



Thousand Home Challenge - Case Study

Larry & Suzanne Weingarten, Salinas CA

The House on Hummingbird Hill



Built in 2006
1,800 ft²
3 levels
3 bedrooms
2 baths

THC Status:
13th Project in North
America to officially
meet THC; 5th in
California

Meets Option B
allowance



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Project Summary

- Off-grid home on rural site
- SIPS (roof R-38, walls R-25, floor R-32)
- 0.63 kW Photovoltaic array (south facing), with generator for battery charging
- Walk-in basement, thermally isolated (includes water heater museum)
- Solar hydronic heating, wood backup
- Solar thermal hot water, propane backup
- Propane cooking, clothes dryer
- Passive cooling & ventilation



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Homeowner Priorities



- Quiet
- Low maintenance
- Energy efficient
- Affordable
- Comfortable
- View of Monterey Bay



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Innovative Heating Design



Wall radiant solar heating
Passive circulation
Heats with 80°F water, low ΔT



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Systems Integration - DHW



Solar hot water storage
Waste water heat recovery



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Minimized Electrical Loads



- Two inverters; the larger, less efficient one is used only for large loads
- Reduced standby & low load AC minimizes need for inverters



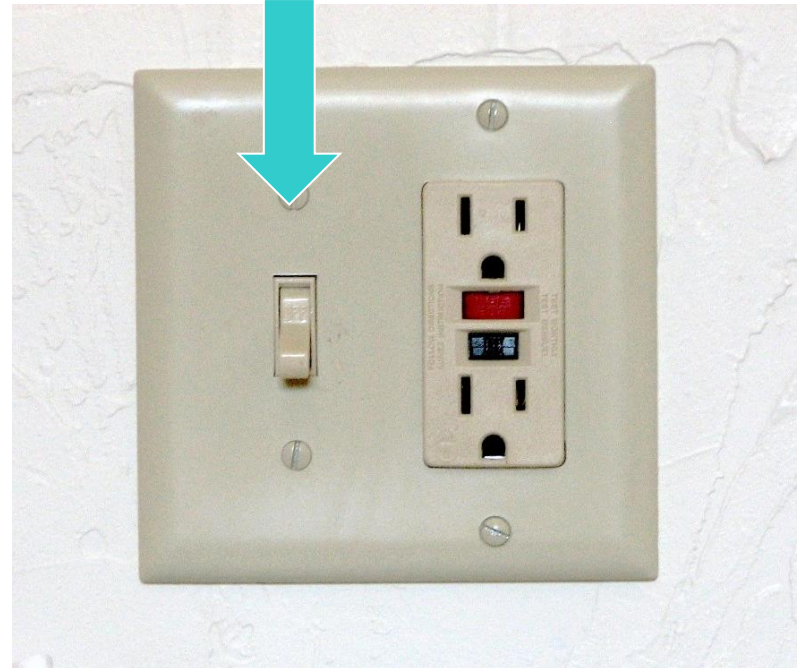
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Minimized Electrical Loads, cont.



- Both 24V DC & 120V AC systems
- Switched GFI reduces phantom load, keeps inverter in sleep mode





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Window Design Strategies



- Careful attention to daylighting, reducing solar gain & glare
- Translucent material in window cavity reduces glare





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North facing home defies passive solar design principles



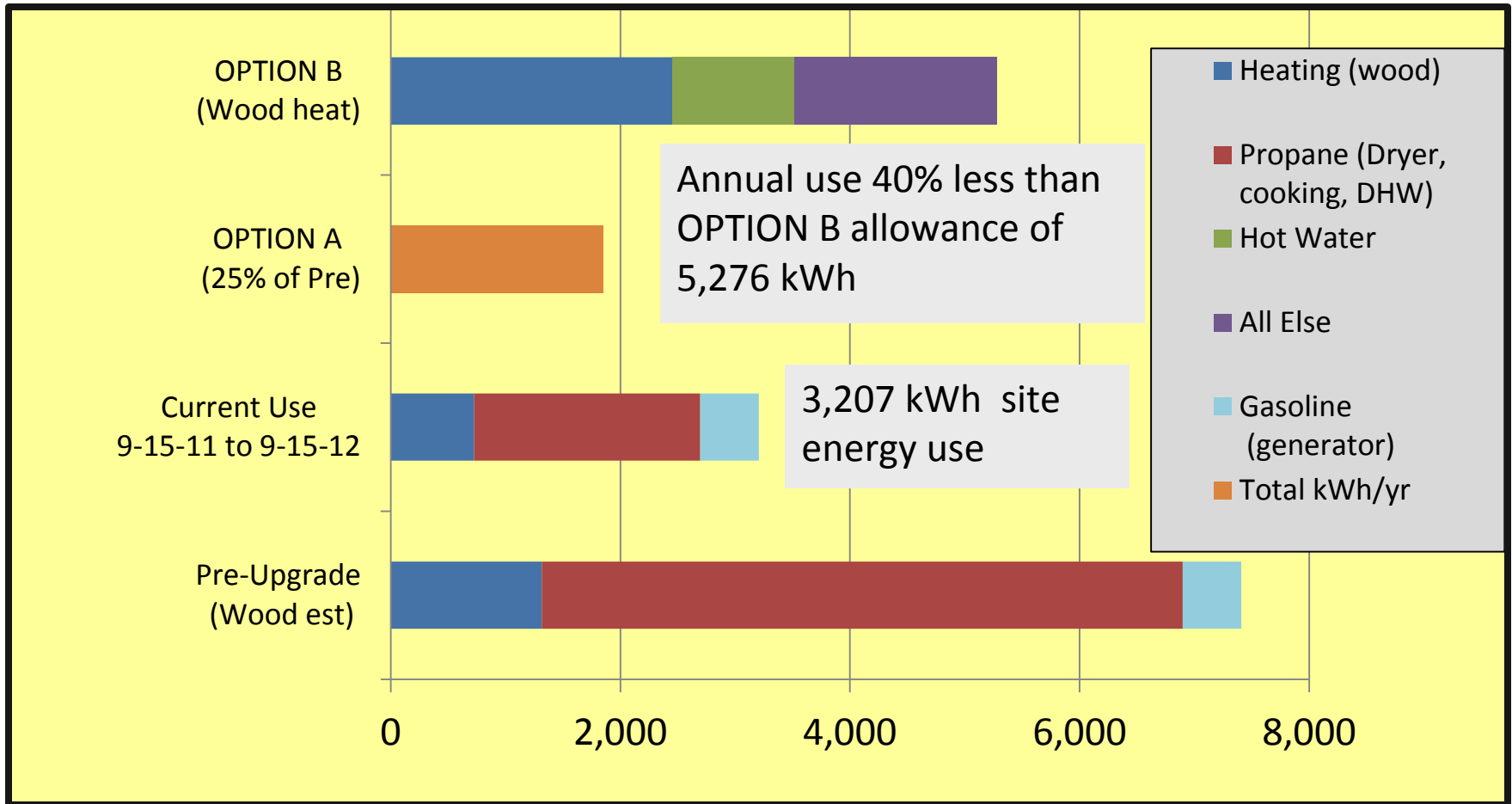
View of back of home and south facing roof with solar thermal & .63 kW PV array



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Energy Use, kWh/year



OPTION B ASSUMPTIONS: 1,800 ft² FFA, 2 occupants, fossil heat, Salinas weather station, 2,767 HDD (base 65)



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Further Energy Reductions



- New chest-type refrigerator & freezer (2010)
- *Original propane refrigerator used ~100 gals/year (~2,500 kWh)!*



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Implications for Other Homes



- Design strategies can have a huge impact
- Assumptions can be successfully challenged: solar orientation & window/glazing strategies
- Even high-performance homes can achieve significant reductions, often at low upgrade cost
- Effective solar thermal “combi” space & water heating
- Innovative ways to minimize electric loads, inverter use
- Radiant heating area – and cost – could be reduced



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For More Information



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- www.waterheaterrescue.com/pages/whh/pages/hummingbird-home.html
(including construction photos)
- www.nytimes.com/2007/07/05/garden/05cheap.html?pagewanted=all
- www.homeenergy.org/show/article/nav/solar/id/696

3-Part Home Energy Magazine Documentary-Interview:

- www.homeenergy.org/show/article/nav/renewableenergy/page/2/id/679
- www.homeenergy.org/show/article/nav/renewableenergy/page/2/id/696
- www.homeenergy.org/newsite2011/public/index.php/show/article/magazine/66/id/712

