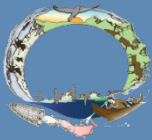


Tanana Chiefs Conference Energy Projects

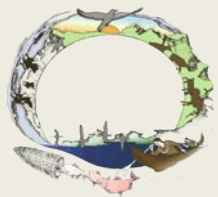
Wes Alexander
TCC Rural Energy Specialist
wes.alexander@tananachiefs.org

Dave Messier
TCC Rural Energy Coordinator
Dave.pm@tananachiefs.org



Tanana
Chiefs
Conference

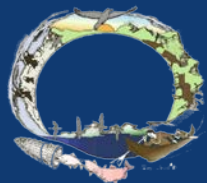
*"Stronger Together
for the Next 100 Years"*



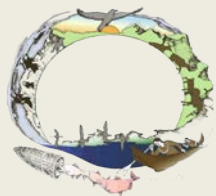
The Organization

Tanana Chiefs Conference is a Tribal Consortium representing 42 federally recognized tribes, and 37 villages.

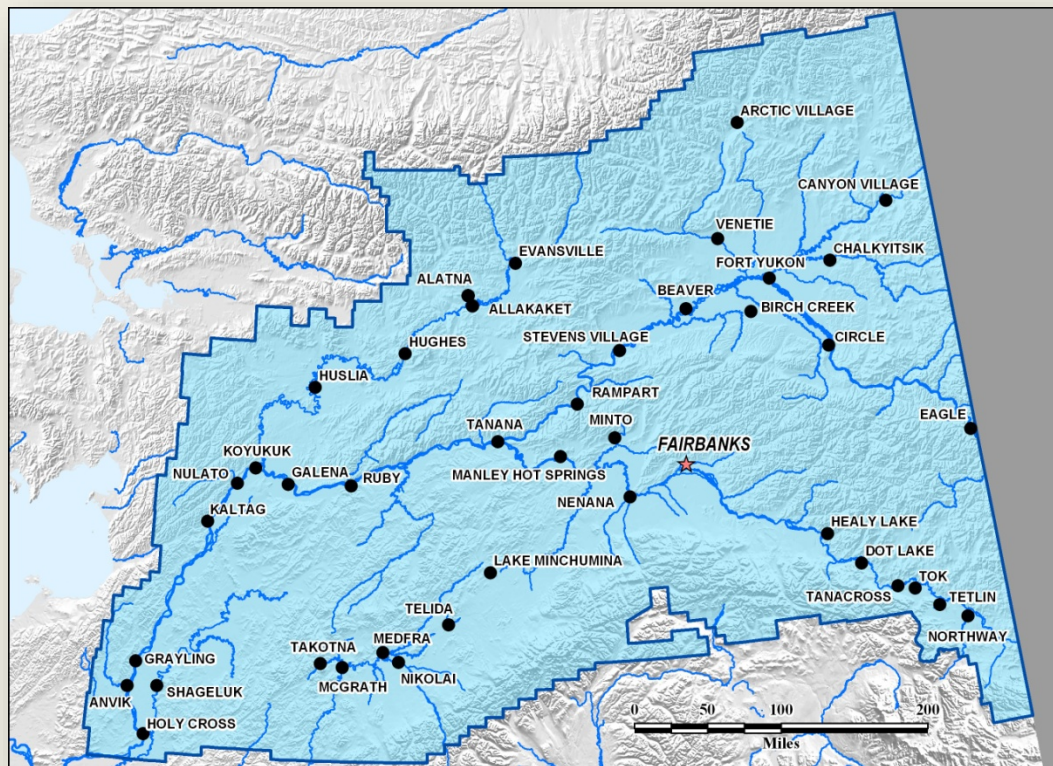
MISSION: “Tanana Chiefs Conference provides a unified voice in advancing sovereign tribal governments through the promotion of physical and mental wellness, education, socioeconomic development, and culture of the Interior Alaska Native people.”



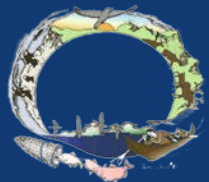
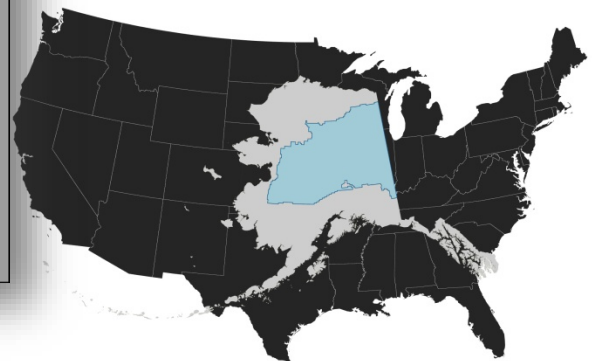
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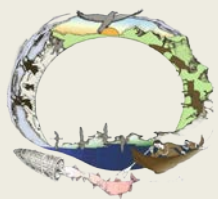


The Region



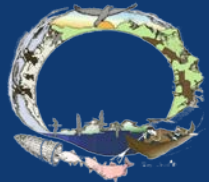
- 235,000 Square Miles
- 37% of the State
- Extreme Subarctic
- Majority off road system
- Avg. Village load is about 100-150 people, 75kW load
- Roughly the size of Texas, fewer miles of road that Rhode Island



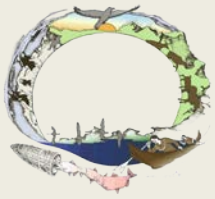


TCC Energy Program Goals

1. Reduce the cost of Energy in Rural Alaska
2. Build Capacity in Rural Communities
3. DO NOT get overwhelmed by the enormity of the challenge

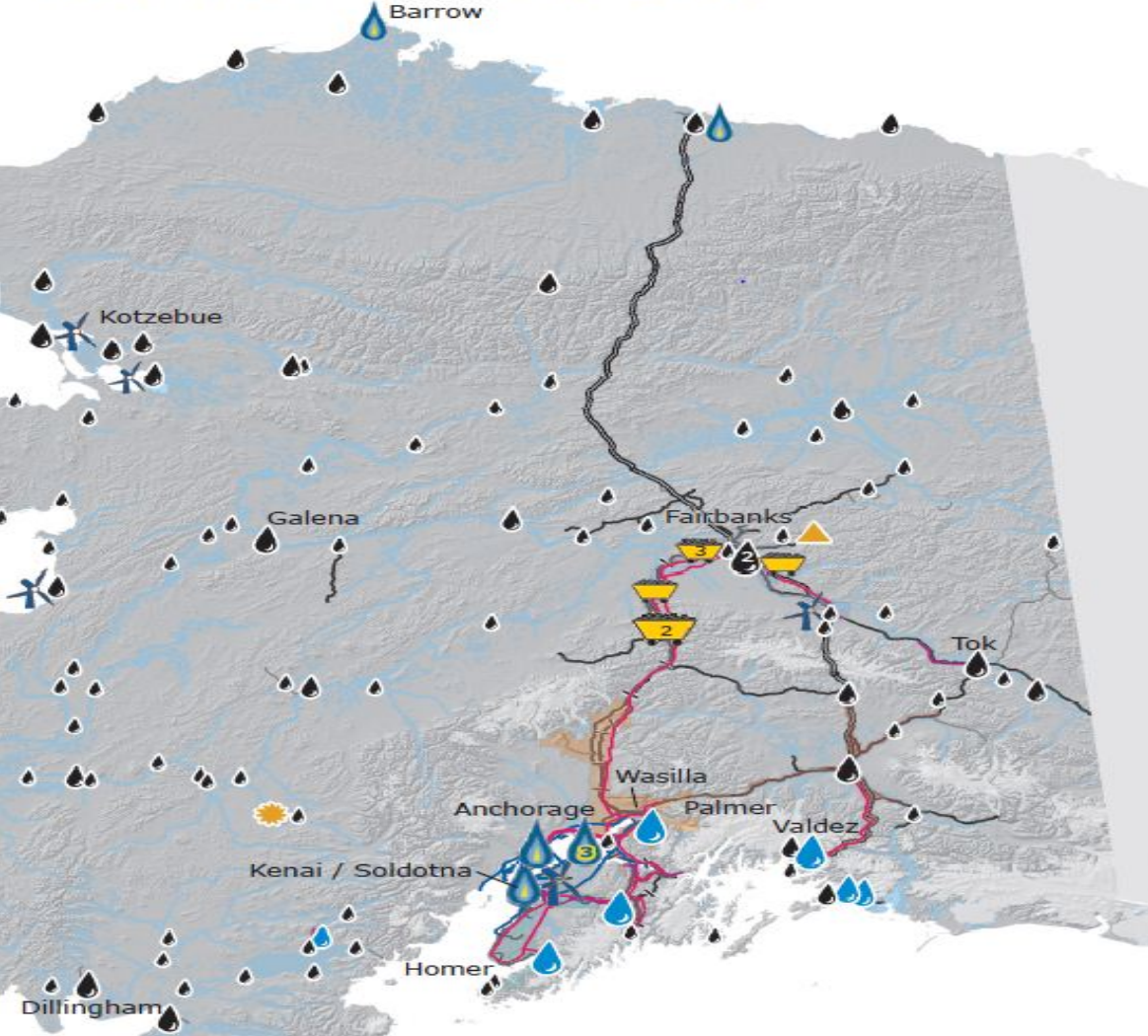


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All our Eggs are in the “Oil Basket”



ARCTIC OCEAN










Infrastructure

Average Electrical Generation								
MW	Gas	Oil	Coal	Hydro-electric	Wind	Bio-mass	Solar	Geo-thermal
< 0.1	—	●	—	—	⚡	—	☀️	—
0.1 - 1	—	●	—	💧	⚡	🌳	—	🔺
1 - 10	💧	●	🚛	💧	⚡	🌳	—	—
> 10	💧	●	🚛	💧	—	—	—	—



Electric Transmission

 > 100 kV
  < 100 kV



Electric Service Areas

-  Anchorage Municipal Light & Power
-  Chugach Electric Association
-  Copper Valley Electric Association
-  Golden Valley Electric Association
-  Homer Electric Association
-  Matanuska Electric Association
-  Seward Electric Association

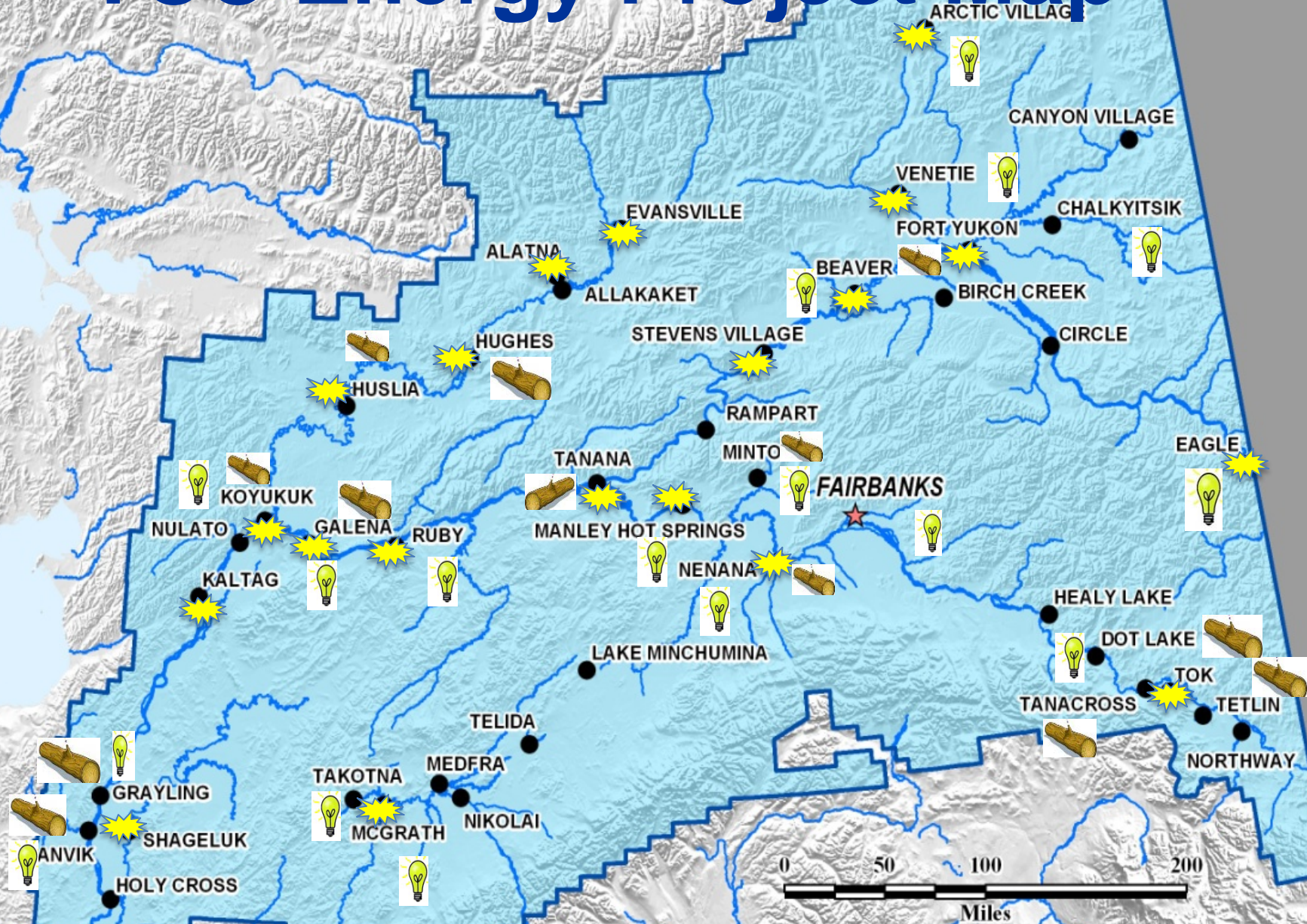
Major Pipelines

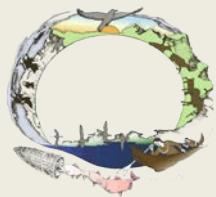
 Natural Gas Pipelines
  Trans-Alaska Pipeline

Major Transportation

 Roads
  Railroad

TCC Energy Project Map



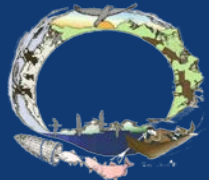


Current Project Portfolio

TCC Energy is Currently Managing \$4mill in Projects

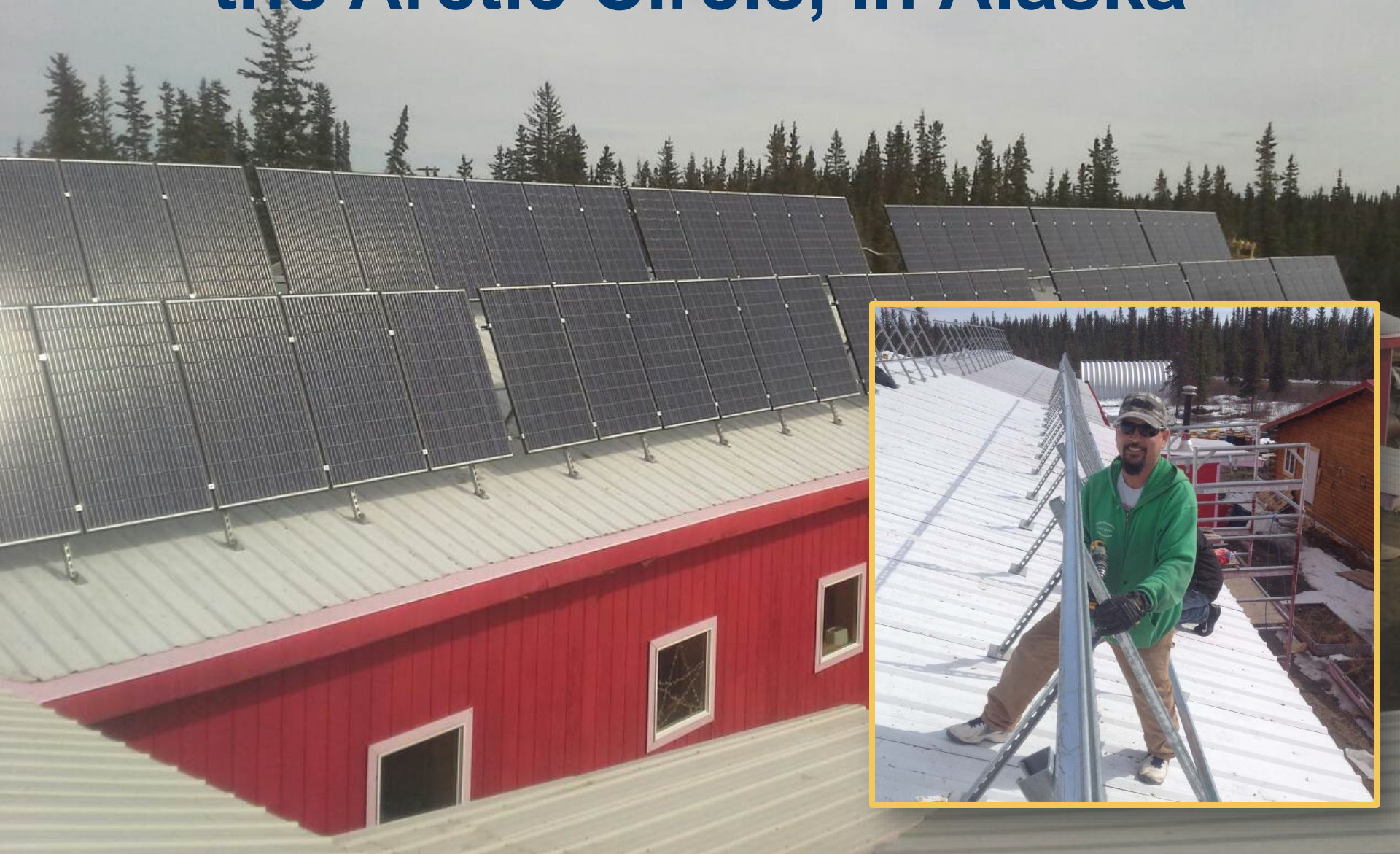
- \$1 mill, 5yr DOE Tribal Energy Grant to TCC
- \$623k Solar PV/Battery Project Hughes Tribe
- \$200k CDBG 3-phase upgrade City of Hughes
- \$1.3 mill, RACEE grants Galena, Ruby, Holy Cross
- \$215k EPA Generator Replacement Project CIK
- \$100k Backup Generator/Solar Project Kaltag
- \$373k Biomass/Lodge Rehab Project Minto
- \$380k Biomass Project Anvik

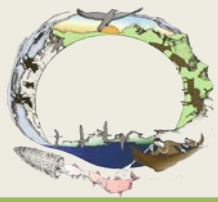
\$4.1 Million



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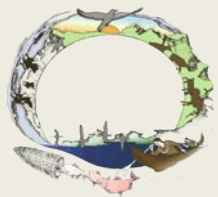
Largest Solar PV array North of the Arctic Circle, in Alaska





Minto Biomass Project

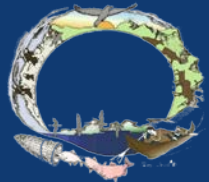




2016-2021 DOE Inter-Tribal Award

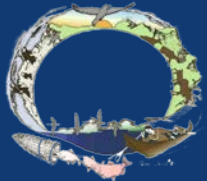
Interior Athabascan Energy Network (IAEN)

1. Assist our villages with the creation of a Tribal Utility
2. Set new construction standards for public buildings by working with local partners
3. Funding to Support more projects/planning
4. Support to complete case studies and broadcast projects



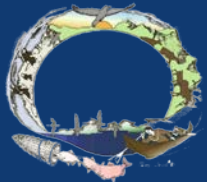
IAECBN 1st Year Punch List

- Implement Interior Athabaskan Energy Network (IAEN), hold quarterly meetings
- Develop a high energy efficiency building performance standard.
- Create a capacity building “Power Pool” network.
- Complete line loss study in one stand alone village
- Craft case studies of past energy projects.
- “Other duties as assigned”.



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IAECBN 1st Year Punch List



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Energy Efficient Buildings

- Formed an Agreement with our housing authorities to build to a 6 star minimum.
- Why 6 star?
- Using the AKwarm energy rating software to predict or verify the performance of residential and commercial construction.

Home Energy Rating Certificate

Alaska Housing FINANCE CORPORATION

The Building Located At:
728 Cold Snap Ct.
North Pole, Alaska

Has Been Energy-Rated As:
★★★★★★
Six Star

Efficiency Score
96.3 points

1 star 2 star 3 star 4 star 5 star 6 star
0 25 50 75 100
BEES Score

Amount of CO2 Produced by the Home
16,900 pounds per year

Projected Annual Energy Costs
\$1,979 per year

Score with Renewables
96.3 points

Estimated Annual Energy Costs

Space Heating	\$611
Water Heating	\$383
Space Cooling	\$0
Lights & Appl.	\$984
Renewables	\$0

Owner of Record: Interior Regional Housing Authority
Date Construction Began: 7/2/2016
Certifying BEES: 2012
Legal Description: LOT 4 BLOCK 5 MENDONE
Energy Rating Date: 11/7/2016
Previously assessed as 1S 1E 12 1247
File: B16102823.hm2
Energy Rater: Dan Spillane
Arctic Technical Services
AKWarm: 2.6.1.0 Library: 8/9/2016

I certify that this Energy Rating is true and correct, to the best of my knowledge and belief, and the structure located on the above described property complies with all the requirements of the building energy efficiency standards as required by Section .04 Part A. of the AHFC New Construction Inspection Guidelines, per the standards adopted by 15 AAC 155.010.

Energy Rater Signature: _____ Date: 11-7-16

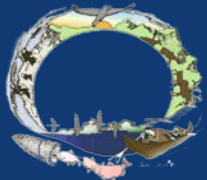
Return to: _____

Form PUR-101 v.3/1/16

TCC HOUSING

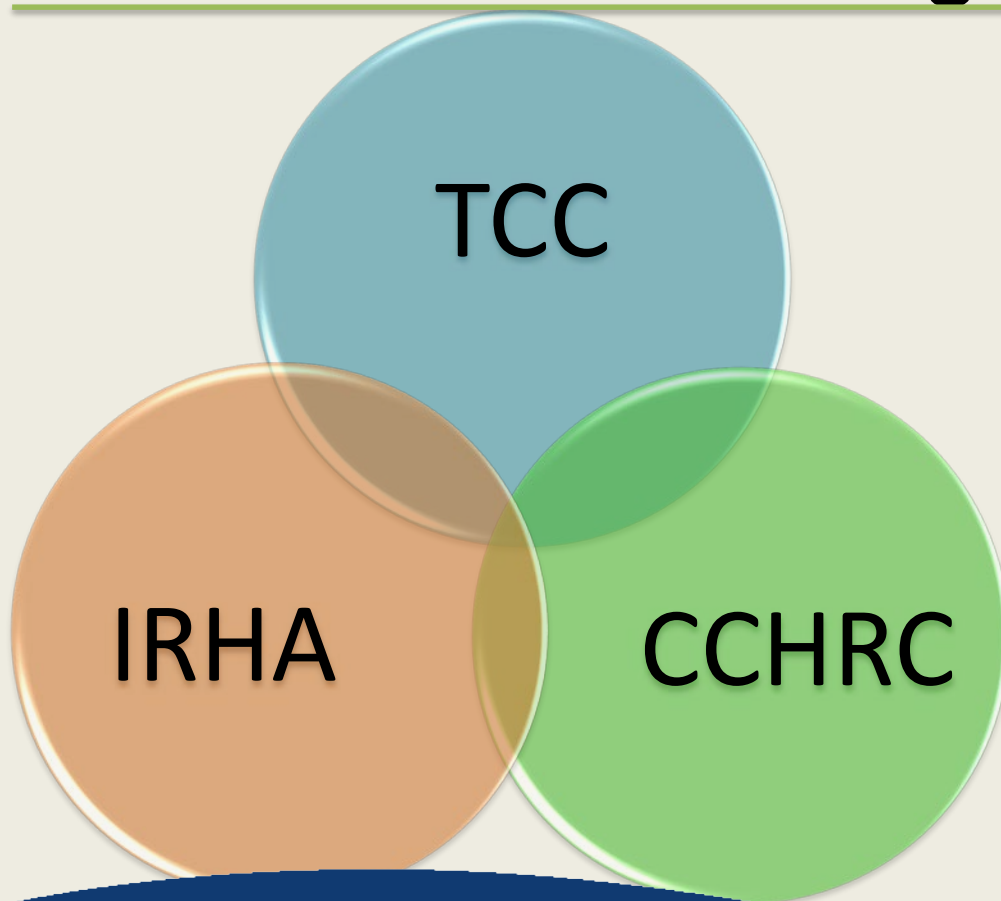


INTERIOR REGIONAL HOUSING AUTHORITY

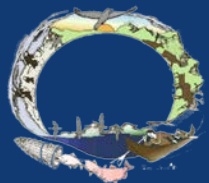


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The Agreement



- Working together to produce results.
- Almost went to hell in a hand basket!
- Concluded it's a win for all.



Forming A Power Pool

- Conglomerate of 11 independent Electric utilities.
- Currently known as the Villages Power Collaborative
- Spread across the entire region.



Beaver

Chalkyitsik

Hughes

Birch Creek

Ruby

Venetie

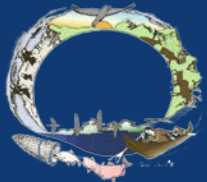
Rampart

Stevens Village

Koyukuk

Nikolai

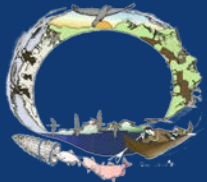
Arctic Village



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What Could Go Wrong???

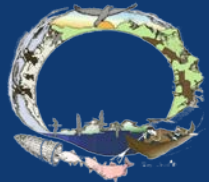
- 100% diesel power generation / 75kw average load.
- Some plant operators have limited mechanical experience.
- No maintenance program.
- No scheduled repair & replacement program.



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Game Plan

- Assist with sending power plant operators or new recruits to a PPO training and certification program.
- Initiate a Computerized Maintenance Management System.
- Address power distribution inefficiencies. (Line loss)
- Building capacity through a supportive network.



Maintenance Program

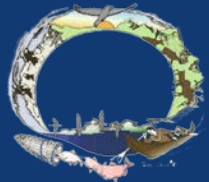
- Partnered with 60Hertz to develop and deploy a CMMS designed for rural Alaskan electric utilities.
- Pilot program will include 4 participants from the “Power Pool”.
- Launch date: January, 2018.

Beaver

Venetie

Hughes

Rampart



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Case Studies

- Condensed information
- Quick reading
- Easy to digest
- Accessible on the TCC website

BIOMASS HEAT

Wood heat project reduces fuel oil consumption and fosters community growth

In 2014, planning and construction began to integrate a wood fired boiler into the village of Koyukuk. This was accomplished through the cooperative efforts of Alaska Native Tribal Health Consortium, Koyukuk Tribal Council, Interior Regional Housing Authority and Tanana Chiefs Conference. The community of 90 residents is situated next to the confluence of the Yukon and Koyukuk River which is located about 500 miles west of Fairbanks.

The cold wood fired system is designed to deliver hydronic heat to the public washeteria, clinic and combined tribal & city office building through a series of insulated piping installed 2' underground. The heat is transferred to each building via a heat exchanger and then distributed throughout the buildings through either high mass wall mounted radiators or in-floor radiant heat systems. The two techniques are an effective means to provide space heat using lower temperature water. When this type of system is coupled to buildings with a high thermal performance it forms an ideal combination that results in less wood consumption. With the boiler in operation from the middle of September through early May, it delivers enough BTUs to supply 50% of the annual heating load, which in turn saves the village a significant amount of money otherwise spent on costly imported fuel oil.

Although a sustainable forestry harvest plan is in place, local wood vendors find it most efficient and cost effective to harvest drift wood directly from the Yukon River. The wood is wrangled from the city waters using river boats during times of high water. The wood is cut into 4' lengths on the bank and then delivered by ATV to the wood storage yard and sold to the city for \$300 per cord.

The boiler is loaded by hand once in the morning and once in the evening. When the outside temperature plunges below -40 degrees, a third firing is necessary as the demand for heat increases.

Project Funding

Department of Energy: \$782,100
State of Alaska: \$89,000
City of Koyukuk: \$50,000

Equipment

1 Garm model 2000 wood boiler

Fuel Oil Savings

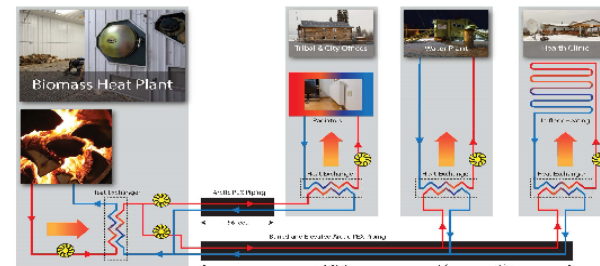
Annually: 5000 gallons
Local value: \$32,500 (2017)

Wood Consumption

36 cords annually
Jobs Created
10 seasonal wood harvesters
2 part time boiler operators

Payback Period
28 years

KOYUKUK'S WOOD BOILER DISTRICT HEAT SYSTEM



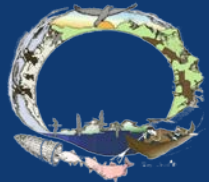
Putting it all together, Koyukuk's Biomass heat Plant currently provides heat for three buildings - The shared city and tribal administration building, water plant, and Tribal Park. Through further development, radiators and PEX piping, PEX in the concrete address solution for "underfloor polyethylene," a type of plastic suitable for the 100°F hot water.



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IRHA
INTERIOR REGIONAL HOUSING AUTHORITY



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Shared Information

- Broadcast project info across the region and beyond.
- More to come...

ENERGY EFFICIENCY FIRST

Maximizing building efficiency should always be the first steps taken before any renewable energy system is incorporated into a community.

IRHA made significant improvements to the tribal & city office building prior to connecting it to the wood boiler heating circuit. A 50% overall reduction in energy consumption was achieved through major weatherization efforts. The retrofit consisted of adding insulation to the floor, wall and ceiling components to establish a high R-value building envelope. Triple pane windows, insulated doors, air-sealing and LED lighting were also measures that contributed towards the goal to significantly reduce the demand for heat and electricity. Efficient primary heating systems supplement heat from the wood fired boiler during extremely low temperatures and provide the main source of heat when the boiler is not in use in the Spring and Fall.


A 6kw grid-tie solar electric system was mounted to the roof of the tribal and city office building that supplies 65% of the total annual electrical demand.

Attention to detail was given by ANTHC and TCC during the planning phase of the clinic to ensure low heat loss and high efficiency was a top priority at the time of construction. The building was assembled using a Structural Insulated Panel (SIP) system with additional layers of foam attached to the exterior walls to achieve respective R-values of 50, 60 and 100 in the floor, wall and ceiling components.

The local construction crew members learned that weatherization and building to the highest efficiency standards were the first priority in reducing the amount of fuel oil consumption throughout the village. Koyukuk plans to weatherize additional buildings and will strive to build highly efficient buildings in the future.





City & Tribal Administration Building



Public Washeteria

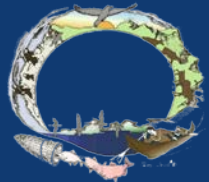


Health Clinic



Koyukuk Tribal Council

Office of Indian Energy



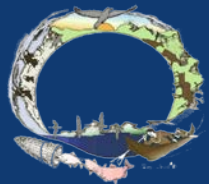
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Other Projects

- Never a dull moment at TCC Energy!
- “Other duties as assigned”



14kw grid tie pv system at the Kaltag clinic.



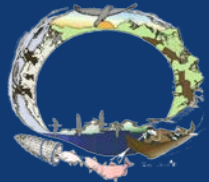
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More Projects

Minto biomass storage

Before

- Exposed to the rain.
- Buried under snow.

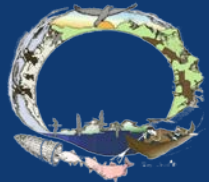


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More Projects

After

- Dry biomass storage.

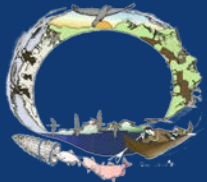


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The Big Picture

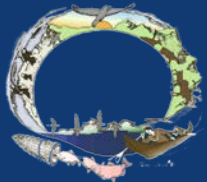


- It's all about forming a strong network.
- Creating partnerships.
- Banding together to succeed!



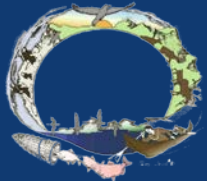
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Athabascans
Not
Athabascant's



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Baasee'
Thank you



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