Welcome!
We will be starting soon.
Low-Income Forum on Energy Presents:

Net Zero Energy Affordable Housing in Vermont

Elizabeth Chant and Allison Donovan
Vermont Energy Investment Corporation

November 17, 2015
1:30 p.m. – 2:30 p.m. ET
LIFE, the Low-Income Forum on Energy, is a unique statewide dialogue that brings together organizations and individuals committed to addressing the challenges and opportunities facing low-income New Yorkers as they seek safe, affordable and reliable energy.

Supported by the New York State Public Service Commission and the New York State Energy Research and Development Authority (NYSERDA), the LIFE dialogue encourages an interactive exchange of information and collaboration among the programs and resources that assist low-income energy consumers.
→ Monthly webinars
  Wednesday, December 16, 2015 @ 1:30-2:30 p.m. ET
  NY-Sun’s Affordable Solar Program
  NYSERDA

→ Monthly email newsletter
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  LinkedIn: Low-Income Forum on Energy
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Find more information on the website
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LIFE@nyserda.ny.gov
Type into the text field and click “send.”
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Click on the “Chat” icon to activate the chat function.
Zero Net Energy Affordable Housing in Vermont

Alison Donovan
Elizabeth Chant

LIFE Webinar
Nov. 17, 2015
Introduction to VEIC

- Mission-driven nonprofit
- 28 years of reducing economic and environmental costs of energy use
- Energy efficiency, renewable energy, and transportation
- Consulting and implementation
- 3 utility-scale implementation programs
VEIC’s Low-Income Vision

- Mission: *Reduce the economic and environmental costs of energy use*
- Articles of Association: “…service to low-income populations and the organizations that serve them”
- Corporate goal since 2007: Carbon reduction
- Low-income goal: 20% of cost savings from carbon reduction accrue to benefit of low-income people
Manufactured Housing Terminology 101

What is a Mobile Home?
Manufactured Housing Terminology 101

What is a Mobile Home?

1. Any trailer that can be pulled behind a car or truck that has a kitchen, sleeping area and restroom.
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3. A dwelling structure built before 1976 on a metal chassis fitted with wheels that is intended to be hauled to a usually permanent site.
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1. A home built in a factory and installed in two pieces on site.
2. A home constructed with vinyl panels and particle board.
3. A factory built home under the HUD Code after June 15, 1976. Manufactured homes may be single- or multi-section and are built on a metal chassis.
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Manufactured Home

Southern Energy Homes
First DOE Zero Energy Ready Manufactured Home
Russellville, AL

Manufactured Housing Terminology 101

What is the HUD code?
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3. Minimum prescriptive envelope standards similar to IECC 2015 for factory built homes.
What is the HUD code?

1. **Federal Manufactured Home Construction and Safety Standards** that regulates building construction safety and energy efficiency of manufactured housing last updated in 1994.

2. A **outcome based standard** that regulates housing affordability.

3. **Minimum prescriptive envelope standards** similar to IECC 2015 for factory built homes.
Manufactured Housing Shipments

Figure 4: Manufactured Housing Shipments and Placements Nationally, 1959 through 2011

Source: Census 2012a

Source: Mobilizing Energy Efficiency in the Manufactured Housing Sector. ACEEE Report A124
Manufactured Housing Terminology 101

How are manufactured homes usually financed?
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How are manufactured homes usually financed?

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2. Chattel loans (personal loan) short term (<15 years) high rate (8-15%)

3. HUD financed at 0% for 30 years
Vermod Cash Flow Example

Monthly Cost by Housing Type

- **Mortgage**
  - Typical Manufactured Home - 20-Year: $318
  - Zero Energy Home - 20-Year: $526
  - Zero Energy Home - 30-Year: $428

- **Energy Cost**
  - Typical Manufactured Home - 20-Year: $244
  - Zero Energy Home - 20-Year: $15
  - Zero Energy Home - 30-Year: $15
Manufactured Housing Terminology 101

What is a typical land lease agreement and conditions in a manufactured home community?
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1. Long-term lot lease and stable park ownership, low rent with updated infrastructure.
2. HUD-managed facility.
3. “Mom and Pop” owned park, short term lease, little restrictions on rent increases or eviction, out-of-date infrastructure.
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Manufactured Home Community
Manufactured Housing Terminology 101

What is a modular home?
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1. A home that is built on site from ground up.
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What is a modular home?
1. A home that is built on site from ground up.
2. A home that is built in a factory, transported on a trailer and placed on a permanent foundation by a crane that qualifies for a traditional mortgage.
Manufactured Housing Terminology 101

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Vermod
Current Deficiencies

Manufactured Housing
- Federal Code
- Lower quality, short life
- High energy bills
- Energy cost uncertainty

Location
- Unstable community ownership
- Short-term land leases
- Possibly outdated infrastructure

Financing
- Financed as personal property
- Short terms, high rates
- Depreciates

Present Opportunities

Net Zero Modular
- Local code
- High quality, long life
- Energy efficient
- Renewable energy

Location
- Stable community ownership
- Long-term security
- Modern infrastructure

Financing
- Financed as real estate
- Long term, low rates
- Retains value
Oh yeah, we haven’t mentioned health and safety

**IMPORTANT HEALTH NOTICE**

Some of the building materials used in this home emit formaldehyde. Eye, nose, and throat irritation, headache, nausea, and a variety of asthma-like symptoms, including shortness of breath, have been reported as a result of formaldehyde exposure. Elderly persons and young children, as well as anyone with a history of asthma, allergies, or lung problems, may be at greater risk. Research is continuing on the possible long-term effects of exposure to formaldehyde.

Reduced ventilation resulting from energy efficiency standards may allow formaldehyde and other contaminants to accumulate in the indoor air. Additional ventilation to dilute the indoor air may be obtained from a passive or mechanical ventilation system offered by the manufacturer. Consult your dealer for information about the ventilation options offered with this home.

High indoor temperatures and humidity raise formaldehyde levels. When a home is to be located in areas subject to extreme summer temperatures, an air-conditioning system can be used to control indoor temperature levels. Check the comfort cooling certificate to determine if this home has been equipped or designed for the installation of an air-conditioning system. If you have any questions regarding the health effects of formaldehyde, consult your doctor or local health department.
VEIC Implementation Recognized as Exemplary

- Responsive to local conditions
- Leverage existing resources
- Strong partners

Low-Income Forum on Energy Webinar | 11-17-15 | Slide 49
Efficiency Vermont

• Created by Vermont Legislature and Vermont Public Service Board (PSB)
• Competitively bid contract to provide electric efficiency services to all ratepayers
• Performance-based contract
  o PSB sets goals and budget
  o PSB establishes performance indicators
  o Allows response to changing conditions
• Now operate under PSB Order of Appointment
• 15% of funds to low-income programming
Tropical Storm Irene

- 17 severely flooded mobile home parks
- 15% of MHs in state damaged
How to Replace Vermont’s Affordable Manufactured Housing

• Let’s rebuild better
  o More resilient
  o More affordable
  o Create an asset that appreciates

• Original partners
  o Efficiency Vermont
  o Vermont Housing and Conservation Board
  o High Meadows Fund
Vermont Mobile Home Replacements

- Effects of Tropical Storm Irene on low-income people
  - Siting of mobile home parks
  - Durability of standard mobile homes
- Net zero mobile home
- Durable & efficient
## Details, Details…

<table>
<thead>
<tr>
<th></th>
<th>Typical New MH</th>
<th>HPMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditioned Area / Vol</td>
<td>1050 sf / 8400 cf</td>
<td>1050 sf / 8400 cf</td>
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<tr>
<td>Infiltration</td>
<td>7 ACH 50</td>
<td>0.66 ACH 50</td>
</tr>
<tr>
<td>Duct Leakage</td>
<td>100</td>
<td>n/a</td>
</tr>
<tr>
<td>Floor Insulation</td>
<td>R30</td>
<td>R45</td>
</tr>
<tr>
<td>Wall Insulation</td>
<td>R20</td>
<td>R45</td>
</tr>
<tr>
<td>Attic Insulation</td>
<td>R30</td>
<td>R61</td>
</tr>
<tr>
<td>Door</td>
<td>R4.4</td>
<td>R7</td>
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<tr>
<td>Windows</td>
<td>U 0.35</td>
<td>U 0.19</td>
</tr>
<tr>
<td>Ventilation</td>
<td>Exhaust only</td>
<td>Heat Recovery</td>
</tr>
<tr>
<td>Heat</td>
<td>LP</td>
<td>ASHP</td>
</tr>
<tr>
<td>Hot water</td>
<td>Elec (resist)</td>
<td>HPWH</td>
</tr>
<tr>
<td>Appliances / Lighting</td>
<td>Std</td>
<td>Upgrade to HE</td>
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</tbody>
</table>
What does that mean for energy use?

<table>
<thead>
<tr>
<th></th>
<th>Typical New MH</th>
<th>HPMH</th>
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</thead>
<tbody>
<tr>
<td>Heating</td>
<td>62.6</td>
<td>6.0</td>
</tr>
<tr>
<td>Water Heating</td>
<td>12.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Appliances / Lighting</td>
<td>17.3</td>
<td>11.3</td>
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<tr>
<td><strong>Total MMBtu</strong></td>
<td><strong>92.5</strong></td>
<td><strong>22.0</strong></td>
</tr>
<tr>
<td>Barrels of oil?</td>
<td>10</td>
<td>3.25</td>
</tr>
<tr>
<td>HPMH w/ PV</td>
<td></td>
<td>1.0</td>
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</tbody>
</table>
Seeking: Partner committed to high-quality affordable, durable, efficient housing. Willing to work together to make it right.
Construction & Siting
Construction & Siting
Construction & Siting
Construction & Siting
Construction & Siting
Construction & Siting
Construction & Siting
Construction & Siting
Building Certifications for High Performance Modular Home
Building the Financial Package

- Establish as real property
- Credit-worthy customers have qualified for reasonable financing using standard underwriting
- 4.875% (fixed) for 25 years
- Compare to 8-12% for 20 years
- Efficiency Vermont provides $2,000 in energy incentives for market-rate purchases
And, for low-income people

- VHFA: 0% deferred down-payment loans on new mfd & mod homes in parks for eligible borrowers
  - $25,000 for new homes
  - $35,000 for HPMD
- USDA pilot program (June 2015): provide access to 30-year mortgage at 3.25% for HPMH in park for LI; VLI potentially eligible for subsidy to bring interest to 1%
- Efficiency Vermont: $8,000 incentive
Other Necessary Market Supports

• Efficiency Vermont has worked with the Vermont Chapter of the Appraisal Institute (AI) to
  o Expand the number of certified green appraisers
  o Educate local appraisal community on the value of HPMH

• Efficiency Vermont has provided incentives for appraisers to complete required courses for inclusion in AI’s *Valuation of Sustainable Buildings Professional Registry*
Moving the Model into Other Jurisdictions

• Delaware Sustainable Energy Utility
  o Conducted preliminary market analysis
  o Now developing pilot program

• Interest from other states and jurisdictions
  o High numbers of MHs
  o High energy costs

• Share what we have learned
Key Lessons

• Know and be realistic about the market
  o Not yet developed funding / financing model for very and extremely low-income homeowners

• Be honest about and ready for barriers
  o Leased land
  o High first cost
  o Confidence in energy savings

• Develop funding, including soft sources, for pilot program work
Partners & Stakeholders: Keep Widening the Circle

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Addison County Community Trust</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Twin Pines Housing Trust</td>
</tr>
<tr>
<td></td>
<td>Cathedral Square Corporation</td>
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<tr>
<td></td>
<td>Upper Valley Housing Coalition</td>
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<tr>
<td>Affordable Housing</td>
<td>VHFA</td>
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<td></td>
<td>USDA RD</td>
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<td></td>
<td>Local Fin Inst</td>
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<tr>
<td>Financiers</td>
<td>Vermod</td>
</tr>
<tr>
<td>Builder</td>
<td>VEIC / Efficiency Vermont</td>
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<tr>
<td></td>
<td>Vermont Housing and Conservation Board</td>
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<tr>
<td>Partners</td>
<td>High Meadows FUnd</td>
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</table>
And, now, I leave you with….

a movie recommendation! Really?

Really!

And a quote…
It always seems impossible, until it is done.

Nelson Mandela
Contacts

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Thank you!
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NY-Sun’s Affordable Solar Program

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