



## **ZEH for New and Existing Homes-- Creating a Sustainable Program**

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## **Achieving ZEH in New Homes**

- Advanced Building Codes with ZEH goals
- Builders Challenge—save at least 30%
  - A few builders offer ZEH (Highly energy efficient homes that produce all the energy they use annually)
- Energy Smart Home Scale (E-Scale)
  - Documents superb energy savings on level playing field for builders & buyers



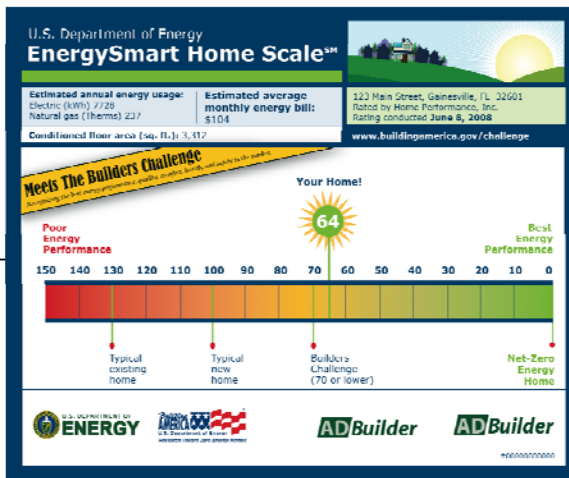
## Achieving ZEH in New Homes

- R&D to cut production costs of components
  - This R&D benefits both new and existing homes
- Marketing
  - ZEH homes sell faster
  - Customers are bragging about low utility bills
  - Document Builders Challenge + homes sell faster
  - Document lower foreclosures, lender benefits
- Zero Peak Communities
  - By automating residential energy management the homes can have a zero peak load on the grid



## EnergySmart Home Scale

- A simple way to understand energy use at-a-glance
- Easy to interpret like MPG
- Measured and verified

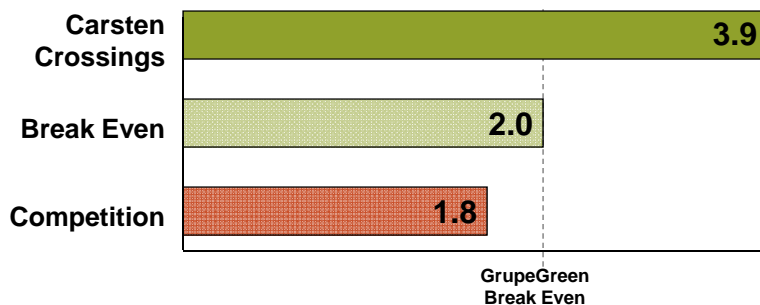




## ZEH Increased Sales Velocity = Profitability

- 144 Homes at Carsten Crossings
- \$2,642,000: cost for solar & EE measures
- \$311,000 Monthly Cost of Carry for Carsten Crossings
- Sales at competitors' rate would add 42 months to absorption period
- 42 months x \$311,000 per month = **\$13 million savings to Grupe**

Homes/month



## Artistic Homes ZEH for \$250,000

“The E-Scale is the coolest thing to come out. It gives a benchmark for improvement. It gives consumers an MPG for homes. They buy our houses because they are energy efficient, green, sustainable...”  
*Tom Wade, President, Artistic Homes, Albuquerque, NM*





## Achieving ZEH in Existing Homes

- Advanced codes for remodeling & resales
- Energy Smart Home Scale (existing home version)
- R&D for deep retrofits--50-70% energy efficiency
- Home Performance with Energy Star
- Test Markets--\$400 million EECBG FOI
- Acquire statistically valid data to document peak load reduction



## Home Performance with Energy Star (HPwES)

- A whole house approach for existing homes based on Building Science
  - Home energy assessment
  - Energy efficiency Upgrades
  - **MUST** meet minimum quality assurance standards
- Jointly-sponsored by DOE & EPA
- Great name recognition



## Residential Retrofit Challenge

- Scalable to continue after ARRA funding
- Retrofit over 30-50 million houses in 10 years
- Reduce utility bills 25-50% (reduce peak 1+ kW/house)
- Pilot/test markets to achieve high volume
  - 100,000s per year in big states & utilities
  - Community based, lower cost programs
  - Event driven: new HVAC, remodeling, code, sale
  - Led by SEOs, municipalities, utilities and/or Industry



## Key Program Activities

- Train--certify & equip raters, installers, & contractors, **AND create business opportunity**
- Test Marketing—market research, advertising & cost-effective utility incentives
- Financing—Educate financial industry, + real estate tax/utility financing on utility bills options
- Monitoring—verify user savings & peak load reduction with statistically valid data
- Minimum quality standards



## Deep Retrofit—HERs 49

- In New England researchers reduced energy use 70% in a 100 year old house to HERs 49
- Key energy improvements cost \$72,000
  - 4 inches of foam insulation on outside walls & roof
  - Replaced windows
  - New high efficiency HVAC
  - Insulated basement



## Sustainable Business Model

- Teams may consist of utilities, major manufacturers, RESNET & BPI raters, home builders, remodelers, & HVAC contractors, etc
- TVA & Duke Power have both proposed developing their next “power plant” from energy efficiency & demand reduction
- Arizona SEO led utility retrofit program



## **ZEH & Retrofit R&D Complementary**

- Windows R&D works for both existing & ZEH
- Need high volume triple pane windows (R-5)
  - ARRA funds to develop production line for these windows
  - To create demand--RFP for volume purchase (Like Golden Carrot program for Refrigerators)
- For ZEH need R-10 window for cold climates



## **Recent Market Research\***

- 2.8 mill. Homes--energy audit in past 24 months
- Who conducted the audits?
  - Local utility company (70%)
  - Private audit company (14%)
  - HVAC contractor (8%)
  - EPA & Department of Energy (4%)
- Where would you go to get an energy audit?
  - Local utility (46%), Private Company (10%)
  - HVAC Contractor (5%), EPA & DOE (6%), Don't know (33%)
- \*2008 American Home Comfort Study, (30,000 Homes), Decision Analyst



## New Utility Focus

- Utilities are respected by customers
- Utilities have the financial resources to market and finance retrofits (add to utility bill)
- Energy efficiency & demand reduction are easier & lower cost than “Building” new power plants
- Emphasize energy retrofits packages improving comfort (low--\$2-3k, medium, & high--\$15-25k)
- Shave summer peak loads--about 1-3 kW/house



## Peak Load Reduction Potential in High Growth Market: Phoenix, Arizona

Technique	kW Reduction	Total kW
20,000 Zero Peak Homes (30% of new Home starts)	6.5	130,000
100k existing homes w/energy efficiency upgrades	1+	100,000
100k existing homes w/CPP & automated energy management	2	200,000

**Total Savings:  
 430 MW--  
 System Load:  
 6020 MW**



## Gulf Power CPP Results

- Critical peak pricing cut existing home peaks 2 kW in summer & 3 kW in winter
- 96% customers “satisfied or “very satisfied”
  - Significantly higher than control group
  - 9,200 customers in 2008—project 40,000
  - Average annual bill savings = 15%
- 0 curtailments in 2003, typically 5-6 in summer and 3-4 in winter
- Florida PSC initially skeptical, now a big fan



## Next Steps—APP & IEA

- Quickly complete ZEH definition (30 min)
- Joint activities (US & Canada, APP & IEA)
  - Complementary R&D activities
  - New & Existing ZEH Code development
  - Market research—document/celebrate successes
  - PUC—Structure utility incentives to increase profitability of EE, CPP & DR activities thereby offsetting need for new power plants
  - Develop Roadmap