

## A Brief History of Renewable Energy on Guemes Island Q&A with Ian Woofenden, island renewable energy expert



The Guemes Island General Store's new solar array, setting the standard for clean energy on the island

The installation of the large solar-electric system at the island store is a worthy time to reflect on the history of renewable energy on Guemes. Ian Woofenden has had a lot to do with that history; he shares some background in the Q&A below.

### • Where did Guemes Island's renewable energy history start?

Native Americans and other early residents and visitors to the island used sunshine, wind, water, biomass, and human power in a variety of ways. The modern renewable energy era, in general, began in the 1970s, when solar-electric (photovoltaic) modules first came on the consumer scene. To my knowledge, the first such systems on the island were my family's, and those of Ferdi Businger and Lane and Susan Parks, in the 1980s. Our off-grid homesteads benefited initially from lights and later from a wide variety of electrical conveniences due to the magic of solar-electric modules, which convert sunlight into electricity with no moving parts. I have modules on my roof that were installed in 1984 and are still doing their job.



Ian's historic solar-electric array (right), with two solar hot water systems

- **Why off-grid?**

In my case, as well as for other early adopters, it was a combination of environmental motivation and the cost of line extension. If your electrical needs are modest and/or the distance to the utility line is long, the cost of a solar-electric system can be lower than the cost of extending the utility lines. Overall, I steer most of my clients away from off-grid systems since the grid is a great means of energy storage. On-grid systems allow daily and season surpluses to be sent back to the utility to be used by your neighbors, while you are credited for the energy, and can use the credit at night and in the darker parts of the year.

- **What changed in the industry and on the island to increase the number of systems here?**

Three major factors come to mind. The first was a heightened national awareness of the value of clean, local energy. The second was the gradual decrease in the price of these systems, coupled with favorable incentives. And the third was local awareness and education, partly supported by the workshops I coordinated and co-taught on the island over a period of roughly 20 years. These workshops were project oriented, and a good number of islanders got not only great systems, but a great experience, with high levels of expertise through the instructors and contractors involved in the programs, as well as students from all over the world, hungry to learn, and eager to contribute.

- **Where are these systems?**

Most of these systems are on private residences, many of which can be seen while riding around the island. Two systems are more community-oriented—the fire hall and the general store. In the summer of 2007, a small and dedicated group of islanders got together to raise money and plan for a solar-electric system for the fire hall. More than \$60,000 was raised from a wide variety of islanders. I procured donations and discounts on all equipment, as well as donated expertise and labor. In October of that year, a workshop group installed an 8-kilowatt (kW) solar-electric system on the fire hall roof that includes a large battery backup for the fire hall to use during utility outages. The system offsets a major portion of the fire hall's electrical usage and gives energy security to this crucial community service.



The fire hall's solar-electric system provides a large portion of the facility's electricity and also backs up critical loads during utility outages

- **How about the store?**

Long before the fire hall project, in the spring of 2003, the Anderson family got excited about doing something with renewables at the store. They made an investment in solar-electric and wind-electric demonstration systems, which were installed by workshop groups. As with the fire hall, I was able to secure donations and discounts on equipment, and expertise and labor at no or low charge.

The wind turbine that was installed had been built the previous year at a workshop Win Anderson's shop, led by my colleague, Hugh Piggott from Scotland, who is perhaps the world's foremost expert on homebuilt wind turbines. We carved the blades by hand, wound copper coils, poured the resin for the alternator stator and rotors, welded, and put together the machine. At the store, we dug holes and poured concrete (in the rain) and installed an 80-foot tall tilt-up tower.



Store co-owner, Mark Linnemann, with the rotor of the homebuilt wind turbine that was retired to make space for the store's new solar array

A different workshop group installed a 1 kW solar-electric array. Both it and the wind turbine were tied to the grid, and all energy was either used directly or sent back to the grid for credit. This system's purpose was to raise awareness, not to power the store. It only offset 2-3% of the store's usage, and three-quarters of that was the solar array.

Early this year, a crew took down the tower and wind turbine, to make way for the new solar-electric array. The original solar-electric system is still operational; you can see the pole-mounted system just south of the new array.



The Anderson family primed the renewable energy drive for the store, as early supporters of the technology, and hit the cover of Home Power magazine

A key lesson of the demonstration systems is that solar-electric systems are very reliable and low maintenance, while wind electric systems take a more hands-on approach, and need attention, repair, and fortitude. The store turbine was taken down every few years for maintenance and repair, and it was replaced once over the 17-year life of the system. The solar array just sat in the sun and made electricity, never requiring any care. And in that 17 years, the price of solar technology came down significantly, making it an even better choice.

- **Why is the store solar array so big?**

The simple answer is that the store is a big energy user, and the owners made a major commitment to power it all with solar energy. A ground-mounted system made sense because there is not enough roof space on the store buildings. Screw-in anchors made the ground-mount a cost-effective option. The solar array is almost 120 kW, and we hope to have a display in the store entry so visitors can see instantaneous and cumulative energy production. With an array that large, there will be some production even on very cloudy days and, on balance, the system will cover the average annual electricity usage of the store.

The general store owners deserve applause for making a major investment to green up their own energy picture while also providing an excellent example for island residents and visitors.

- **How long will it last?**

Modern solar-electric modules are warranted for 80+% of their rated capacity for 25 years. As I mentioned earlier, I have modules on my roof that are 36 years old and still producing. The store array will provide decades of service and ongoing renewable energy awareness on the island.

- **What can islanders do to improve their energy picture?**

The wisest first step is to evaluate your energy usage and look for ways to decrease it, through efficiency and conservation strategies. This will lower your energy costs and also reduce the size and cost of renewable energy systems needed. Simple strategies like switching to LED lighting are low cost and smart. Moving heating/cooling systems to ductless mini-split heat pumps is a larger investment that will yield larger benefits.

Solar-electric systems can offset some or all of your energy usage, depending on your site, solar access, and budget. While incentives are not what they were ten years ago, the cost of the systems is lower, and financing is readily available. Many islanders can attest to the financial and environmental benefits, and the good feeling of knowing that every time the sun shines, they are making clean energy.

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Ian Woofenden consults on renewable energy and energy efficiency on Guemes Island and around the country, and represents several regional solar-electric installation companies. He's been involved in the majority of solar projects on the island, plus a handful of wind-electric and solar hot water projects.

Ian's experience with renewables includes almost 40 years of living off-grid, twenty years as an editor with Home Power magazine, and twenty years of teaching and coordinating renewable energy workshops on the island, in Central America, and in other locations in the States and the Caribbean. He is the author of "Wind Power for Dummies" and co-author of "Power From the Wind." He's also a big fan of bicycling, wheelbarrows, and compost, and loves singing with his partner, Lisa Grace, his kids, friends, and total strangers.