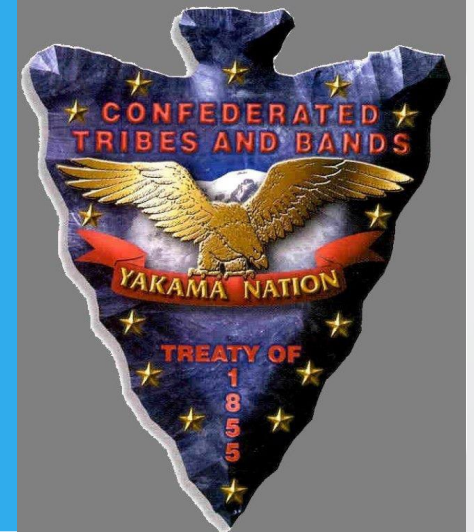
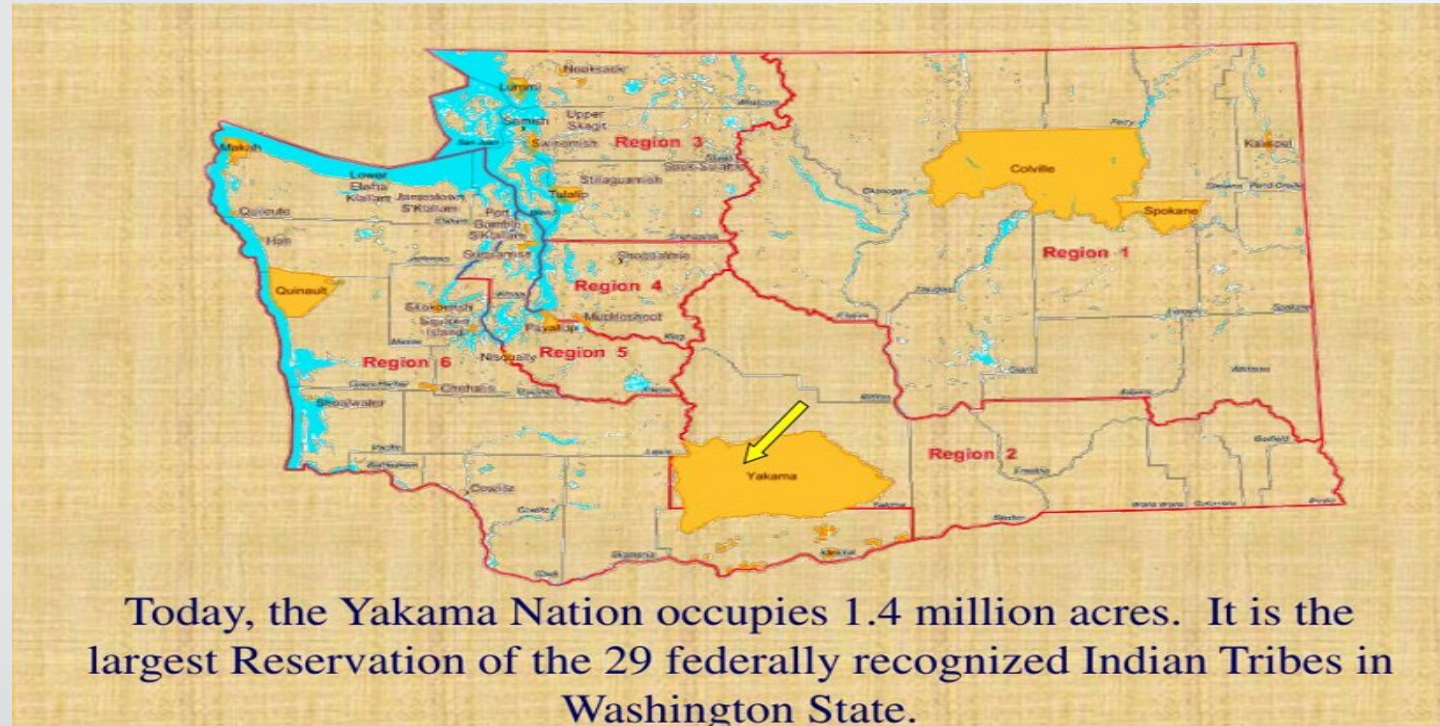


Yakama Nation Housing Authority
Gorge View Drive Country Loop Solar Project
Wishram Washington

Department of Energy
Office of Indian Energy Program Review 2024



Yakama Nation Reservation



- Yakama Nation has over 10,000 enrolled tribal members
- Yakama Nation signed a treaty with the U.S government June 9, 1855
- The Confederated Tribes and Bands of the Yakama Nation consist of 14 tribes the Kah-milt-pah, Klickitat, Klinquit, Kow-was-say-ee, Li-ay-was, Oche-chotes, Palouse, Pisuose, Se-ap-cat, Shyiks, Skin-pah, Wenatshapam, Wishram, and Yakama

Yakama Nation History



- Celilo Falls was one of the main fishing sites for the Yakama, Umatilla, Warm springs, and Nez Perce tribe.
- On March 10, 1957 the falls were flooded in less than five hours, and the Dalles dam was constructed.
- The Yakama people practice religious beliefs, hunt, gather traditional foods, and are well known for trading salmon from annual runs in the Columbia river.



- Wishram has a population of 366, and is located in southern Klickitat County sitting on the north bend of the Columbia river. The Dalles dam is located just 9 miles down stream on the Columbia river. The area of Wishram was located ½ mile above the head of the Celilo falls.
- The 46 homes in Gorge View Drive Country loop was designed and built for the tribal families that settle and fish in the area along the Columbia river.
- Gorge View Drive Country Loop in Wishram is approximately 74 miles, and about an hour and a half drive from our Main housing office in Wapato, Washington.

Yakama Nation Housing Authority

- The Yakama Nation Housing Authority (YNHA) was established June 21st, 1977 by the Yakama Nation Tribal council.
- YNHA currently employs 82 team members to manage over 550 homes on the 1.4 million acres of the Yakama Reservation.
- Programs that we provide for our community are maintenance, homeowners assistance funding, HUD VASH, emergency housing for homeless, student housing, resident opportunity and support services, elder minor home repair, and weatherization.

The Yakama Nation Housing Authority
Gorge View Drive Country Loop Solar project
one of the eighteen Clean Energy Projects that was selected by the
Department of Energy.

- Gorge View Drive Country Loop solar project will install 6.32 kW- DC systems with a combined total of 290.72 kW of solar PV on 46 newly constructed built homes on the Yakama Nation Reservation in Wishram Washington. The systems will save the low-income Wishram residents an average of \$40,100 (\$890 per household) per year on energy bills.
- (DOE award amount towards the clean energy project \$1,020,916.00)
- Bonneville Environmental Foundation awarded \$100,000 towards Wishram solar project (10% cost share)

Partnered with GRID Alternatives National Tribal Program

TRIBAL IMPACTS (TO DATE)

\$10.2 million

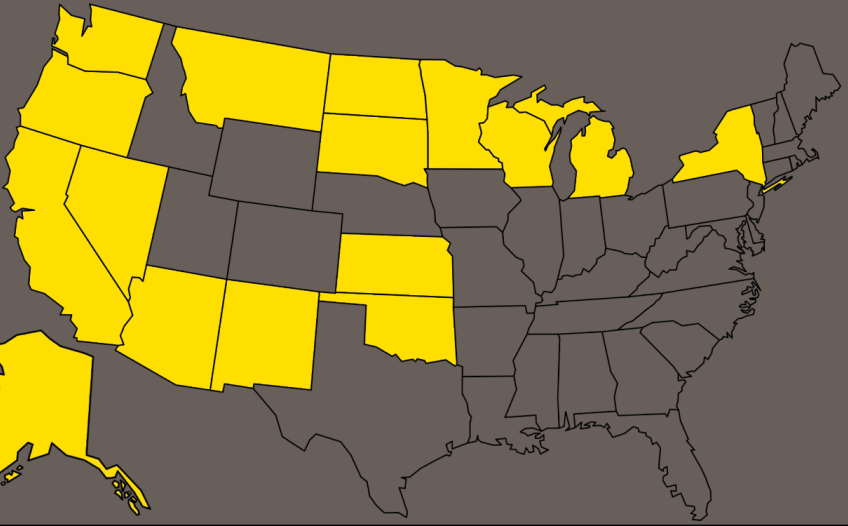
FUNDING
AWARDED
TO TRIBAL
PARTNERS

8+

MEGAWATTS
SOLAR FOR
TRIBAL NATIONS

16

STATES
WORKED IN



\$44 million

LIFETIME ENERGY SAVINGS



75+

TRIBAL PARTNERS

Partnership Development

Engagement with tribal community and leaders from a place-based approach that honors sovereignty.

Workforce

Development/Education

Recruit job trainees from the tribes we work with to gain skills and industry experience in the renewable energy projects taking place in their own community.

Solar Installation

Manage and implement projects that break away for the reliance on outside contractors for installation, and training.



- The Gorge View Country Loop site was chosen to be our first clean energy solar project with installation of solar photovoltaic systems in mind when homes were designed.
- April 19, 2024 outreach to Klickitat PUD for meter accounts, and residents of Gorge View Drive Country Loop notified of solar project
- Grid Alternatives first batch of photovoltaic design plans sent for approval process 5/28/2024.
- Klickitat PUD approved first batch of Interconnection applications 6/24/2024



- Grid Alternatives arrived on site July 10, 2024 for delivery of equipment, modules, and supplies.
- Canadian Solar module 395 w (25 year warranty)
- Enphase IQ8+ Microinverters (25 year limited warranty)
- Enphase IQ4 Combiner (10 year warranty) with cell modem (5 years)
- SNR UR-60 rail with SNR SpeedSeal Attachments for comp shingle



- TERO Program had four trainees on site for solar installation training, Yakama Nation Housing Authority had five trainees on site for training, and Grid Alternatives had four trainers and a Project Manager on site.
- OSHA 10 construction, First Aid, and field safety training was provided to trainees.
- Grid Alternatives provided hard hats, gloves, safety vests, safety glasses, safety harness for all the trainees.
- Solar panel installation began July 16, 2024 on the first homes.

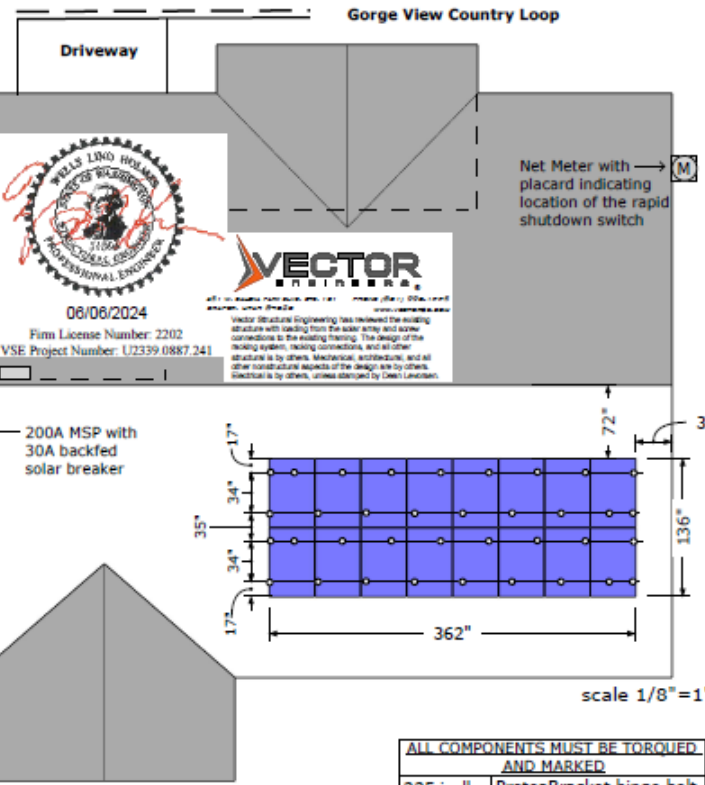
CONSTRUCTION DIAGRAMS

SOUTH ARRAY
Azimuth: 185°
Tilt: 26.5°
Modules: 16
Area: 336ft²

ATTACHMENTS
Type: SNR SpeedSeal
QTY: 36
Spacing: 48"
Max rail cantilever: 16"

RACKING
Type: UR-60
Splices: 8 splices
Rail: 10 sticks
Rail overhang: 3"
Module overhang: 16"-19"
Module width: 44.6"
Module length: 67.8"
Midclamp width: 0.75"

RAIL CUT LIST
4) x 172" (Full stick)
4) x 86" (Half stick)
4) x 109"



- ELECTRICAL EQUIPMENT**
- (1) Enphase combiner box
 - (1) Enphase cell modem
 - (2) 20A 2P Eaton breaker for combiner
 - (1) 30A unfused AC disconnect
 - (1) 30A 2P breaker for interconnection

ALL COMPONENTS MUST BE TORQUUED AND MARKED	
225 in-lbs	ProteaBracket hinge bolt
144 in-lbs	ProteaBracket to Rail mounting hardware
	Rail splice
192 in-lbs	Ground lug
120 in-lbs	MLPE
	Midclamp
	Endclamp

WARNING LABELS

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY

Located on AC enphase combiner

GRID Alternatives contact info

WARNING
PHOTOVOLTAIC SYSTEM COMBINER PANEL
DO NOT ADD LOADS

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT: 19.36A
NOMINAL OPERATING AC VOLTAGE: 240 V

Located on AC disconnect

WARNING: PHOTOVOLTAIC POWER SOURCE

Located on PV source circuit conduit every 10' and all DC junction boxes

WARNING DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

WARNING
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

Located on main service panel interior door

WARNING
POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

2' x 4"

Located adjacent to PV interconnection breaker

CAUTION: MULTIPLE SOURCES OF POWER
6.32 kW-DC / 4.42 kW-AC (16) Canadian Solar 350W module
→ N with (16) Enphase IQ8+ microinverters
14 Gorge View Country Loop
Wahram Heights, WA 98635

MEP AND POINT OF INTERCONNECTION
COMBINER PANEL WITH MONITORING
SOLAR ARRAY
NET METER

RATED AC CURRENT: 19.36A
OPERATING AC VOLTAGE: 240V

Located near main service disconnect or in readily visible location.

TRIBAL
T R I B A L
GRID ALTERNATIVES

GRID Alternatives Tribal Program
1030 W Ellsworth Ave, Denver CO 80223
info@gridalternatives.org (303) 963-1041

LOT #0001

Address: 14 Gorge View Country Loop, Wahram, WA 98635
PV RESIDENTIAL DESIGN

CONSTRUCTION DIAGRAMS

GORGE VIEW COUNTRY LP 14

ISSUE:
Drawn by: L. Lilliecamp
Drawn on: 2/16/2024

REVISIONS

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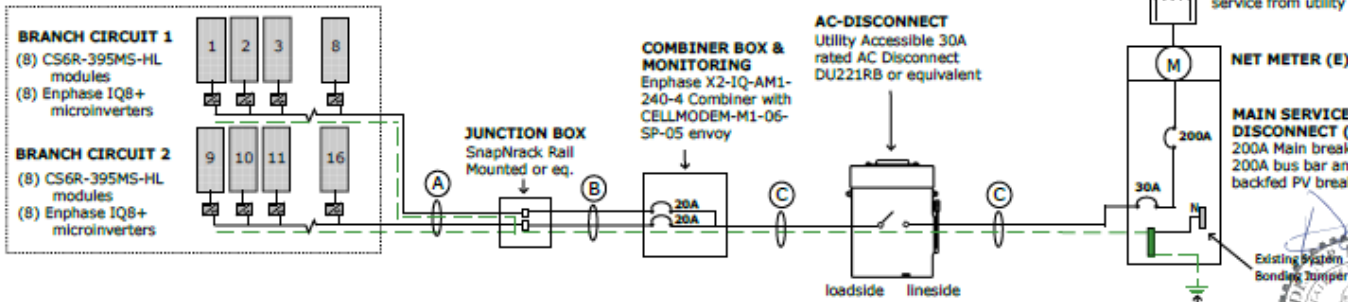
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Design: Structural Plans



Design: Electrical Plans

SINGLE LINE DIAGRAM 6.32 kW-DC (16) Canadian Solar 395W Modules
4.64 kW-AC (16) Enphase IQ8+ Microinverters



	LOCATION	CONDUCTORS	RACEWAY	EQUIPMENT GROUNDING CONDUCTOR
A	Modules to j-box	(2) #12 Cu THWN-2 in Enphase Q-Cable	Free-air under array	#10 Bare Copper EGC where protected from damage, bonded to rail and module frames via UL2703 compliant racking system
B	J-box to Enphase combiner box	(4) #10 Cu THWN-2	3/4" EMT	#10 Cu THWN-2
C	Combiner to MSP	(3) #10 Cu THWN-2	3/4" EMT	#10 Cu THWN-2

MODULES	
Module type:	CS6R-395MS-HL
Weight:	49.4 lbs
Dimensions:	67.8" x 44.6" x 1.38"
Power:	395 W
Voc:	36.6 V
Vmp:	30.6 V
Isc:	13.77 A
Imp:	12.91A
Temperature coef. of Voc:	-0.26 %/°C

MICROINVERTERS	
Microinverter type:	Enphase IQ8-PLUS-72-M-US
Weight:	2.43 lbs
Continuous output power:	290 VA
Nominal Voltage:	240 V
Nominal output current:	1.21 A
Max input DC voltage:	60 V
Min/Max start voltage:	22 V/ 58 V
Peak Power tracking voltage:	27-45 V
Max units per branch circuit:	13
UL Listed as PV rapid shut down equipment.	

SINGLE LINE NOTES	
1.	System complies with NEC 2020 and IRC 2018, and rapid shutdown requirements.
2.	Wire and conduit sizes are as indicated or larger
3.	All equipment is UL listed and bonded by mechanical means or by a grounding conductor
4.	This system is grid-tied, no batteries.
5.	Wires are situated in free-air or conduit a distance of 7/8" or greater above roof surface



06/05/2024
Firm License Number: 2202
VSE Project Number: U2339.0887.241
The contractor must notify Vector Structural Engineering, LLC, should discrepancies between the as-built electrical system and what is shown on the permit plans be found. Vector Structural Engineering shall be notified of any changes from the approved design before installation. Vector Structural Engineering assumes no responsibility for improper installation of the solar system.

TRIBAL PROGRAM
GRID Alternatives Tribal Program
1030 W Ellsworth Ave, Denver CO 80223
info@gridalternatives.org (303) 963-1343

LOT #0001

Address: 14 Gorge View
Country Loop,
Wiltonam, WA 98665

PV RESIDENTIAL DESIGN

SINGLE LINE

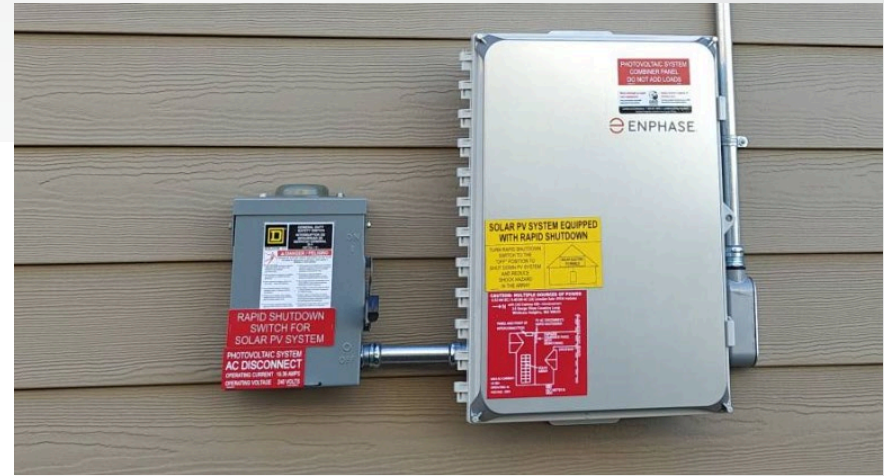
GORGE VIEW COUNTRY LP 14

ISSUE
Drawn by: L. Lillibridge
Drawn on: 2/16/2024

REVISIONS

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Tribal electrical inspector approving electrical service, trainees receiving training on commissioning the systems. First 28 homes was in operation by September 30, 2024.



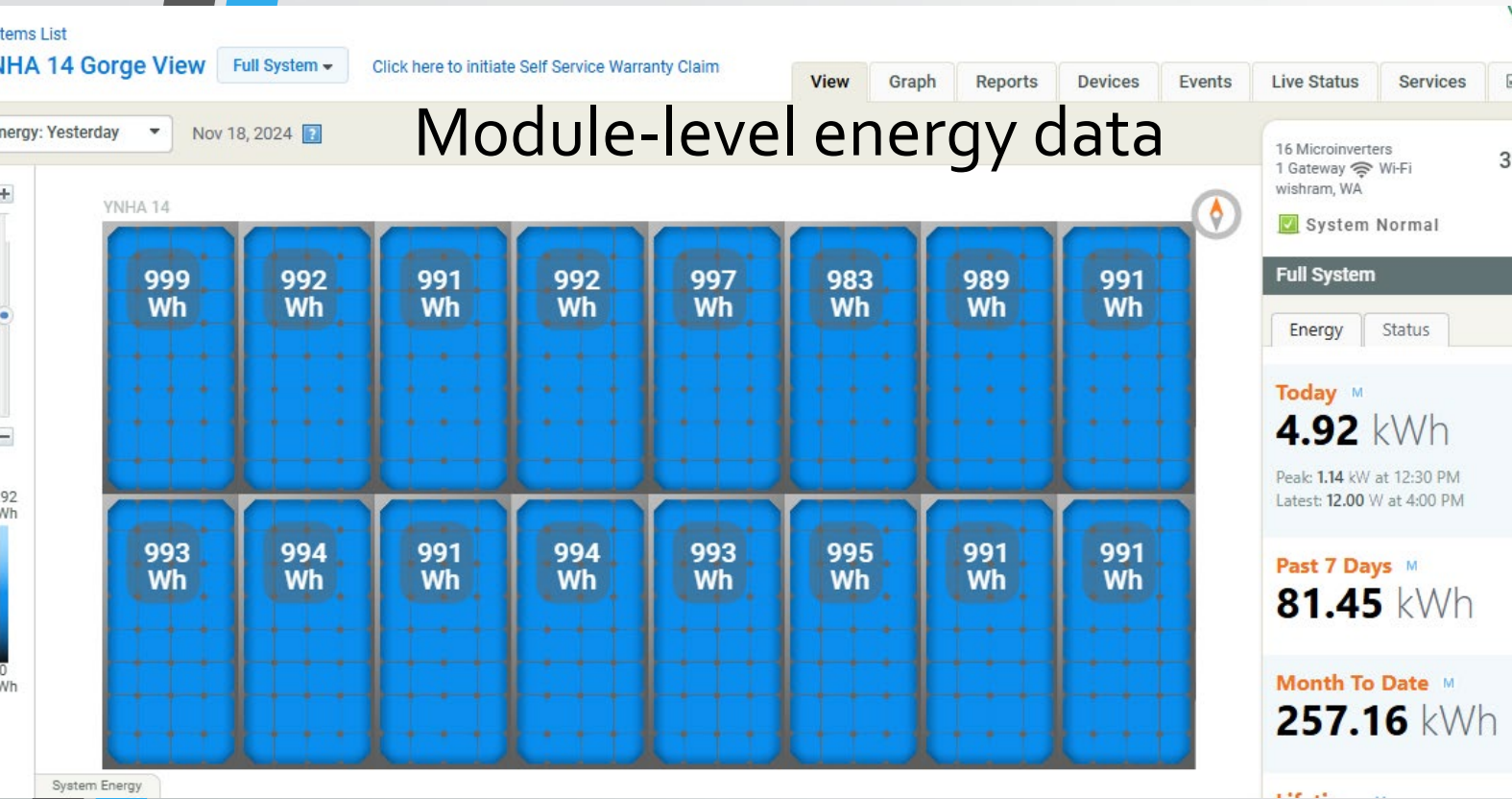
All nine Yakama Nation employees have successfully completed the solar installation training and received a certification by Grid Alternatives Tribal Program

Solar panel installation for all 46 homes were completed September 13, 2024. And on October 15, 2024 all systems were in operation.

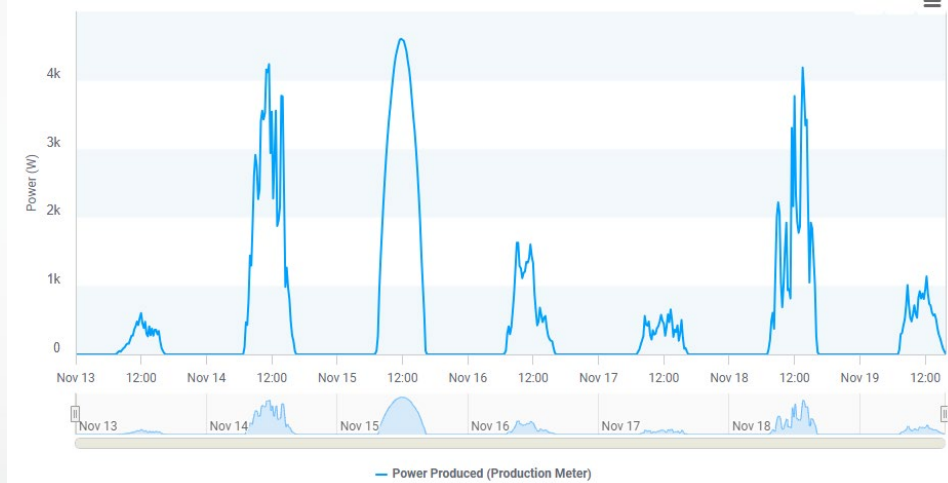


Status	System ID	Name
All	System ID	Name
✓ Normal	5429304	YNHA 08 Gorge View
✓ Normal	5430281	YNHA 50 Gorge View
✓ Normal	5430284	YNHA 42 Gorge View
✓ Normal	5430287	YNHA 46 Gorge View
✓ Normal	5430309	YNHA 36 Gorge View
✓ Normal	5430315	YNHA 32 Gorge View
✓ Normal	5430321	YNHA 28 Gorge View
✓ Normal	5430314	YNHA 34 Gorge View
✓ Normal	5430342	YNHA 20 Gorge View
✓ Normal	5426719	YNHA 59 Gorge view

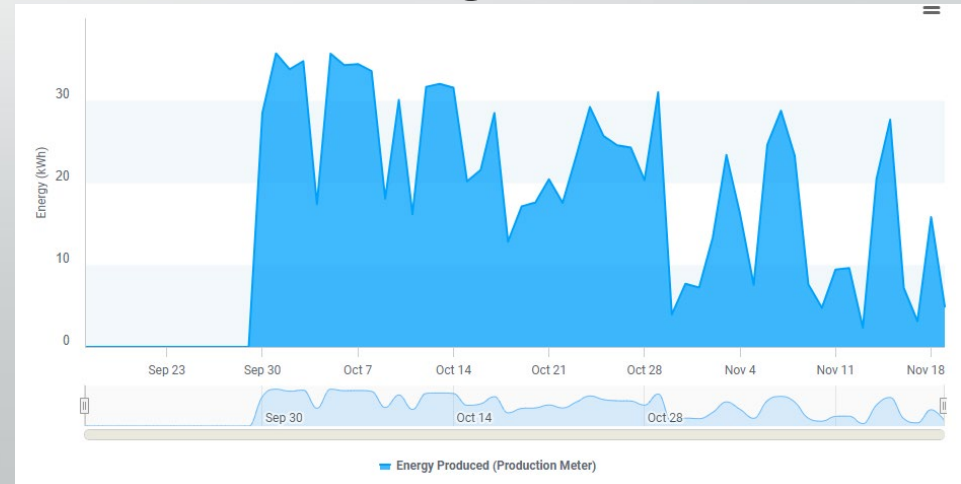
Enphase Monitoring



One week of power production



Lifetime energy production



Example: Monitoring for 14 Gorge View Country Loop - Produced 1.05MWh over the life of the system (on since Sept 29th)

Lesson Learned

- Anticipate internal delays such as
 - Staff travel daily to a rural location (2 hours from YNHA office)
 - Electrical inspection jurisdiction on the reservation. We were referred to the Tribal inspector by the L&I inspector.
 - Connecting monitoring took a lot of time, monitoring is slow due to low cellular connectivity.

Thanks to Department Of Energy, Bonneville Environmental Foundation, and Raymond James, YNHA has been able to improve the quality of life for 46 families while promoting self-sufficiency.



Questions?

- **Thank You to the Team that worked on the project:**
- **Yakama Nation TERO-Brian Polk Jr., Nathaniel Silva, Piyu Sutterlict, Wade Ohms Jr,**
- **YNHA staff members (installing)- Tim Shippentower, Leonard Sam, Horacio Rodrigues, Erniemarion George, and Robert Briceno,**
- **Vendor and Staff- Grid Alternative, Cassandra Valandra, Justin Brandom, Julius Billie, Zikiah Montoya, Johnathan Montoya, Patti Brisbois, Ed Nicodemus, Laura Lilienkamp, and Simon Wood**
- **Department of Energy- Tweedie Doe, Jennifer Luna, and Jami Alley.**
- **Bonneville Environmental Foundation – Evan Ramsey, and Jessica Carmona**
- **Godfrey & Kahn – John Clancy**
- **Spokane Indian Housing Authority – Clyde Abrahamson, Stephen Tsoodle**
- **Klickitat PUD – Anita Clever**