kyoto Protocol, renewable energy systems must address the concept of ***additionality*** in order to qualify for carbon credits ("CERs"): The carbon-reduction intervention must be in *addition* to what might otherwise have been done. In the Galapagos we have set up sensors and dataloggers to monitor performance of the legacy systems prior to the renewable energy intervention. When the renewable systems are installed, we will have a benchmark to determine their *additionality*. To date we have installed sensors on each of seven diesel generators at the power plant on San Cristobal Island (serving 5,000 people in the town of Puerto Baquerizo Moreno), the electrical service at the office of ElecGalapagos (the provincial electric utility), and a high school. A weather station is also online, providing realtime solar, wind, temperature, rainfall and other climate data.

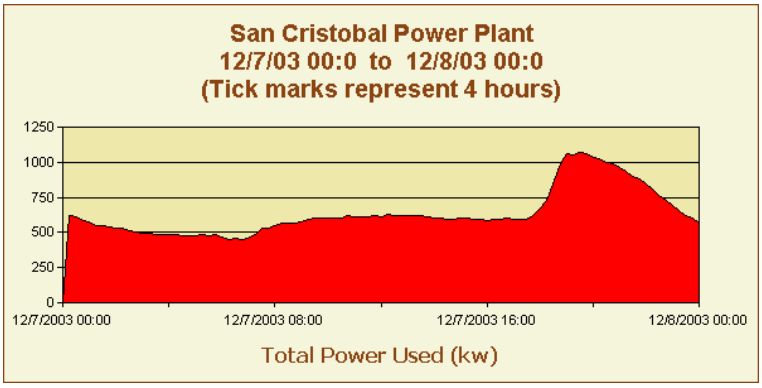
Representing several countries around the world, our client group enthusiastically embraced the prospect of delivering data to anyone's desktop in real-time via the internet. In remote locations like the Galapagos, connectivity is a major challenge. Internet via satellite is less consistent and costs an order of magnitude more than dial-up service in industrialized countries. Addressing the challenge, we have established a wireless network linking energy sensors within a 1 km radius to a central server, and from there via satellite to our solar-powered server in the USA, accessible to the system design engineers for load assessment and to all those eager to learn about the potential impact of renewable energy.

Linking Rational Use of Energy and Renewable Energy Systems

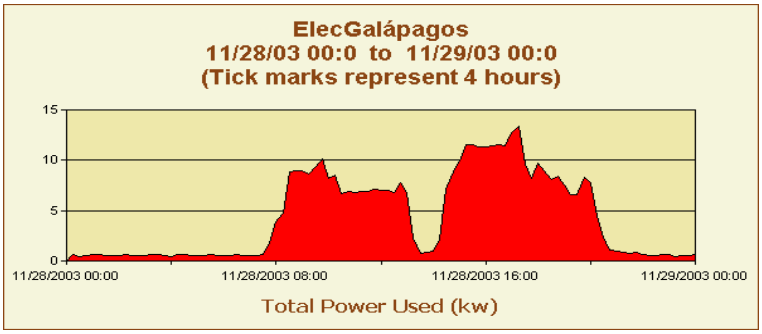
In the context of the coming renewable energy installation (about two megawatts of wind turbines and several strategic small photovoltaic installations), we are working with local schools to encourage energy conservation -- the Rational Use of Energy ("RUE"). Energy monitoring data will serve as a baseline for a curriculum to foster RUE practices in the students' homes and by extension into the community at large.

Conclusions

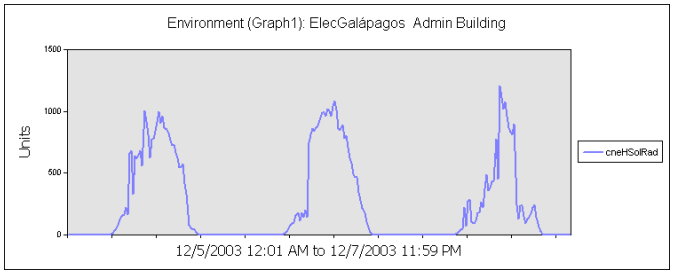
Russia has decided not sign the Kyoto Protocol in its present form. Nonetheless, most countries of Europe, Japan, Canada and others have already begun gearing up for renewable energy. Our energy monitoring systems will give light to the transformation in the Galapagos and assist people there to guide late-comers such as Russia and the USA towards energy self-sufficiency.



Typical Daily Power Generation at San Cristobal Island Power Plant
Averaging 650 kW, peaking at 1,100 kW, consisting of 7 diesel generators



Typical Daily Power Consumption at ElecGalápagos Administrative Building
Note energy conservation during lunch hour, higher air conditioning load during afternoon.



Solar Insolation, Puerto Baquerizo Moreno, Galápagos
3 days in early December 2003