

Agua Caliente Band of Cahuilla Indians, Indian Canyon Trading Post PV Project

**Renewable Energy and Project Development and Financing for
California Tribes**

Sacramento, CA

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Presentation Topics

- Project overview
- Regional / Local issues
- Analysis
 - Demand
 - Technology
 - Economics
- Current Status



Project Overview

- ❑ Funded by U.S. DOI, Bureau of Indian Affairs, Minerals Assessment Program
- ❑ Work conducted by McNeil Technologies.
- ❑ Support from ACBCI Energy Task Force
- ❑ Intent to determine cost-effective solar applications
- ❑ Other renewable (geothermal, biomass, wind) activities as part of project



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Image NASA
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Streaming 100%

°22'44.98" N 112°50'25.21" W

Eye alt

Tribal Overview

- Tribal enrollment: ~ 365
- Area; ~ 32,000 acres
- ~6,700 acres within city of Palm Springs, largest landowner
- Indian Canyons, listed on the National Register of Historic Places



ACBCI Challenges

- Precedent
 - ACBCI has not “done” a PV project to date
 - Some limited but growing involvement with energy issues
- Market favors:
 - Grid connected (RPS influence)
 - Tax liability (ITC, PTC)
 - Large systems (>300kW due to silicon shortage)
- Location
 - Minimize impact
 - Window for construction constrained by seasonal issues:
 - Extremely hot in summer
 - Busy tourist season for 9 months

Approach

- Site Analysis
 - Existing generator
 - Condition
 - Operating costs
 - Demand
 - Physical space for PV system
- HOMER analysis (free NREL tool)
 - Sizing
 - Economics
 - Homer
 - <https://analysis.nrel.gov/homer/>
- Work with Tribal Council

Existing Propane Generator

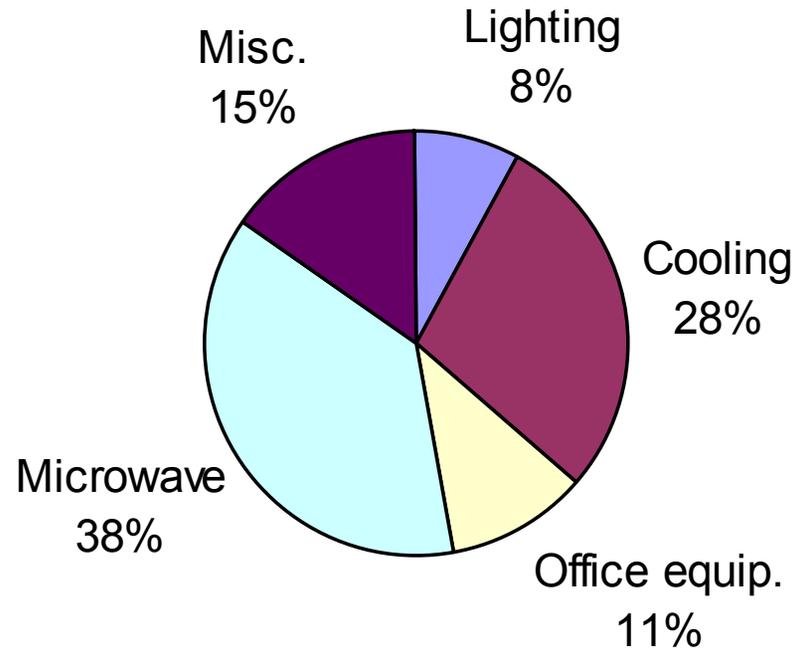
- 15kW
- ~\$5k/yr. for propane
- Noisy, some pollution, mostly a discernible smell
- High maintenance costs
- Escalating fuel costs



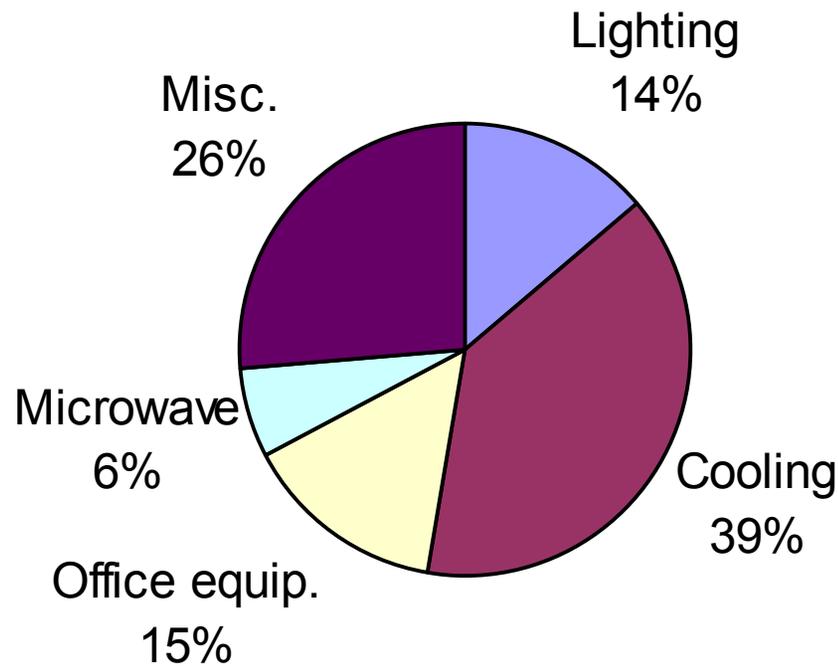
Current Electric Loads



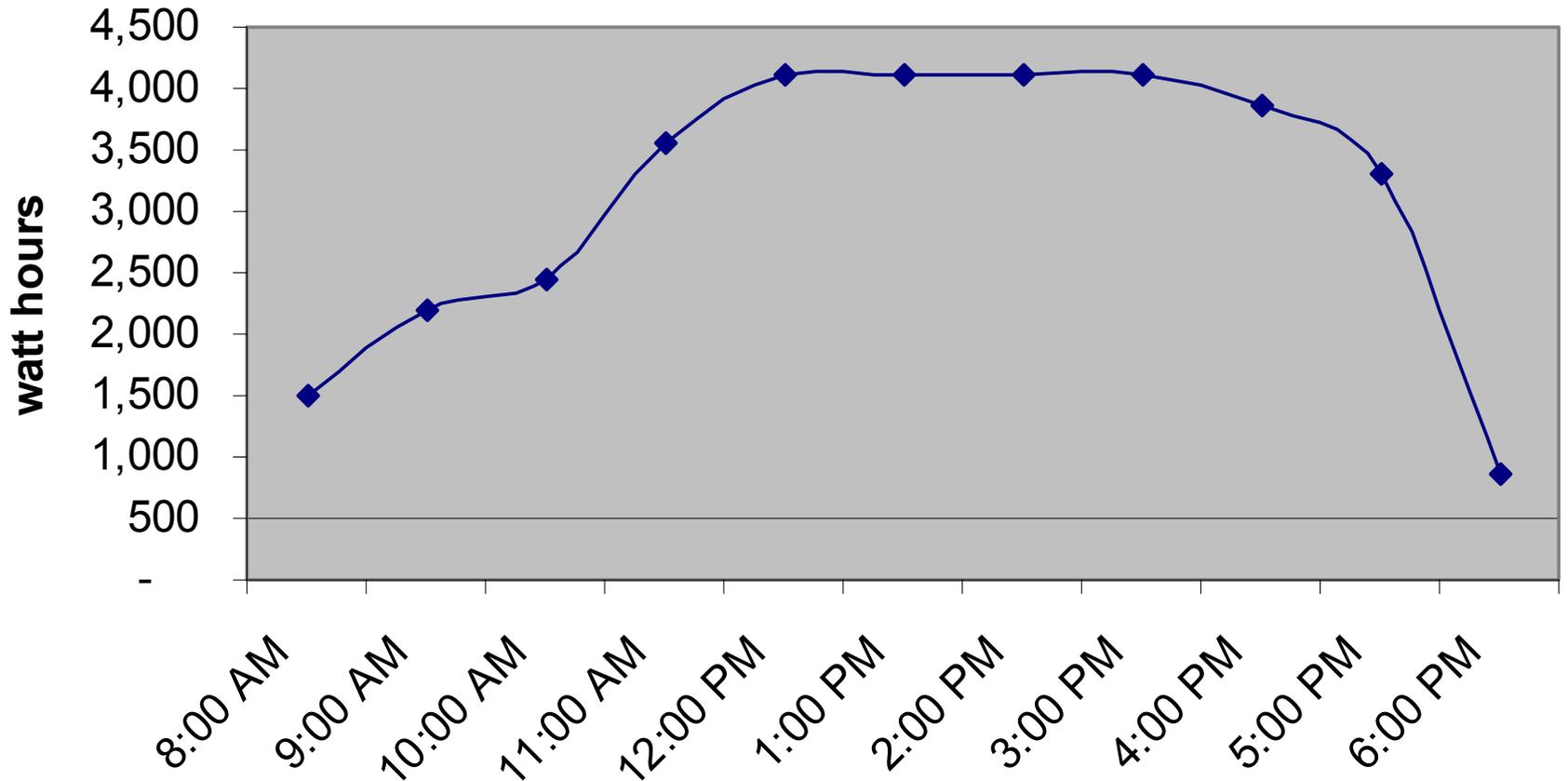
Calculated Peak Power Demand Distribution, ~8kW



Calculated Electricity Consumption Profile, ~12,000 kWh/yr.



Calculated Daily Electricity Consumption Profile



PV System Sizing

- Hybrid system
 - Don't want to eliminate propane unit
- Solar Fraction
 - Critical user input to HOMER model
 - In our analysis varies of 90 – 100%
- Assumed 3 day battery supply

PV System Considerations

- Assumptions
 - 8kW
 - 10% efficiency
 - Single crystal silicon
 - No tracking
- PV Collectors
 - Require about 800 sq. ft.
 - Carport requires a bit more space
- Batteries (deep cycle)
 - 20 batteries
 - Require about 20 sq. ft. with spacing
 - Sensitive to overheating
 - Generator room is probably ok



40' X 48' =
~1,920 ft²

w/o
obstructions
~1,336 ft²

16'

17'

South







Cost Comparison

- Capital costs
 - PV, ~\$130k or \$16,250/kW (possibly high but intentionally conservative)
 - Propane, sunk cost
- Operating costs
 - PV, ~\$200 / yr. miscellaneous
 - Propane, ~\$5k/yr and escalating
 - Generator, ~\$2k/yr (high maintenance cost)
- Externalities
 - Noise, air emissions

Economic Analysis

- Simple payback
 - ~18 years

Cap Cost (\$/kW)	LCOE (\$/kWh)	Difference (\$/kWh)	Annual \$ savings*	"Payback" years
\$ 12,000	\$ 0.33	\$ 0.37	\$ 9,440	9
\$ 15,000	\$ 0.41	\$ 0.29	\$ 8,480	12
\$ 18,557	\$ 0.51	\$ 0.20	\$ 7,340	18

* Includes \$5k year propane savings

- Levelized Cost of Electricity
 - PV, ~\$.51/kWh
 - Propane, ~\$.70/kWh

Conclusions

- PV is the least cost-alternative for electricity supply at Indian Canyons but payback is long
- Propane generation may be viewed as a backup
- PV offers environmental benefits including noise reduction
- PV aesthetics need to be accounted for
- Few financial incentives for Tribal installation

Current Status

- ❑ Building structural analysis completed summer 2007
- ❑ Tribal Council approval Fall 2007
- ❑ Decision to re-roof at same time as PV installation
- ❑ Bid package prepared
- ❑ Presently teeing up for late Spring / early summer installation



Thank You

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