The End-Game: Zero Energy Homes

Communities of Super-Efficient Homes
With Integrated Solar Generation





What is ZEH?

- DOE Program
 - Element of Building America
 - Produce as much energy as consume
 - By 2020 Communities
- Today
 - Demonstration homes: Net-zero
 - Communities: 50% bill reduction
- ConSol
 - 60% bill reduction
 - Net-zero annual energy bill







Why Build ZEH?

• ... Other than reduced dependence on foreign oil, reduced emissions, reduced peak-electricity demand...

- Market Differentiation
- Press Exposure
- Increased Profits







Pardee Ultimate Family Home







































Pardee Homes -- Ultimate Family Home Floor Area 5300 sqft

Zero Energy Home Features

ENVELOPE: (Insulation)

Roof (attic, rafter) R-38, R-30

Wall (Exterior) R-21

Floor (above garage) R-30

GLAZING:

Windows & French Doors (U-factor, SHGC) U=0.33, SHGC=0.33

HVAC SYSTEM:

Furnace AFUE, A/C SEER 0.95 AFUE, 15 SEER

Duct Insulation / Location R-6

WATER HEATING:

Main Solar ICS

Backup 0.82 EF Tankless

Distribution System Pipelnsulation; short run; PEX

PHOTOVOLTAIC SYSTEM (PV) 8.6kW DC

FLUORESCENT LIGHTING Mainly fluorescent/HalogenIR accents

INSPECTIONS AND TESTS All features, duct and envelope leakage, air flows







Water Heating









Photovoltaic System (PV)











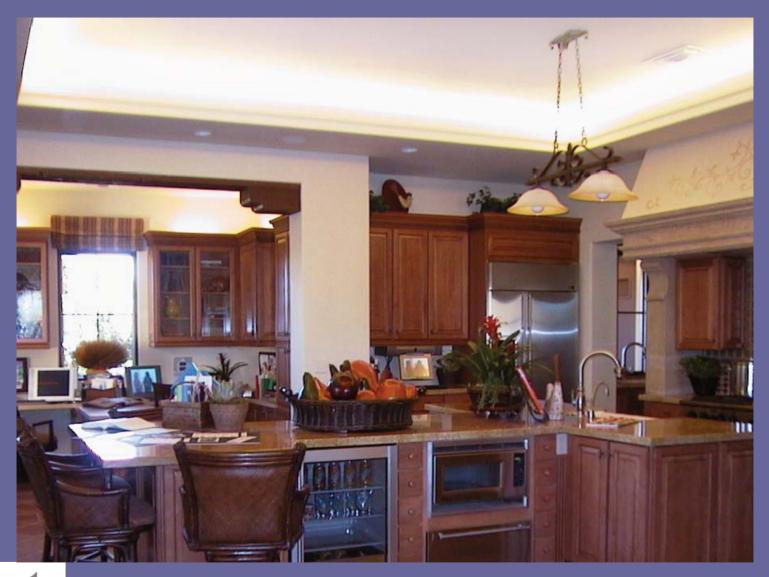
Fluorescent Lighting

- Typical Problems with Fluorescents
 - Typical replacement wattage is too low
 - Quality, hard-wired, IC-rated, air-tight cans not available
 - Color rendition
- Solutions
 - Good lighting design; Careful choice of fixtures
 - Proper wattages (about 25W for 75W replacement)
 - New down-light cans are coming soon
 - 2700 3000°K, 80 or greater CRI



























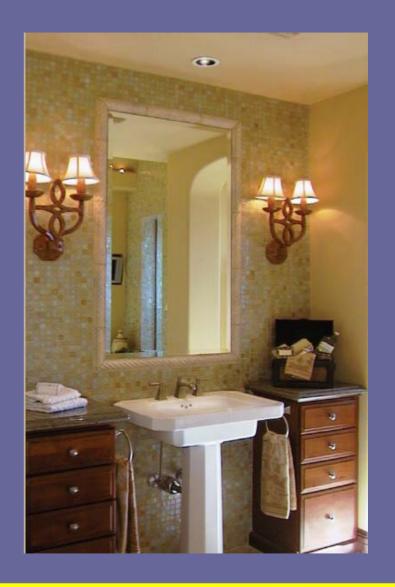


















Energy and Cost Savings

58%
71%
41%
54%
53%

reduce kWh by solar contribution 11,568 kWh

Total Reduction in Electricity Use 98%
Total Reduction in Energy Use 86%
Total Reduction in Energy Cost 88%







Marketable/Affordable ZEH

- 50% or Greater Energy-Bill Reduction
 - Whole house
 - Integrated solar







ZEH Subdivisions

- Pardee Homes, Orange Co CA
- Pardee Homes, Las Vegas
- Morrison Homes, Sacramento CA
- Clarum Homes, East PA & Watsonville CA
- Premier Homes, Sacramento







Clarum Homes

- "Vista Montana"
 - 257 Homes, All ZEH
 - Mix: SF Attached & Detached
 - Affordable, Entry, Move-Up
- Over 60% Sold before Grand Opening
- No Marketing Used
 - Only Press from ZEH









Research Needed

- Energy-efficiency technologies
 - New, better, less expensive
 - Building America, Solar programs
- Integration of Solar
- Market Analysis
 - What will buyers buy? Why? How Market?
- Community Impacts of Distributed Generation







Rating Issues and Opportunities

- "Normal" Inspections/Tests
 - All features inspected/tested
- Lighting
 - Maximize fluorescent
 - Quality/color
- Solar
 - Size
 - Operation





