Igiugig Microgrid: *Why* and **How?**

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"A Resilient and Autonomous Microgrid Powered by Marine Renewable Energy for the Village Of Igiugig, Alaska"

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The *Why*

9,000+ yrs ago
Yup'ik people living sustainably in Central Western Alaska

1867-1930s
Commercial Fishing Economy

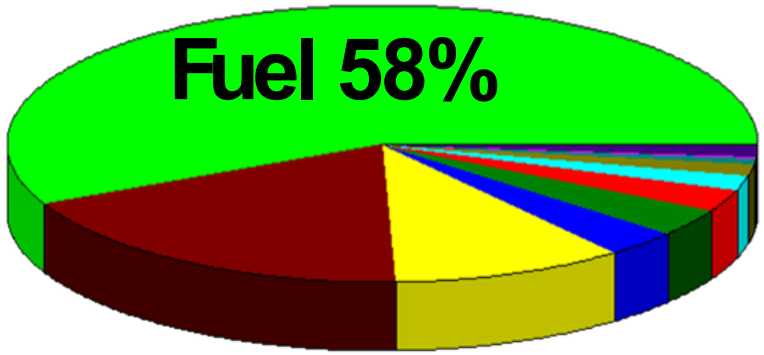
1930s-1970s
Era of Land Claims

1971-2000
Growing Diesel Dependence, Alaska Oil Pipeline

2000-Today
Journey Towards Sustainability & Self-Determination

- Fuel prices continue to rise
- Dependence on gov't assistance and electric company subsidy growing
- Environmental concerns

Annual cost of Igiugig Electric Company: $250,000



Fuel Prices in Igiugig Today

Heating oil	$6.00 per gal
Gas	$7.80 per gal

Electricity

$0.91/ kWh

$0.62/kWh power cost equalization subsidy

Igiugig is one of 250 microgrid communities in Alaska.

The **HOW:** Navigating from a Test Site to Commercialization

- 2008: Locally driven strategic planning process identifies “Alternative Energy” and a goal to transition from diesel as main source of power by 2025. IVC begins testing wind, solar, and hydro options.
- 2011: Power Plant Upgrade
- 2012-13: Igiugig opens the Kvichak River Test Site (profiling & permitting)
- 2014: Hydrokinetic companies test emerging technologies
- 2015-present: Igiugig selects one company to move forward for hydrokinetic power – Ocean Renewable Power Company with integration options for other energy sources (e.g. wind)

https://youtu.be/GxjELfnX5xc

ORPC

We have come a LONG way…

Reassembly in Igiugig

Anchor installation in the Kvichak River


Project site
Village of Igiugig
Kvichak River
Assembly area


HONDA

Project Phases 2 & 3
2020-2021

Economic & environmental benefits

- Noise and environmental risk decreased
- Diesel usage down 90%
- CO_2 down 230 metric tons/year
- O&M costs down $50,000/year

Predictable baseload power

RivGen® Power System
2nd device installed 2021

Diesel
Backup

Variable power

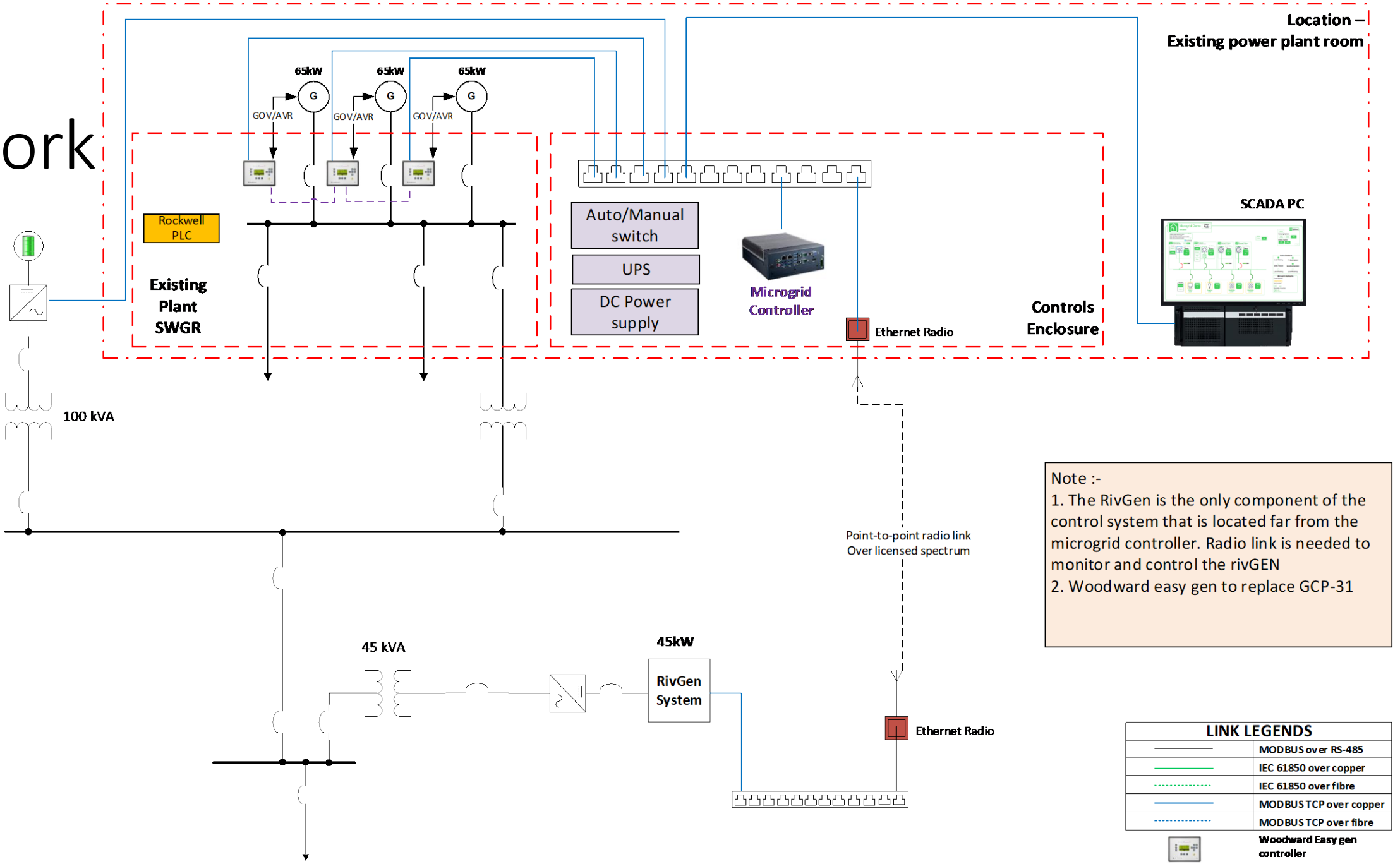
Smart Microgrid System Installed 2020

Power to the community

Energy Storage
Installed 2020

The Smart Microgrid Solution for Igiugig

The Network



Note :-
1. The RivGen is the only component of the control system that is located far from the microgrid controller. Radio link is needed to monitor and control the rivGEN
2. Woodward easy gen to replace GCP-31

LINK LEGENDS	
	MODBUS over RS-485
	IEC 61850 over copper
	IEC 61850 over fibre
	MODBUS TCP over copper
	MODBUS TCP over fibre
	Woodward Easy gen controller

ROLES AND RESPOSIBILITIES MATRIX for the IGIUGIG MICROGRID					
R	Responsible	C	Consulted	NA	Not Available
A	Accountable	I	Informed		
TASK		Existing power plant system integrator	Microgrid Supplier	Radio Comms integrator	Comments
Generator Management system modifications	Procurement of the easyGEN controller	R & A	C	NA	
	Modification in rockwell PLC to interface with the new easy gen controllers	R & A	C	NA	GEN paralleing controller is expected to be housed in the paralleling SWGR. The microgridc controller and the HMI is also expected to be mounted in the GEN controls section
	Modification in rockwell PLC to interface with the new MG controller	R & A	C	NA	The MG controller will treat the rockwell PLC as the GEN system controller. It will send power setpoints to the PLC and receive monitoring inputs such as power, GEN statuses and alarms
	Power setpoint division among the easyGENs	R & A	C	NA	The MG controller will send a global power setpoint to the rockwell PLC. The PLC must divide the setpoints among the generators as per the demand table
Core Microgrid control	Black-start sequence using BESS or GEN	C	R & A	NA	
	BESS power management	I	R & A	NA	
	BESS SOC management			NA	
	RivGen control	I	R & A	NA	
	Monitoring of village feeder breaker status	I	R & A	NA	
	Standalone wall mounted controls panel with microgrid controller, ethernet switch and UPS	C	R & A	NA	
	Trends, alarms and sequence of events recorder for the whole system	I	R & A	NA	
	Local and remote HMI for the complete system (BESS+RivGen+ Power plant)	C	R & A	NA	
Ethernet Radio Comms	Procurement of the radio equipement	I	R & A	C	
	Commissioning and testing of the radio comms	I	C	R & A	

Concluding Thoughts…

- Solid teamwork has been key
- Opportunity for Business Ventures…how do we invest?
- Diesels are here to stay
- Navigating State policies and programs and permitting (smolt)
- Growing our own local capacity

Quyana! Thank You!

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