

Pinoleville Pomo Nation Renewable Energy Feasibility Study Status



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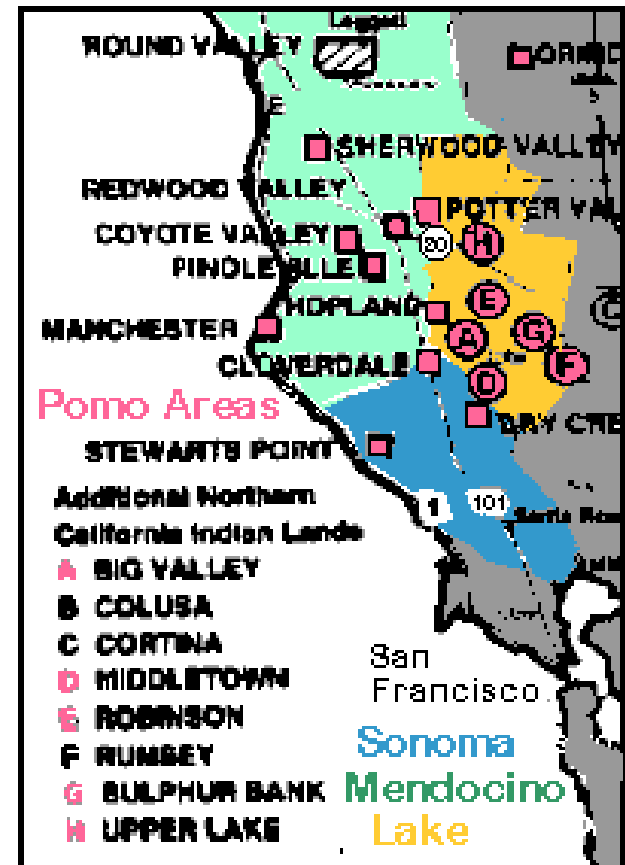
Program Manager, Community Assessment of Renewable Energy &
Sustainability (CARES)

2011 U.S. Department of Energy Tribal Energy Program Review

November 15, 2011

Pinoleville Pomo Nation

- The Pinoleville Pomo Nation is a Native American tribe located in Mendocino County



Mission Statement of the Pinoleville Pomo Nation

- Secures tribal government, affirms and protects tribal sovereignty
- Maintains government-to-government relationships
- Dedication to developing and maintaining co-operative alliances that benefit the tribe
- Committed to the preservation of its history, culture, and traditions
- Provides for health , safety, and general welfare of its citizens



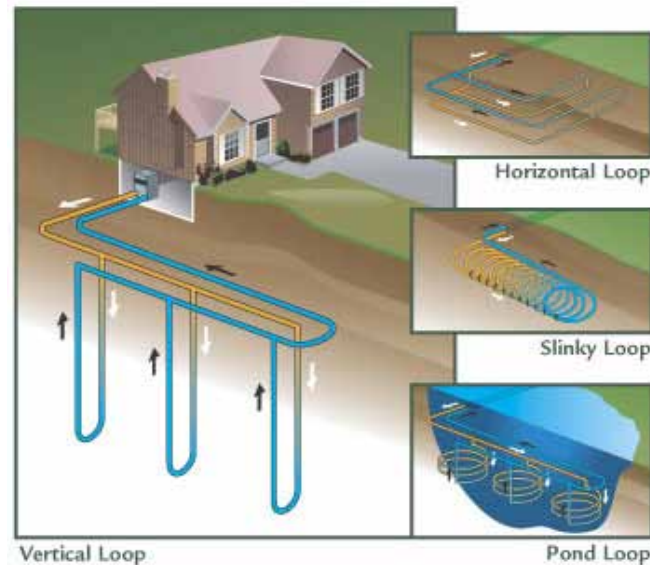
Vision Statement of the Pinoleville Pomo Nation

- Being healthy spiritually, physically, emotionally, mentally
- Being independent and self-sufficient
- Self governance with a focus on cultural and traditional values
- Being able to pass knowledge and wisdom of ancestors to future generations



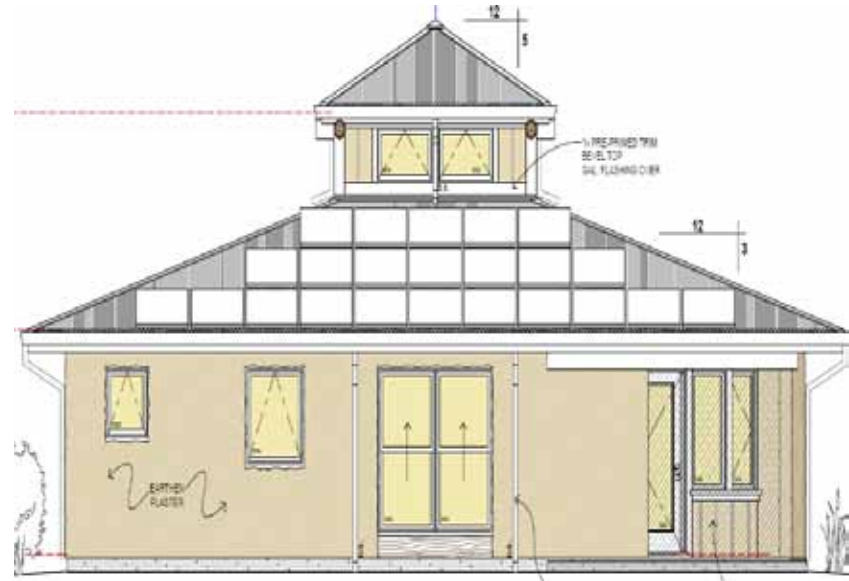
Pinoleville Pomo Nation Approach to Sustainability, Pt. 1

- Goal: maintain cultural and tradition over the generations
- Focus:
 - Create project that utilize renewable energy
 - Incorporate cultural and traditional values
 - Self sufficiency
- Using renewables wherever possible
 - Geothermal pumps
 - Microhydro
 - Wind
 - Solar

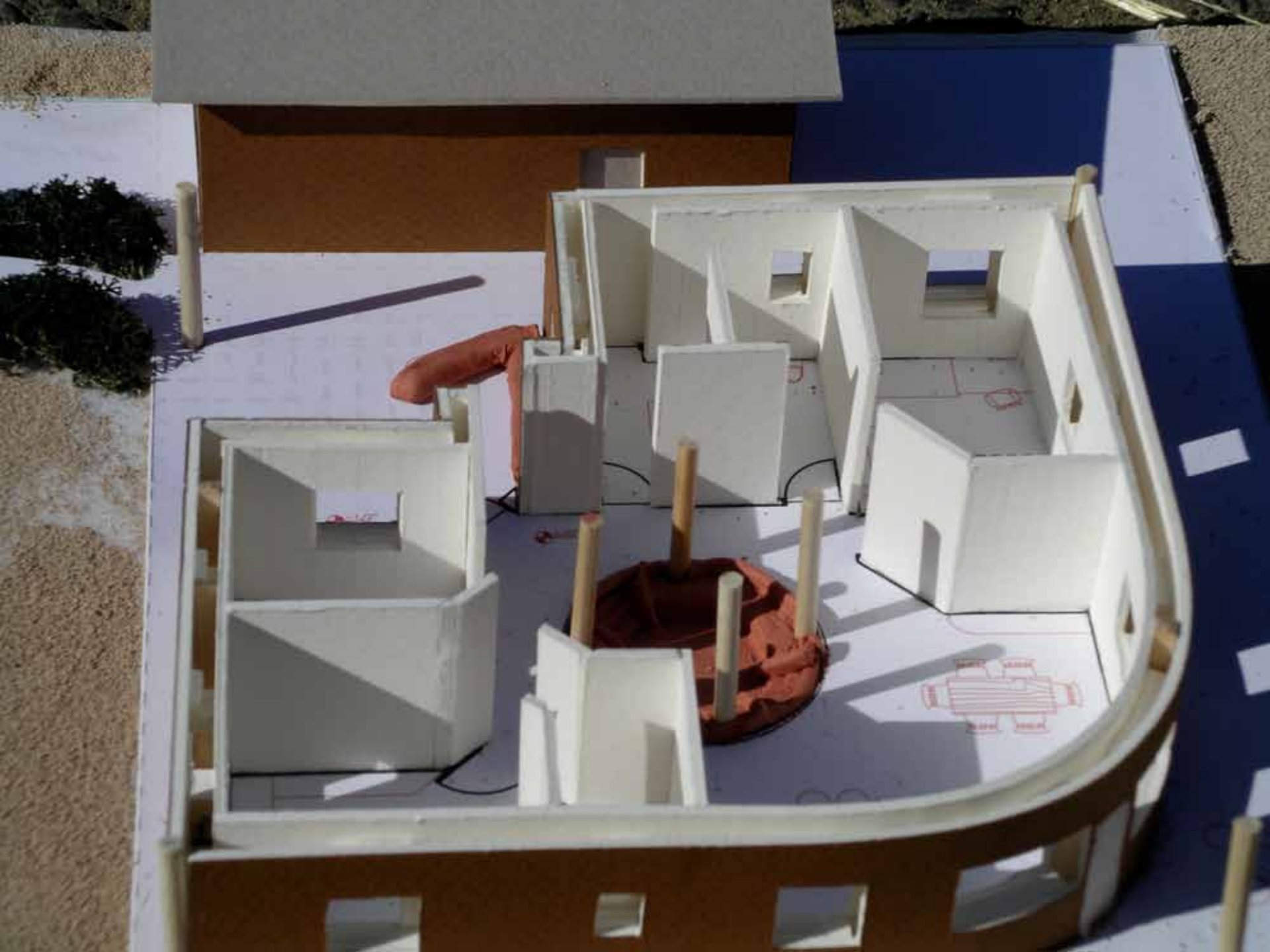


Pinoleville Pomo Nation Approach to Sustainability, Pt 2

- Co-designing & weaving together the various energy technologies in building designs
- Goals:
 - Low cost,
 - Energy efficiency
 - Natural materials (strawbale)
 - Net zero or positive energy buildings





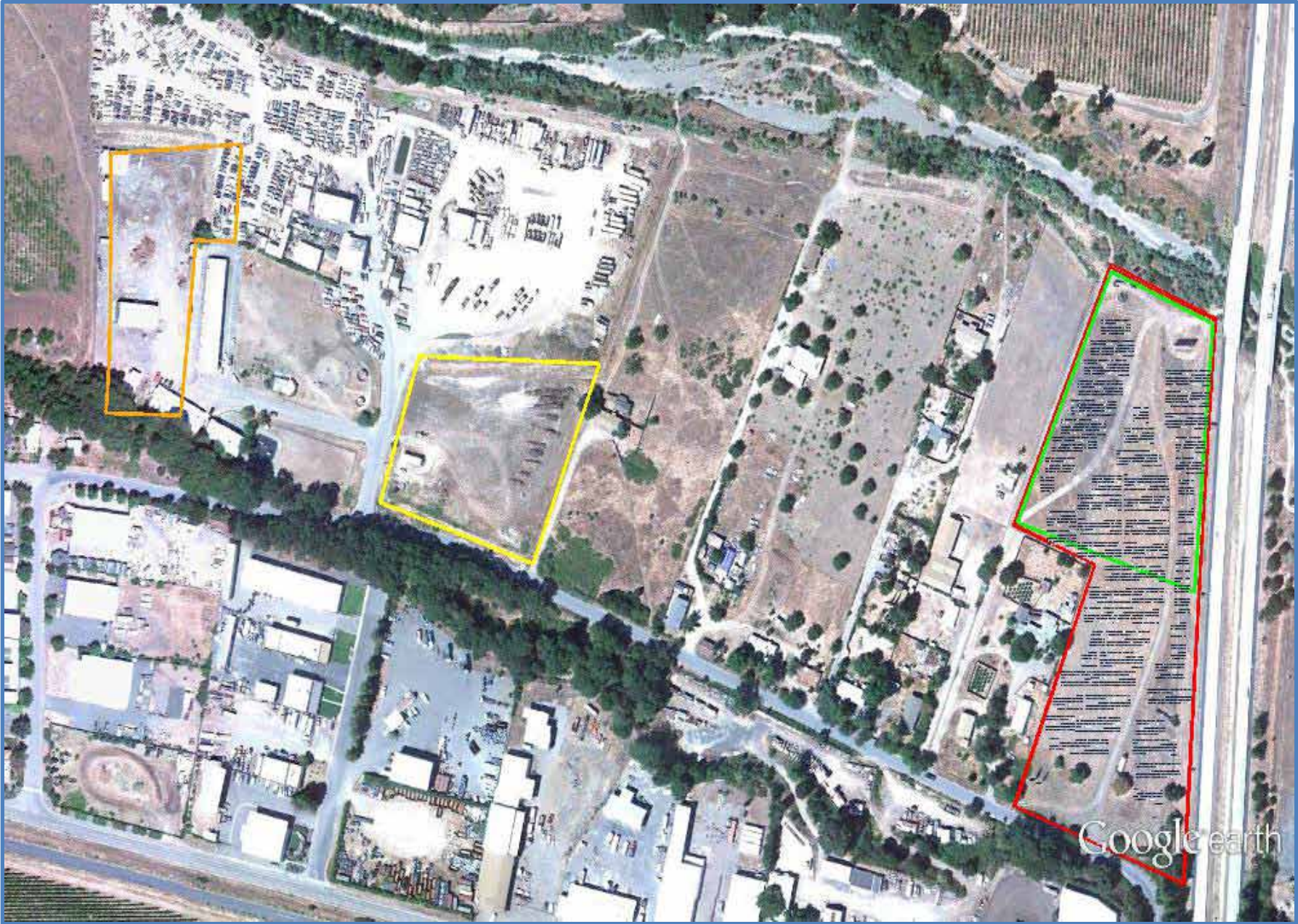




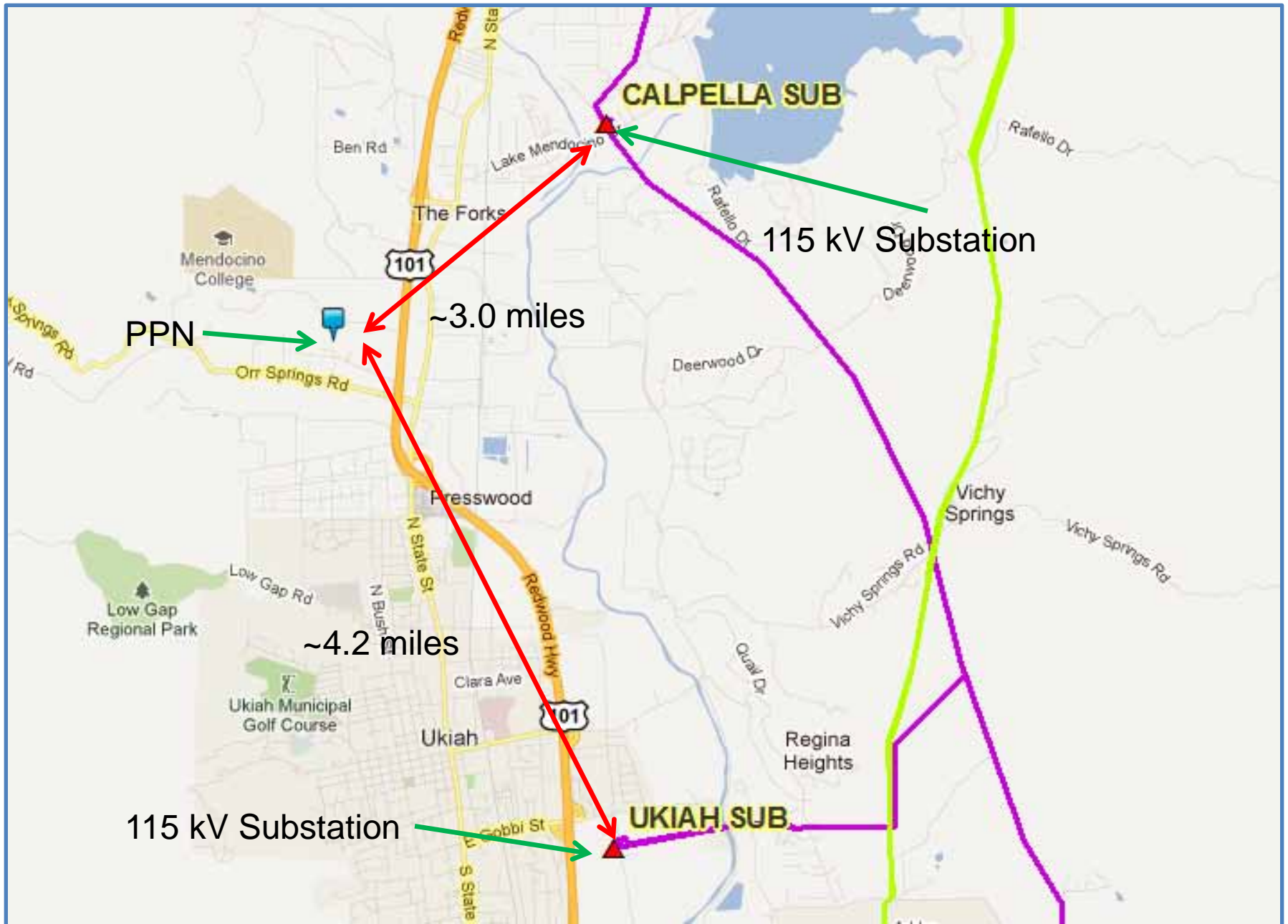




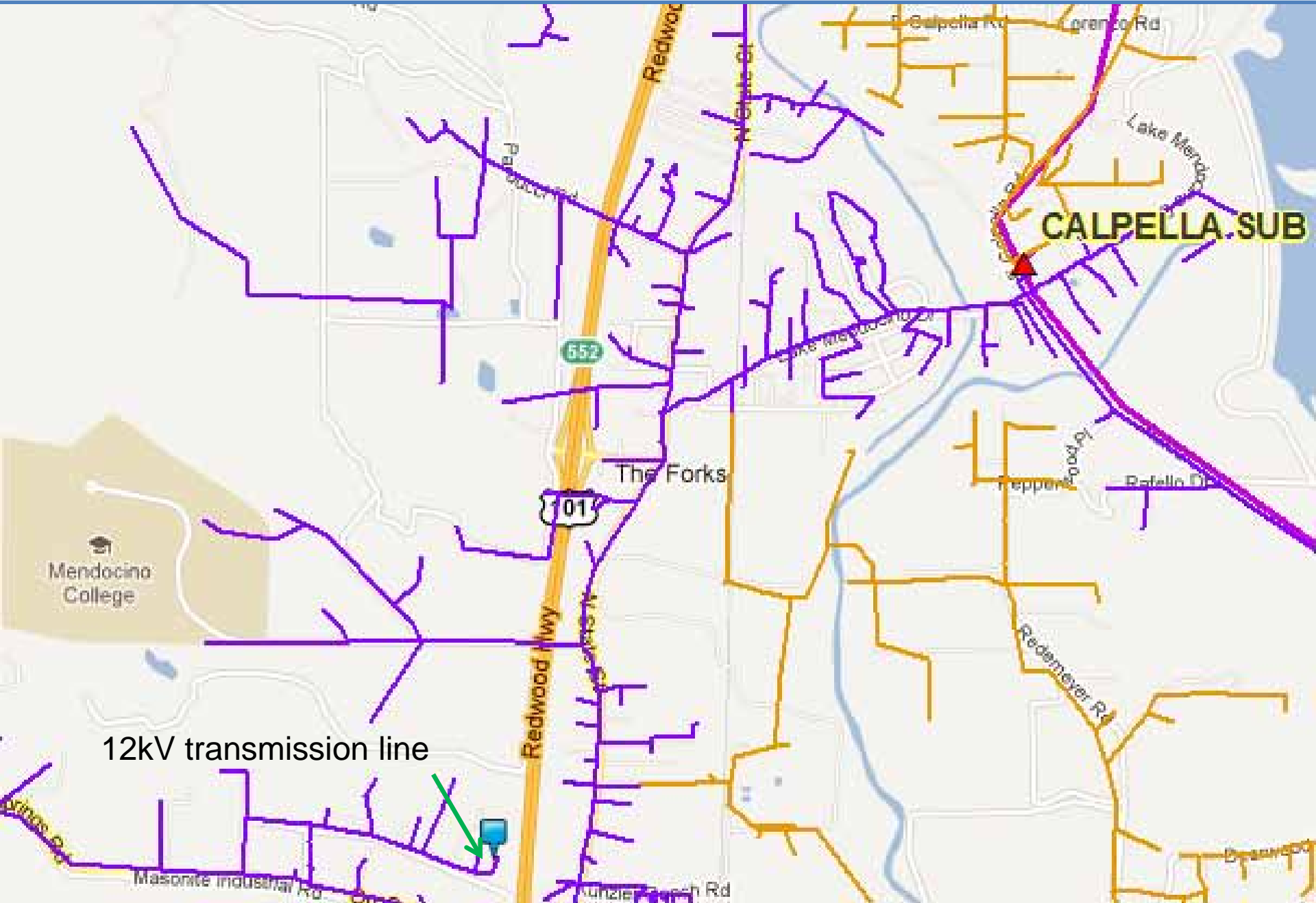
Solar Sites Under Consideration for 3 MW Utility



Transmission Line and Substation Location, Pt 1

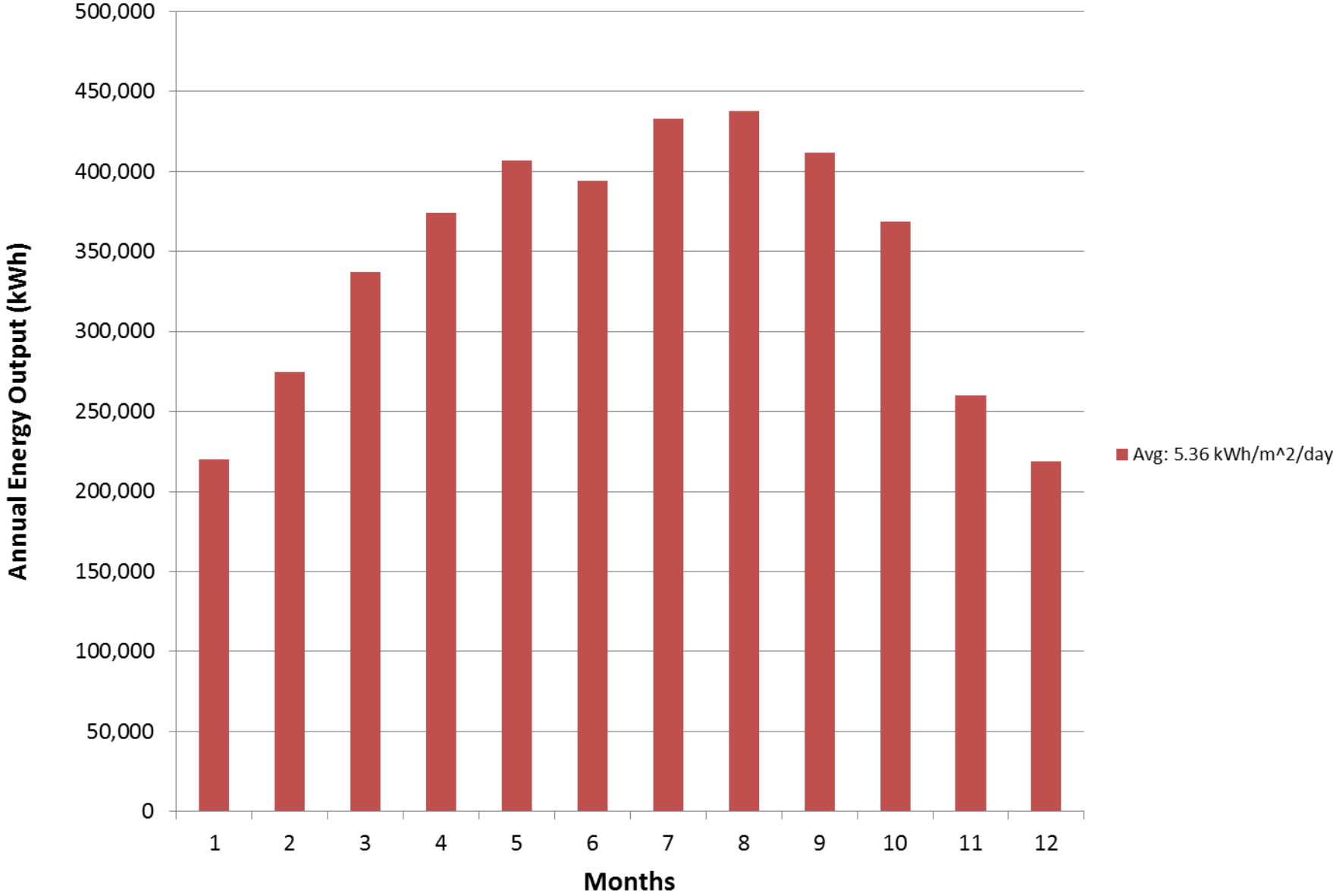


Transmission Line and Substation Location, Pt 2



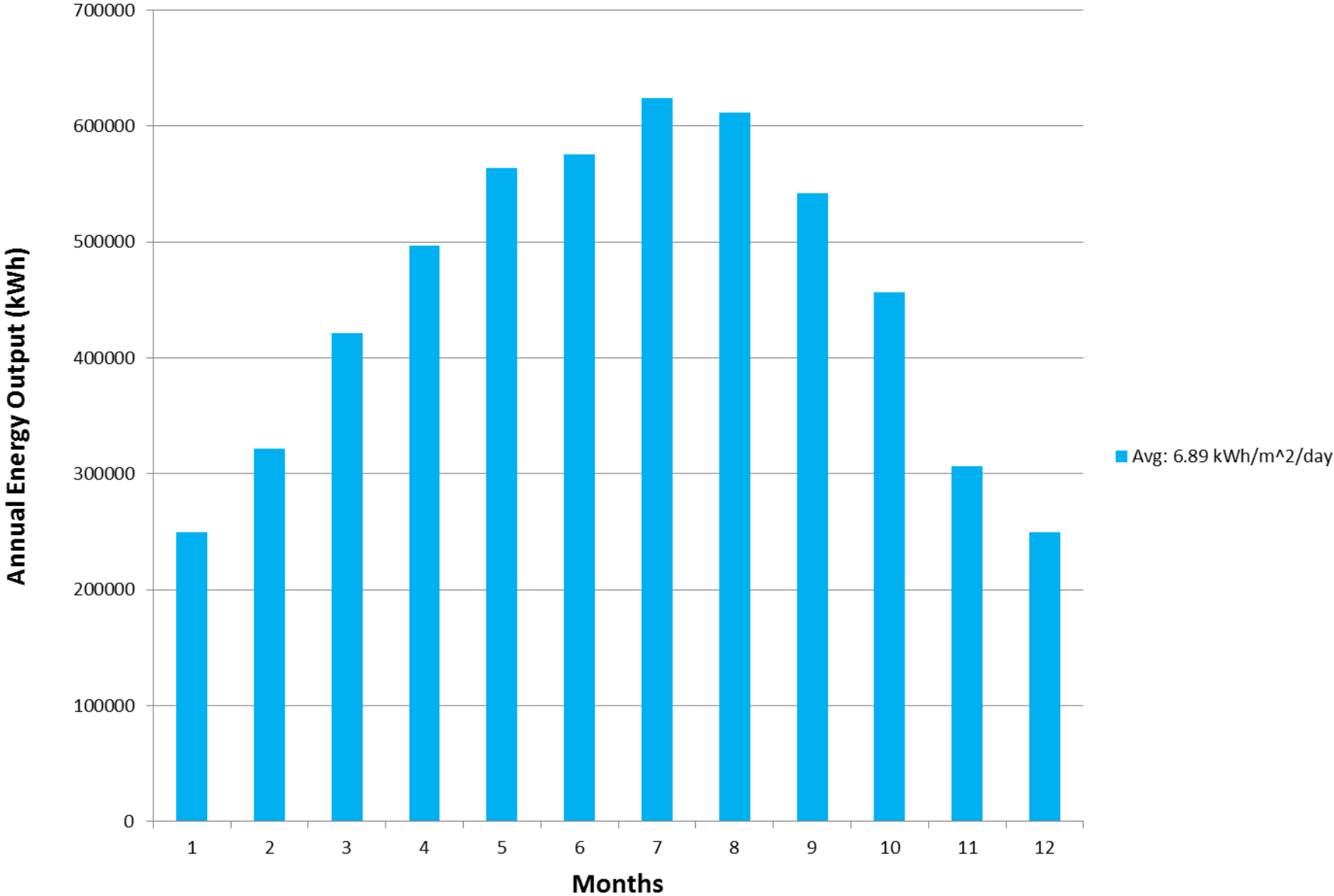
Monthly & Yearly Avg. Solar Radiation for Fixed PV Array Fixed

Fixed PV Array Fixed Facing South



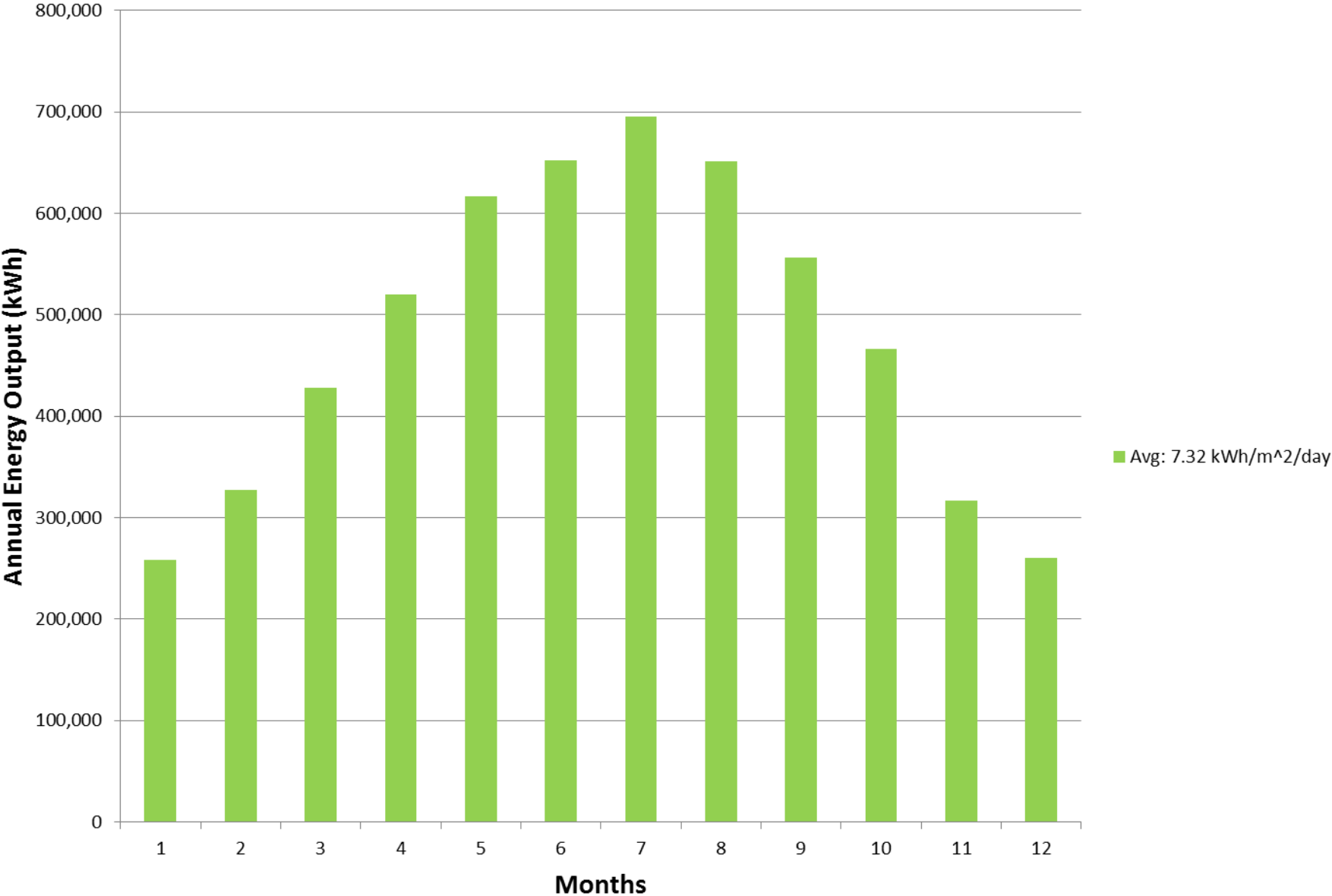
Monthly & Yearly Avg. Solar Radiation for Single Axis PV Array

Single Axis PV Array Fixed Facing South

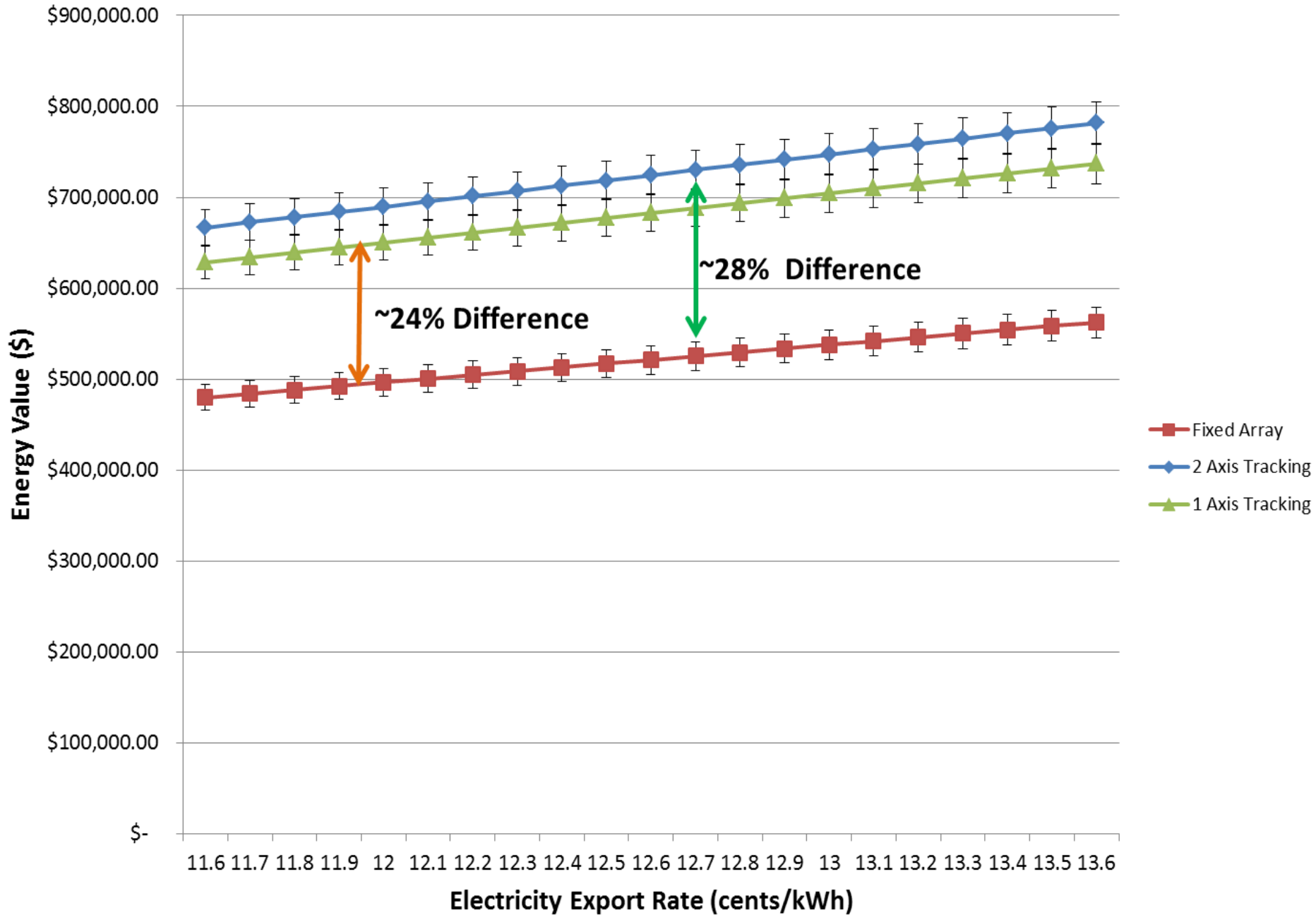


Monthly & Yearly Avg. Solar Radiation for Two Axis PV Array

Two Axis PV Array Fixed Facing South



Energy Value vs Electricity Export Rate for 3 MW



Monthly & Yearly Avg. Solar Radiation for Single Axis PV Array

- Fixed solar array and its components: \$.18 per watt installed
- Single axis tracking system and its components: \$.22 per watt installed
- Two axis tracking system and its components: \$.27 per watt installed.
- ~ 18% difference between the fixed and single axis system option.
- A single axis tracking system results in ~24% increase in energy value of electricity generated compared to a fixed array system.
- **This is a net energy value increase of 6%**

Total levelized cost of energy for solar utility near Ukiah, CA

Capacity Factor (%)	Levelized Capital Cost (\$/MW)	Fixed O&M (\$/MW)	Variable O&M (including fuel) (\$/MW)	Transmission Connection (\$/MW)	CRF	Interest rate	n	Total System Levelized Cost (\$/MWh)
25	5,165,592	11,380	0	91,871	0.08	0.06	25	233.07

- Wind energy tLCOE: \$268.14/MWh
- Biomass energy tLCOE: \$200/MWh
 - Lack of access to stable resource

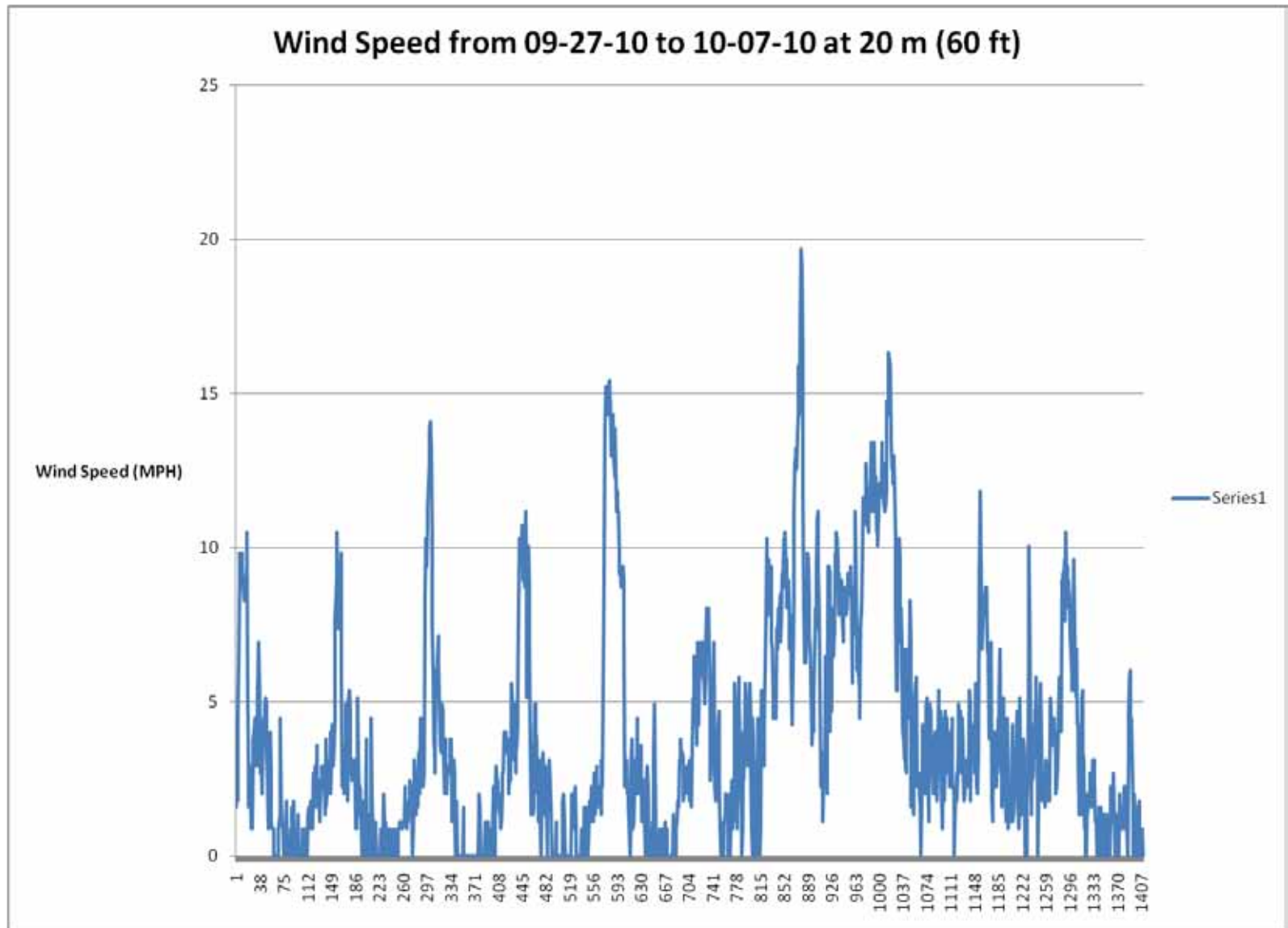
Renewable Energy Feasibility Study: Anemometer Details



More images here:

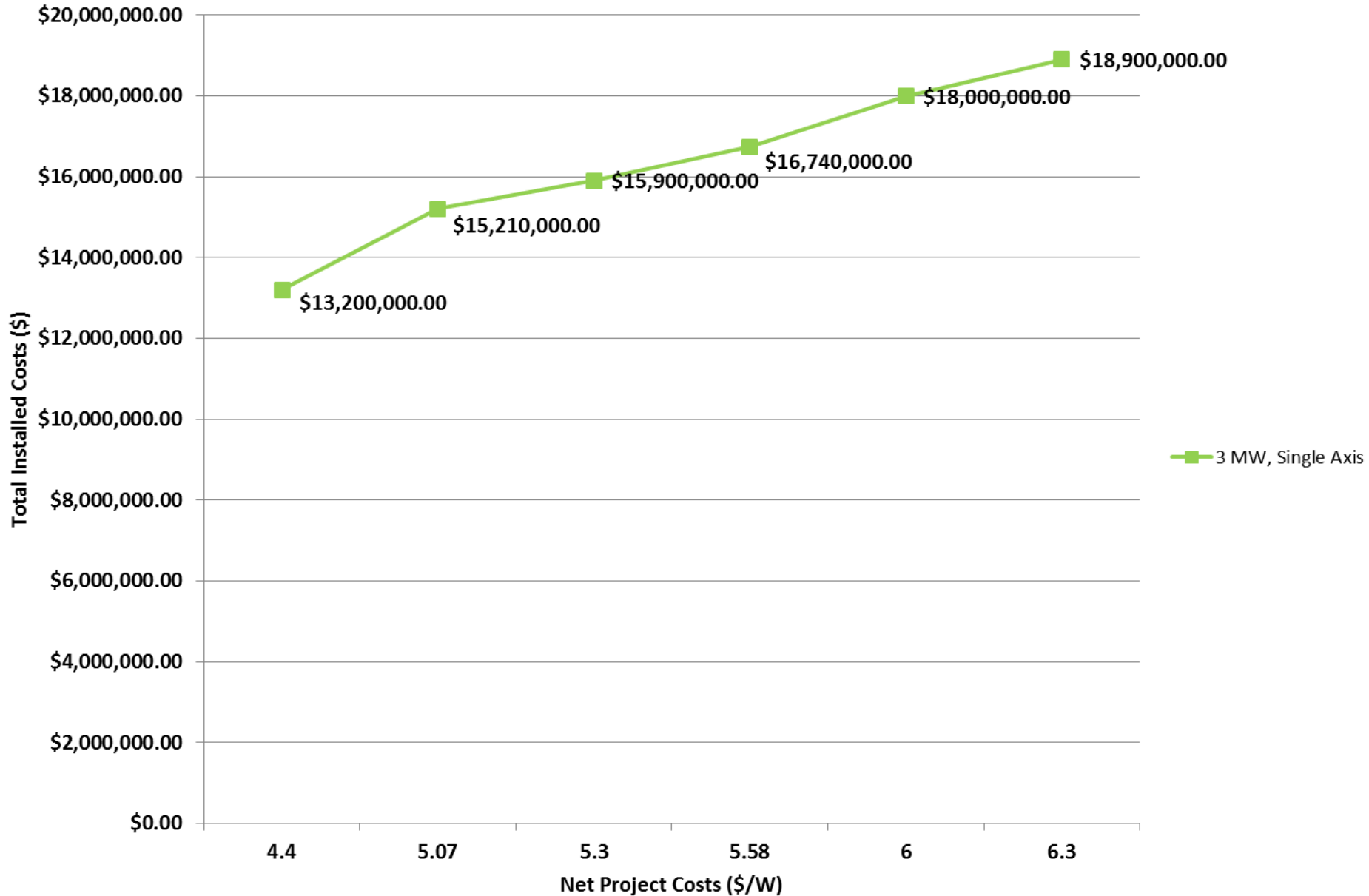
<http://www.ryanlshelby.com/2010-pinoleville-pomo-nation-anemometer-installation.html>

Sample Wind Speed Data



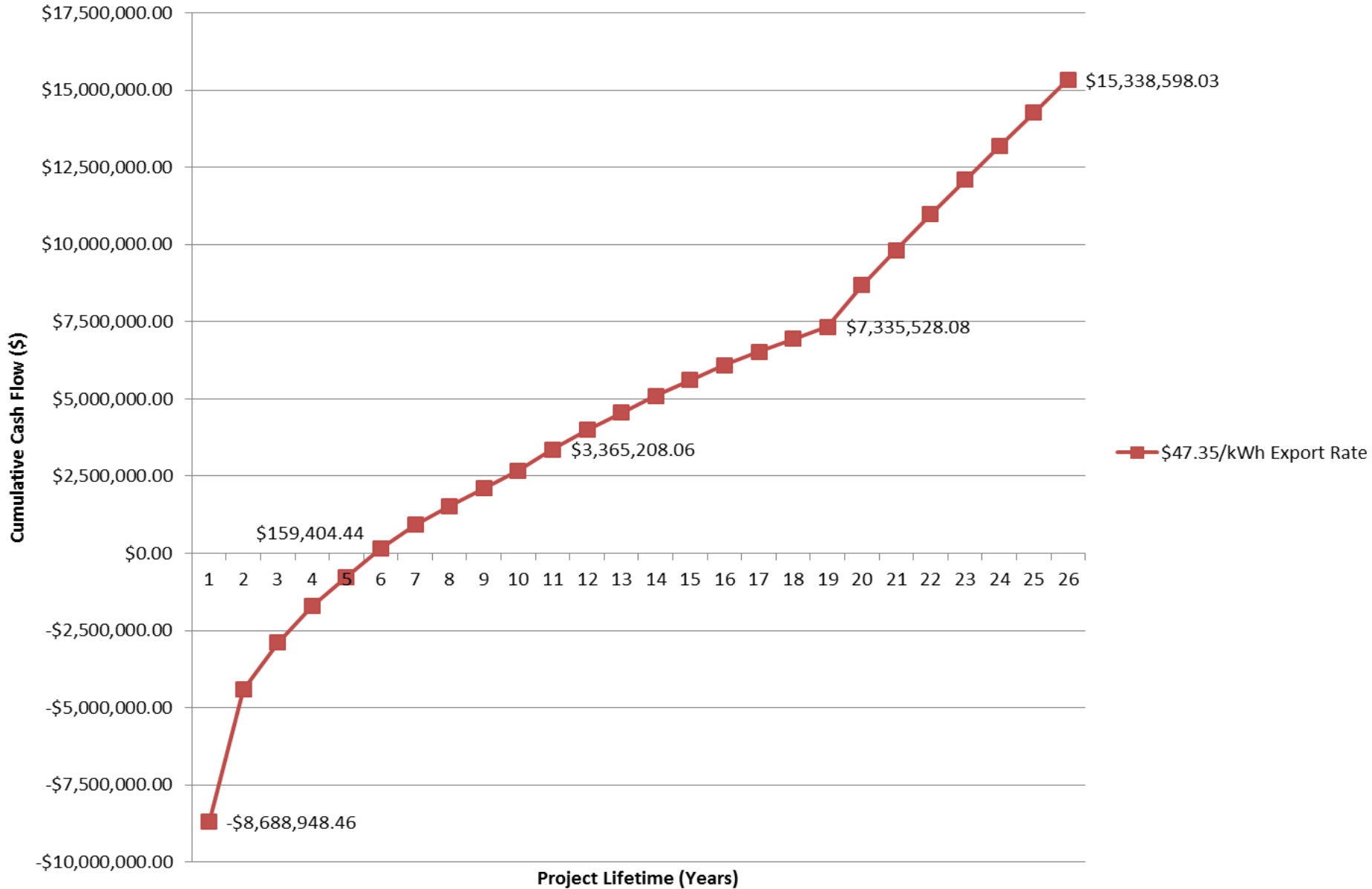
Total Installed Costs vs Net Project Costs via CREST Model

Total Installed Costs vs Net Project Costs



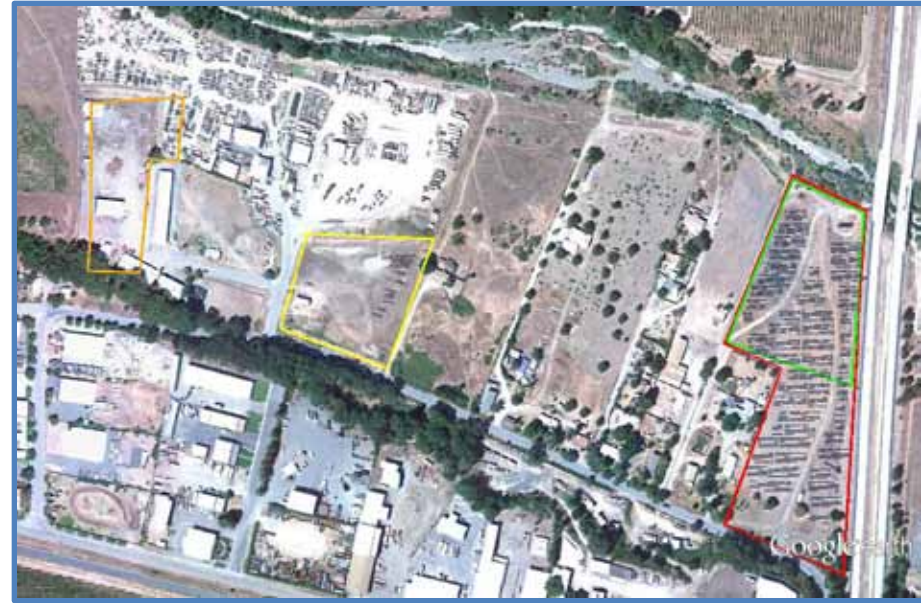
Cumulative Cash Flow at Net Project Cost of \$5.07/W, 15% IRR

Cumulative Cash Flow @ \$5.07/W Net Project Cost



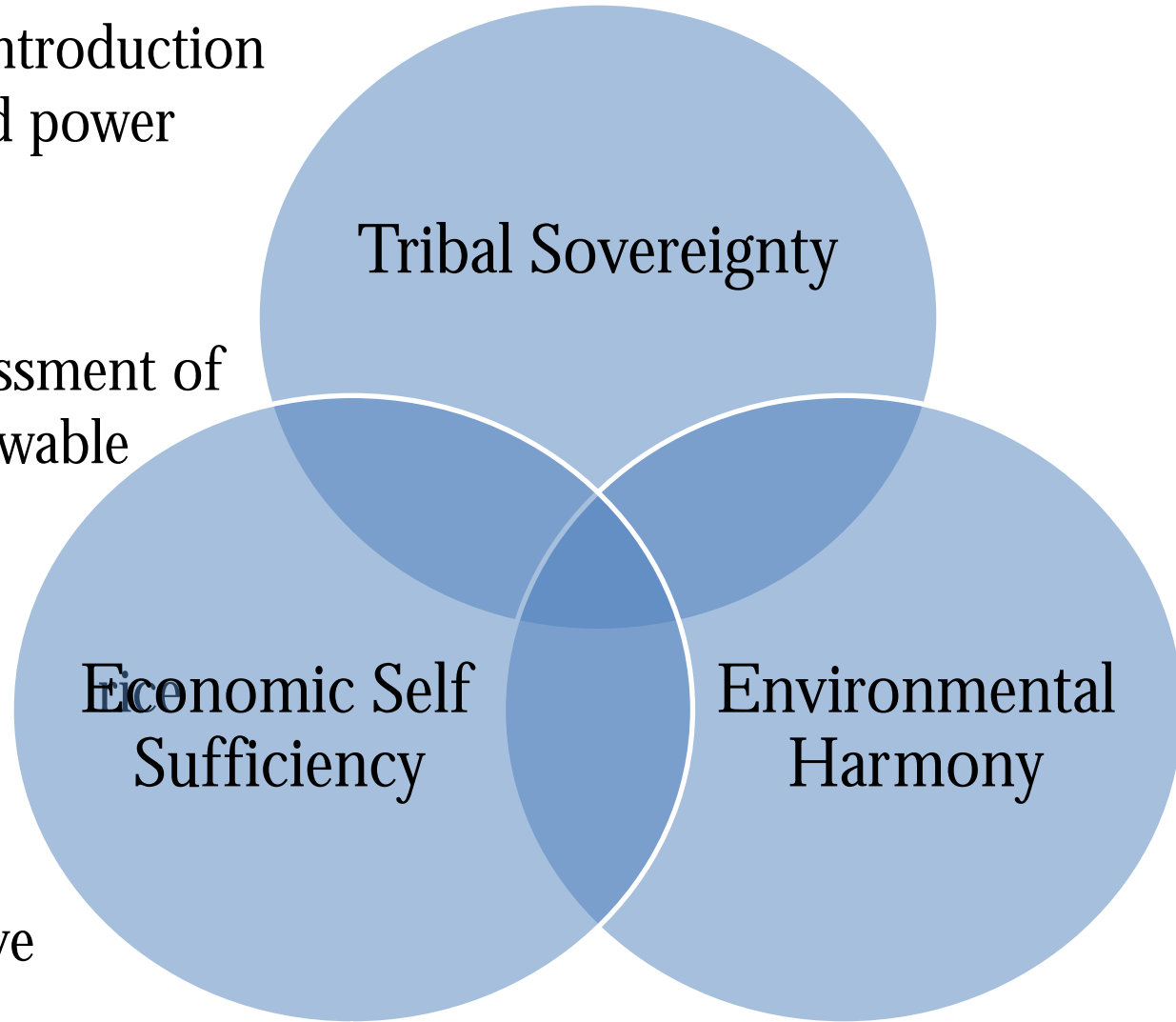
Future Research and Next Steps, Pt 1

- PPN has started talks PGE on a PPA
- Laying initial groundwork for deployment grant
- Renewable Energy Credits
- Seeking Auto dismantler site as a Brownfields site
- This is preferable location; PPN could use the other land for homes and/or EV station



Future Research and Next Steps, Pt 2

- Rebound effect with introduction of energy efficient and power generation system
- Social Life Cycle Assessment of sustainability and renewable energy systems
- Thermal efficiency of strawbale
- Net zero or net positive energy buildings



Future Research and Next Steps, Pt 3

- Marginal Abatement Cost Curve
 - \$/CO₂e
 - \$/Tribal Sovereignty
- Electric Vehicle Station
 - 500 miles traveled with EV; would use pickup truck instead
 - Saved .23 CO₂e (metric tons)
 - Green Corridor along HWY 101
- Nissan Leaf: 24 kW-hr battery
 - 100 mile range
 - 14,464.8 kWh for 60,270 miles
 - minimum array size is 10.5 kW



Q/A?
