Sustainable Solar Energy for Hughes Village Council, Hudotl’eekkaakk’e Tribe

A project to increase energy security and tribal resiliency in Hughes Alaska

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Tanana Chiefs Conference

Hughes, Alaska

- Koyukon Athabascan community
- 210 Air miles northwest of Fairbanks
- Fly in Only for Fuel using DC4's built in the 50's and 60's

Hughes, Alaska – Community Vision

“We are a community who value their subsistence way of life, our children and elders, and our healthy lifestyles. We will take direction from our elders through hands-on learning and story-telling. We are preparing our next generation to continue our work. We approach our work with open minds and open hears and the intention to build a community that is designed by its members to be a place safe from floods and reflective of our values and our lifestyles. We are continuously seeking a higher quality of life. “

Community Planning Progress

Community Planning Initiated in 2002, Successes:

-Construction of new teacher clinic (Completed)

-Construction of outdoor basketball court (Completed)

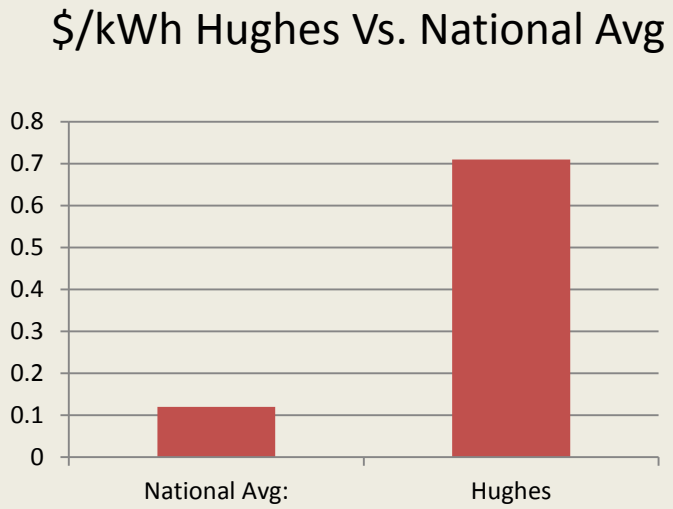
- VHF Radios for residents (Completed)

- Completion of a new landfill (Completed)

- Biomass Heating Project (Completed)

- Reduce Reliance on Imported Diesel fuel for electric generation (ongoing, Thanks DOE!)

Where does YOUR Electricity come from?



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The Challenge?

How do we get Hughes from HERE… To …HERE

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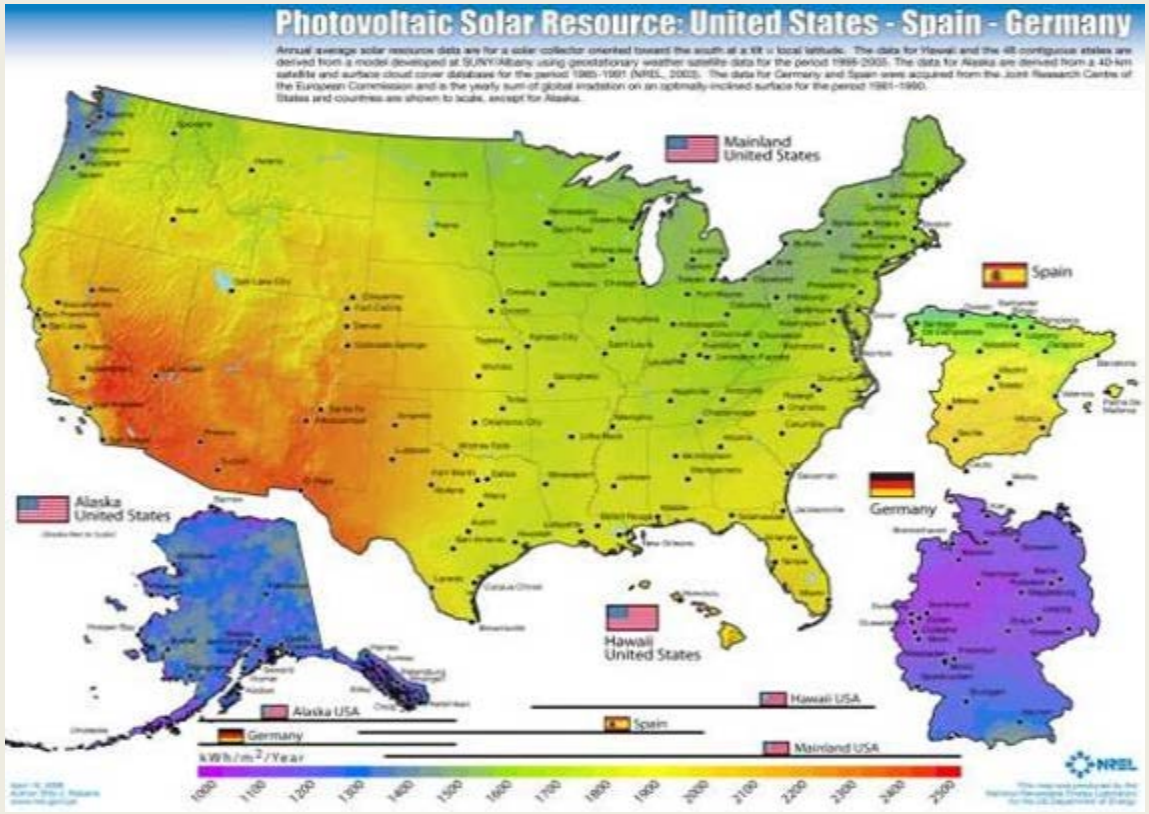
But wait a sec, I thought Alaska didn't have much sun?



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Did we mention the DC 4's…

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Renewable Portfolio Standard

Renewable/Efficiency Portfolio Standard:

"**NOW THEREFORE BE IT RESOLVED** that the city of Hughes, Alaska and the Hughes Tribal Council recognize the importance of communities working together to improve their energy situation…[and] that these entities choose to establish a goal of 50% diesel displacement in our community by the year 2025….meaning that 50% of the electricity generated and sold by the local utility will be from renewable energy sources"

Project Goals

1. Increase Tribal Energy Security and Resiliency

2. Development of a replicable PV-Diesel hybrid electrical system that can be deployed in other villages

3. Implement a financial model that allows tribal ownership, reduces energy costs and does not negatively effect the PCE contribution to electric rates

Hughes Plant Operators and Gensets

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Hughes Village

Future Site of Hughes Solar PV Array

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Site of Solar PV Array

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Site of Solar PV Array as of Monday

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Helical Pile

Project Timeline

Fall 2016-Present	Spec. engineering outline, clear the area
Feb ’18	Purchase Panels and Helical Pile, Order battery pack/control sys
April ’18	Begin moving gravel, create 1’ pad on tundra, 1st DC6 shipment get panels and pile on site
June ’18	Install solar PV racking and panels

Project Timeline

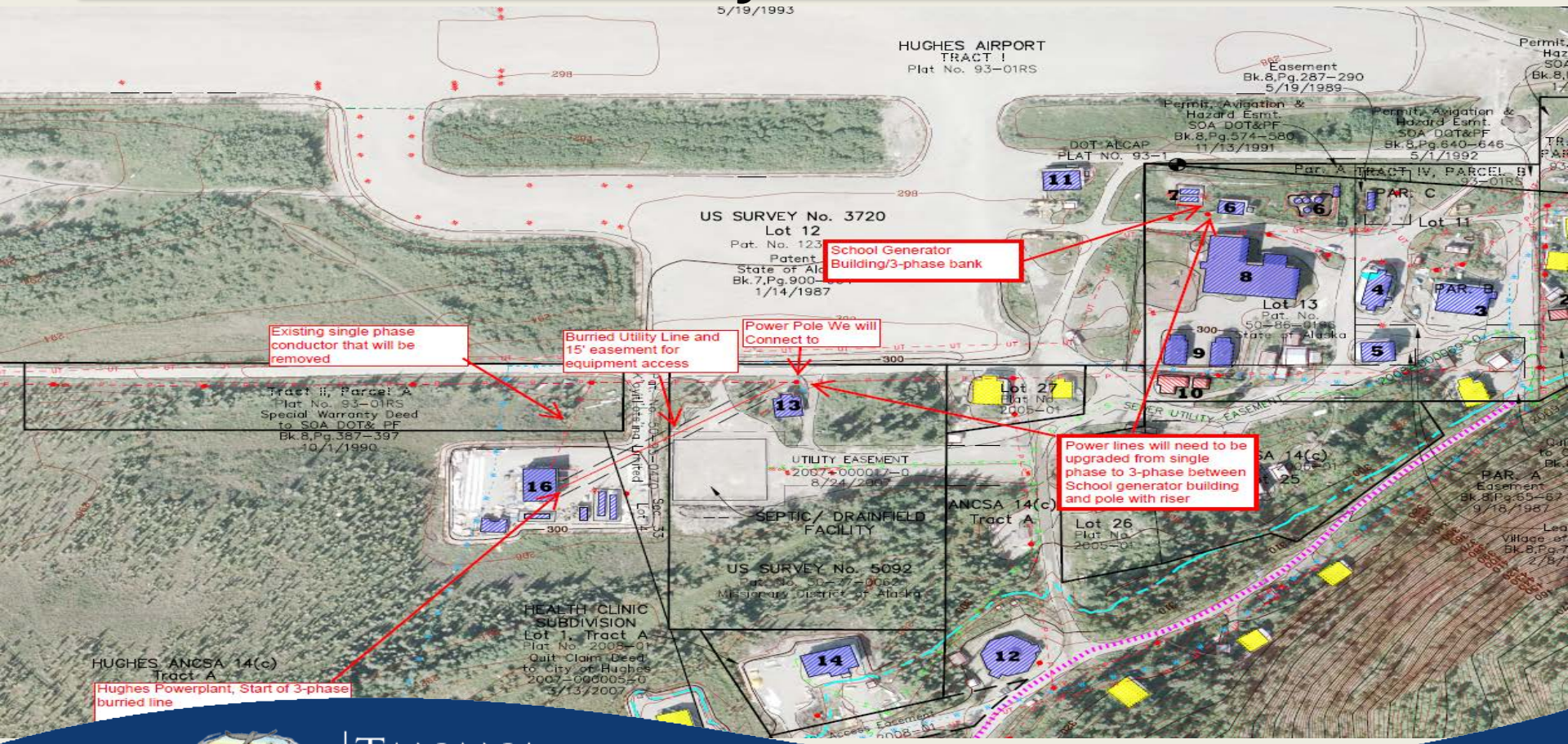
Summer ‘18	Ship battery bank to Hughes and begin commissioning
Spring ’18	Attempt to turn the diesel generators off and run in battery only mode
Winter ‘18/’19	Begin to workout all of the unexpected Kinks in the system
Summer ’18	Create handbook for plant operators to assist with system, and potential service contract
June ’18 – Dec 19’	Collect data and make modifications as needed.

What have we done since last year?

Anyone ever coordinated the conversion of a single phase islanded grid to a 3-phase islanded grid?

2 generators rebuilt/replaced
3 generators converted from single phase to 3 phase
600’ of underground 3phase conductor run
ROW land use agreement with the local episcopal diocese
3-phase transformer ordered and installed
Conductor upgraded on 20+ poles
Switchgear converted
School contracts put out upgrading school electrical system from single to 3-phase
Load balanced
Solar project site cleared

What have we done since last year?



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3-phase conversion photos

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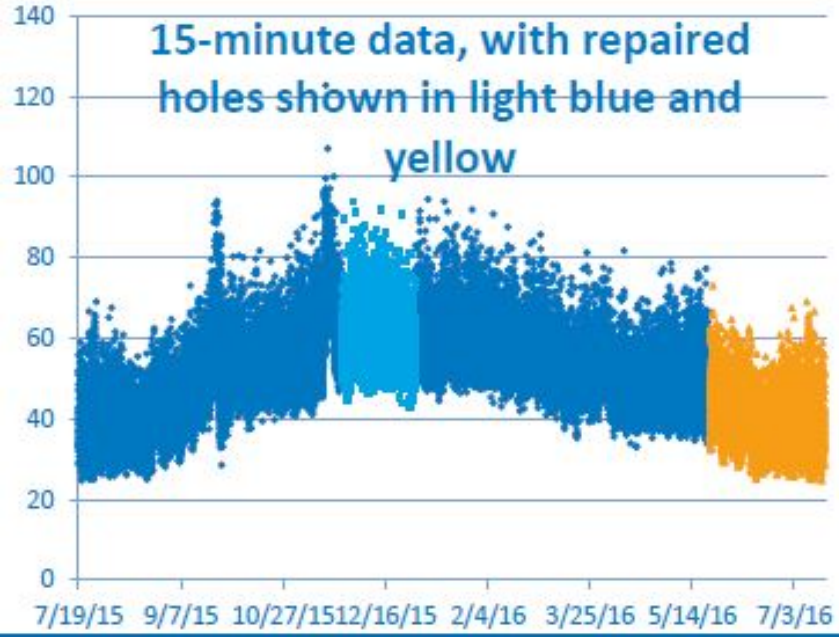
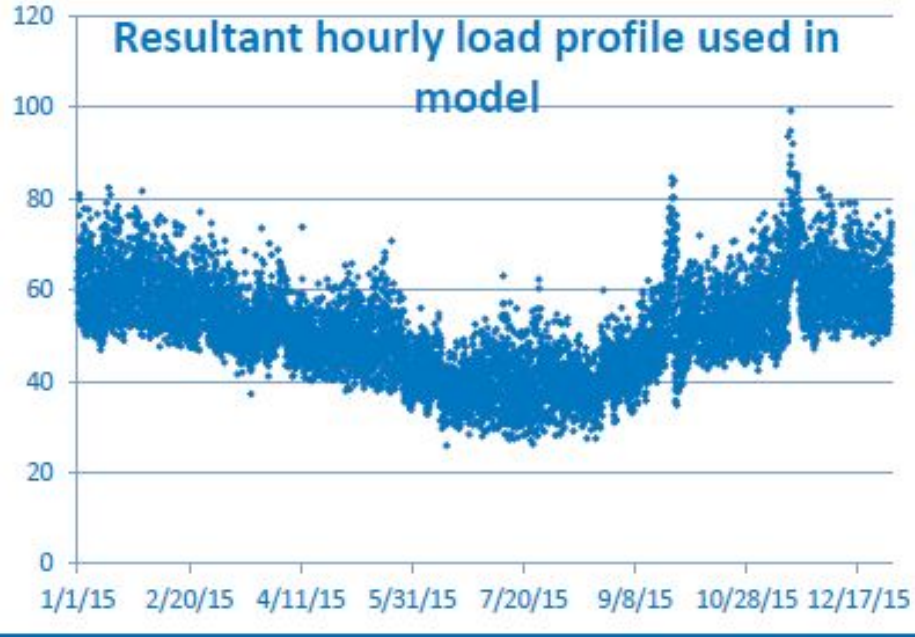
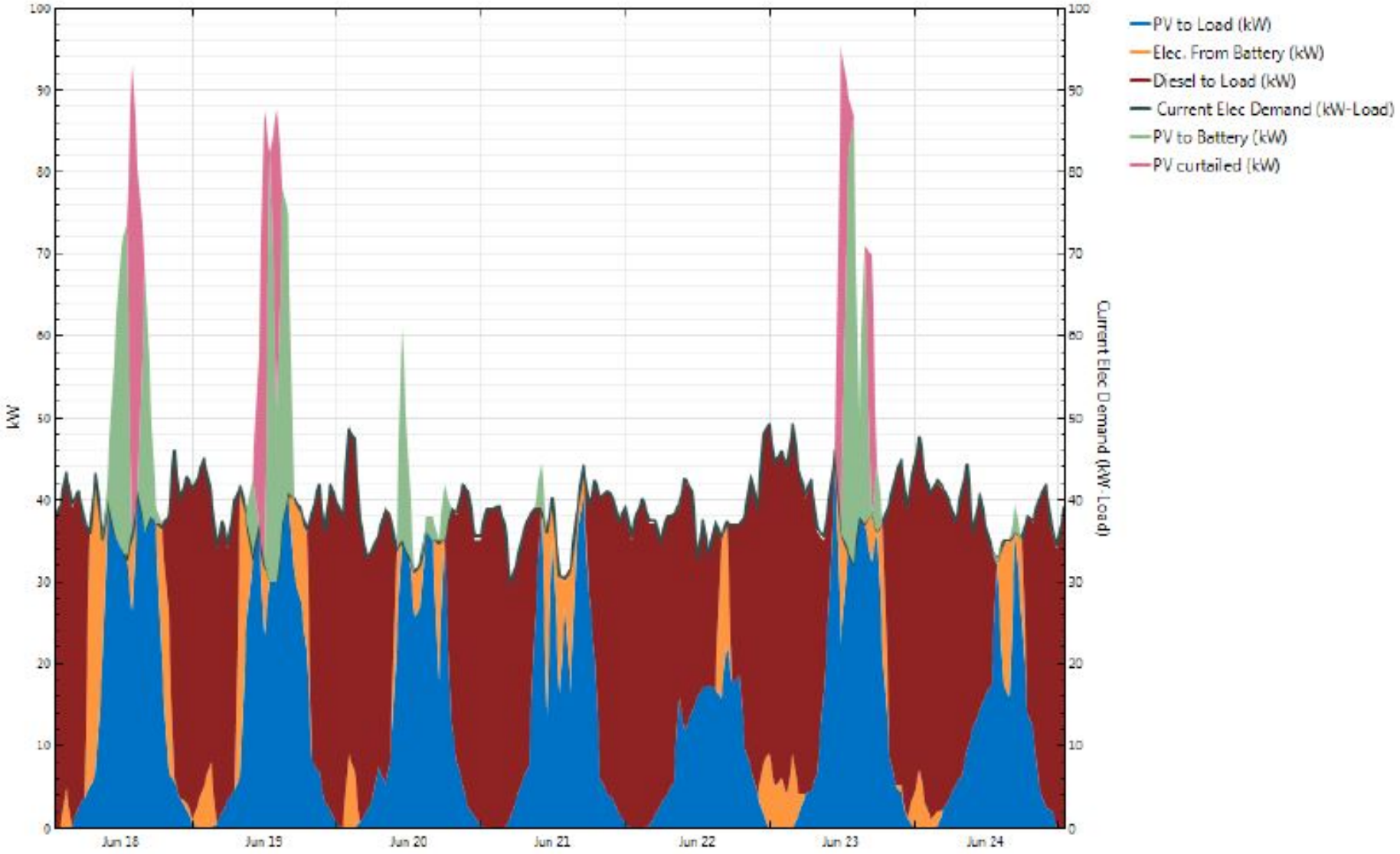
Electrical Load

- Daily power plant logs provided for multiple years
- 15-minute load data provided for ~254 days, spanning 7/19/2015 to 11/24/2015
- To get a full year, filled in missing hours from other times of the year
- Maximum 99 kW
- Average 51kW
- Total annual energy 448,062kWh





Dispatch – Nominal battery cost



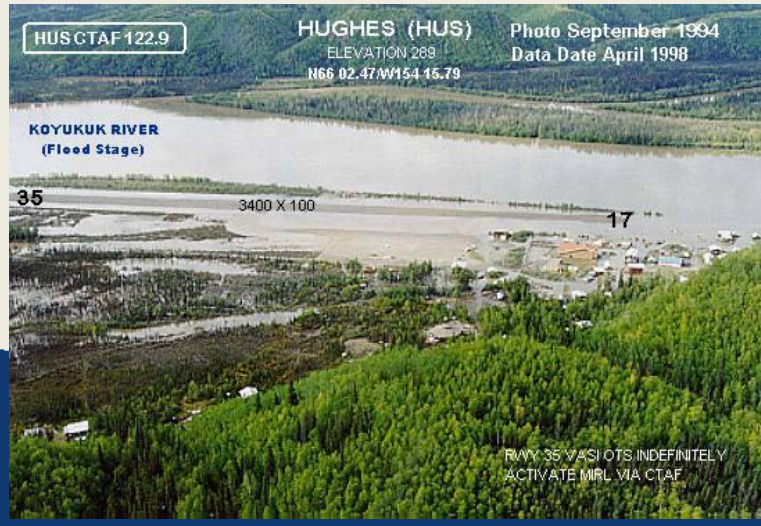
Project Challenges

1. Cost effective design and battery bank

2. ~~Single Phase limitation in the community of Hughes~~

3. Getting panels and battery bank out of the flood plain

4. Implementation of Effective Micro-grid Control System



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Ana Basee' (Thank you!) Dept. of Energy for your support!

Questions?

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