Pinoleville Pomo Nation
Renewable Energy Feasibility Study Status

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

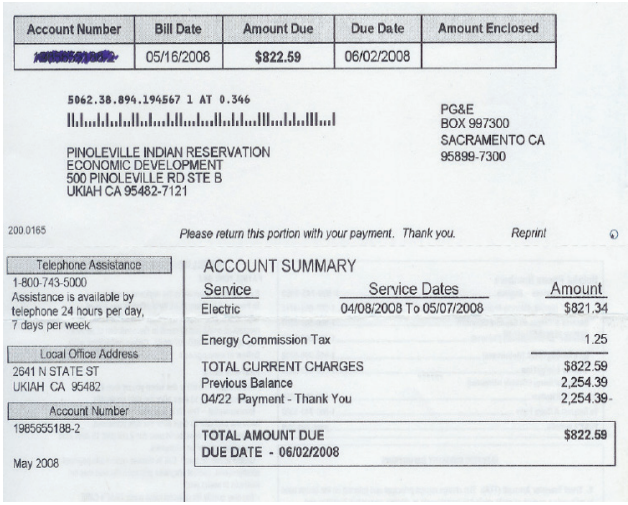
November 18, 2009

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
[redacted]	05/16/2008	$822.59	06/02/2008	

5062.38.894.194567 1 AT 0.346

PINOLEVILLE INDIAN RESERVATION
ECONOMIC DEVELOPMENT
500 PINOLEVILLE RD STE B
UKIAH CA 95482-7121

PG&E
BOX 997300
SACRAMENTO CA
95899-7300

200.0165 *Please return this portion with your payment. Thank you.* *Reprint*

Telephone Assistance
1-800-743-5000
Assistance is available by telephone 24 hours per day, 7 days per week

Local Office Address
2641 N STATE ST
UKIAH CA 95482

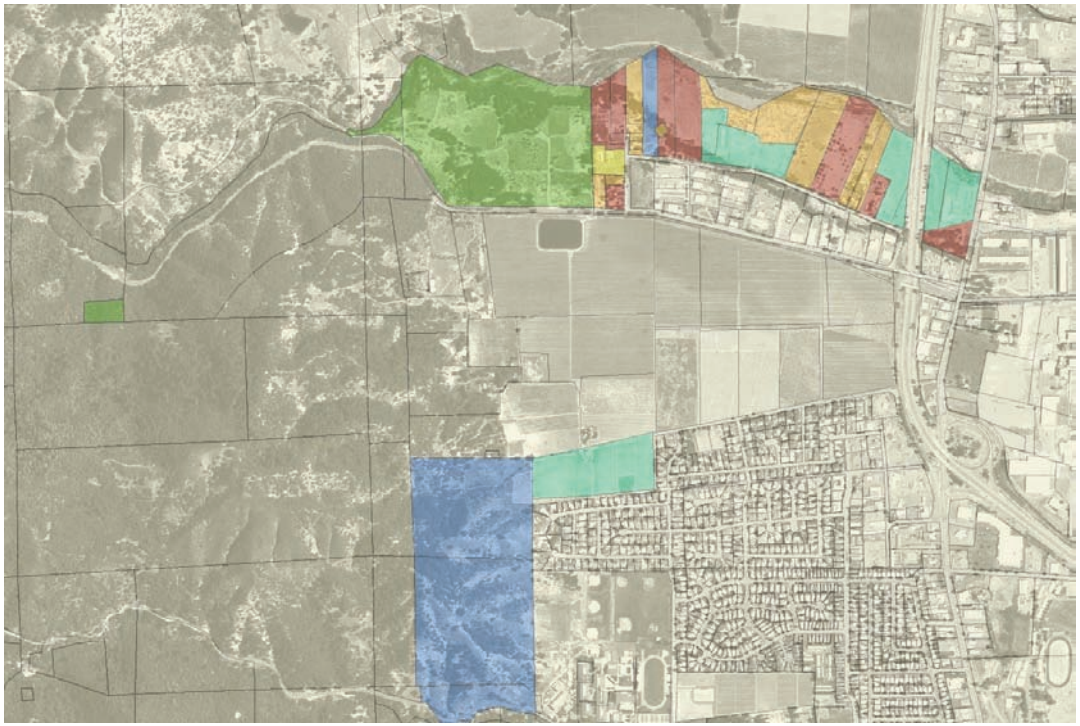
Account Number
1985655188-2

May 2008

ACCOUNT SUMMARY

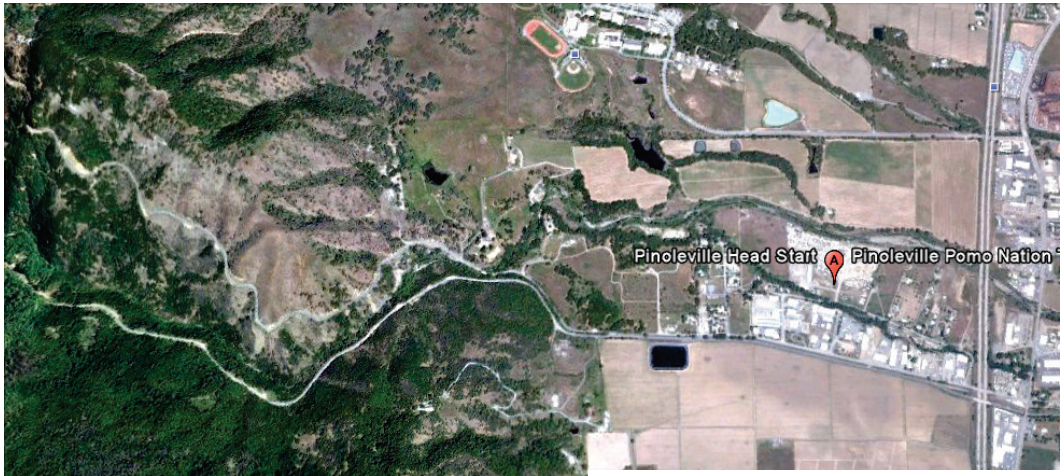
Service	Service Dates	Amount
Electric	04/08/2008 To 05/07/2008	$821.34
Energy Commission Tax		1.25
TOTAL CURRENT CHARGES		$822.59
Previous Balance		2,254.39
04/22 Payment - Thank You		2,254.39-
TOTAL AMOUNT DUE		**$822.59**
DUE DATE - 06/02/2008		

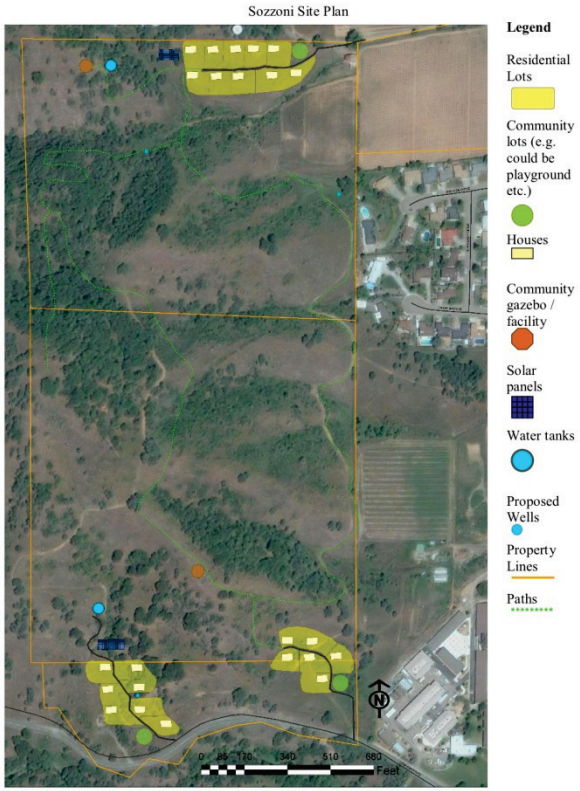
Constraints



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

Opportunities

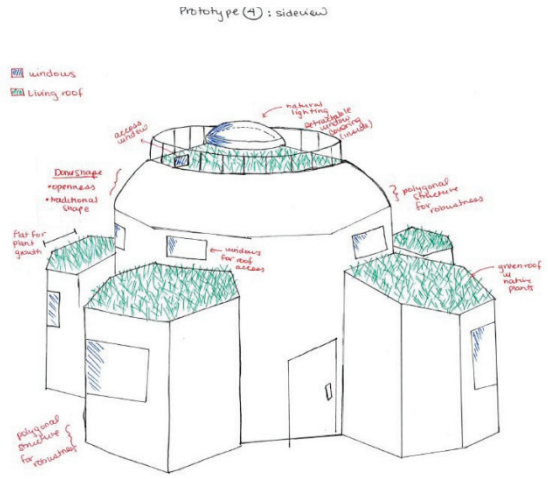




- New projects coming
- Access to potential markets
- Access to technical support
- Access to biomass
- Favorable micro-geography

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

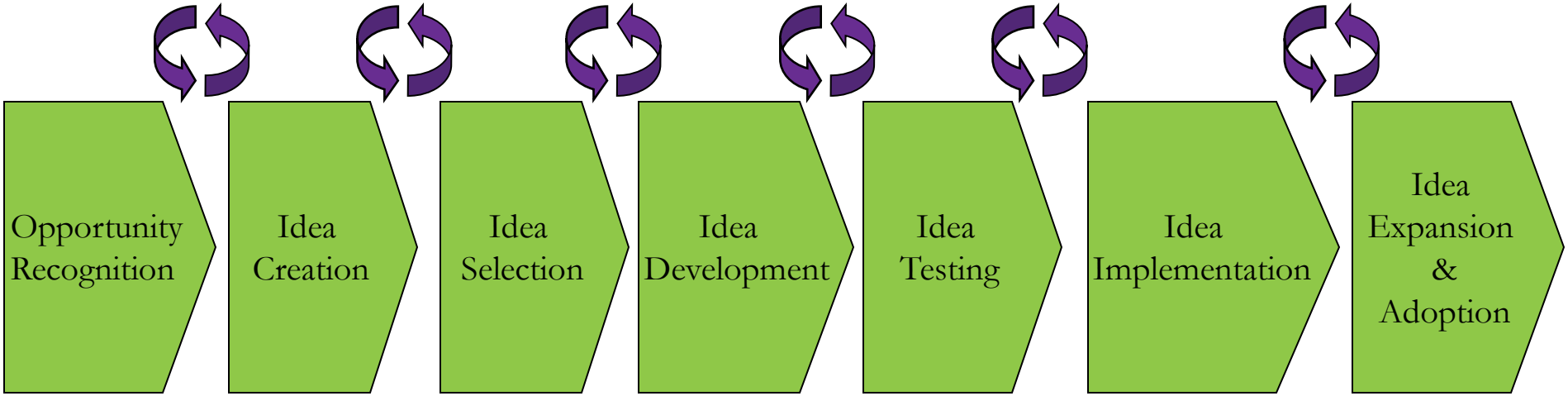
- Team members disciplines:
  - Engineering (Mechanical, Electrical, Civil)
  - Architecture
  - Business
  - Environmental Design and Planning

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

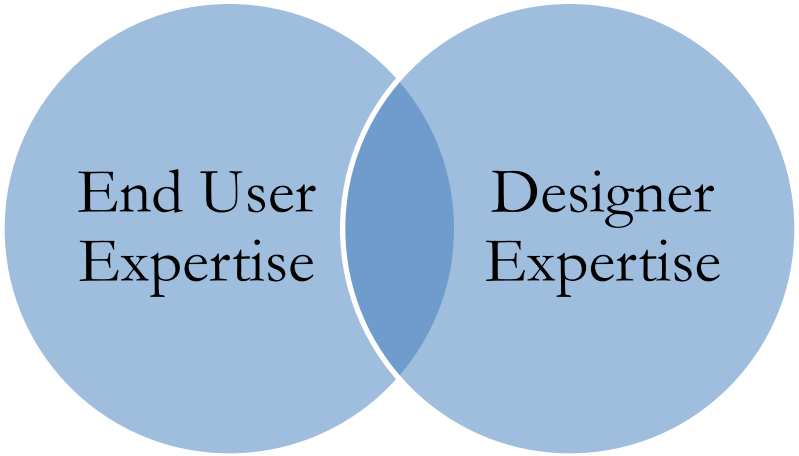
Central Tenets: Co-Design Methodology

- Co-Design focus:

I. End user is expert on needs

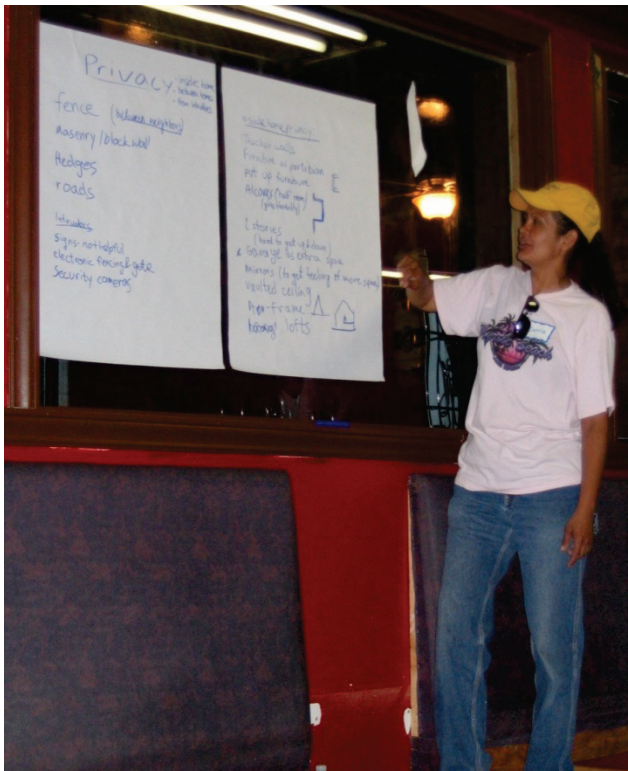
II. End users and designers both control idea creation

III. Idea creation is done in the usage environment



Codesign: Innovation Workshop 2008

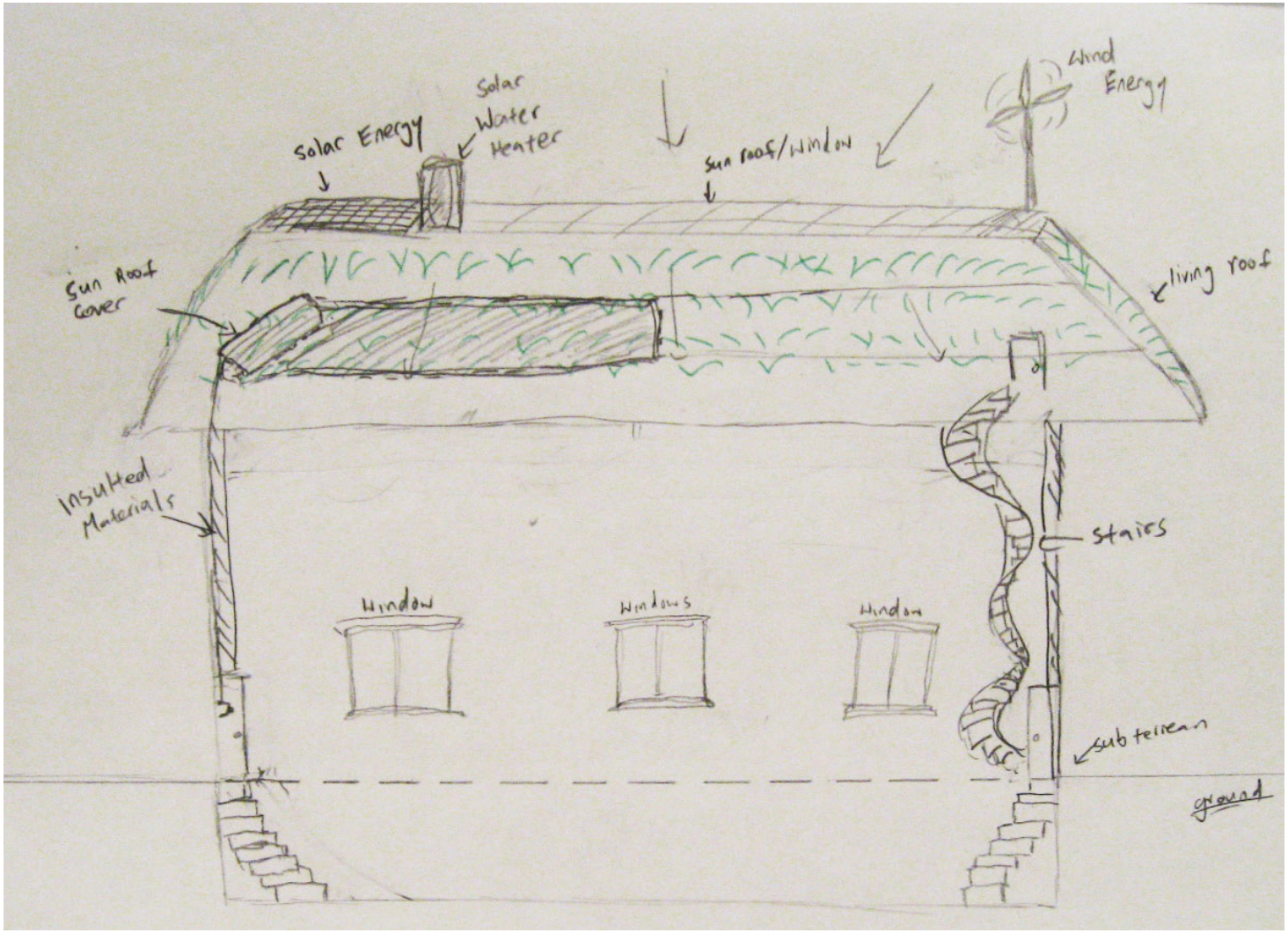
- Workshop held to understand needs and brainstorm concepts with PPN.
- Focus on is on the principles and goals of end user
- Good and Bad Technology Round Robin Session
- Split Group User Needs Assessment Session
  - Elders
  - Adults
  - Youth
- Brainstorming on Conceptual Designs Session



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

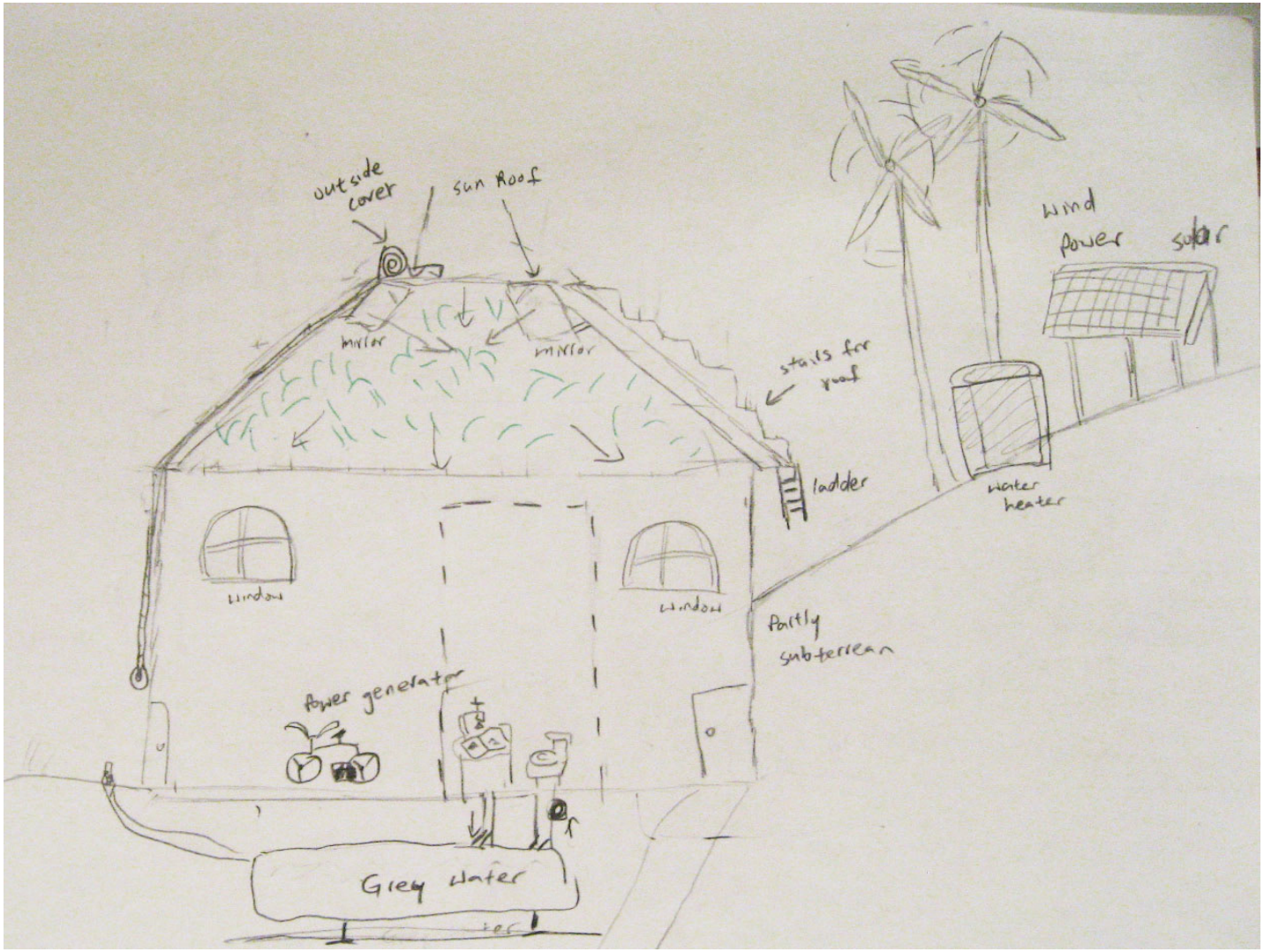


Conceptual Home Design 1 with Solar and Wind Power Generation

Innovation Workshop 2008: Co-designed Concepts

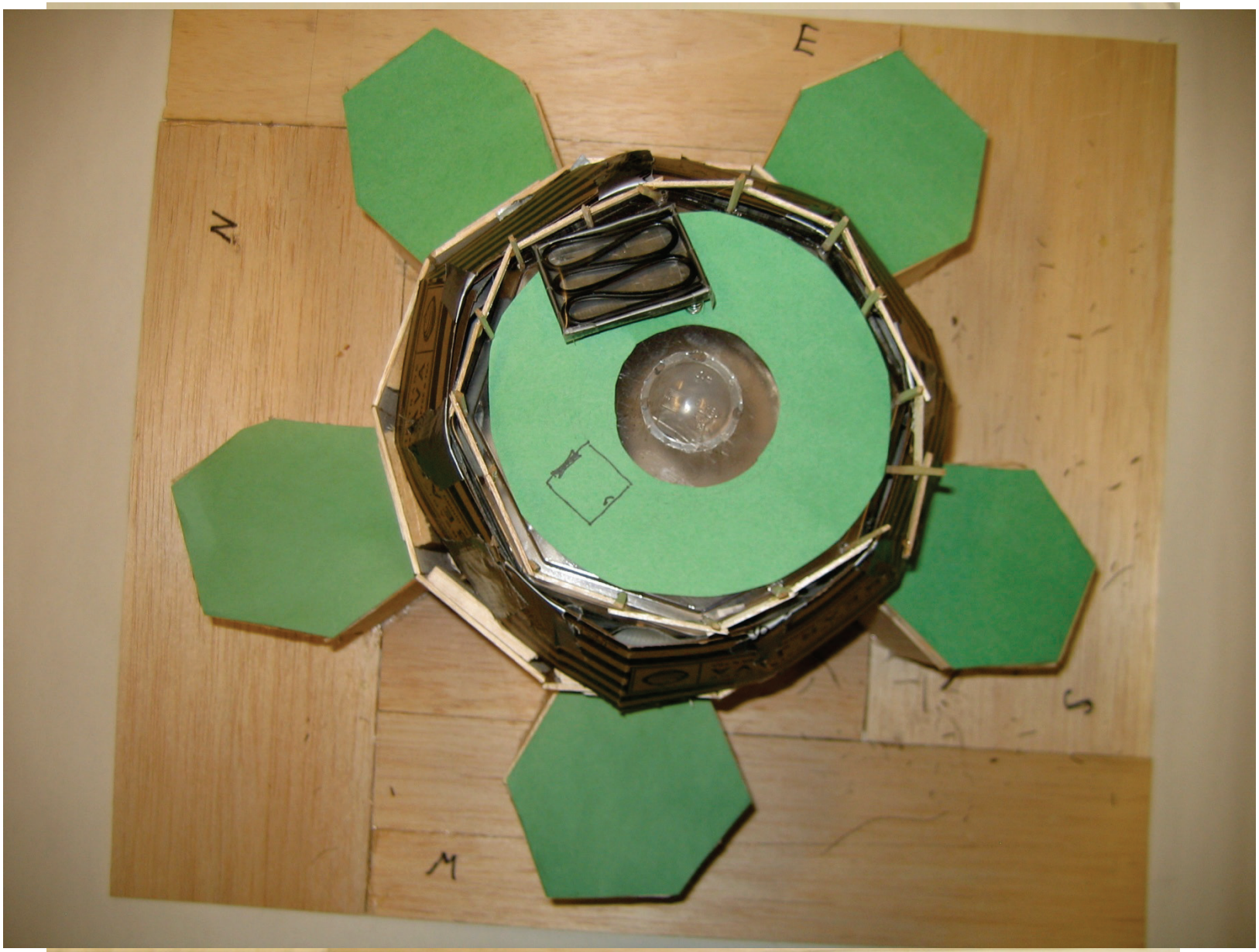
Conceptual Home Design 2 Wind Power Generation and Grey Water

Innovation Workshop 2008: Co-designed Concepts



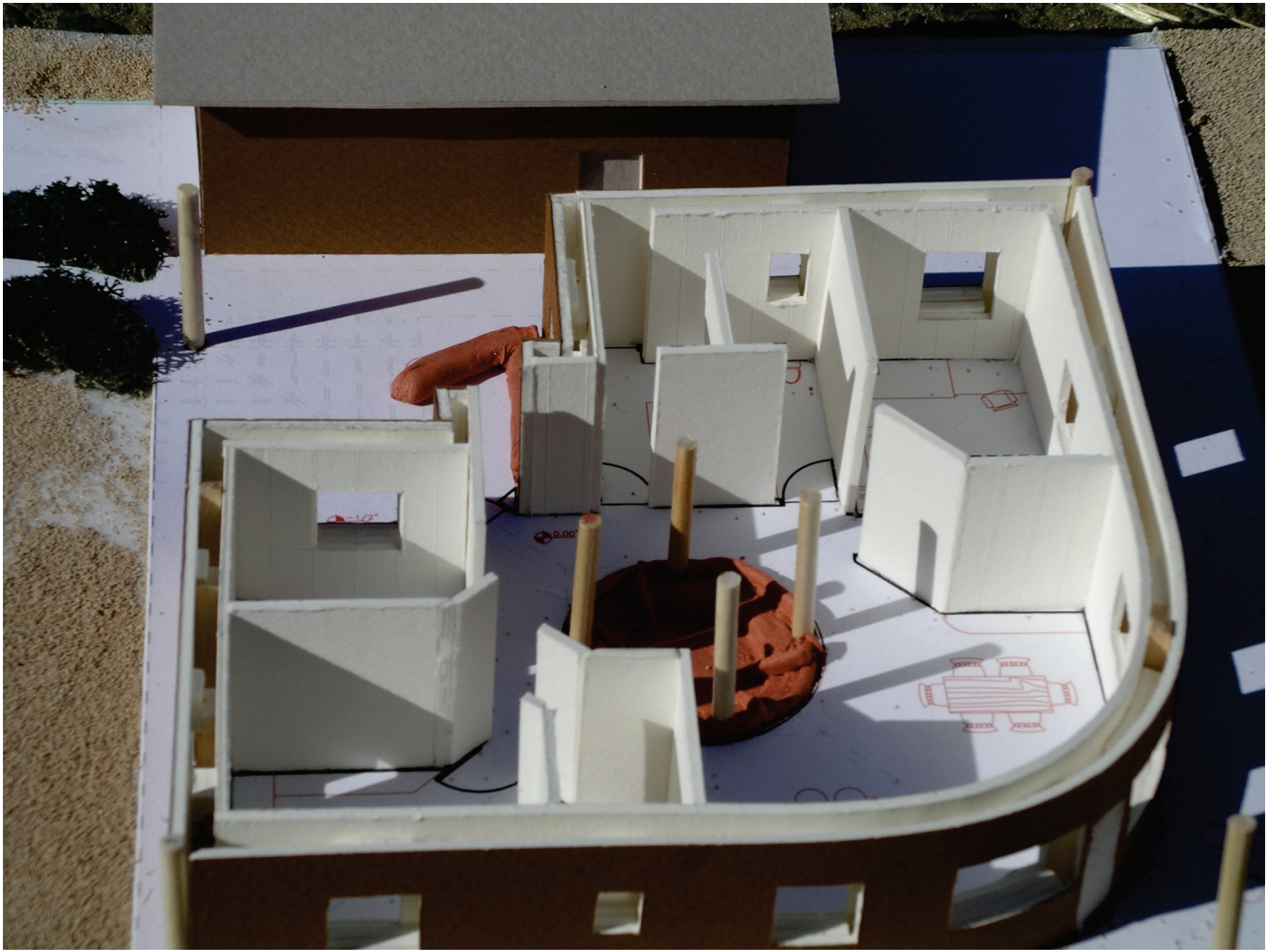
Conceptual Home Design 3 with Grey Water, Wind, and Solar Power Generation

Pomo-inspired Housing Prototype

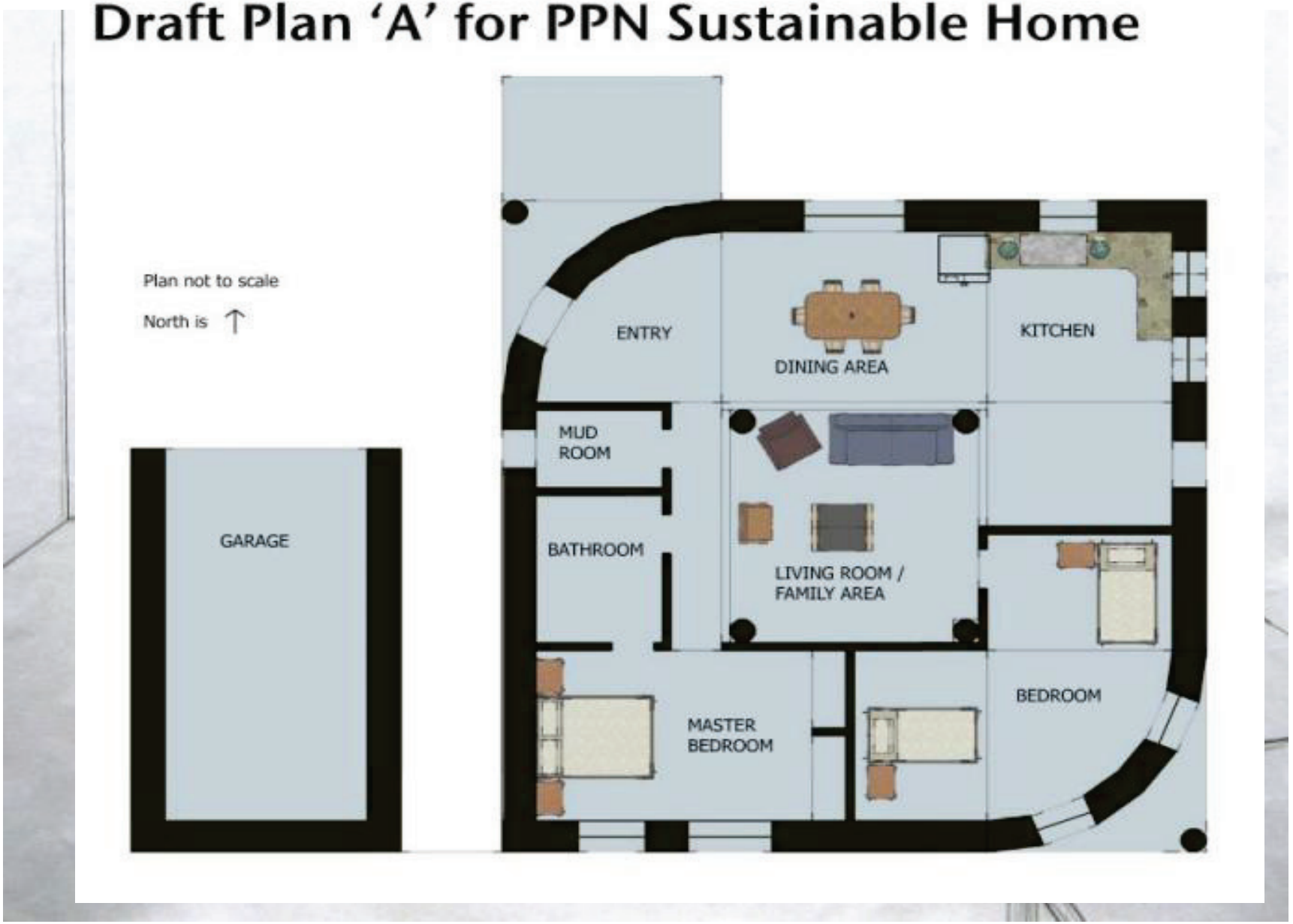


Final Housing Design: Innovation Workshop 2009

Final Housing Design I: Summer 2009

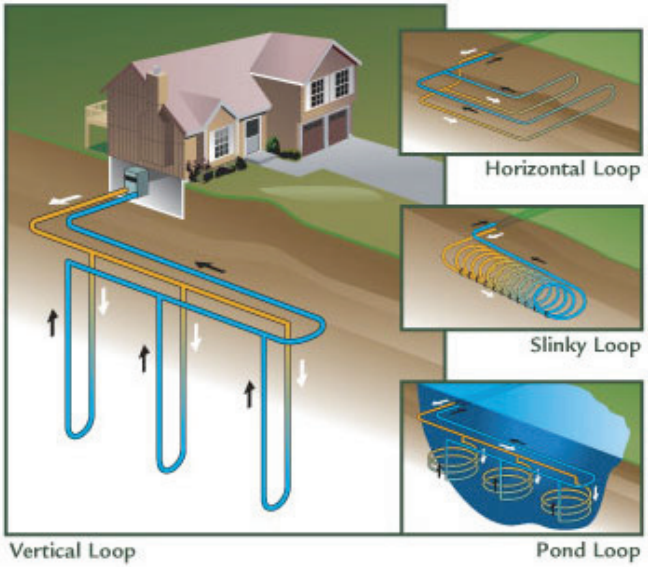


Final Housing Design II: Summer 2009



Renewable Energy Feasibility Study: Overview

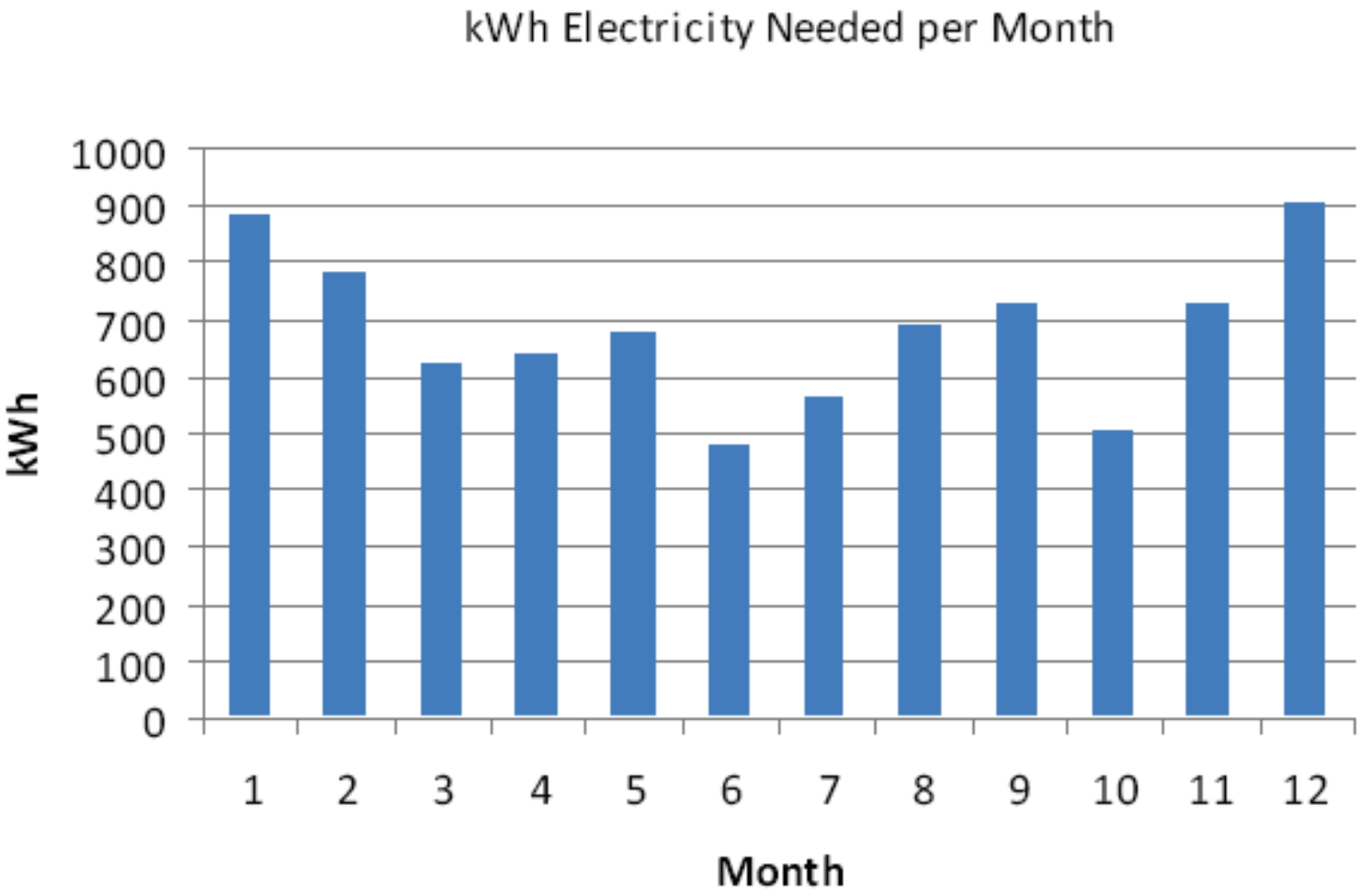
- Focus areas:
  - micro-hydroelectric,
  - moderate-temperate geothermal electrical,
  - geothermal heat pumps,
  - biomass,
  - biogas,
  - wind,
  - solar electric,
  - solar thermal



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

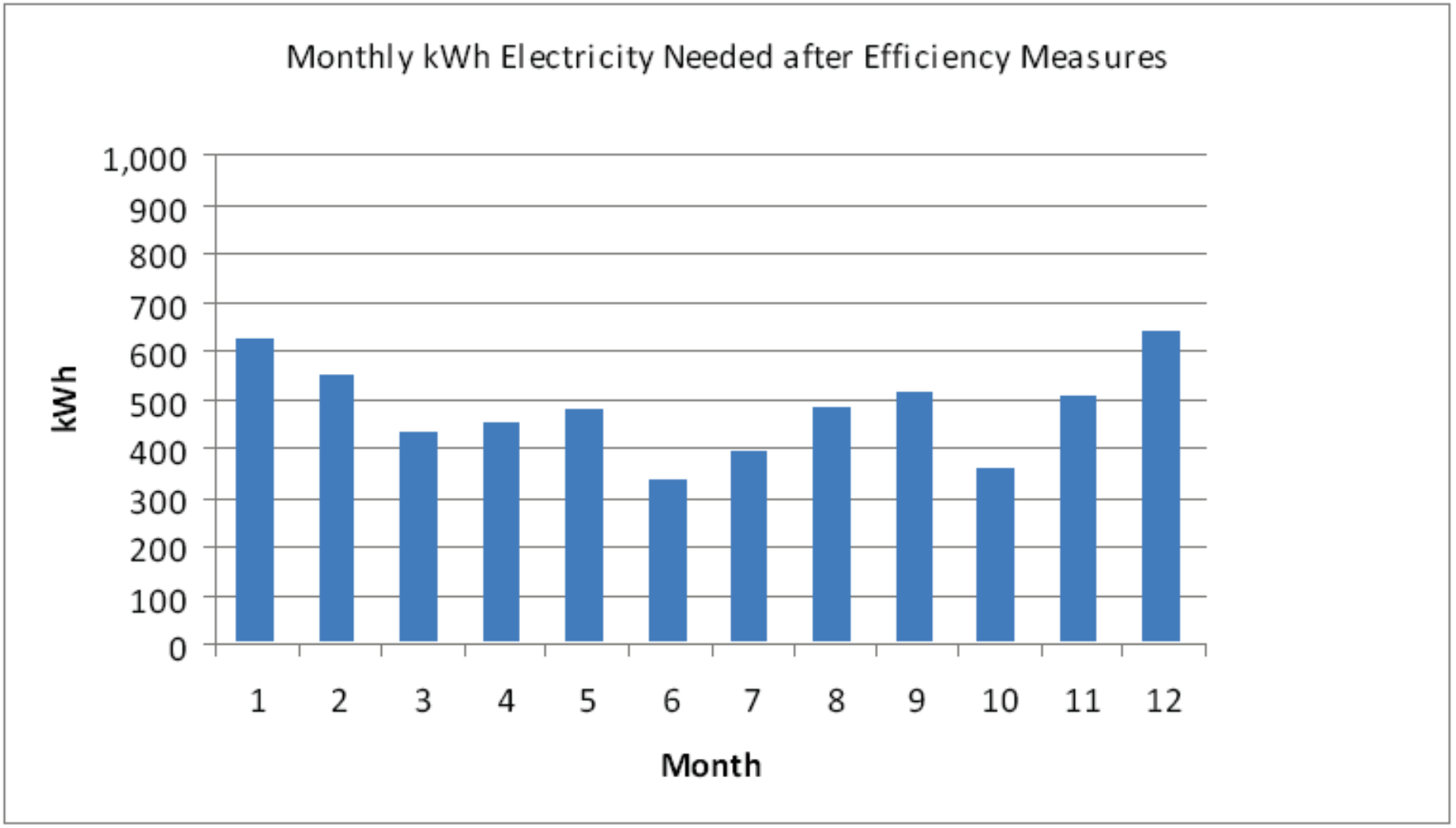
Renewable Energy Feasibility Study: Work Done So Far

- 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

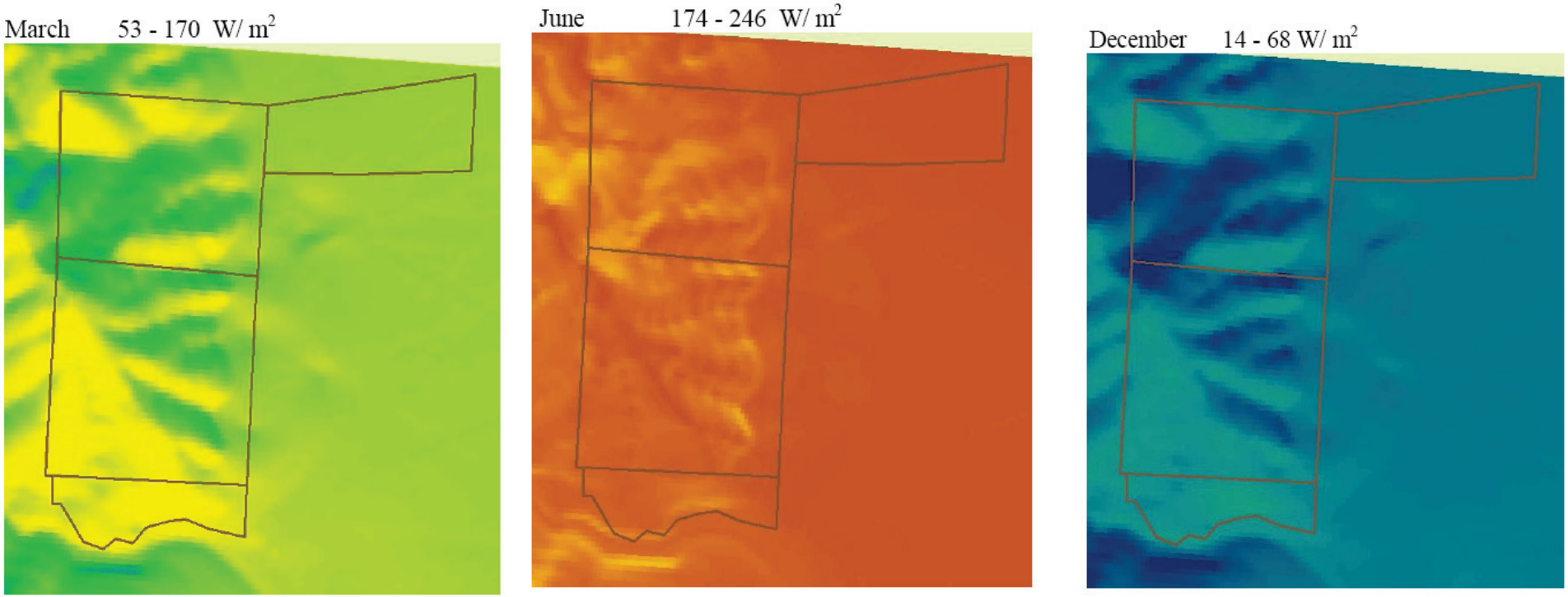
- Determined the solar insolation potential of the Sozzoni property for 2010

Figure __ Solar Radiation (Watt-hours/m^2) January – April 2010

194,699 Wh/m^2 OR 267 W m^2

9,925 Wh/m^2 OR 14 W/m^2

Property boundary



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

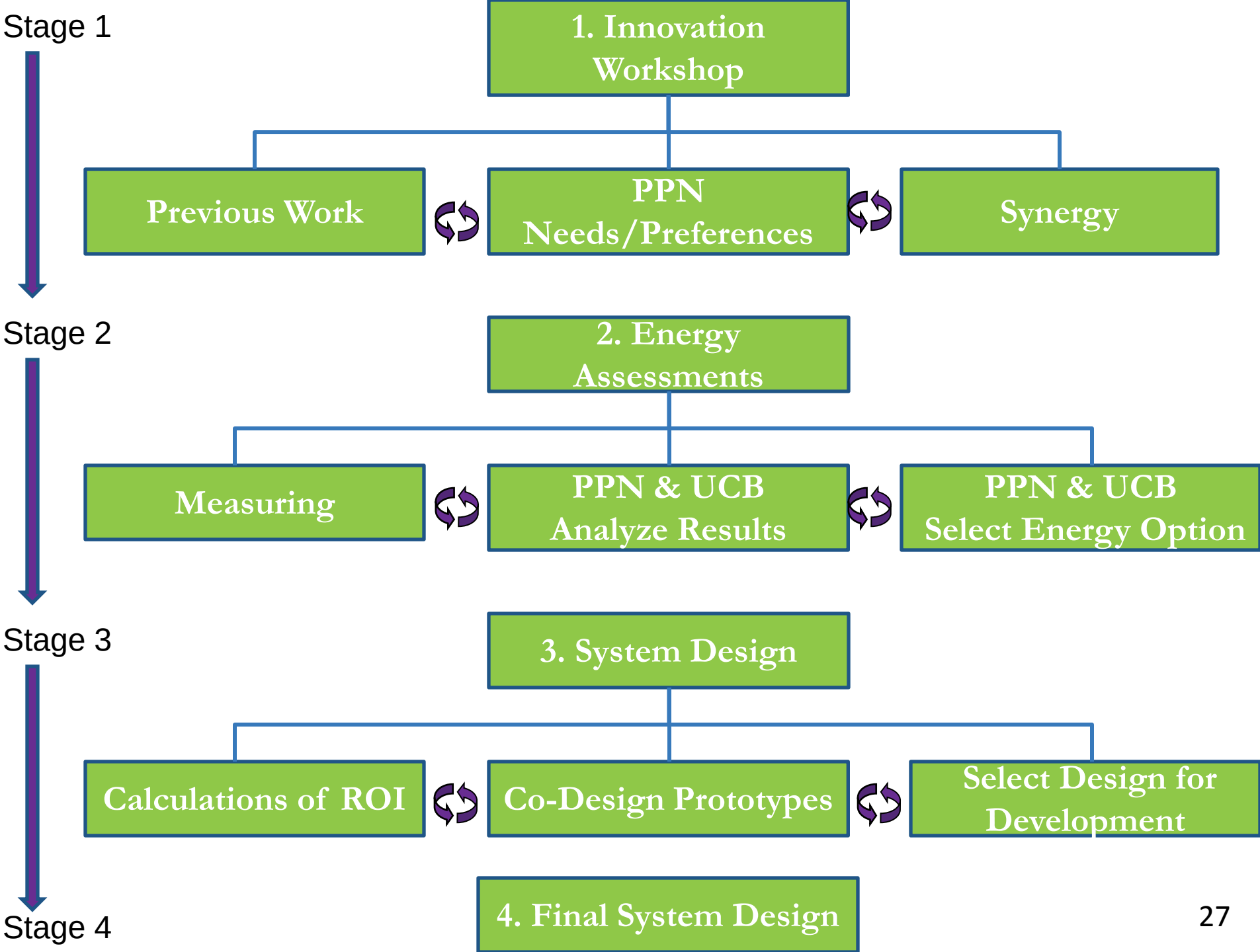
II. Assessing energy potential of resources

- 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)


Stage 1
1. Innovation Workshop
Previous Work
PPN Needs/Preferences
Synergy
Stage 2
2. Energy Assessments
Measuring
PPN & UCB Analyze Results
PPN & UCB Select Energy Option
Stage 3
3. System Design
Calculations of ROI
Co-Design Prototypes
Select Design for Development
Stage 4
4. Final System Design

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

- Leona Williams (PPN), Carrie Williams (PPN), Don Williams (PPN)

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Q/A?