Bear River Band of the Rohnerville Rancheria
Renewable Energy Options Analysis

The mission of Bear River Band of Rohnerville Rancheria is to promote balance between quality of life, self-sufficiency, sustainability and cultural awareness for Bear River.

Bear River Band of the Rohnerville Rancheria History

- Established in 1910 in Rohnerville, CA
- Federal recognition was removed in 1960- the majority of Tribal members lost their land and homes due to owing CA state taxes.
- The Tribe regained federal recognition in 1983
- In early 1990's purchased 60 acres near Loleta
- For the first 10-12 years the Tribe struggled to build homes and infrastructure for its members

Bear River Band of the Rohnerville Rancheria Development

- Since that time there has been much growth
- In the mid-2000's the Tribe purchased 113 acres of land. Over 45 homes and a 2-story community center have been built.
- Several businesses have been established, including a casino, hotel, gas station, recreation center, Tobacco Traders, and Family Entertainment Center.
- Rural, disadvantaged community

Renewable Energy Development

- 2009 10 kW Wind Turbine Pilot Project
- 2014 Wind Feasibility Study
- 2014 Energy Development Plan
- 2015 Solar/wind array on hillside by community center offsets 75% of usage
- GRID Alternatives
- 2016 Renewable Energy Sovereignty Master Plan
- Goal of “zero net annual utility energy consumption”

Energy Options Analysis

1621-1503

Project Summary

The Schatz Energy Research Center (SERC) will collaborate with the Bear River Band of Rohnerville Rancheria (BRB), as a subcontractor under BRB, to develop an analysis of renewable energy options that focus on BRB's strategic vision of zero net annual utility energy consumption. In alignment with BRB's Energy Development Strategic Plan, SERC will: Develop current and future load profiles of residential and commercial properties, leverage and expand on recently identified demand-side reduction strategies, update past renewable energy resource assessments, assist with the development of a tribal advisory committee, assess the status of existing infrastructure, and develop an implementation plan that packages this work into an actionable guide to pursue future renewable energy development.

Key Personnel/Organizations

Edwin Smith, EPA Director, Bear River Band of the Rohnerville Rancheria

Dr. Arne Jacobson, Director: Schatz Energy Research Center (Humboldt State University), Contractor

Budget and Timeline

Federal funds: $180,00 Cost-share: $ 20,000 Total: $200,000

Key Milestones & Deliverables

Year 1:	Renewable Energy Resource Assessment, and Baseline and Optimized Load Profiles
Year 2:	Production Readiness Assessment, Implementation Plan

Project Outcomes

Identifying clear recommendations and next steps for moving the implementation plan forward into a feasibility analysis stage.

Implementation Plan that packages this work into a comprehensive and actionable guide the Tribe can use to pursue future renewable energy development.

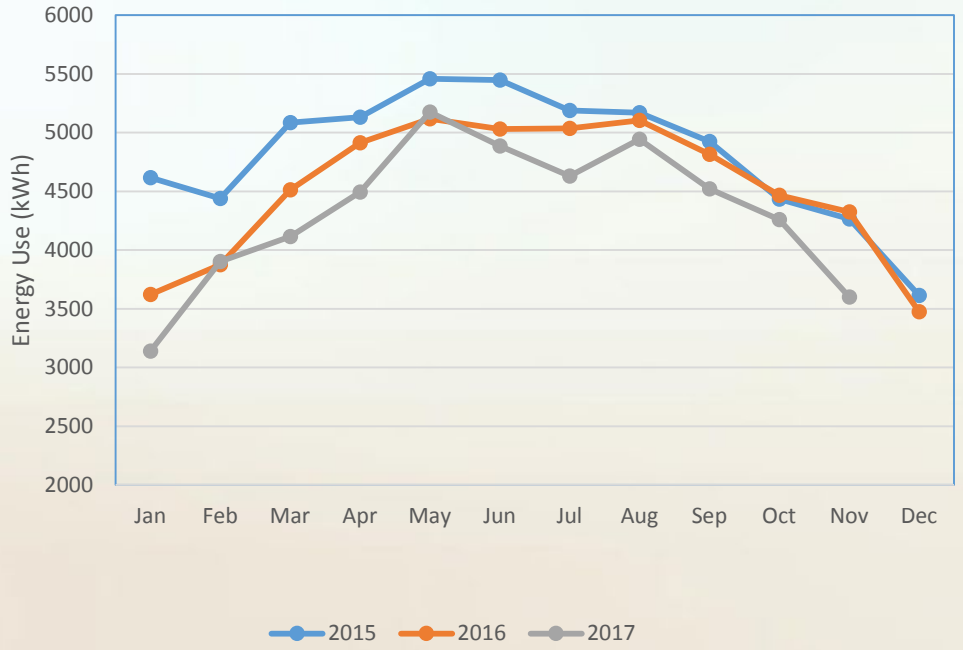
Renewable energy options analysis and demand-side efficiency options for zero net annual utility energy consumption

Project Tasks

- Load Assessment
  - Energy use now and in the future
- Demand-side Management Opportunities
  - Conserve energy
- Renewable Energy Resource Assessment
  - Locating renewable energy systems
- Existing Infrastructure and RE Production Assessment
  - Electrical points of connection
- Energy Options Implementation Plan (in progress)
  - Guide for RE development

Load Assessment – Now and in the Future

- Reviewed past energy assessment work
- Developed load profiles for existing commercial and residential properties
- Developed a projected combined load profile



Results:

- The Casino accounts for 65% of energy use of commercial facilities
- The planned commercial buildings will increase the projected load

Demand-side Management Opportunities Assessment Energy Conservation

- Reviewed the recent energy audit work and associated recommendations
- Identified equipment that would provide the largest energy and cost savings

Parameter Summary

Feature Name	Candidate	Standard
EER	12	11.7
Unit Cost (k$)	4.5	4
Annual Maintenance Cost ($/year)	0	0
Enable Economizer	on	off
	Applies to Both Units	
Building Type	Hotel-Large	
State, City	OR, ASTORIA	
Schedule	All week, All day	
Setpoint Temperature, Setback	65, 5	
Total Capacity (kBtuh), Oversizing (%)	216, 0	
Electric Utility Rate ($/kWhrs)	0.08	
Equipment Life	15	
Number of Units	1	
Discounted costs, Rate	on, 0.07	

RESULTS

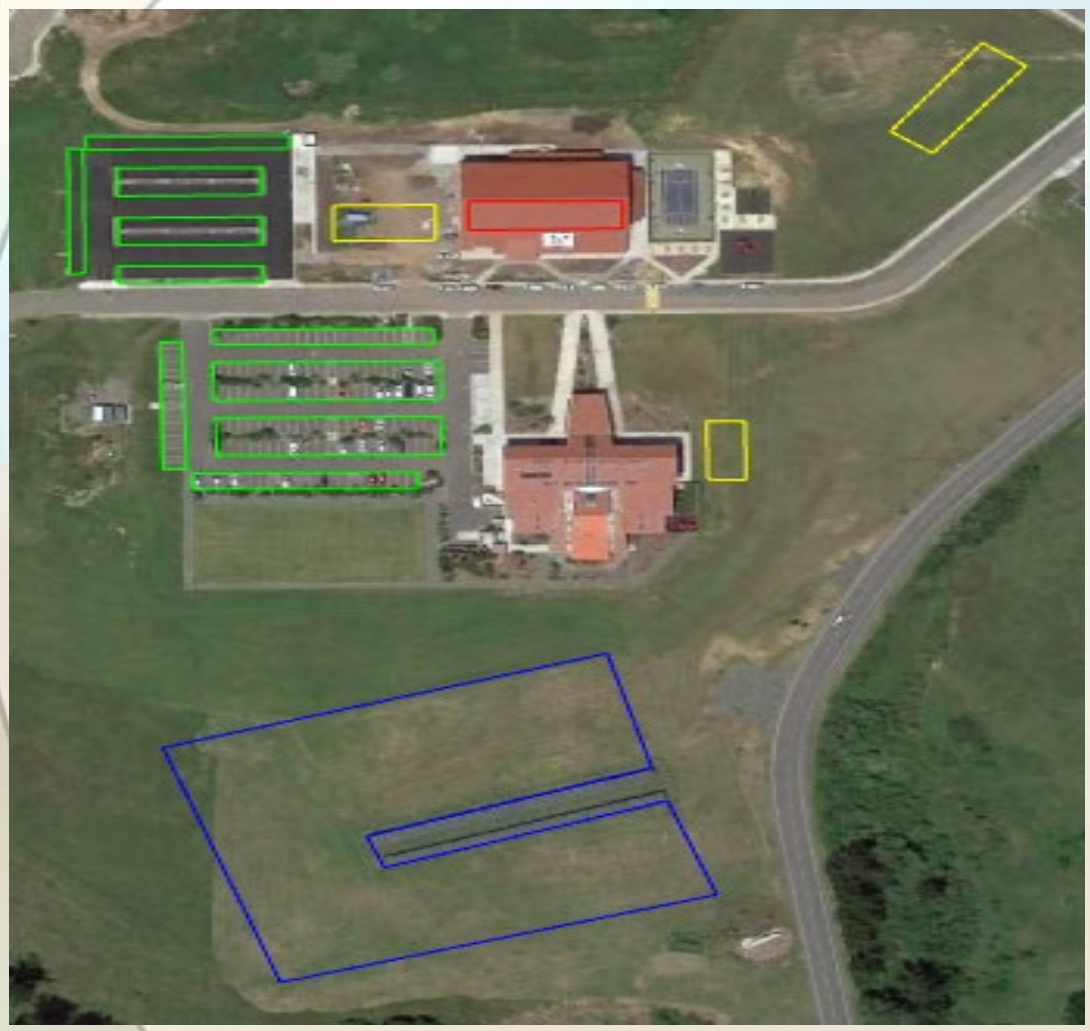
ASTORIA, OR	Candidate	Standard	Savings	
Annual Energy Consumption (kWhrs)	29,135	35,801	6,666	19%
Annual Operating Cost ($)	2,331	2,864	533	19%
15 Year Life Cycle Cost ($)	25,729	30,086	4,357	14%
Annualized Cost ($)	2,825	3,303	478	14%
Net Present Value ($)	4,357			
Payback (yrs)	1.0			
Rate of Return (%)	106.66			
Savings to Investment Ratio (SIR)	9.71			

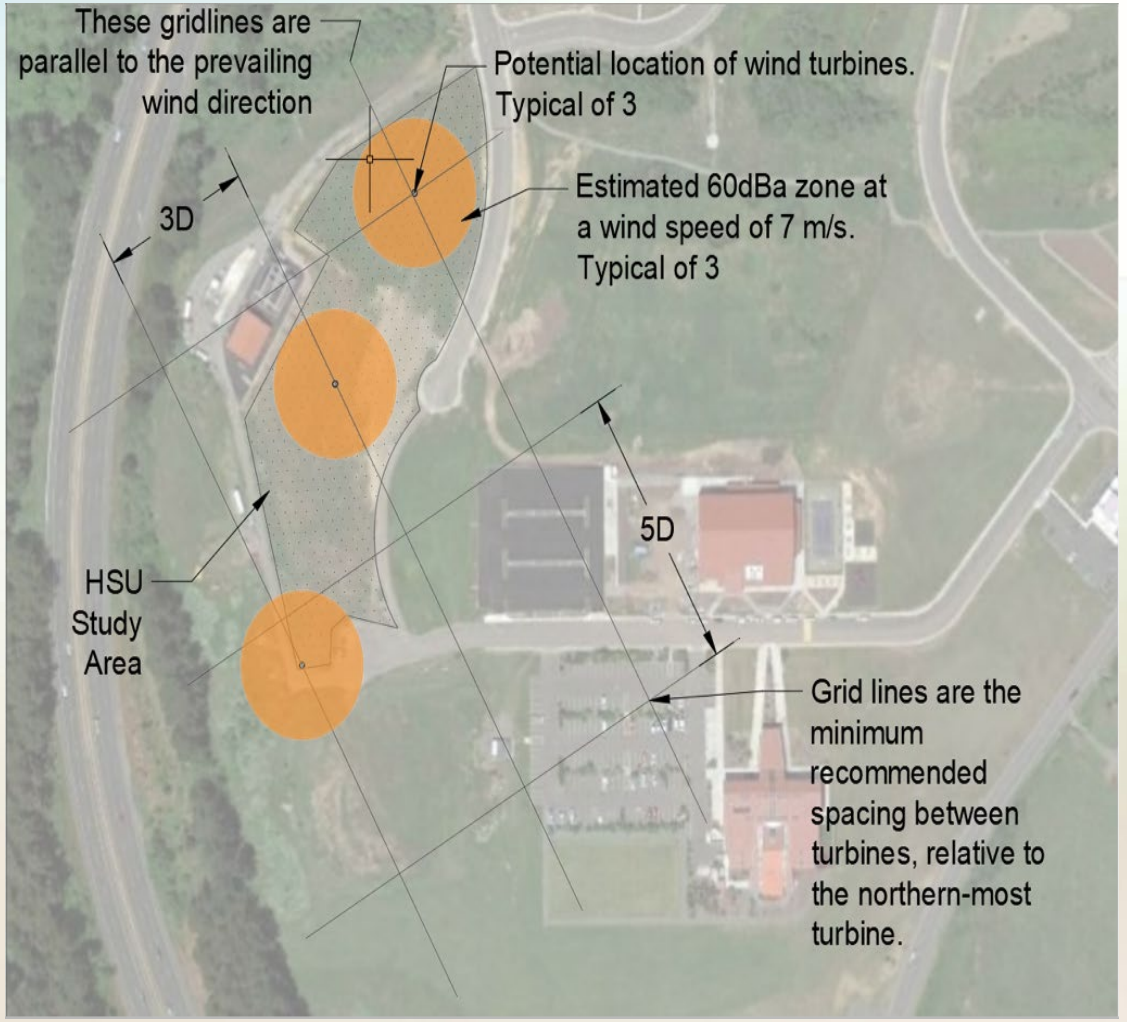
Figure 1: Parameter Summary and Estimated Annual Energy Use for the 18 ton RTU (cooling mode only)

*Replacement of HVAC equipment is the most cost-effective opportunity to save energy

Renewable Energy Resource Assessment: Solar and Wind

- Identified locations available for on-site solar and wind renewable energy systems





*Great opportunity for large PV systems on the south-facing hillside and in the parking lots

Renewable Energy Resource Assessment
Potential Energy Generation

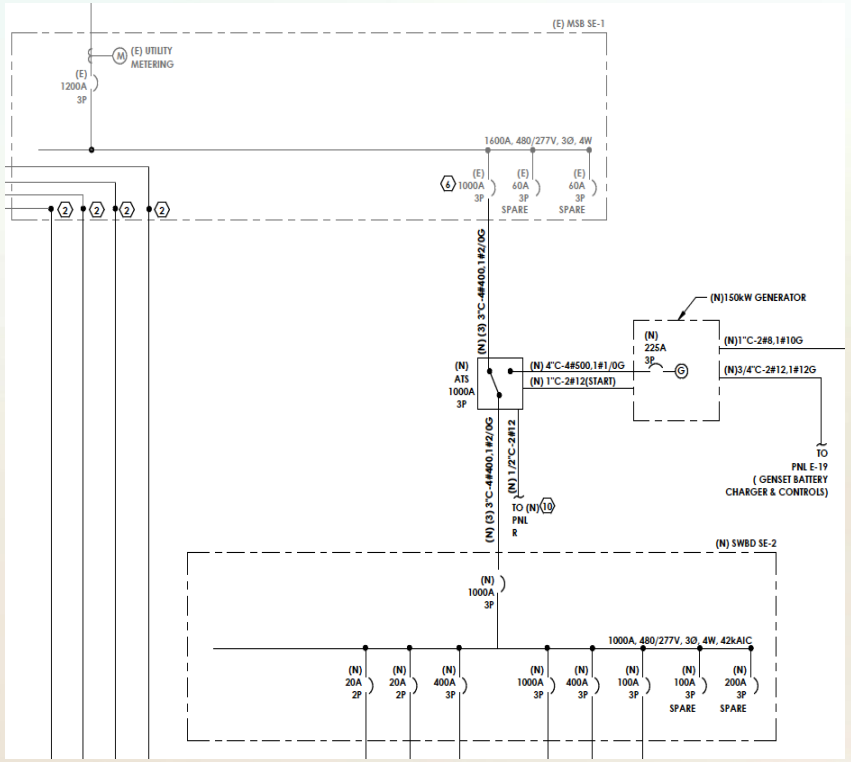
- Estimated the maximum possible on-site energy production from the various ground-mounted, rooftop and carport PV systems using *PV Watts Calculator*

Site	Location	Type of System	Available Area (m2)	PV Size (kWDC)	Orientation (°)	Tilt (°)	Estimated Annual Energy Production (kWh)
TNCC Hillside	south side	ground	12050	744	160	30	1,013,564
TNCC Parking Lot	E-W islands	carport	3140	560	180	7	785,915
Rec Center Lot	E-W islands	carport	1696	297	180	7	333,857
Pump & Play	dispensing canopy	canopy	240	48	130	7	59,037
Bear River Drive	hillside	ground	1664	103	130	30	132,058
Casino Parking Lot	west lot	carport	8082	145	130	7	2,021,240
Rec Center	rooftop	roof	430	86	180	20	116,122
Casino	rooftop	roof	580	116	130	30	148,725
Youth Center	rooftop	roof	175	175	270	10	41,579

*A significant amount of renewable energy can be produced on site

Existing Infrastructure and RE Readiness Assessment

- Reviewed documentation of utility and site electrical infrastructure
- Identified locations for electrical interconnection points for each RE system based on size of proposed system and existing electrical infrastructure



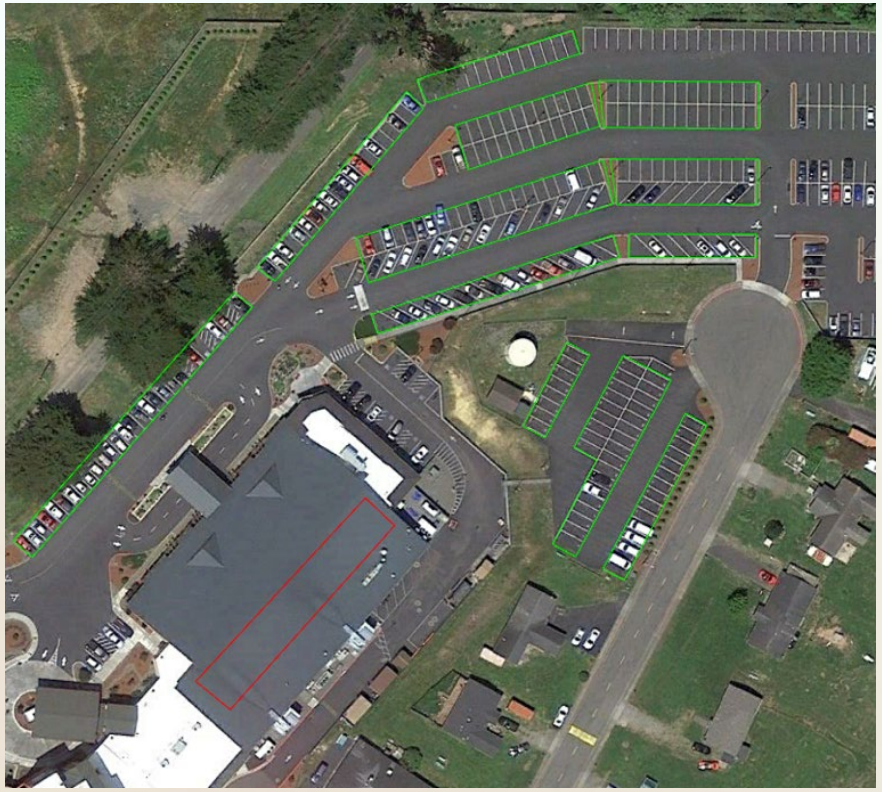
*Upgrades to switchgear may be required for large capacity systems

Energy Options Implementation Plan: In Progress

- Focusing on large ground-mounted, rooftop, and solar carport photovoltaic systems
- Analyzing performance and cost savings for three options using PG&E Net Energy Metering (NEM2) and Net Energy Metering Aggregation (NEM2A)

Energy Option 1: Net Energy Metering (NEM2) - Casino

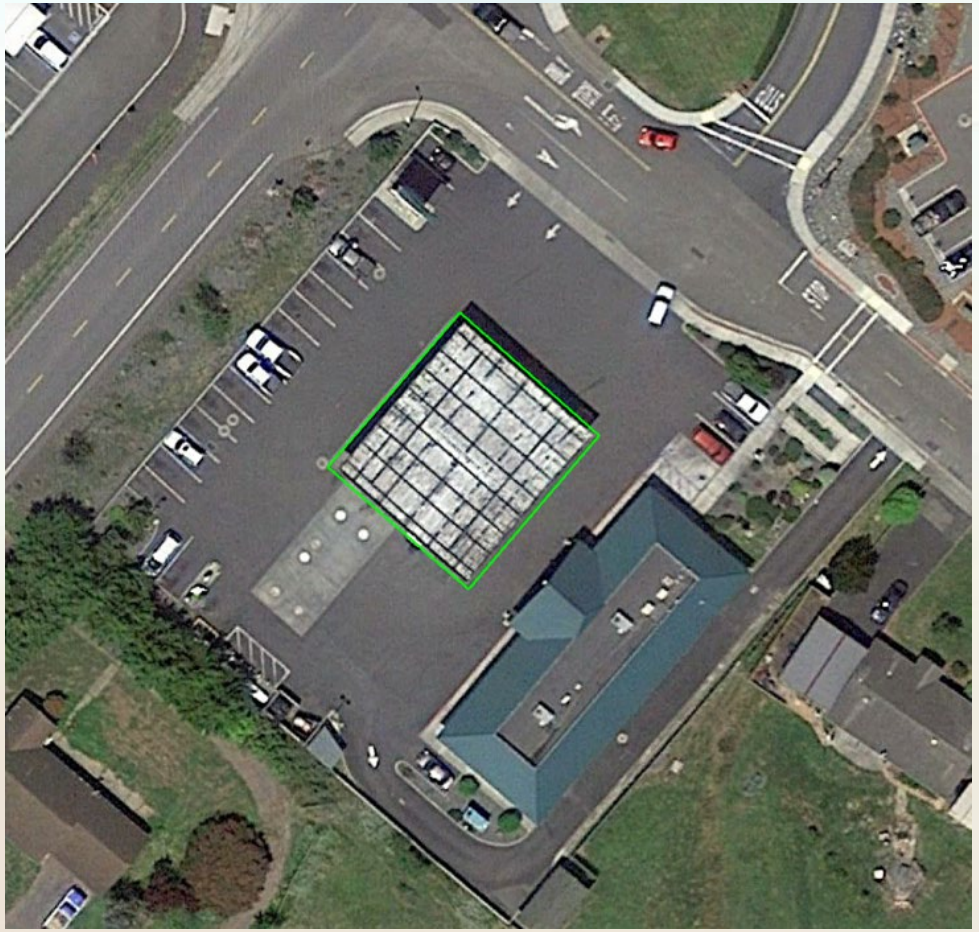
- The Casino's high energy use and peak load demand make it an ideal facility to install a NEM Paired PV-Battery system
- The System Advisor Model (SAM) developed by the National Renewable Energy Laboratory will be used to estimate the energy generation and cost savings



Casino showing the proposed solar carports shown in green

Energy Option 2: Net Energy Metering (NEM2) – Gas Station

- A 48-kWDC canopy-mounted, NEM PV system is proposed for the gas station



*Estimated annual energy production is 59,085 kWh for an estimated annual savings of $11,085

Energy Option 3: Net Energy Metering Aggregation (NEM2A) Rancheria

Aggregate net metering allows a single customer with multiple meters on the same property, or on adjacent or contiguous properties, to use renewable generation to serve the aggregated load behind all eligible meters and receive the benefits of Net Energy Metering (NEM2)

The renewable generator may be one or a combination of the:

- Community Center PV system
- Community Center solar carports
- Recreation Center solar carports

The eligible aggregate load accounts may include the:

- Family Entertainment Center
- Bear River Health and Wellness Center
- Wastewater Treatment Plant

* A NEM2A arrangement appears to be the most promising option for the Rancheria commercial sites

Source: PG&E https://www.pge.com/en_US/for-our-business-partners/interconnection-renewables/net-energy-metering/nem-aggregation.page

Future Plans

- Analyze the performance and cost savings for:
  - NEM2 PV-battery systems at the Casino
  - NEM2 PV system at the gas station
  - NEM2A PV systems on the west side of the Rancheria
- Identify the electrical points of connection for each of the proposed energy options
- Complete the Energy Options Implementation Plan

Schatz Energy Research Center

Thank you!

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