Zero Energy Homes Show
Continuing Strong Growth
NBI Webinar July 18, 2019

Ann Edminster
Inventory Director
Team Zero (Formerly Net Zero Energy Coalition)

Geoff Ferrell
Chief Technology Officer
Mandalay Homes

Alexi Miller
Sr. Project Manager
New Buildings Institute
Efficiency delivered.

NBI is responding to increasing urgency to reduce carbon emissions and increased demand for improved energy performance of new and existing buildings.

NBI’s Theory of Market Change:

Our Program Areas

(1) Building & Program Innovation

(2) Zero Energy Leadership & Market Development

(3) Advancing Codes & Policy

VanDusen Botanical Gardens Visitor Centre | Vancouver, BC
Source: Nic Lehoux
Today’s Agenda

• Highlights from the 2018 Team Zero Inventory of Zero Energy Homes – Richard Willingham and Ann Edminster, Team Zero

• The Mandalay Zero Energy Story – Geoff Ferrell, Mandalay Homes

• Wrap-Up and Announcements – Alexi Miller, NBI

• Q&A
TO ZERO AND BEYOND

Zero Energy Residential Buildings Study

2018 inventory of residential projects on the path to zero in the U.S. and Canada

59% growth 2018 over 2017!
Who is TEAM ZERO?

• A shared vision: The built environment will be a positive asset on the carbon balance sheet of the planet by 2050
• Participants to date:
• Agreed in a Think Tank process that they could arrive at their zero-related ambitions faster and more effectively by coordinating activities and sharing resources
Job #1: Inventory

• How many ZE homes are there?
  • Is this ‘thing’ catching on?
  • How quickly is the industry growing?

Why do these questions matter?
• The answers are proof of market to designers, builders, planners and manufacturers who provide ZE materials and technology
• Proof that ZE is widespread and growing quickly across US and Canada
• Proof of viability in different climates, markets and political jurisdictions
• Inspiring non-ZE designers and builders
What’s next for the 2019 Inventory?

• Improved value, deeper data, deeper analysis
• New, expanded, data collection process
• Greater data depth—fuels, mechanical systems, envelope design
• Self-serve data analysis
• More frequent updates available, promoted and shared to motivate slow adopters
• Industry consultation—added questions, priorities
ZE Homes Are Going Strong!

Year-over-year growth continues to be robust.

http://teamzero.com/zero-energy-inventory/
Tip of the Iceberg?

• The Inventory doesn’t tell the whole story
• Inventory doesn’t capture all units:
  • As ZE activity increases, the community becomes more diffuse
  • More and more spontaneous engagement
  • They haven’t yet found us so we don’t know them
• Suggests strongly that ZE is catching on even faster than we know
• Don’t forget the 31,000 planned units counted but not reported in 2018!
From Zero Energy Ready to Net Positive

Significant energy performance gains:

- 7.2% migration from the zero energy ready category to zero energy
  - 2017: 73.8% ZE Ready and 21.7% ZE
  - 2018: 66.6% ZE Ready and 29% ZE
- Net positive units are holding steady at 4.5% of the total
Multifamily & Multi-unit Single-family Projects Dominate

95.4% of the total

PROJECTS COMPRISING 2+ UNITS

5,416

SINGLE-FAMILY HOMES

15,707

UNITS IN MULTI-FAMILY BUILDINGS

SINGLE-FAMILY VS. MULTIFAMILY UNITS

<table>
<thead>
<tr>
<th>Year</th>
<th>Single Family</th>
<th>Multi Family</th>
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<tbody>
<tr>
<td>2015</td>
<td>3,071</td>
<td>3,106</td>
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<tr>
<td>2016</td>
<td>4,727</td>
<td>3,476</td>
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<tr>
<td>2017</td>
<td>5,582</td>
<td>8,323</td>
</tr>
<tr>
<td>2018</td>
<td>6,439</td>
<td>15,707</td>
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</table>
ZE development intensity is highest where there are advanced energy policies and market leaders.
**Arizona is the Single-Family ZE Stronghold**

- Mandalay Homes, with 23 ZE projects totaling 1,159 units
- Mandalay reported largest single-family project – Mountain Gate in Clarkdale, AZ (323 homes under construction, zero energy ready)
- The largest completed project is Flagstaff Meadows subdivision in Bellemont, AZ, by Capstone Homes (24 homes, zero energy ready)
- US Southwest = North American ZE stronghold—9,589 units in California, Arizona (#4), Colorado (#7) and Texas (#10) together
ZE Homes Are Going Strong!

Plus:

30,256 units planned in 33 projects, including:

- 21,500 units in Santa Clarita, CA (Newhall Ranch, FivePoint)
- 5,000 units in Waterset, FL (EcoVillage Waterset, Planet Greenergy)
- 2,900 units in Prescott Valley, AZ (Jasper, Mandalay Homes)

Trends to watch:

- Community micro-grids
- Electrification
- Grid harmonization
- Zero carbon
RESOURCES

Team Zero Annual Inventory Reports
http://teamzero.org/resources/zero-energy-inventory/

Team Zero Website
http://teamzero.org

Zero Energy Builder Directory
http://zeroenergyproject.org/zero-energy-home-builders/

Case Study Database (details on enclosure, etc.)
http://nesea.org/search-case-studies

Thank you!
- RESNET estimates
- based on 2100 sf
Assembly Matters
The parts of the whole make the difference

Building Blocks for Scale
- The more efficient the foundation home, the fewer renewables are needed to get to energy neutral or HERS 0 rating.
- Good energy details that eliminate thermal bridging, and that allow for continuous insulation levels per design lead to better thermal efficiency.
- A tight livable envelope maximizes thermal efficiency by retaining inputs longer.
- As the envelope is developed tighter and tighter, better ventilation strategies must be employed to protect both indoor air quality and overall durability.
- Quality windows and doors protect against unwanted solar heat gain and provide for better comfort control.
- High quality HVAC that employs high SEER equipment and staged or variable compressors maximizes efficiency in low load envelopes.
What is iON?

- Basis is an extremely efficient building that consumes less as an asset before renewables are added as an offset
- For our service area, all electric home for performance driven appliances
- Energy storage to meet TOU/Demand parameters
- Solar array sized to meet home needs during sunny hours and provide some charge capacity. Not all and designed to not export to the grid.
- Tuned to specific utility rate plan that incentivize off peak usages and encourages non-use during daily peak period
- Energy Management features to help the home utilize less energy or the “right energy”
Utility Relationships

Daily Operations

• Operates under the specific rate plan created by the utility
• All energy pass through and is metered by utility per the rate plan
• All energy import and storage is for the local benefit of the home occupant only
• Energy sharing, Voltage support, Frequency regulation all possible, but agreements with utilities are just beginning to form in the US
• iON is about grid support and leveraging pricing signals, not defection or off grid operations
• In time, iON “fleet” can be dispatched to meet grid needs as a Virtual Power Plant
• VPP energy and power only limited by adoption and installations across a distributed grid
Jasper – First sonnen Community in the US

Designed to be an iON community from the start

- Any home built in Jasper must meet a community Performance guideline. Just like an Architectural guideline.
- Community amenities designed to be net zero through renewables and storage
- Reduced community utility costs will result in more effective HOA fees for community improvement.
- Water sustainability and reduction are just as important as electricity
- Homes built in Jasper will have the newest generation of energy management features on the market to better position them for future VPP capabilities with the utility's involvement
Other Projects in the VPP Sphere

-Utah
- Large Multi-Family project incorporating on site solar, high efficiency building techniques and energy storage
- Industry first collaboration between the local utility and the developer to implement and harness renewable energy managed through energy storage as a grid balancing asset

-North East region
- VPPs being financed and deployed throughout the region. VPP operators participate in the wholesale energy market just like a power plant provider

-South East region
- Utility and developer focus on grid resiliency and disaster resistance. Energy storage assets create microgrids in power outage scenarios and can provide grid support during recovery and re-build efforts

- Dark Blue = Grid Charge
- Orange = Discharge
Resources and Upcoming Events
GETTING TO ZERO BUILDINGS DATABASE

Online Tool / May 6, 2019 / Zero Net Energy

NBI works to identify, research, analyze, and promote commercial and multifamily buildings that are leaders in low and zero energy. We maintain the most comprehensive list of zero energy (ZE) commercial and multifamily buildings across North America. This interactive tool puts NBI’s Getting to Zero Buildings Database at your fingertips and allows you to generate customized maps, lists, and charts.

There are two tabs:

1. Map and List: The map plots cities in which ZE projects are located. The table (below the map) lists each project and its key characteristics. Use the check boxes on the left to filter by ZE status, location, and building type.

2. Analysis: Interactive charts display key data about the ZE building stock. Use the check boxes to customize the charts by ZE status, location, building type, ownership, and size.

NBI Getting to Zero Buildings Database

Use the filters on the left to filter projects in the map, and/or select a bubble on the map to filter the table below. Click on the Analysis tab above to see the big picture and create customized charts.

ZE Status
- Emerging
- Verified

State or Province
- (All)
- Alabama
- Alberta
- Arizona
- Arkansas
- British Columbia

Count
- 500
- 83
NBI Getting to Zero Buildings Database

Use the filters on the left to filter projects in the map, and/or select a bubble on the map to filter the table below. Click on the Analysis tab above to see the big picture and create customized charts.

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<thead>
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<td>Alberta</td>
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<td>Connecticut</td>
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<table>
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<tr>
<td>Education</td>
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<tr>
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<tr>
<td>Mercantile (Enclosed)</td>
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<tr>
<td>Mercantile (Retail Other)</td>
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Search
NBI Getting to Zero Buildings Database

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<th>Net Site EUI</th>
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Use Case: Analysis

NBI Getting to Zero Buildings Analysis

Market Growth

Ownership Type Breakdown

Building Size Breakdown

Building Type

Building Size Range

Ownership

Building Type

© New Buildings Institute
Please do **Use** and **Share** NBI GTZ Database graphics in reports, presentations, etc. in your work to help more projects Get to Zero!

Be sure to credit graphics properly when you use GTZ content:

*Source: New Buildings Institute, (month, year)*
Access the Database:
newbuildings.org/getting-to-zero-database

On-Demand Intro & Demo:
What’s your number?
Submit your zero energy project information and have your numbers shared!

newbuildings.org/project-registry/

zHome in Issaquah, WA, has an EUI of 21 significantly lower than the CBECs average* for multifamily housing of 59.6.

*CBECs-Commercial Buildings Energy Consumption Survey

zHome | Issaquah, WA
Credit: Ichijo USA

© New Buildings Institute 2019
NBI and RESNET are jointly piloting the Zero Energy Designed Homes (ZED Homes) certification program that offers value to homebuyers, sellers, and builders.

Homebuyers can be confident that they are buying a premium energy performing home with better value.

Builders can use the certification as a mark of distinction to showcase their top-tier projects.

Efficiency program managers gain a ready-made opportunity to catalyze the market for zero energy homes.

RESNET is excited about partnering with NBI to launch the ZED Homes Certification. RESNET’s HERS Energy Rating Index provides an industry-recognized mechanism to identify zero energy homes and RESNET’s infrastructure of certified HERS Raters will link the program with progressive builders.

-Steve Baden, RESNET Executive Director

newbuildings.org/zero-energy-homes
Many NBI ZE and Energy Efficiency Resources
JOIN US!

Join us at the premier global event dedicated to creating a zero energy, zero carbon future for the built environment.

GETTING TO ZERO FORUM 2019

October 9-11
OAKLAND MARRIOTT
Oakland, CA

gettingtozeroforum.org
Thank You!

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Alexi Miller: alexi@newbuildings.org