

Better Buildings Challenge

Lend Lease Commitment

Krista Sprenger, VP-Director Sustainability, Americas

Duncan Prah, Research Architect, IBACOS

March, 2012




Lend Lease

Goals of the Better Buildings Challenge

Make buildings 20% more efficient by 2020; save \$40 billion annually for US organizations; create American jobs

- ▶ Overcoming market barriers/persistent obstacles with replicable, marketplace solutions
- ▶ Market leaders stepping forward to share data and real solutions
- ▶ Demonstrating leadership
- ▶ Showcasing real solutions
- ▶ Connecting the market
- ▶ Partnering with industry leaders to better understand policy and technical opportunities

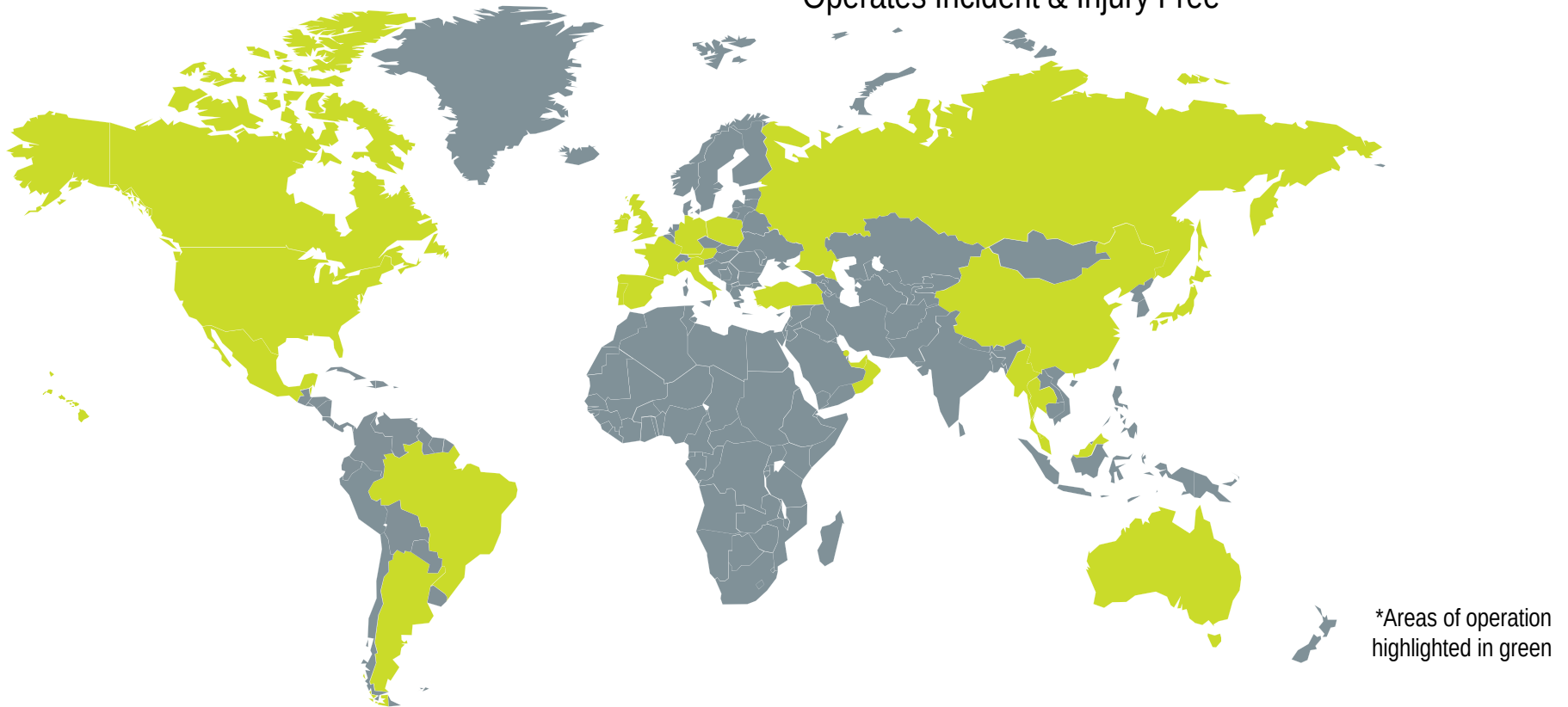


More Than 50 Years' Property Experience

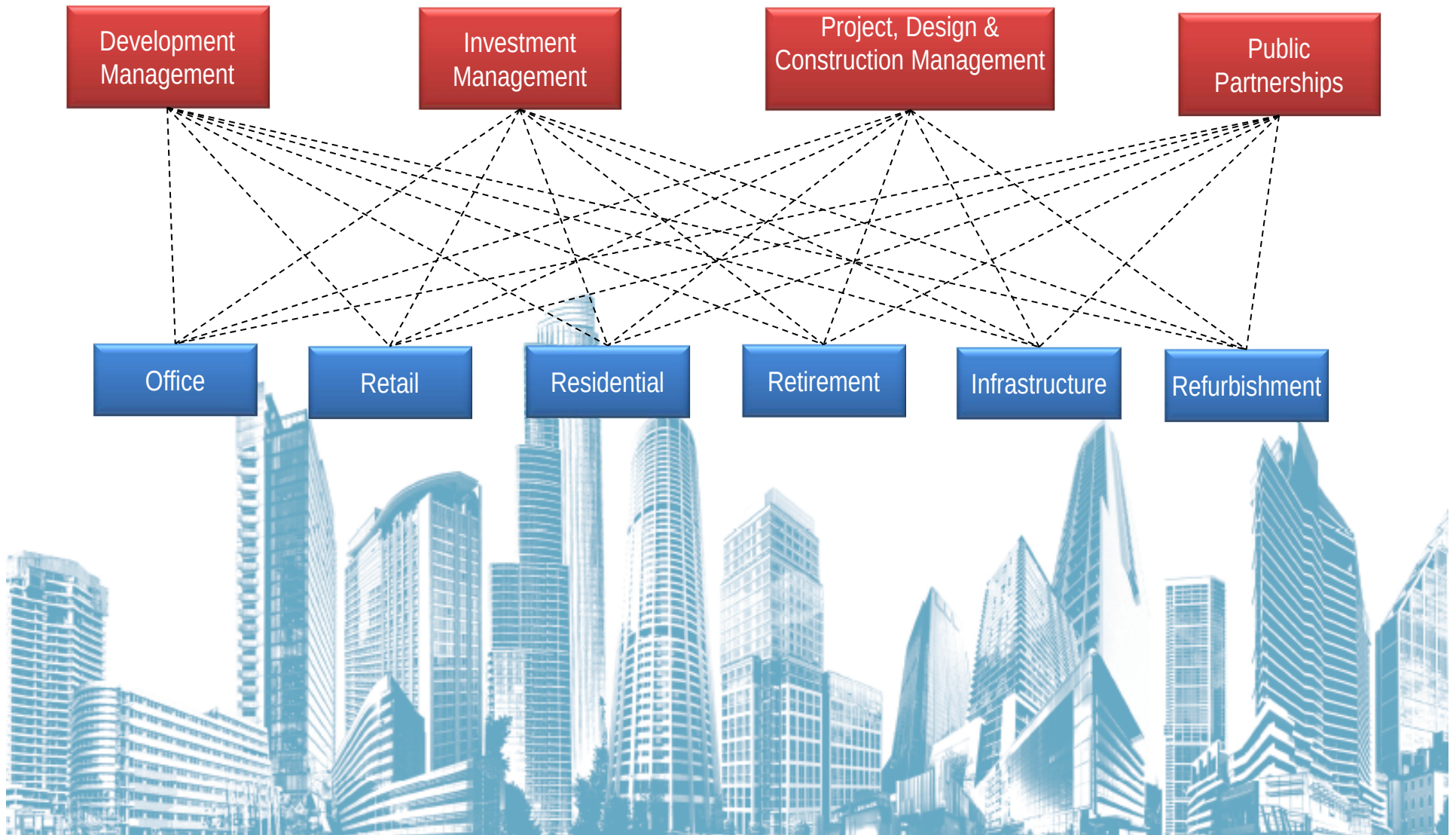


Lend Lease

- Creating innovative property and infrastructure solutions for more than 50 years
- Completed over 10,000 projects worldwide
- Over 17,000 employees across the globe
- Circa A\$10.9 Billion funds under management
- Market capitalization of A\$5.1 Billion
- Top 50 Company on the Australian Stock Exchange (ASX:LLC)
- Specializes across multiple asset classes
- Is committed to creating and building innovative and sustainable solutions
- Operates Incident & Injury Free



Lend Lease Capabilities



Lend Lease Public Partnerships



- As part of the Military Housing Privatization Initiative (MHPI), Lend Lease partners with the Department of Defense to build and maintain communities on military installations
- 50-year partnership includes all development, maintenance, construction
- 40,000 homes, nearly 8,500 hotel rooms and 192 apartments
- 140,000 people live/work in our communities
- Largest MHPI Developer



Atlantic Marine Corps Communities, Tarawa Terrace Community Center

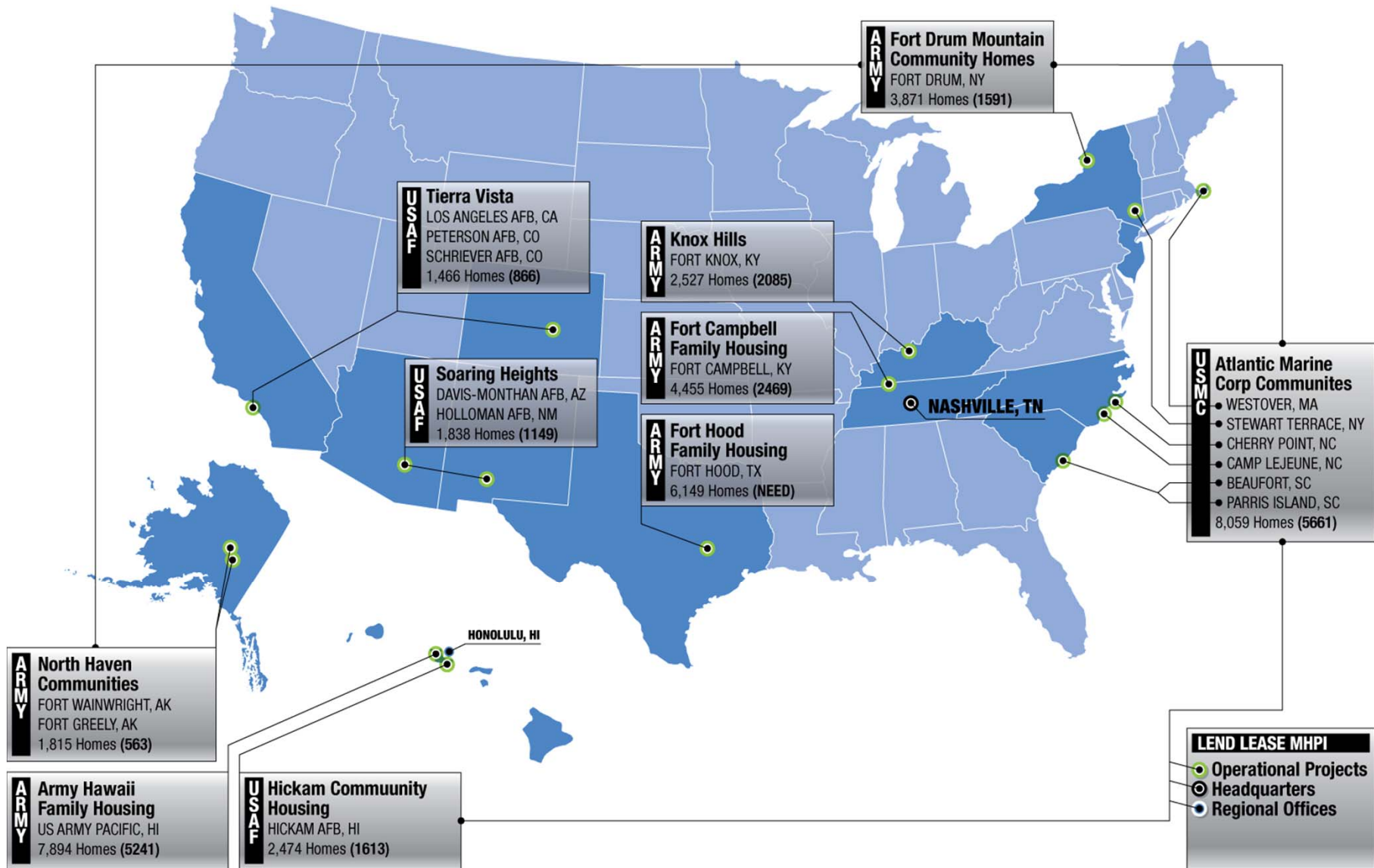
Better Buildings Challenge



- Reduce energy consumption by at least a 20% within 2-5yrs
- ~40,000 homes, 800 historic structures, 19 offices, and 19 community centers
- 65.3 million square feet of real estate nationwide



Lend Lease MHPI Locations



Lend Lease Public Partnerships



- All new construction built to LEED Homes standards
- Two of the nation's largest solar powered communities
- The nation's largest solar thermal project
- Largest EnergyStar Community in NY
- LEED-ND Certified Community, Island Palm Communities
- Only Zero Energy Homes on a military installation
- Comprehensive data set of houses and energy consumption



Approach



Behavior Modification (Avoid)

- Home/Building Management Systems
- SYNERGY - Resident education and training program to support sustained conservation

Green Retrofit (Reduce)

- Assessment of current state of built environment
- Implement customized whole building energy management solutions to reduce consumption

Renewables (Produce)

- Incorporate renewable energy systems such as solar, wind, etc. to reduce grid consumption

Lend Lease Better Buildings Challenge

Phase 1



- Neighborhood level general evaluation
 - Energy durability, health, safety and comfort
- High level energy analysis for various levels of investment for reducing energy consumption
 - Variety of options and strategies
- Report back to project teams on findings
- Strategic planning session with each project team to develop more a detailed plan by neighborhood
- Develop two BBC Showcase projects
- Support development of methodology for determining energy baseline and savings

Lend Lease Better Buildings Challenge

Phase 2 (2012)



- Support with detailed design and implementation plans
- Additional prototypes houses or pilot programs
- Support ongoing energy monitoring and analysis
- Occupant energy education
- Training programs as needed for Lend Lease employees, trade partners, and suppliers
- Developing “knowledge repositories” and internal expertise within Lend Lease
- Work with NREL to conduct pre and post upgrade utility bill analysis

No matter where you go, there you are...



- Opportunities Abound
 - Thermal Enclosures
 - HVAC
 - DHW
 - Energy Management



Building America Solutions Being Considered



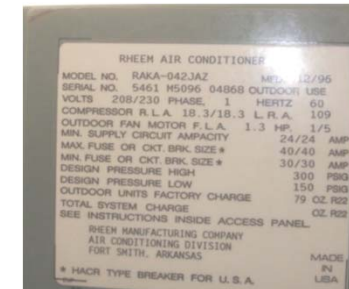
- HVAC
 - High efficiency equipment
 - Duct repair / sealing
 - Distributed, simplified HVAC
 - Multiple mini-splits
- Air sealing and Insulation
 - Mostly attics
- DHW
 - Tankless gas
 - Low flow fixtures



Technical Challenges HVAC



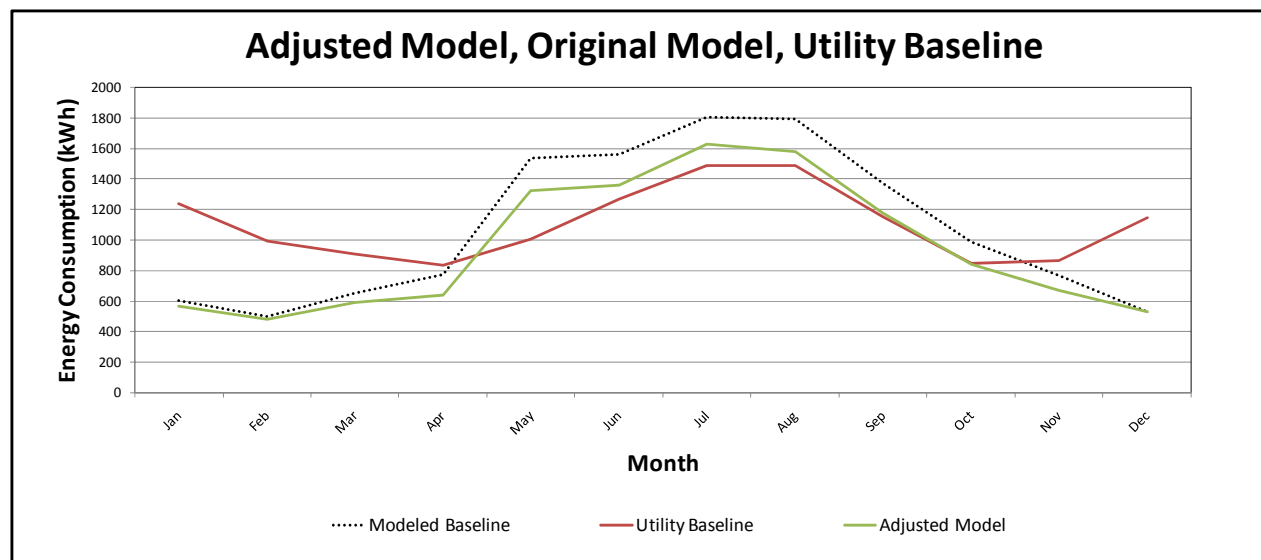
- Some HVAC systems oversized for as built conditions
 - Ducts will be grossly oversized for new “right sized” equipment
- Possible Solution: Distributed simplified minisplit systems
 - Bring systems entirely within conditioned space
 - Zone living space and bedrooms
- Issues:
 - Going from gas heat to electric
 - Utility costs, source energy consumption, relatively high equipment cost
 - Impact on occupant comfort
 - Comparative in place system efficiency



Technical Challenges HVAC



- Modeled performance vs. in place efficiency
- Comparison between utility bills and predicted performance showed wide discrepancy
- Likely in place system performance much lower than nameplate
 - Entire system
 - COP, EER and t'stat set point used to “tune” models
- Issues:
 - Reliability of savings predictions



Technical Challenges Air Sealing and Insulation



- Some attics previously insulated but not air sealed
- Difficult access
 - Low slope roofs
 - Lots of ductwork
- Many walls are un-insulated, but have brick veneer exterior
 - Difficult and costly to insulate from outside
 - Lower cost low intrusion wall insulation methods



Technical Challenges Domestic Hot Water



- Tankless gas DHW attractive in many locations
 - Water quality is an issue – scale buildup
- Low flow fixtures
 - Concerns with occupant comfort and “sabotage”
- Solar thermal
 - High cost, long returns
 - Evaluation of existing systems – are they still working?



Technical Challenges Energy Management



- Possible solution for annual and peak load control
- Pilot programs have shown 7 % + reduction in electric use
- Cost to implement systems
- What is the true level of control possible as opposed to simply relying on occupant participation?



Areas Needing Support



- **Built Environment**

- Help with how we account for district wide systems which we do not control (e.g - steam at North Haven Communities)
- Assessment of New Construction Design Guidelines / Conversion Renovations
- Technology recommendations

- **Renewables**

- District Energy Systems (non solar)
- Technology recommendations

- **Behavior Modification**

- Consumption Reduction Program Peer Review/Input
- Home Management Systems and other Technology recommendations

Questions?

