

Pinoleville Pomo Nation

Renewable Energy Feasibility Study Status



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2009 U.S. Department of Energy Tribal Energy Program Review

November 18, 2009

Strategic Plan

- Self-sufficiency
- Job creation
- Revenue creation
- Cultural integrity



Strategy Into Energy Goals

- Choose energy technologies that reflect cultural values
- Small-scale, multi-source energy to maintain flexibility and resilience
- Potential to be off-grid
- Local M & O capability to generate jobs
- Support local projects first
- Sell enough to cover perhaps 50% of costs



Account Number:	Bill Date:	Amount Due:	Due Date:	Amount Enclosed:
954238-894-19447-1 AT 8-346	05/16/2008	\$822.58	06/02/2008	

PG&E:
BOX 987300
SACRAMENTO CA
95896-7300

PRINCETON INDIAN RESERVATION
ECONOMIC DEVELOPMENT
500 PRINCETON RD STE B
UNION CA 95483-7121

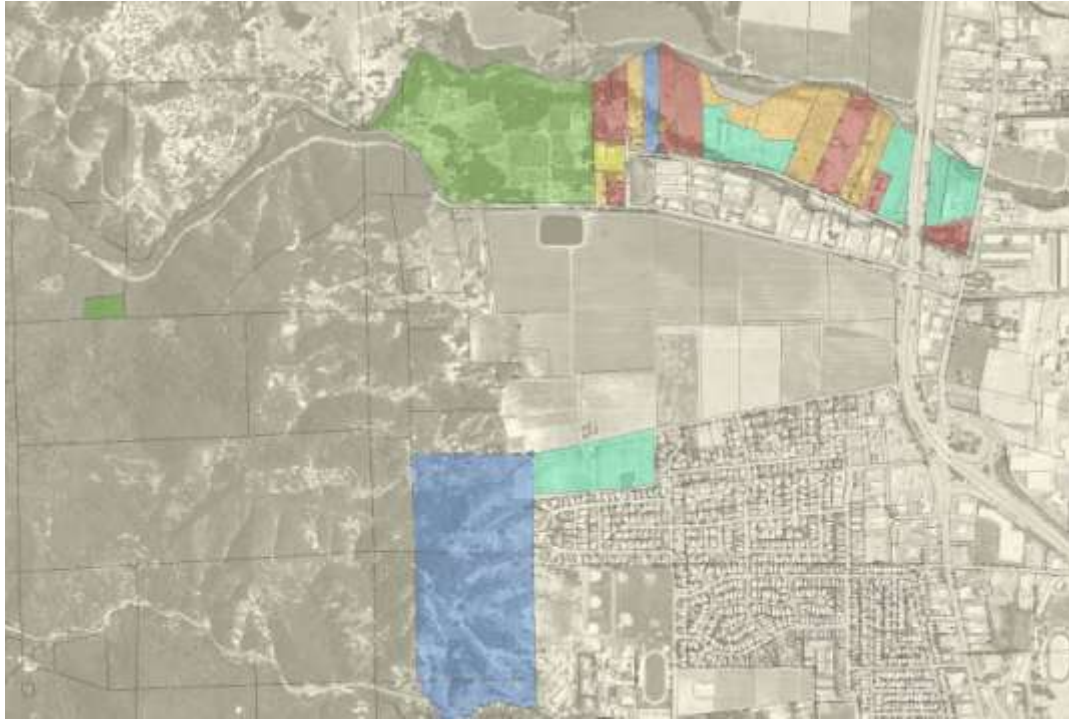
25 (11/07) Please return this portion with your payment. Thank you Reply

ACCOUNT SUMMARY		
Service	Service Dates	Amount
Electric	04/08/2008 To 05/07/2008	\$821.34
Energy Commission Tax		1.25
TOTAL CURRENT CHARGES		\$822.59
Previous Balance		2,354.30
0402 Payment - Thank You		2,354.30
TOTAL AMOUNT DUE		\$822.58
DUE DATE - 06/02/2008		

May 2008

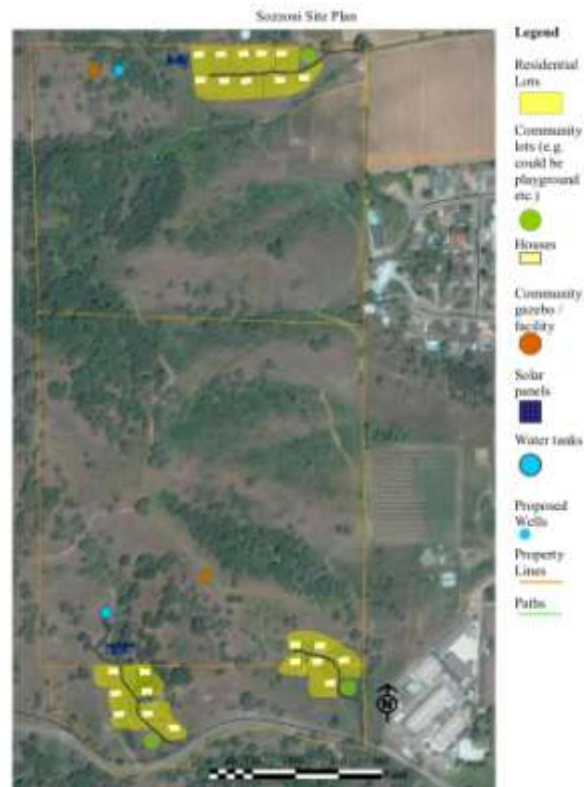


Constraints



- Small land base
- Checkerboard
- Small population
- Few in-house tech skills
- Newly back on the land
- Little money

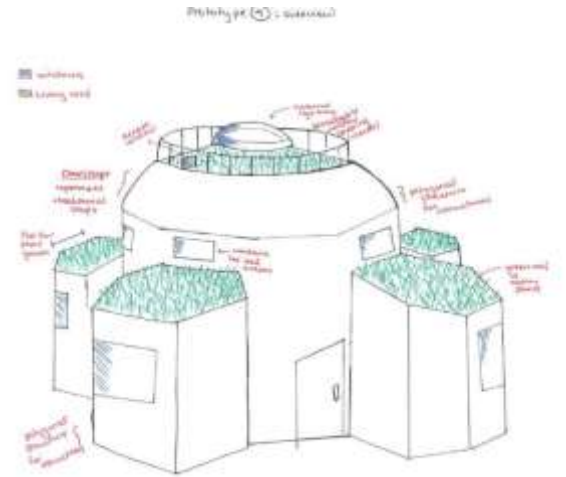
Opportunities



- New projects coming
- Access to potential markets
- Access to technical support
- Access to biomass
- Favorable micro-geography

Approach

- Multi-tribal
- Small pilot projects to test principles, build support, develop capacity
- Tied to other projects (prototype house)
- Co-design process
 - Tribal citizens as experts/designers
 - Centering cultural values
 - Providing educational opportunities



Introduction to CARES

- CARES is an engineering and sustainability assessment organization based at UCB
- Participants include community, industry, academia, and government reps
- Team members disciplines:
 - Engineering (Mechanical, Electrical, Civil)
 - Architecture
 - Business
 - Environmental Design and Planning

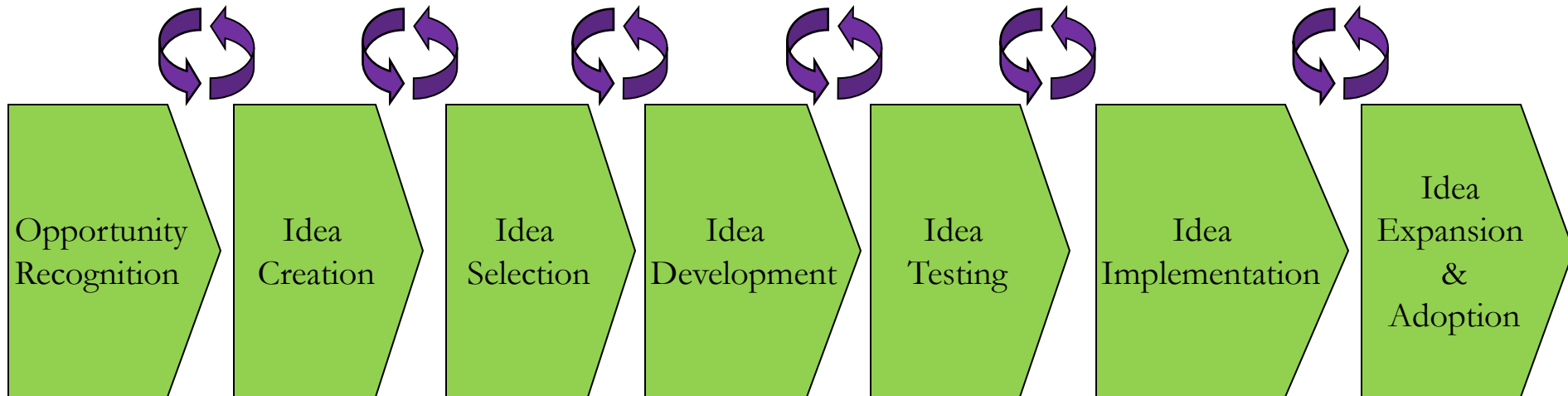


Mission of CARES

- Enable consumers and stakeholders to make informed decisions about sustainability and renewable energy technologies
- Co-design and implement solutions that meet end user needs



New Product Development (NPD) Process



Central Tenets: Technology Driven Design Methodology

- Technology Centered Design focus:

- I. Performance
- II. Reliability
- III. Manufacturability
- IV. Price Points
- V. Time to Market



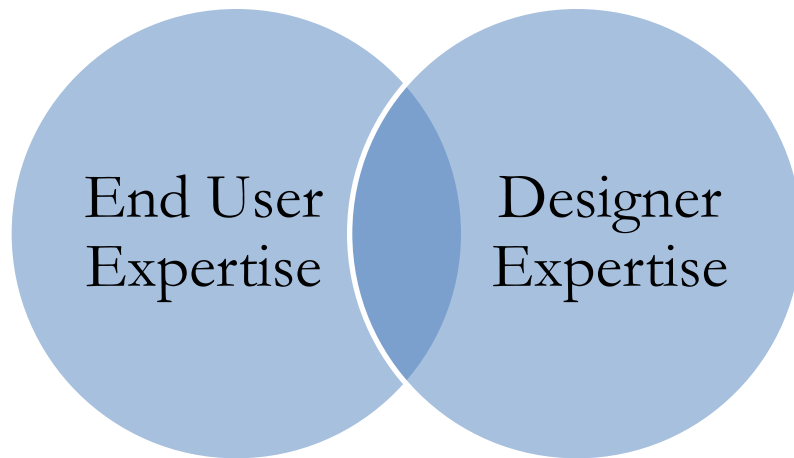
Central Tenets: Co-Design Methodology

- Co-Design focus:

I. End user is expert on needs

II. End users and designers both control idea creation

III. Idea creation is done in the usage environment



Codesign: Innovation Workshop 2008

- Workshop held to understand needs and brainstorm concepts with PPN.
- Focus on is on the principles and goals of end user
- Good and Bad Technology Round Robin Session
- Split Group User Needs Assessment Session
 - Elders
 - Adults
 - Youth
- Brainstorming on Conceptual Designs Session

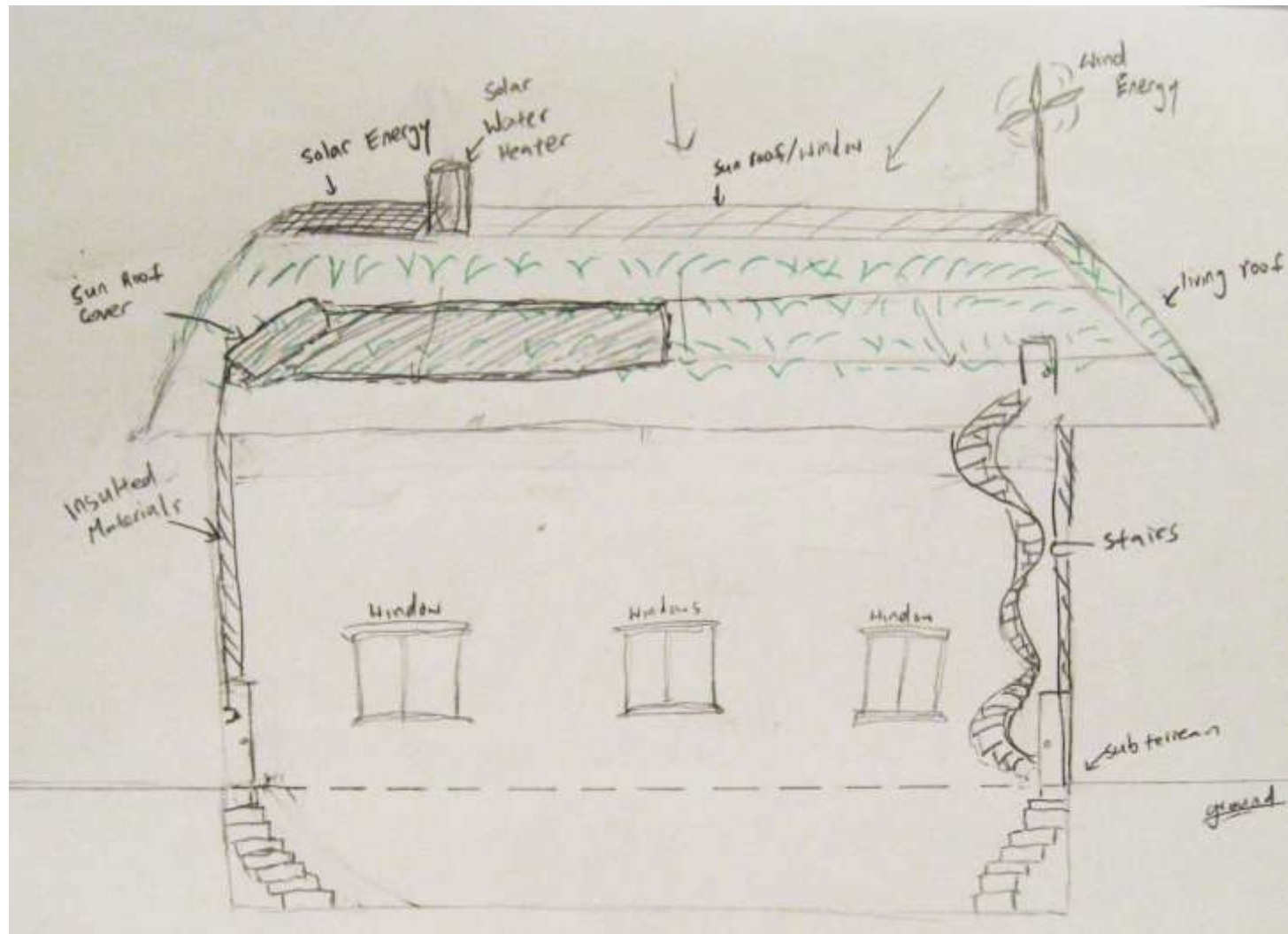


Innovation Workshop 2008: Top Needs and Metrics

- Learn and Use Traditional Techniques (Cultural Values)
 - Round Shape
 - Natural Materials
- Energy Conservation
- Water Conservation
- Privacy
- Exercise
- Storage
- Safety
- Comfort
- Lower Energy Costs
- Space



Innovation Workshop 2008: Co-designed Concepts



Conceptual Home Design 1 with Solar and Wind Power Generation

Innovation Workshop 2008: Co-designed Concepts



Conceptual Home Design 2 Wind Power Generation and Grey Water

Innovation Workshop 2008: Co-designed Concepts



Conceptual Home Design 3 with Grey Water, Wind, and Solar Power Generation

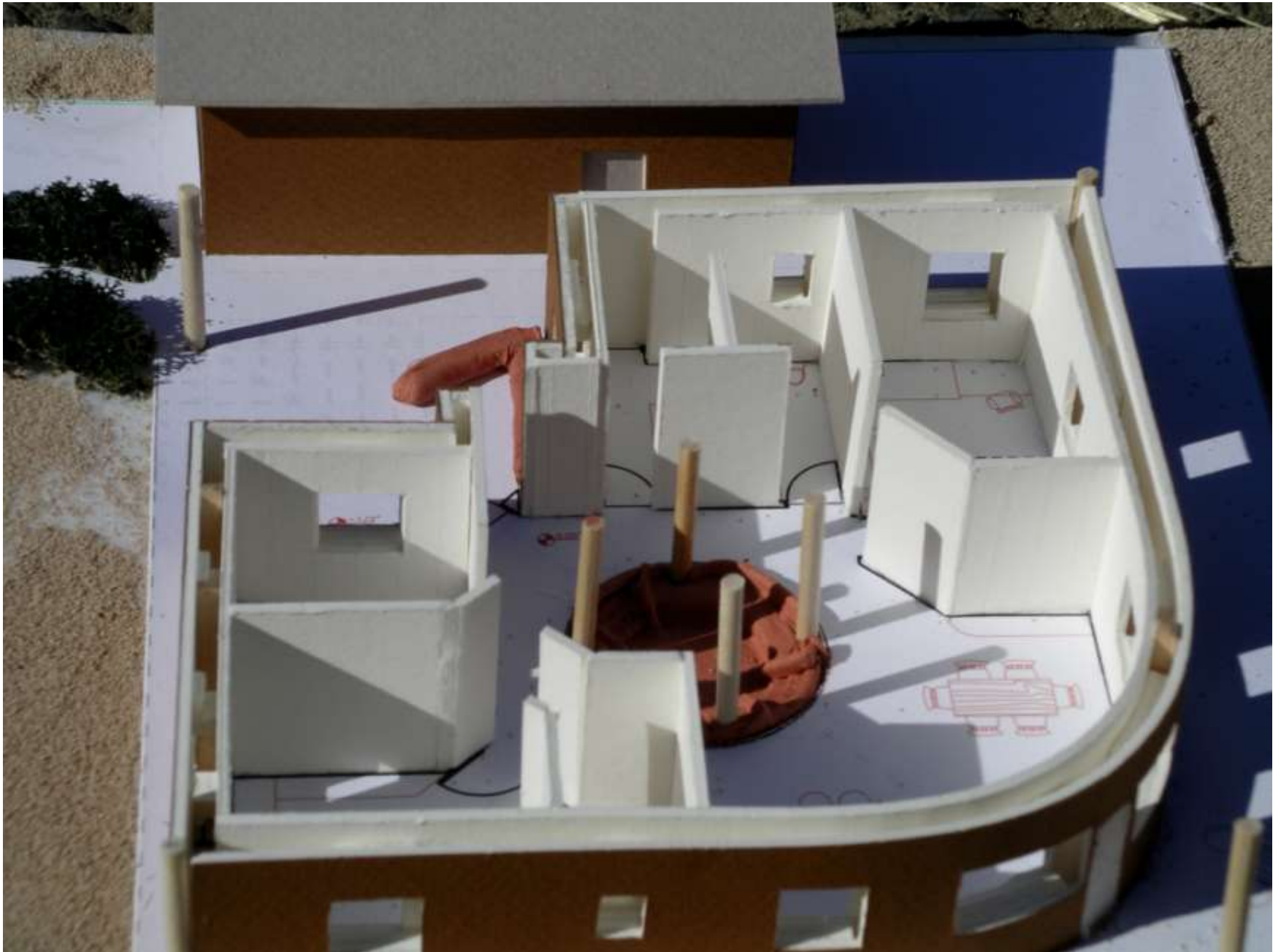
Pomo-inspired Housing Prototype



Final Housing Design: Innovation Workshop 2009



Final Housing Design I: Summer 2009



Draft Plan 'A' for PPN Sustainable Home

Plan not to scale

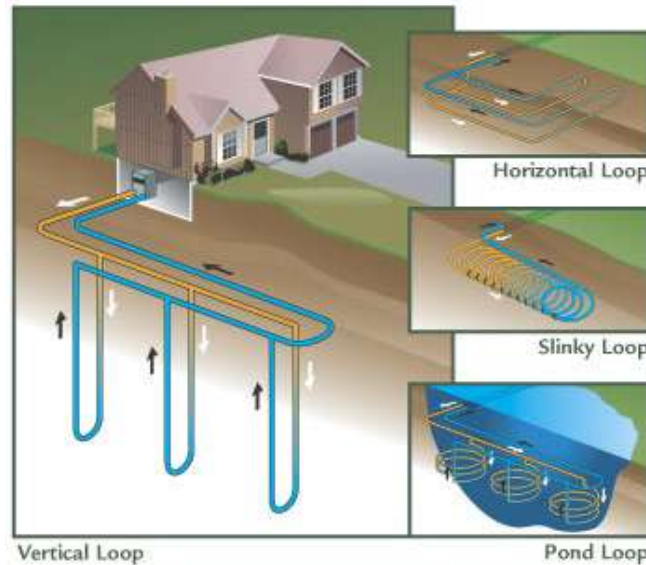
North is ↑



Renewable Energy Feasibility Study: Overview

- Focus areas:

- micro-hydroelectric,
- moderate-temperate geothermal electrical,
- geothermal heat pumps,
- biomass,
- biogas,
- wind,
- solar electric,
- solar thermal

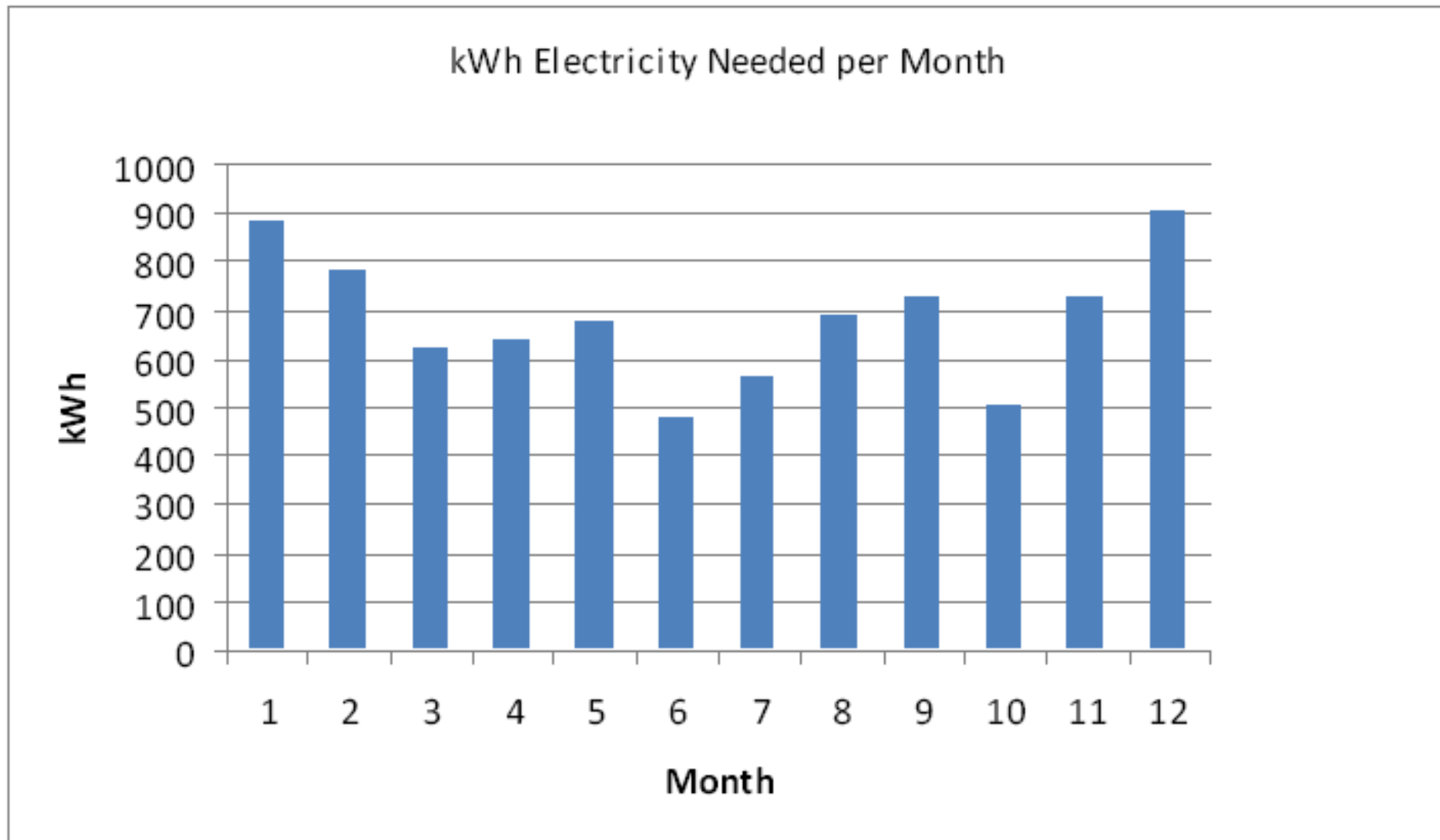


- Deliverables:

- Deployment and development plan that has the renewable energy options and designs that meets the PPN's cultural, environmental, and economic requirements

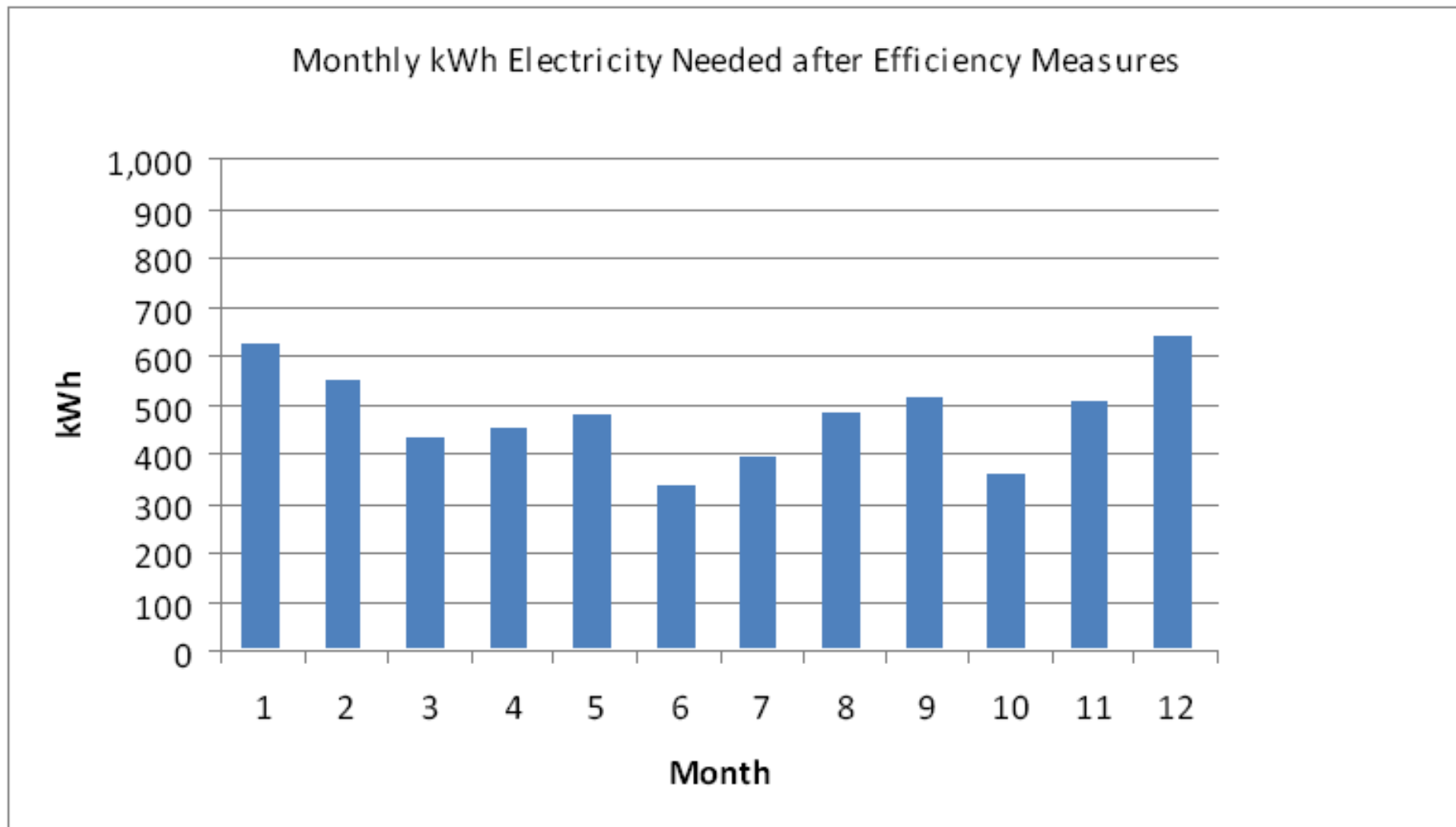
Renewable Energy Feasibility Study: Work Done So Far

- Historical Avg. Electricity Consumption of PPN Homes



Renewable Energy Feasibility Study: Work Done So Far

- Estimated Avg. Electricity Consumption of PPN Homes after Efficiency

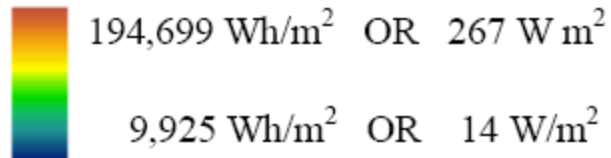


20 – 30% electricity savings projected

Renewable Energy Feasibility Study: Work Done So Far

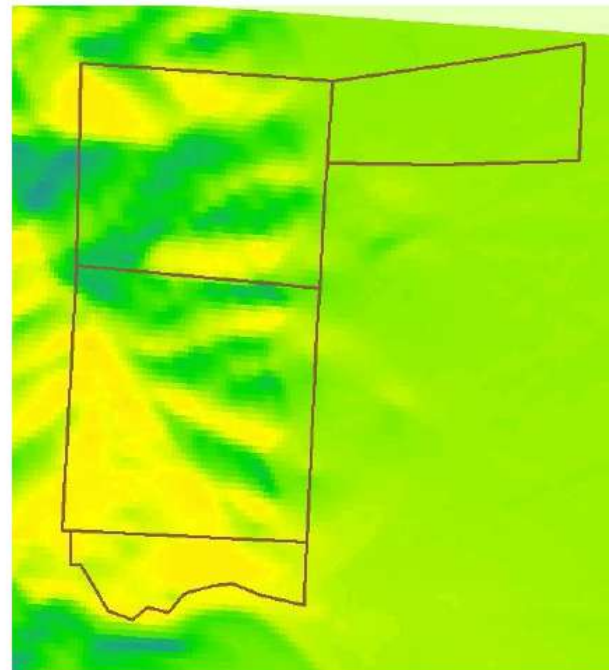
- Determined the solar insolation potential of the Sozzoni property for 2010

Figure __ Solar Radiation
(Watt-hours/m²)
January – April 2010

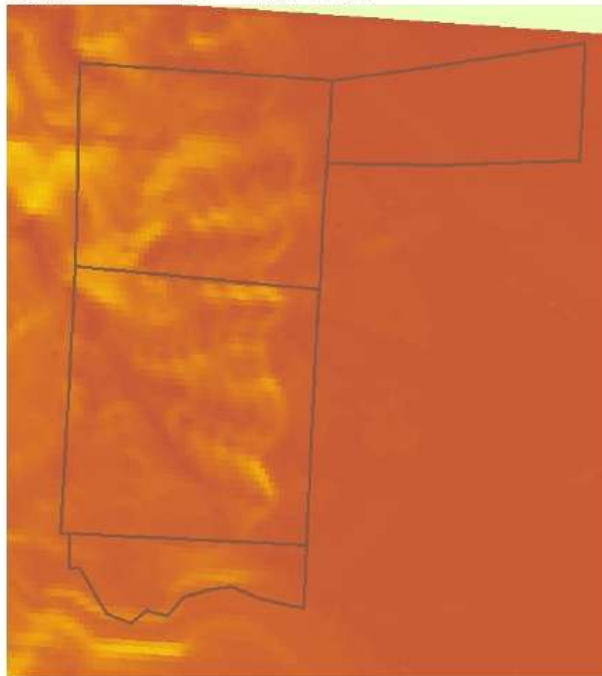


— Property boundary

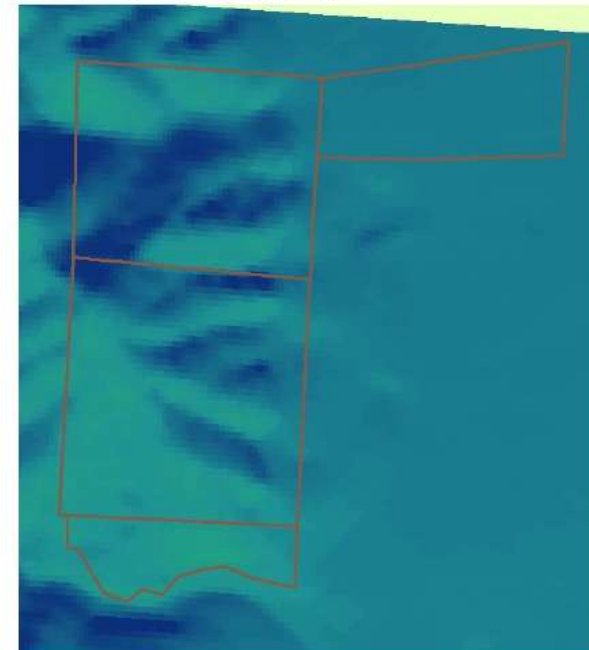
March 53 - 170 W/m²



June 174 - 246 W/m²



December 14 - 68 W/m²



Renewable Energy Feasibility Study: Methodology

I. Conduct Series of Innovation Workshops

- Understand previous work done
- Identify fundamental needs and preferences of Pinoleville Pomo Nation
- Prioritize focus areas and determine product specifications
- Establish synergy with other Native American Nations

II. Assessing energy potential of resources

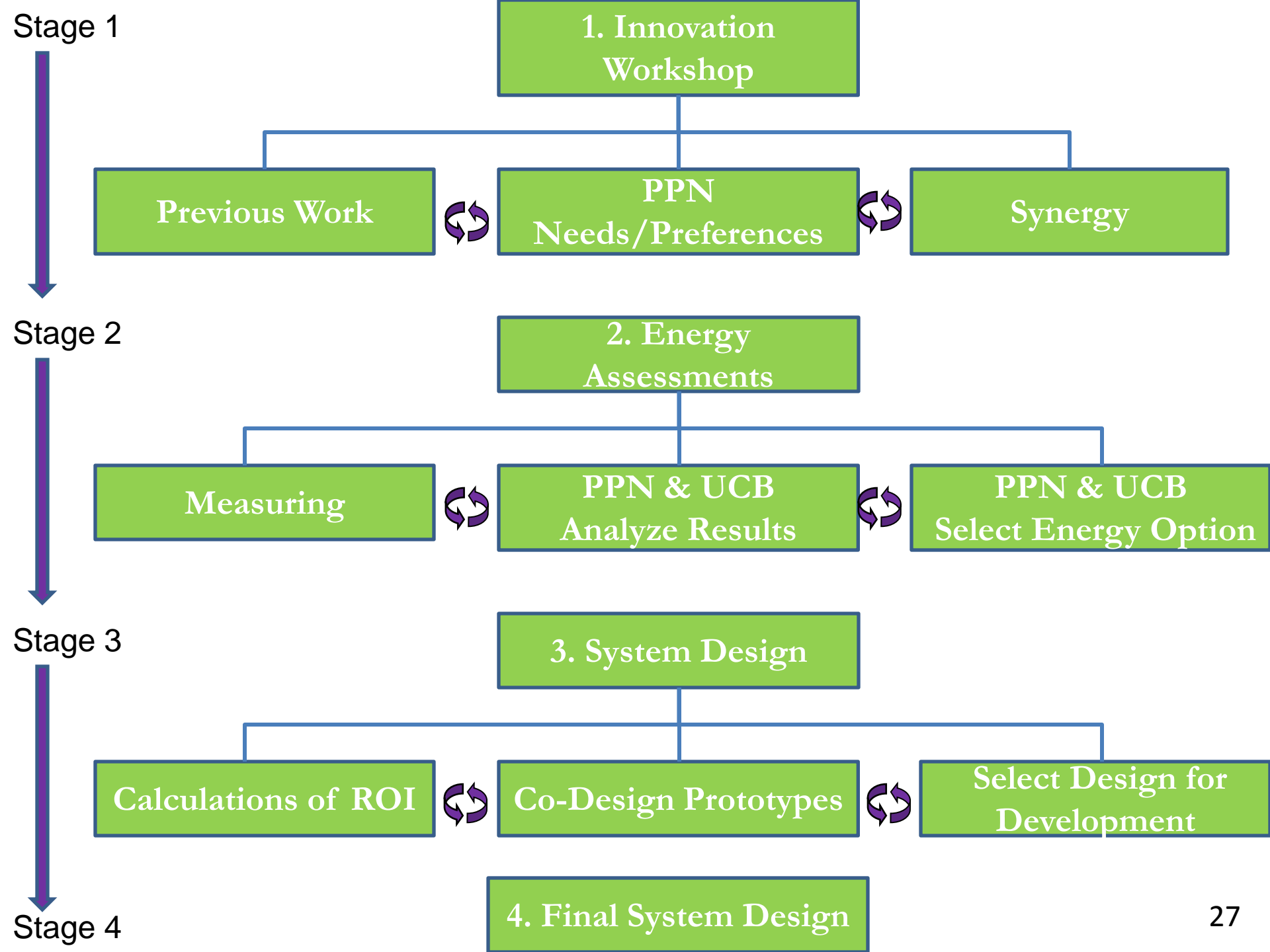
- Solar insolation
- Volume flow rates
- Wind speeds at varying heights (30 m, 50 m, 70 m, 100 m)
- Yamobida (Pomo for wind hole creek)
- Biomass potential from local forest companies
- Biogas potential from local waste

Renewable Energy Feasibility Study: Methodology, contd.



III. Co-design energy systems for deployment

- Reconvene with PPN to analyze data and design system
- Culturally appropriate
- Multi-source, resilient
- Power Generation Capacity
- Economic ROI
- Job Creation Potential
- Maintenance and Operation by PPN
- GHG emissions production and ROI
- Reliability of Supply
- Market for Sale (i.e. sell back to grid)





Final Thoughts: Lessons Learned

- There is no one standard for sustainability; merely frameworks
- Sustainability is personal; must be defined by the end user
- Key is to harness the local knowledge within end user group
- Co-design changes the power dynamics to utilize expertise of all
- Co-designing  Solutions  Willingness to Adopt

A Note on Engineering Support.

- How can small tribal nations meet engineering needs?
 - Need to have technical partners worthy of trust
 - Need to work with other tribes
 - Need to control costs
 - Prefer iterative, co-design process to assure social structures and cultural values honored
- Creating an innovation hub with CARES
 - Available and accessible to tribal nations
 - Responding to a wide range of tribal needs
 - Committed to building tribal capacity, educating youth
 - Associated with university, but responsible to tribal nations

Acknowledgements

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