

Solar "Comes Together" Through an Energy Co-op in Canada



## A unique hybrid solar micro-hydro system on Vancouver Island, using Morningstar TriStar controllers

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**Don Cameron**

Viridian Energy Co-Op  
Service Manager and  
Solar Technical Specialist

## Overview

A unique hybrid solar micro-hydro system on Vancouver Island, using Morningstar TriStar controllers, provides a technological showcase for the Viridian Energy Co-Op on Vancouver Island, B.C. It is a remote off-grid residential "triple threat" system consisting of solar, hydro, and generator, presenting diversion load challenges met by Morningstar TriStar controllers.

### System components include:

- 9kW kW of solar panel input
- 1 Schneider XW inverter, 4.8kW
- 6 Morningstar TriStar TS60 controllers, for 7.2kW total load diversion
- 40 kWh AGM battery bank

## Situation

The International Co-Operative Alliance defines a cooperative, or co-op, as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically controlled enterprise." Unlike corporations and by nature, co-ops are jointly owned and democratically controlled by the participating members and accountable to them.

A socio-economic development now approaching its third century, co-ops traditionally have thrived in areas where people, driven by a strong sense of community and self-sufficiency, came together to form them to provide for themselves with basic needs, including groceries, farm supplies, and financial services (through credit unions). Other services, including energy, have also made the list of types of cooperatives, most recently with solar co-ops springing up to supply renewable electricity to individual users as well as entire communities.

Viridian Energy Co-Operative is one such organization headquartered in Duncan, British Columbia, on Vancouver Island, just off the west coast of Canada. Island living, with its inherent need for greater self-reliance and sufficiency, provides a thriving location for co-op development, which two decades ago placed Viridian squarely in "the right place at the right time" to become the first and now the leading supplier of solar panels and installations in the area.



Viridian's micro-hydro load diversion or "dump load" arrangement, using six Morningstar TS-60A controllers

# Solution



They are a “good neighbor” in the co-op tradition, donating 10% back to the communities served and supplying donated systems to some of them in need of solar to power key sustaining projects. Viridian’s diverse installation portfolio includes farms, warehouses and even lighthouses, along with single homes and entire communities, and spans both grid-tied and off-grid system design, installation and maintenance services. A newer area for the co-op is micro-hydro systems, which Viridian expects will become more commonplace as more members explore and develop sustainable living methods.

Explains Don Cameron, Viridian’s Service and Operations chief, “micro-hydro is still a relatively novel, ‘outlier’ project type for us, because it depends on specific land features—a stream and elevation at the minimum. Plus, waterways can be encumbered by numerous use restrictions and limitations, posting a permitting challenge. That makes designing such systems a highly-customized craft, with no two alike. But we expect to be doing more of them, and the lessons learned on this well-developed application requiring load diversion will help blueprint others in the future.”

The system to which Don refers is a “triple threat” hybrid consisting of solar, hydro and generator produced electricity. It incorporates a 4.8 kW inverter, 40 kWh AGM battery bank, and 9kW of solar. Key to it is the need for a diversion or “dump” load, to safely “bleed off” and store the excess energy output produced by the micro-hydro turbine during peak flow periods, particularly in winter.

As Cameron describes the requirement, “think of a system needing a giant “resistor” to divert away excess production, because without that you’d wreak havoc on inverters and potentially boil batteries. It has to go someplace. One method might be to put electric baseboard heaters outside so the electricity can be turned into heat that dissipates. But a better and less wasteful method would be to heat a reservoir of hot water that can be used for the household. That’s what we did here, for this remote homestead client.”

In this particular micro-hydro hybrid application, that entailed using an array of six Morningstar TriStar TS-60A controllers, each capable of 1.2kW to provide 7,200W of diversion control into a hot water storage system. Explains Cameron, “the system runs throughout the winter and the TriStars are enough to keep things from literally boiling over, with superior diversion load management capabilities.”

“Reliability in a dump (diversion) load scheme is crucial,” continues Don Cameron, “because should the system fail you’d cook the batteries and likely damage the rest of the electronics. We don’t worry about that with the TriStar, though—we’ve used lots of them over the past 15 years and I think we had maybe one replaced? As Service Manager, I want something that’s not even on my mind... my biggest thing is choosing components that I can forget about entirely! Morningstar TriStars are in that class.”

Concludes Cameron, “I think Morningstar is cheaper for our clients in the end. There’s less chance of failure and of having to call us back out to their remote homes to fix something. For both of us, it’s all about reliability. The Morningstar TriStars always do what we need them to do... they are our one go-to for off-grid design.”