12 Years of Residential 'Off-Grid' PV Hybrid System Operation and Evolution in Nemiah Valley, Canada

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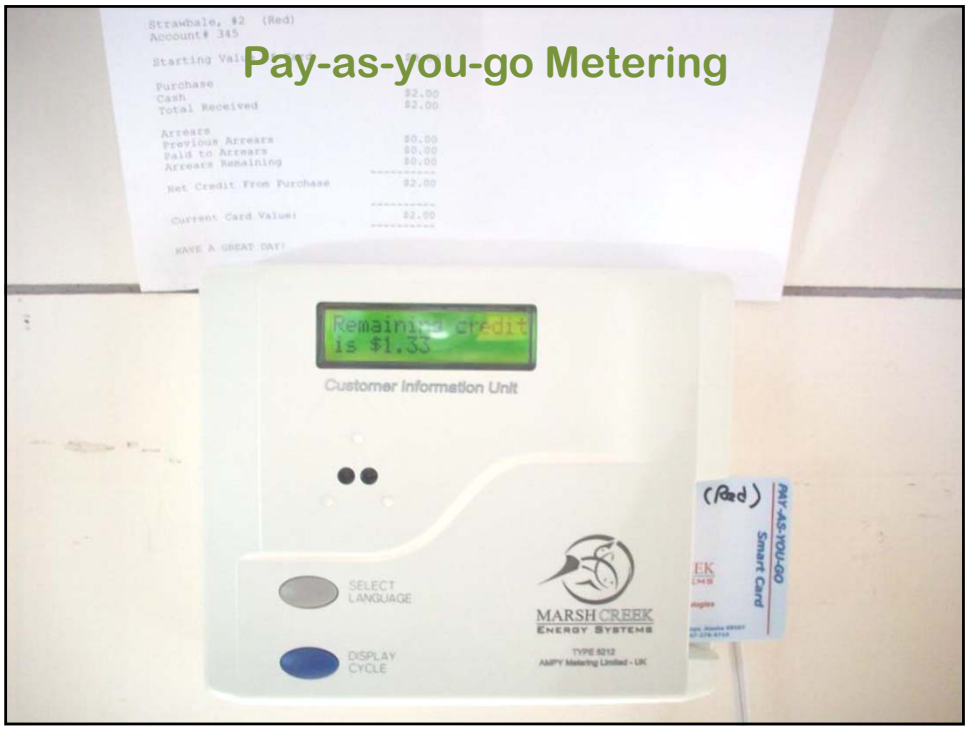
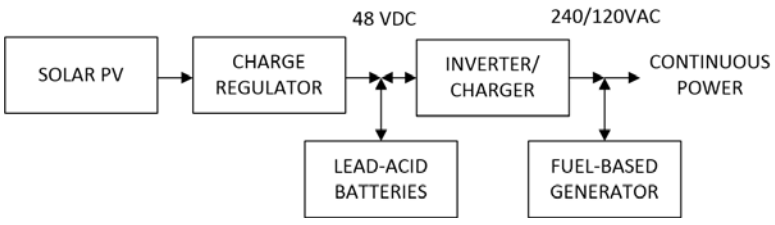
Where and what is Nemiah Valley?

- Nemiah Valley is the home of the Xeni-Gwet'in First Nation
- The Xeni Gwet'in First Nation is small community comprised of approximately 250 people in 74 houses widespread between seven community land reserves.
- The Xeni Gwet'in First Nation has signed no treaties with either the Provincial of Federal Government and will not give up their rights or title to their land. A primary goal of the Xeni Gwet'in is to keep the beauty of the land and to keep the land, air, and water clean.

Pay-as-you-go Metering



Initial Hybrid System 2006



Initial Hybrid System 2006

Interim Hybrid System – 2008


Interim Hybrid System – 2008


Three 'Solar Stations' – 2008

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Lessons Learned 2006 - 2016

-Enclosed system preferred for maintenance.

-PV and power converters were very reliable.

-Difficulties in assessing system performance.

-Noted reduction in winter battery capacity and system tolerance to operating with reduced-in-capacity batteries.

-Genset failure was the most significant technical problem. Noted failures at 4000-6000 hours.

-Design for reduced dependence on the generator in the future.

Seven New Containerized Systems – 2017

Design:

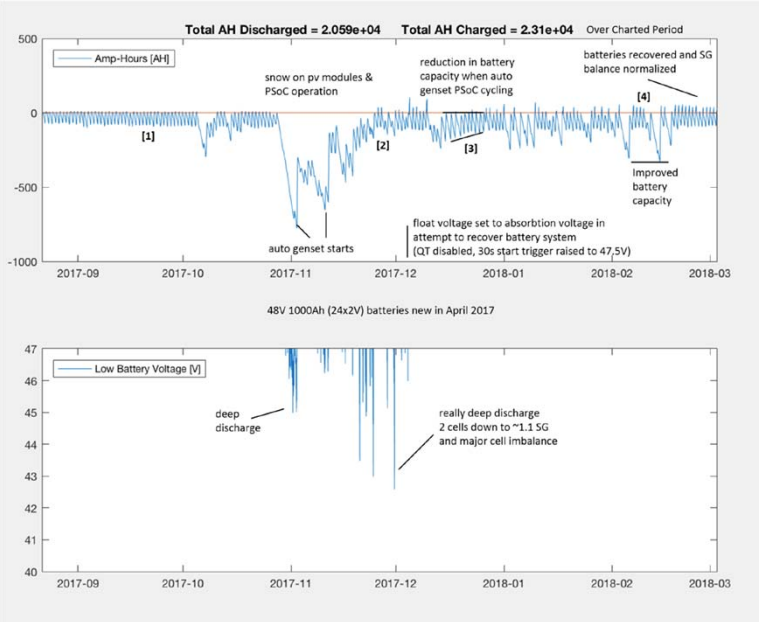
-15kWh Load
-6kW PV
-60kWh Storage
-85% PV Fraction
-<250 genset h/yr
-Remote Control
-Energy Monitoring

Seven New Containerized Systems – 2017

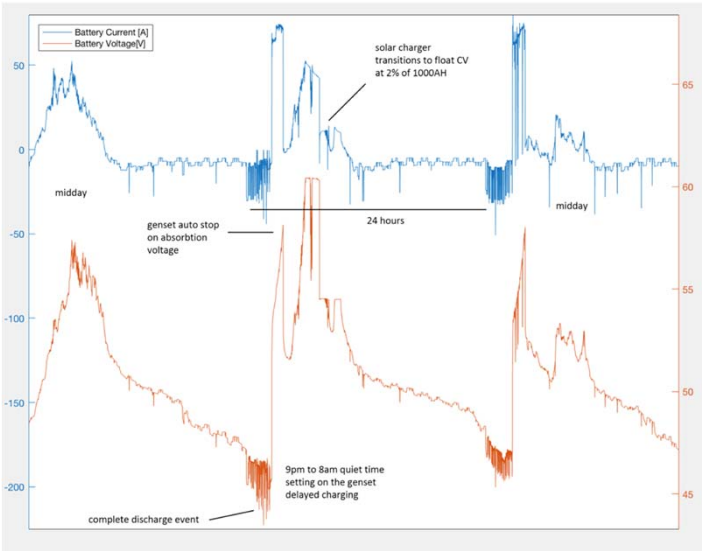
Seven New Containerized Systems – 2017

Seven New Container Systems – 2017

Poor Battery Performance Example

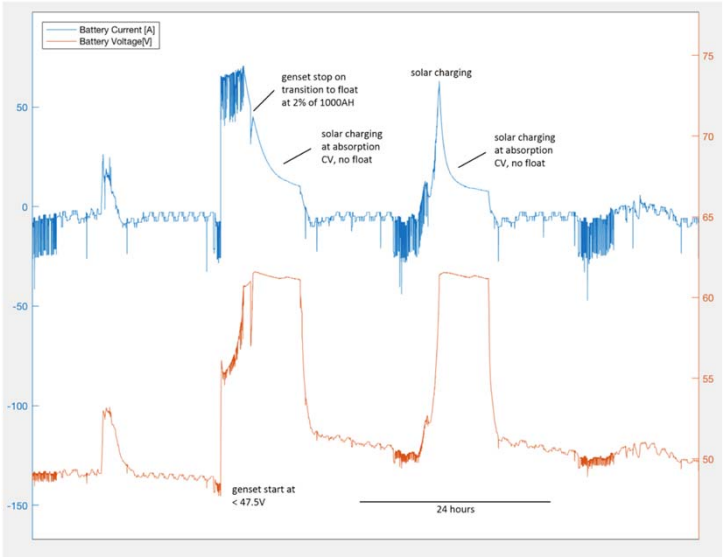


Poor Battery Performance Example



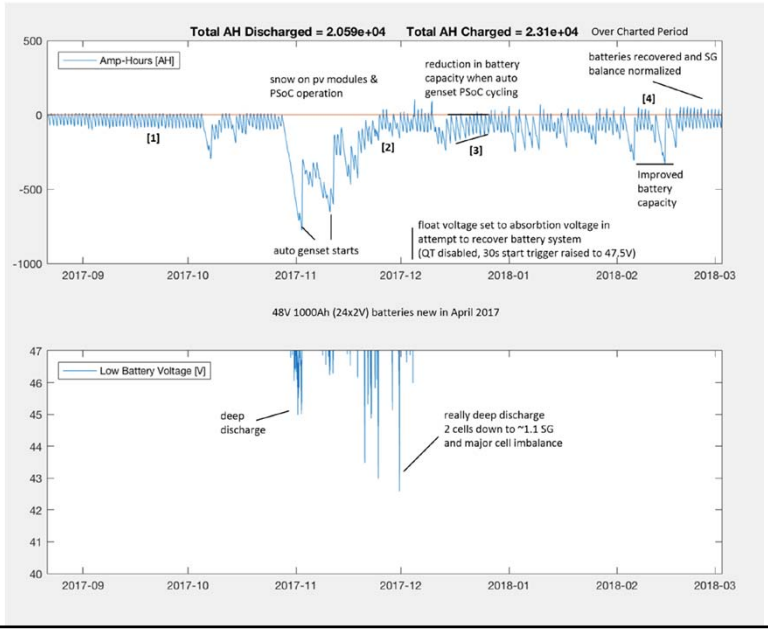
Normal set-points fail to recharge after deep discharge and PSoC.

Poor Battery Performance Example



Manually increased charge set points.

Poor Battery Performance Example



Lessons Learned 2018+

-Remote monitoring and configuration is essential.

-Larger PV doesn't necessarily solve inherent battery performance issues when deeply discharged and/or then operated in partial state of charge.

-More aggressive charge control set-points or even closed-loop Amp-hour reconciliation charge control may yield better system performance.

Thank-you