What is the CURRENT STATE of Residential Zero Energy in North America?

Frank Baker, NZEC Board of Directors
TO ZERO AND BEYOND

Zero Energy Residential Buildings Study

2016 Inventory of residential projects on the path to zero in the U.S. and Canada

JUNE 2017
RESIDENTIAL ZE GROWTH 2015-2016

equivalent of 16,406 cars each year and 77,929 tons of CO2 emissions eliminated

741 PROJECTS
+82%

4,077 BUILDINGS
+22%

8,203 UNITS
+33%
RESIDENTIAL ZE GROWTH 2016-2017

SNEAK PEEK!

>14,000

+71%

+33%

< 2015  2016  2017

UNITS
94% of ZE PROJECTS >1 Unit
as of January 2016

MULTI-UNIT PROJECTS
PROJECT TYPE BY UNITS

average project 33 units

2,960
SINGLE-FAMILY UNITS

average project 46 units

4,727
MULTI-FAMILY UNITS

Multi-unit projects are projects greater than 2 units, including both single family detached projects and multi-unit buildings

The remainder are single-unit projects
UPWARD SHIFT in Energy Performance as of January 2016

THOUSAND HOME CHALLENGE: existing home deep energy reduction projects (retrofit/behavior)
WHAT have we LEARNED from the inventories?
Custom & Luxury ZE Homes

Early adopters

Daniel Smith & Associates Architects
Arkin-Tilt Architects
reKU Design

HKS/Hill-Glazier Studios (courtesy Blake Marvin)
Affordable & Multifamily ZE Homes

2nd wave

K. Boodjeh Architects

The Pacific Companies
Spec & Production ZE Homes

3rd wave ~ up and coming!

Thriving Communities
One Sky Homes
The Paul Davis Partnership
Meritage
And ... ZE is happening at COMMUNITY SCALE

Fujisawa Sustainable Smart Town, Japan

FortZED, Ft. Collins, CO

Pecan Street, Austin, TX

Lancaster, CA
ZNE development intensity is highest where there are advanced energy policies.
## Individual Builder & Developer Activity Also Drives Growth

<table>
<thead>
<tr>
<th>WHERE</th>
<th>WHAT</th>
<th>WHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW YORK</td>
<td>#4 in units</td>
<td>Greenhill Contracting (New Paltz): 31 ZE units</td>
</tr>
<tr>
<td></td>
<td>#3 in builders</td>
<td></td>
</tr>
<tr>
<td>CALIFORNIA</td>
<td>#1 in units and builders</td>
<td>Redwood Energy (Arcata): 1,581 ZE units (mostly multifamily)</td>
</tr>
<tr>
<td>ALBERTA, CA</td>
<td>#10 in units</td>
<td>8 individual builders: numerous large ZE projects</td>
</tr>
<tr>
<td>NEW MEXICO</td>
<td>#13 in per-capita units</td>
<td>Palo Duro Homes (Albuquerque): 16 ZE projects</td>
</tr>
<tr>
<td>MAINE</td>
<td>#10 in per-capita ZE units</td>
<td>BrightBuilt Home (Portland): 79 projects</td>
</tr>
</tbody>
</table>

**Most in North America!**
NZE SIP house
Pleasant Meadow, Blissfield, Michigan
<table>
<thead>
<tr>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solarworld 270 Watt, Monocrystalline, 60 cell, PV Module, MC4, PV Wire, 31mm frame, Clear 2.5 Frame</td>
<td>38.00</td>
</tr>
<tr>
<td>SolarEdge, SE7600A 1-Ph Grid Tied Inverter, 7600W, 208/240VAC, 60Hz, DC/AC Discon, 2 Unfused Input, No MPPT, 12 Yr Warr, Ungrounded, RS485 and Ethernet</td>
<td>1.00</td>
</tr>
<tr>
<td>SolarEdge, Power Optimizer, 300W, per module Add-On Box, MC4 In - MC4 Out, 5-55V, 10A</td>
<td>29.00</td>
</tr>
<tr>
<td>SMA, Sunny Boy 3000TL-US, 1-Ph Grid Tied Inverter, 3000W, 208/240VAC, 60HZ, DC Disconnect, 2 Unfused Input, 10 Yr Warr, Ungrounded, Arc-Fault Protection</td>
<td>1.00</td>
</tr>
<tr>
<td>DPW Racking System</td>
<td>1.00</td>
</tr>
<tr>
<td>Locus Energy System Monitoring Subsystem, includes data collection, storage, and web based reporting. Includes 5 year warranty and 5 year monitoring service (after which is $36 per year).</td>
<td>1.00</td>
</tr>
<tr>
<td>Balance of System PV Roof. Components, including: disconnects, fuses, kWh meter, conduit, wire, fittings, grounding, labels, documentation.</td>
<td>1.00</td>
</tr>
<tr>
<td>Professional Design &amp; Installation Services to meet or exceed NEC. Includes five year Dovetail system warranty.</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Inverters & Monitor
The Traditional sweetspot for SIPs:
The custom home building market--arguably the most important part of the new home market for most independent dealers--grew by about 2% in 2017 from the year before to total 172,000 homes, the National Association of Home Builders (NAHB) reports.

NAHB’s analysis of Census Data from the Quarterly Starts and Completions by Purpose and Design survey found there were roughly 40,000 total custom starts in 2017's fourth quarter. Custom home building starts are homes built on an owner’s land, with either the owner or a builder acting as the general contractor. It doesn't count spec homes built on a custom basis.

NAHB added:
As measured on a one-year moving average, the market share of custom home building in terms of total single-family starts is now 20%, down from a cycle high of 31.5% set during the second quarter of 2009.
Arguably the fastest growing building segment is Net Zero and it matches up extremely well with the advantages of SIPs. SIPs represent the best building envelope technology to achieve Net Zero.

The largest building segment yet to be tapped by SIPS/RIPS is the remodeling/retrofit market. It represents over 130,000,000 homes most of which were built prior to energy codes. These buildings are also targets for NZE.
WHERE do we GO from here?

NZEC can help SIPA:
• Understand the marketplace and potential growth opportunities
• Identify where SIPs have most/least traction
• Identify where ZNE builders are concentrated and how they build
• Add SIP ZNE projects to the case study database & inventory and assist in promotion
• http://nesea.org/search-case-studies
<table>
<thead>
<tr>
<th>TEAM ZERO Membership Category</th>
<th>Annual Fee</th>
<th>Monthly Option</th>
<th>Free Webinar Attendees</th>
<th>Minimum Webinar Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual No company affiliation</td>
<td>$100</td>
<td>$10</td>
<td>1</td>
<td>$60</td>
</tr>
<tr>
<td>Team 1 Sub-national professional services firm Government agency Education institution Builder 0-99 units/yr</td>
<td>$300</td>
<td>$30</td>
<td>4</td>
<td>$240</td>
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<tr>
<td>Team 2 Small utility or corporation National/international professional services firm Builder 100-499 units/yr</td>
<td>$500</td>
<td>$50</td>
<td>8</td>
<td>$480</td>
</tr>
<tr>
<td>Team 3 Large utility or corporation Builder 500+ units/yr Manufacturer &lt;$20M/yr</td>
<td>$1,000</td>
<td>$100</td>
<td>15</td>
<td>$900</td>
</tr>
<tr>
<td>Team 4 Manufacturer $20M+ /yr</td>
<td>$2,000</td>
<td>$200</td>
<td>25</td>
<td>$1,500</td>
</tr>
</tbody>
</table>
RESOURCES

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

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

2016 Inventory Report
http://netzeroenergycoalition.com/2016-zero-energy-inventory/

NZEC Website
http://netzeroenergycoalition.com

Thank you!