Highlights of PNNL Building America Activities

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Introduction

- For the past 10 years PNNL has assisted the BA program market transformation activities by producing documents that disseminate BA research to practitioners and consumers.
  - Lead – Michael Baechler
- Last year, with ARRA funding, a research program on deep energy retrofits and high performance new homes was initiated with ARRA funding.
  - Lead – Subrato Chandra
- ORNL is a key PNNL collaborator in both efforts.
  - ORNL Leads – Pat Love and Roderick Jackson

Example Documents – Case Studies

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Example Document – Marketing Assistance

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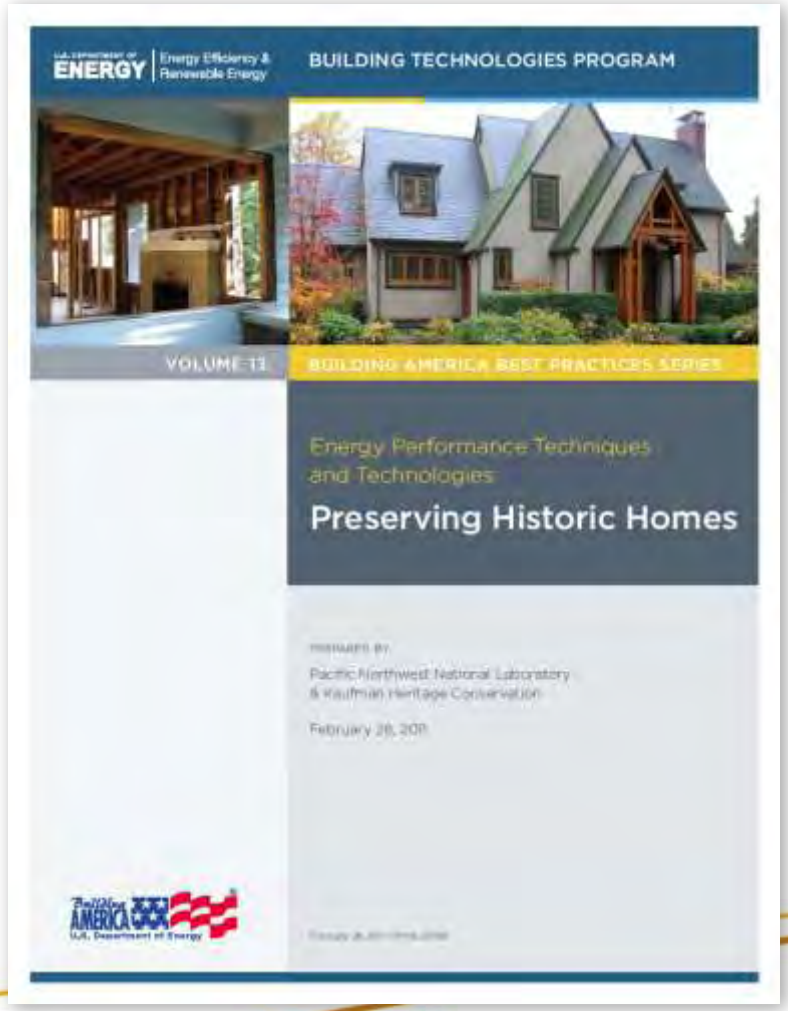
Example Documents – Best Practices



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Research on Deep Retrofits & New Housing

- Team -- PNNL, FSEC, WSU, PSU, GTI, Calcs-Plus, Florida –Hero, Northwest EnergyWorks

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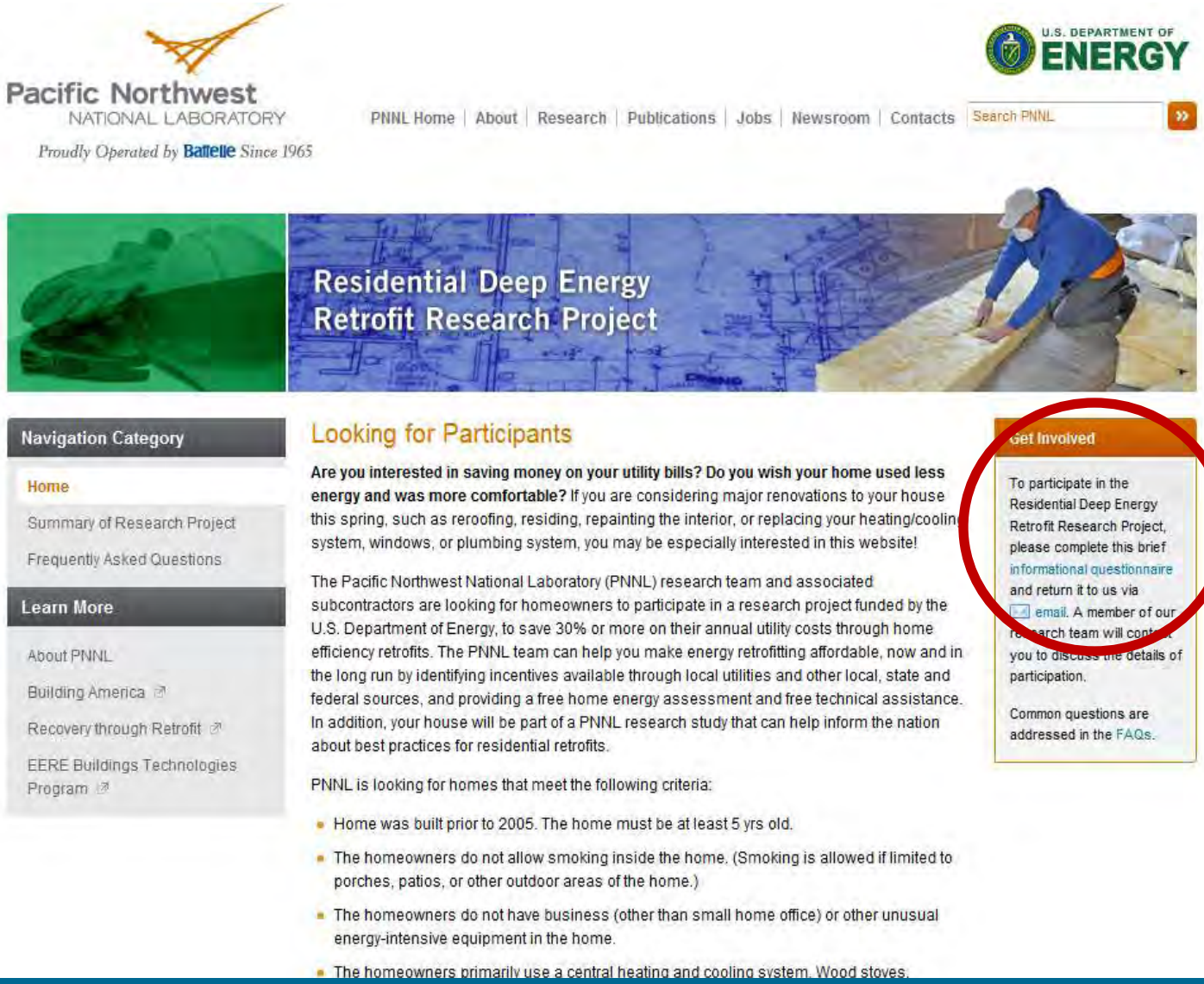
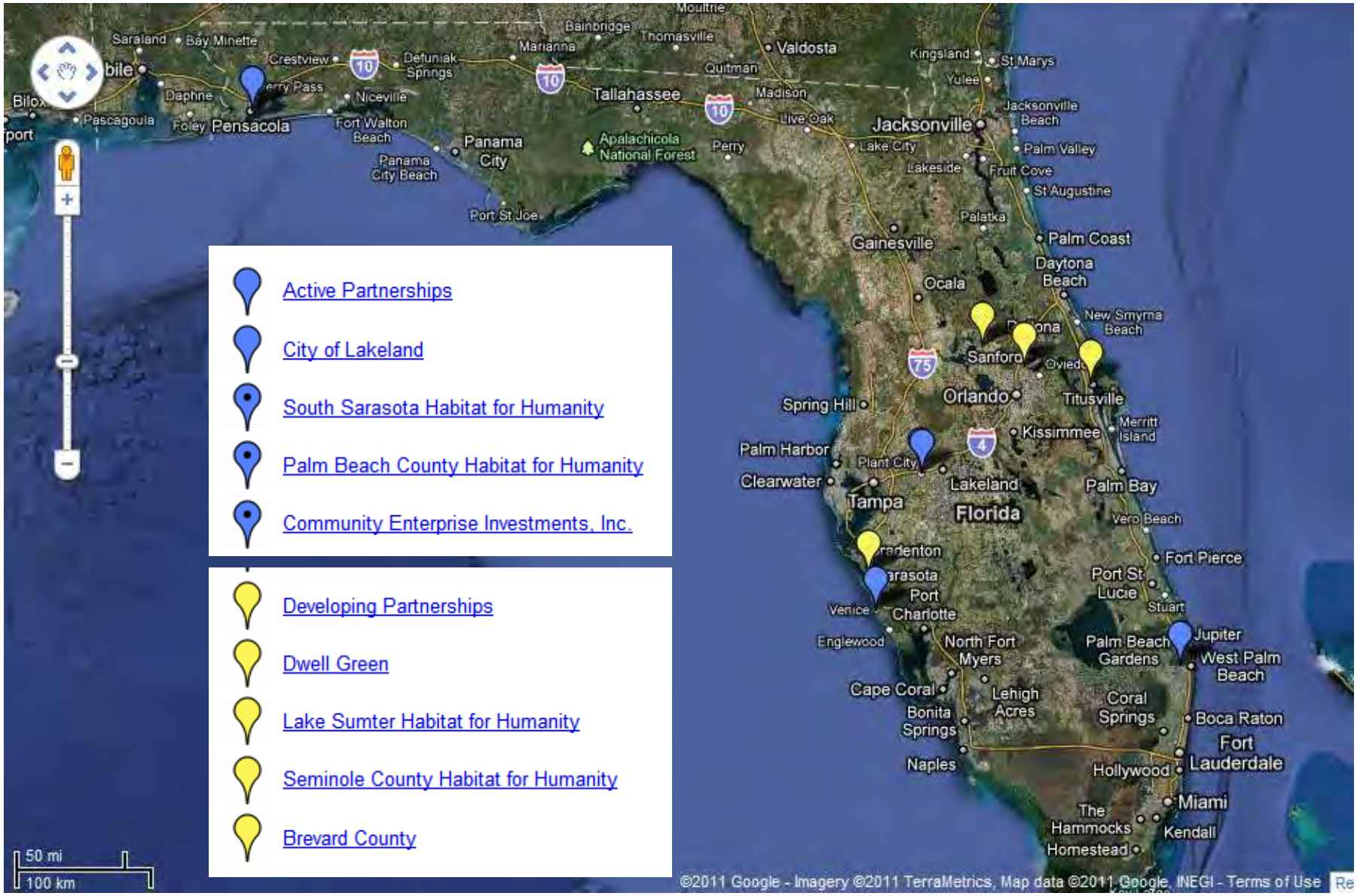
  ORNL and Southface
- **Goals:**
  - 50 High quality retrofits that save >30%; 12 to be metered
  - Evaluation of retrofitted homes in military bases and in the Portland metro area to identify effective strategies
  - Performance evaluation of four HERS <=0 homes
  - Affordable high performance homes and DHP evaluations
  - Side-by-side Lab Homes on PNNL campus

deepenergyretrofits.pnnl.gov

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy



Deep Energy Retrofits in Florida - FSEC



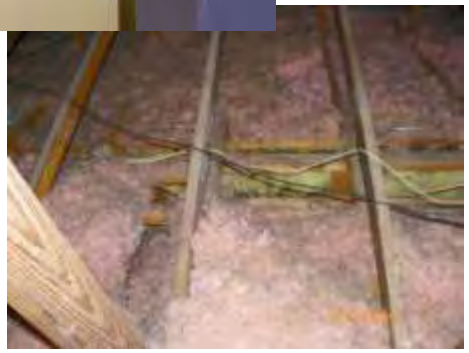
Typical Pre-Retrofit Issues

- Filthy coils & leaky plenums
- Poorly sealed AHU closets or restricted flow
- High levels of duct leakage
- Missing & compressed attic insulation
- Large wall penetrations to attic & exterior
- Windows unable to fully close or leaks around frame
- Porches and garages converted to living space

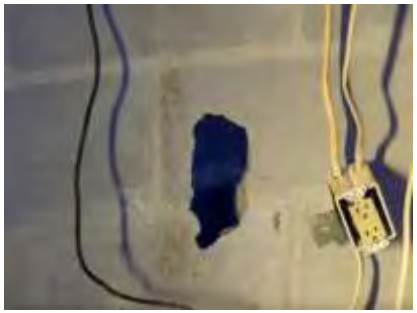
Case Study – HFH Sarasota, FL - Calcs-Plus

- 1978, 1,814 sq. ft.
- Uninsulated wall, R-19 ceiling
- AHU in attic
- ACH 50=31
- Duct Leak to Out @25Pa =115 cfm
- Unoccupied

Problems Uncovered



- Air pathways connecting attic to cond. space via interior walls at dropped ceiling areas
- Holes in wall
- Gaps around window frame



Pre-Retrofit Example

- 1250 ft^2, 1960 3 bed/2 bath
- Central Florida
- Slab on grade, block construction
- Test-In HERS Index 178
- Target HERS Index 89
- **50% Improvement**
  - **Attic insulation, window and HVAC replacement, appliances, & lighting**

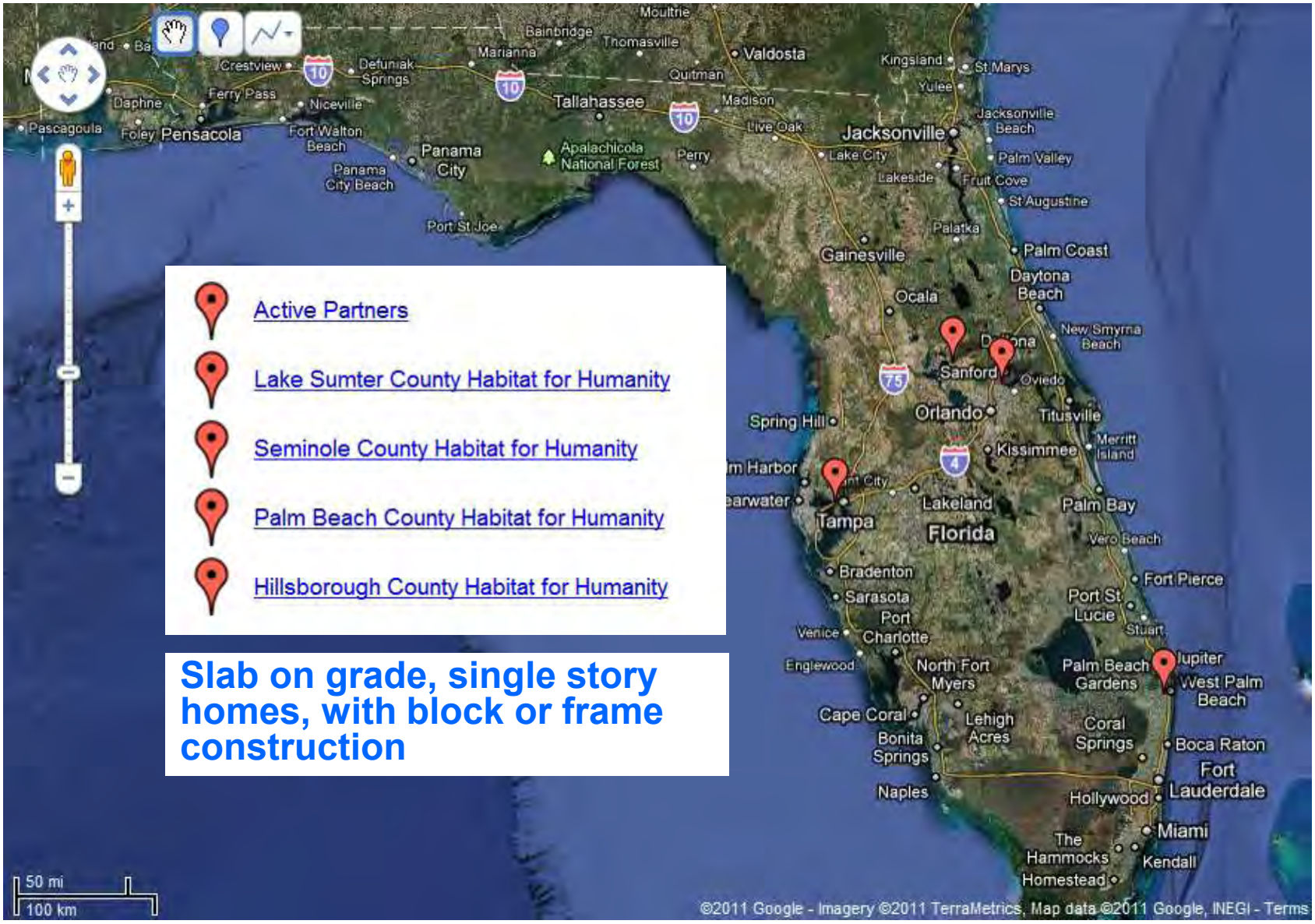
Pre-Retrofit Example

- 1373 ft^2, 2003 3 bed/2 bath
- South Florida
- Slab on grade, frame construction
- Test-In HERS Index 97
- Target HERS Index 63
- **35% Improvement**
  - **HVAC, HP water heater, window film, appliances, lighting**

High Performance New Home Prototypes

- Habitat for Humanity Prototypes in Florida – FSEC
- Monitor performance of 4 HERS <=0 prototypes– FSEC
- Habitat for Humanity Prototypes and billing analysis in WA – WSU. Includes identifying best practices and lessons learned. Evaluation of foam sheathing board and ductless heat pumps on prototypes through metering
- Evaluation of two new manufactured homes with ductless heat pumps - Northwest Energy Works (N.E.W.). Metering to be done by Ecotope

New Construction
High Performance Affordable Housing



New Construction Partner

- Hillsborough County Habitat (Tampa)
- 1100 ft^2, 3 bed/2 bath, slab on grade, frame construction
- Anticipated HERS index
  - With gas = upper 60's
  - All electric = low 60's

New Construction Partner

- Lake Sumter County Habitat
- 3 houses – (2BR/1bath, 3BR/1.5 bath, & a 4BR/2 bath)
- Slab on grade, frame construction
- Anticipated HERS Index = Mid 60’s

Four HERS < = 0 homes monitored by FSEC

Side-by-side Lab Homes

- Combined funding from DOE-BA, DOE-Fenestration, DOE- OE (smart grid) and BPA programs
- Graham Parker, PNNL, PI for the DOE Fenestration and BPA funded efforts and site manager for this task
- Two flexible double-wide, ~1,500 sq. ft. manufactured homes to be sited at PNNL with full utility hook ups by summer 2011.
- First year experiment is to evaluate high performance windows compared to standard current stock

Thank You

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