

# EcoVillage at Ithaca: Designing For and With Community

**Gregory Thomas  
President**

**Performance Systems Development, Inc.**

**Former Resident and  
Consultant to EcoVillage First Neighborhood  
HVAC Contractor and Energy Rater for SONG  
[www.psdconsulting.com](http://www.psdconsulting.com)**



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# Who is Performance Systems?

- Development, Inc.
  - Contractor, Rater, Realtor Training
  - Ratings Provider
  - Research and Development (Protocols, etc.)
  - TREAT Software
  - Green Building Consulting (EVI First Neighborhood)
- Contracting, Inc.
  - Sub Contractor and Rater for New Homes (EVI Second Neighborhood)
  - Home Performance with Energy Star Contractor for Existing Homes
- Ithaca, NY Based

# PSD and PSC



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# EcoVillage at Ithaca

- FROG and SONG Co-Housing Communities
  - Started meeting 1991, started building Fall 1995, occupancy began Fall 1996, everybody in Summer 1997
  - SONG started 1999, first occupancy 2002 Finished early 2004
  - Long time horizon once in the community



# Location, Location, Location

- Biggest impact is location
  - EVI turned down free land 20 miles and saved \$357K from avoided transportation costs.
  - Individual 30 Acre Special Land Use Districts
  - “Home offices” included in common house

## EcoVillage Transportation Cost Analysis

Households (1 neighborhood)	Round trips per day	Miles per round trip	Days per year	\$ spent per mile	\$ spent per year
30	1	5	350	\$020	\$10,500.00
30	1	20	350	\$020	\$42,000.00
<b>Annual Savings in Gas</b>					<b>\$31,500.00</b>
Monthly Savings					\$2,625.00
Years of Mortgage					30
Interest Rate					8.00%
<b>Present Value of 30 Year Transportation Savings</b>					<b>\$357,744.17</b>

Households (5 neighborhoods)	Round trips per day	Miles per round trip	Days per year	\$ spent per mile	\$ spent per year
150	1	5	350	\$020	\$52,500.00
150	1	20	350	\$020	\$210,000.00
<b>Annual Savings in Gas</b>					<b>\$157,500.00</b>
Monthly Savings					\$13,125.00
Years of Mortgage					30
Interest Rate					8.00%
<b>Present Value of 30 Year Transportation Savings</b>					<b>\$1,788,720.86</b>

Assume inflation and energy costs cancel

# About Facing

- Orientation is the next biggest impact
  - South orientation for better winter gain
  - Reduced east-west exposure for reduced summer gain
  - After presentation, residents willing gave up view for north side houses



# Solar Control Strategies



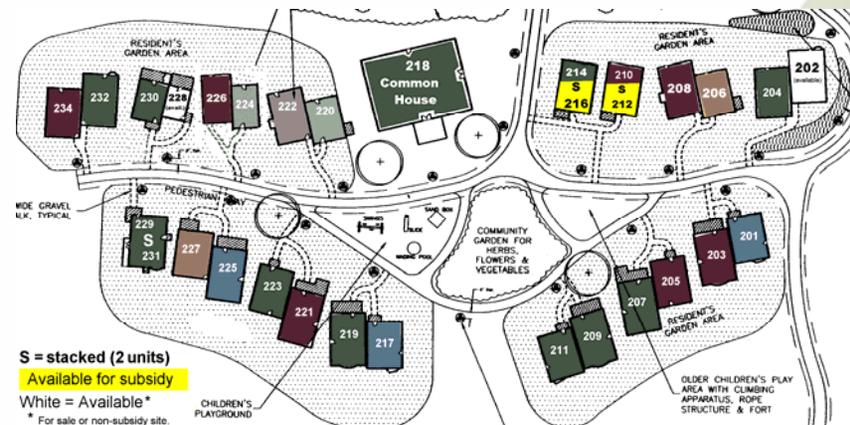
**1999**



**2004**

# Clustered Housing

- Shared wall housing
  - Dense pack cellulose and tight construction reduces noise transmission
  - Reduced heat loss
  - Reduced materials
  - Local code limitations for more than duplex
  - Reduced land use
- Cars off to the side



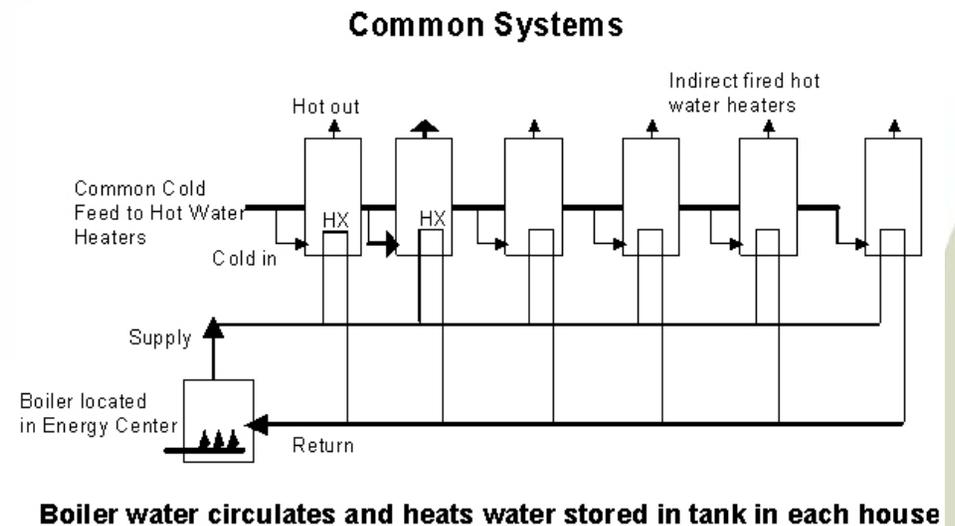
# Community Concepts

- Common Systems
  - District heating and hot water from “Energy Centers”
  - Shared ethernet and broadband
- Open Systems
  - Ability to adapt to new technologies
    - Energy
    - Communications



# Common System Features

- Submetering savings
- Individual accountability
- Hot water storage for each unit
- Remote combustion
- Fuel conversion cost effectiveness
- Solar DHW retrofit



# Common System Details

- Central boilers serve 6 to 8 household clusters
- Loop to 3 way valves
  - Constant flow
  - Hot water priority
  - Peak load reduction
  - Individual hot water storage
- Advanced control and submetering design



# FROG Boiler Room



# Sub-Metering



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# Open Systems

- Chases for plumbing, wiring, communications
  - Conduits between houses
  - Open web trusses
  - Center plumbing chase
- Excavation impacts
- Local area network retrofit



# Connections Between Buildings



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# Build It Tight

- 2 by 6 exterior with 2 by 2 interior horizontal strapping
- Vapor barrier between 2 by 6 and 2 by 2
- Dense pack cellulose
- Spray cellulose on band joist
- Drainage plane behind siding



# Ventilate It Right

- Air handlers in each unit provide:
  - Heat
  - Air filtration
  - Fresh air intake
  - Fresh air distribution
- Exhaust fans in bathroom and kitchen
- No combustion in the units
- No fixed carpets



# Appliances

- Convection oven or combination convection-microwave
- Electric radiant and halogen stovetop
- Low flow everything
- Grey water piping
- Reduced size refrigerator



# Lighting

- Daylighting
- T-8 Indirect lighting in kitchen and living room
- Compact fluorescent fixture hall and room lights
- 12 Volt outside lighting



# Common Area



1999



2004

# Common House

- Massive passive
  - Radiant floor
- Heat recovery ventilation
- Walk in cooler
- Pond water cooling
- Maytag Neptune washers
- 12 Volt lighting



# A table for 60, please



# Mail Room



# Play Room



# Three Washers, 30 Households



# A Breath of Fresh Air



# Rain Water Collection Retrofit



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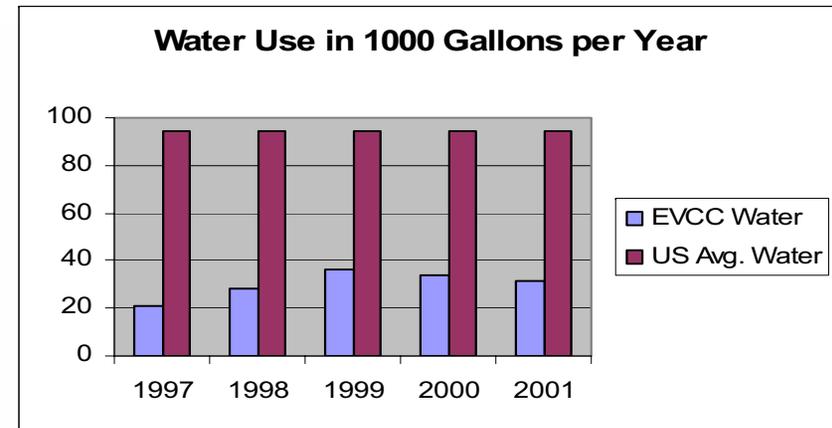
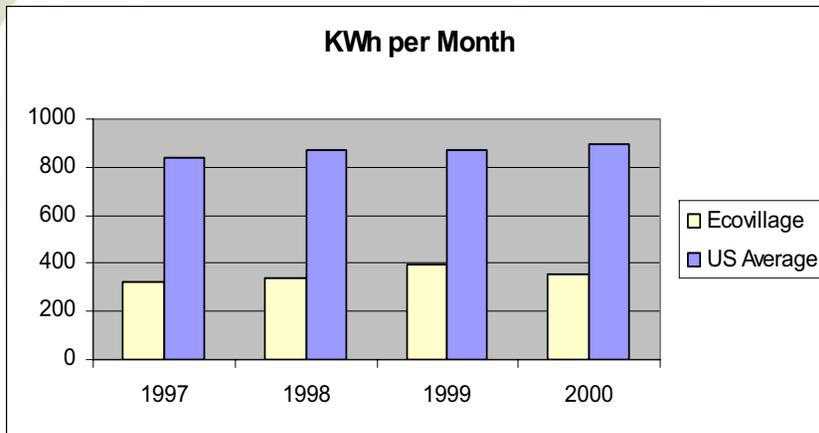
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# FROG Process Issues

- Consultant to Residents
  - Time intensive debate and educational process
  - “Energy committee” screens proposals
- Consultant to Architect
  - Pick your battles
  - Get common systems, mass and HVAC placement defined before conceptual drawings
  - Difficult to make design adjustments after initial construction is underway, even after the fire



# FROG Performance Data



# Second Neighborhood (SONG)



# FROG vs SONG



# Process

- FROG
  - Developer Consultant became Design Builder
  - Centralized design and planning
- SONG
  - Resident driven planning with support from FROG latecomers
  - Individual design or basic options



# ICFs and Radiant Floors



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# SIPs vs Cellulose or Straw

- Sound transmission
  - SIP transmits more sound from outside and from other side of duplex than high density cellulose walls
  - Shared slab also transmits more sound than floors over crawlspace
- Straw bale convective looping?



# Two and Four Unit Boilers



# PV and Maybe Wind



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# Across the Neighborhoods

- Digital ride boards
- Sustainability circle
- Shared vehicles
- Hybrid vehicles
- Child care groups
- Laundry cam?



# Common Carports and Animals



# Common Compost



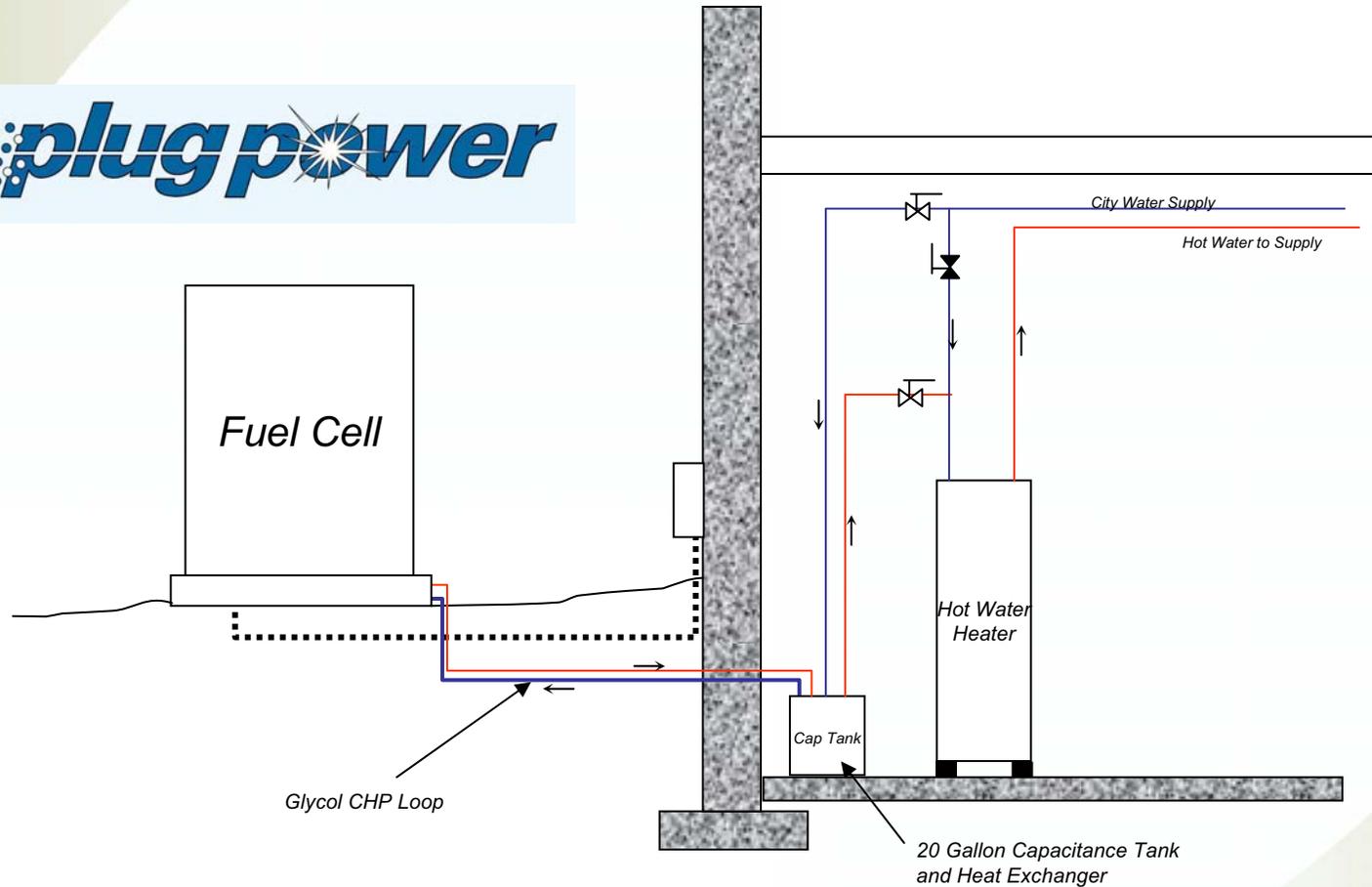
# Community Supported Agriculture



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# The Future?



**Plug Power Plumbing Elevation for CHP / Feedwater Preheater Kit**



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