Building Science Corporation Kohta Ueno, Senior Associate, Building Science Corporation

### **BSC Building America Projects**

March 4, 2014







### AIA Best Practice Slide

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation

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### Merrimack Valley Habitat for Humanity

- Existing brick building (former convent) converted into 10 affordable housing units
  - Roof R-60
  - Walls R-30
  - Foundation Walls R-20
  - Foundation Slab R-10
  - Windows R-3
  - Mechanical hydronic heat (combi DHW), no AC, individual HRVs





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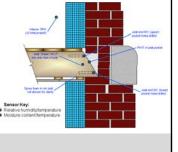
### Merrimack Valley Habitat for Humanity Energy Modeling Wall comparison 1 id heat its (6" XPS, 4" XPS, 5" ccSPF, 2" ccSPF + 5.5" FG Window comparison (existing, storm Point 4 2" ccSPF + 5.5" FG 1.7 ACH50 Point 1 Point 2 Point 3 Point 5 5" ccSPF 1.2 ACH50 windows, new windows) 67 ACHSO REM/Rate Modeling Results for Selected Housing Units ENERGY STAR Percent Savings over User Unit Number Defined Reference Home HERS v3 Tier II Unit 2 Unit 8 43.5% Yes **BA Meeting** March 4, 2014

### Merrimack Valley Habitat for Humanity

- Embedded Joist Monitoring Project
  - Monitoring joist (and pocket) moisture content (3 measurements) x 10 joists (various orientations/ conditions), temperature, relative humidity

In-situ measurements ~2 years logging; several variables (orientation, wall, insulated/non; air sealed; wetting in year 2)





### Transformations, Inc. Net Zero Houses

- Net Zero Communities
  - Townsend, MA
  - Devens, MA
  - Easthampton, MA
- Net Zero Homes
  - Roof R-60 (vented attic)
  - Walls R-45 (double stud)
  - Foundation Walls R-20
  - Foundation Slab R-10
  - Windows R-5
  - Mechanical Mini-split system, HRV or exhaust only ventilation Devens, MA







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### Transformations, Inc. Net Zero Houses

- DOE Challenge Home Winner Devens, MA
  - Production Home (16.3 kW PV System, HERS -37)
  - Custom Home (17.3 kW PV System, HERS -21)





Custom Home

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### Unvented Roofs without Spray Foam





Chicago-area test house; 7 side-by-side roof bays, monitoring for moisture content, temperature, and relative humidity. 50% RH interior conditions.







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### NIST Net Zero Lab House

- 3-bedroom, 4-bathroom lab house at the NIST campus in Gaithersburg, MD
  - Roof R-75
  - Walls R-48
  - Foundation Walls R-28
  - Foundation Slab R-11
  - Windows R-5
  - Mechanical multiple mechanical systems
  - PV System 10.2 kW

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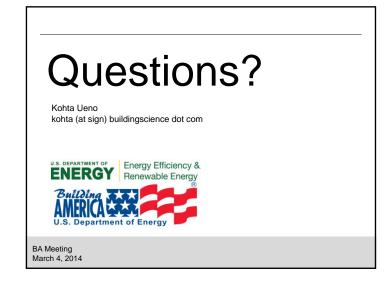


# ■ Objectives: ■ Provide guidelines to achieve NZEHs ■ Develop effective monitoring techniques ■ Measure system performance of NZEHs ■ Select appropriate heating and cooling equipment ■ Collect and analyze home energy data (interior loads, performance of space conditioning systems, simulated occupant behavior, PV system contribution)

## Questions?

This temporarily suspends the AIA CEU content

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# Questions?

AIA CEU content is now resumed

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