



Low-Income Forum on Energy

**Welcome to the LIFE Webinar Series.
We will be starting soon.**



Low-Income Forum on Energy

The Low-Income Forum on Energy Presents:

Zero Energy Modular Market Analysis – New York State

John Scicchitano, NYSERDA

Alison Donovan, Vermont Energy Investment Corporation

Phillip Picotte, Vermont Energy Investment Corporation

August 16, 2018

1:30 p.m. - 2:30 p.m. ET



Low-Income Forum on Energy

Working to help low-income New Yorkers address energy issues.

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.



Low-Income Forum on Energy

→ Monthly webinars

City of Utica – Local Microgrid Project

Thursday, September 20, 2018, 10:30 - 11:30 a.m. ET

HEAP Updates for the 2018-2019 Heating Season

Wednesday, October 17, 2018, 1:00 - 3:00 p.m. ET

→ Monthly email newsletter

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Low-Income Forum on Energy

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Newsletter suggestions, webinar ideas, event announcements

LIFE@nyserderda.ny.gov

Contact LIFE

Phone: 866-697-3732 – Request “Low-Income Forum on Energy”

Email: LIFE@nyserderda.ny.gov

Asking Questions During Today's Webinar

The screenshot shows the Cisco WebEx Event Center interface. The main content area displays a slide with the New York State logo and the text "NEW YORK STATE OF OPPORTUNITY. Low-Income Forum on Energy". Below the slide, it says "Welcome! We will be starting soon." The right-hand sidebar contains several sections: "Participants (1)" showing "NYSERDA Events (Host, me)" as the host and "Attendees: 0 (0 displayed)"; "Q&A" section with a text input field and "Send" and "Send Privately..." buttons. A red circle highlights the Q&A section, and two yellow arrows point to the text input field and the "Send" button respectively. The bottom of the interface shows the Cisco logo and a "Connected" status indicator.

Type into the text field and click “send.”

Technical Difficulties or Contacting the Host

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Click on the “Chat” icon to activate the chat function.

August 16, 2018

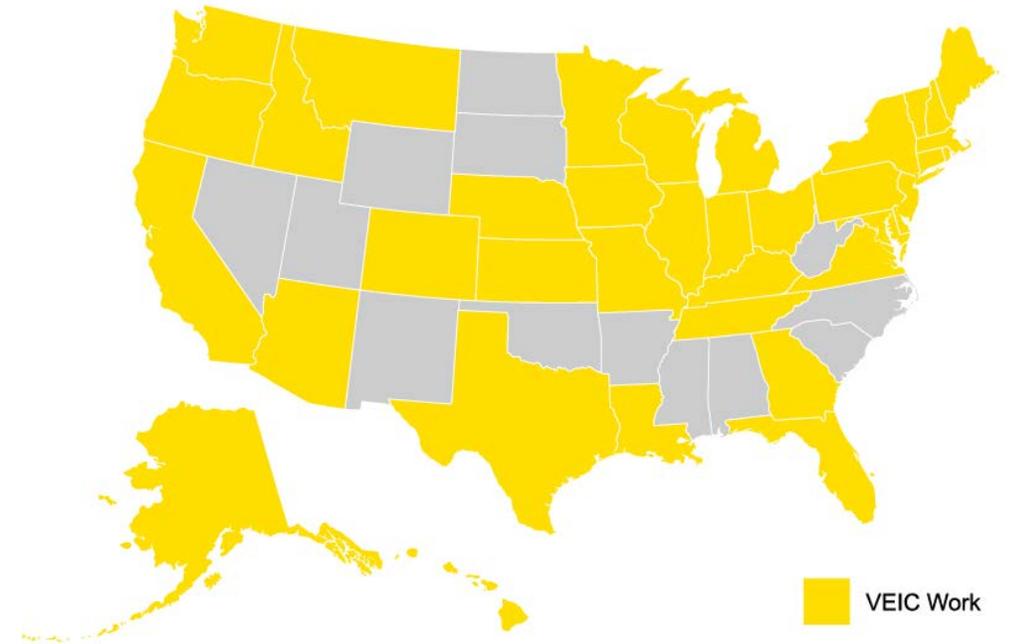
Zero Energy Modular Market Analysis

Low-Income Forum on Energy Webinar Series



About VEIC

- Nonprofit founded in 1986
- 300+ Employees
- Locations: VT, DC, OH, NY
- Design, deliver, and evaluate programs nationwide:
 - Energy efficiency
 - Transportation
 - Renewable energy



Our Customers:

- Utilities
- Businesses
- Government
- Foundations
- Environmental & Consumer Groups

Agenda

Introduction

Zero Energy Modular

New York State Market Analysis

- Mobile and Manufactured Homes and Communities
- Calculating Homeowner Economics
- Barriers & Opportunities

Questions / Discussion

Introduction

NYSERDA hired VEIC to research what it will take to bring zero energy modular (ZEM) homes to New York State.

During this call, NYSERDA and VEIC will present our research and preliminary conclusions on the opportunities and barriers of ZEM as an affordable housing solution.

We are soliciting comments and input on the findings from stakeholders to include in final report recommendations, and suggested next steps.

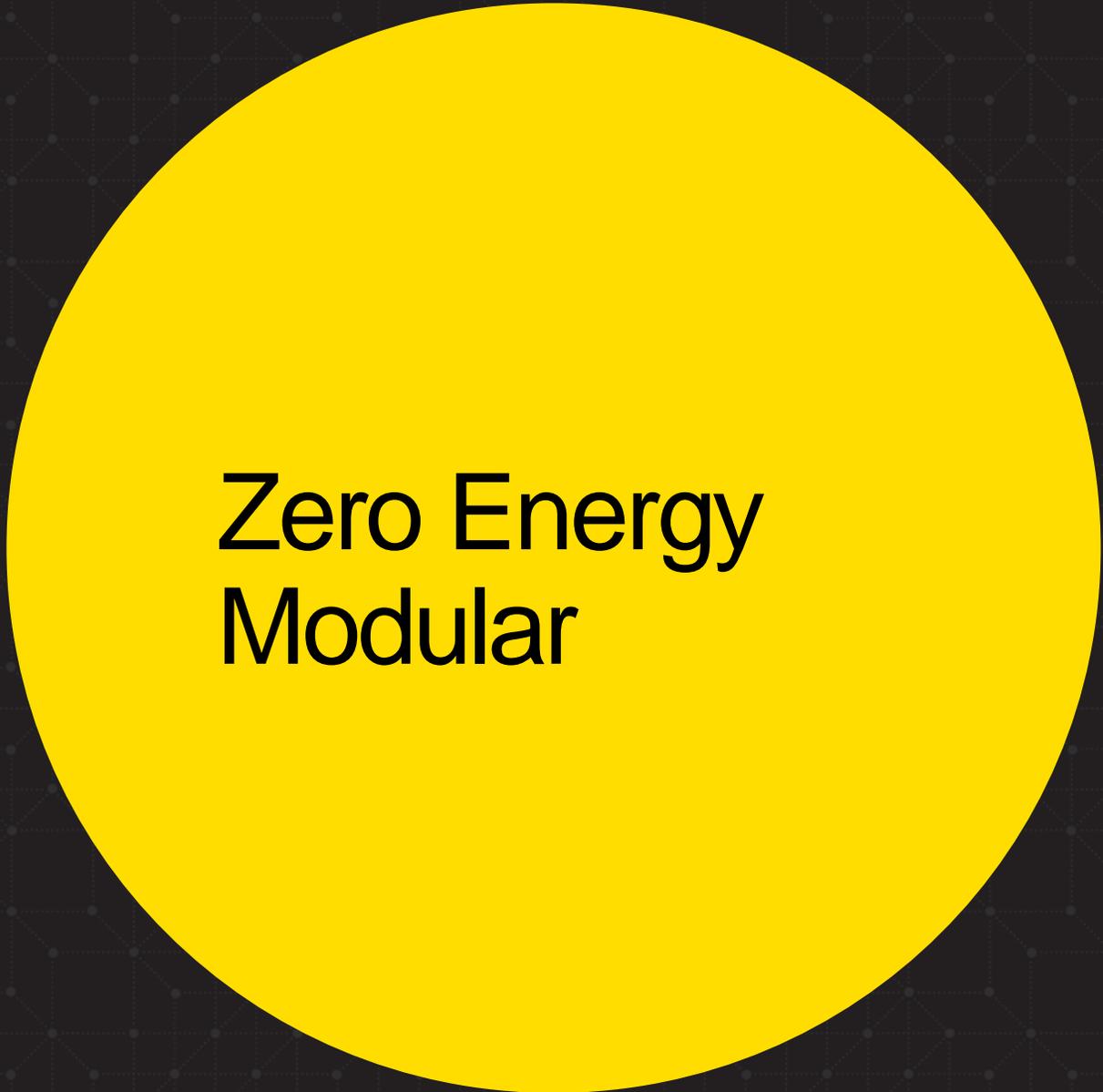
A Few Acronyms

LMI = Low and moderate income

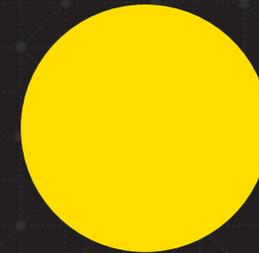
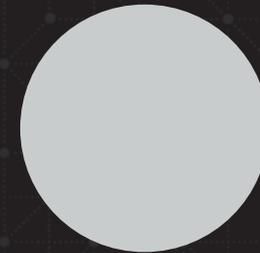
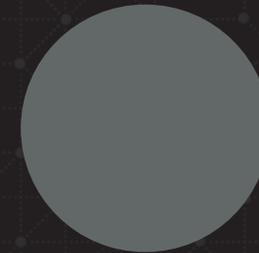
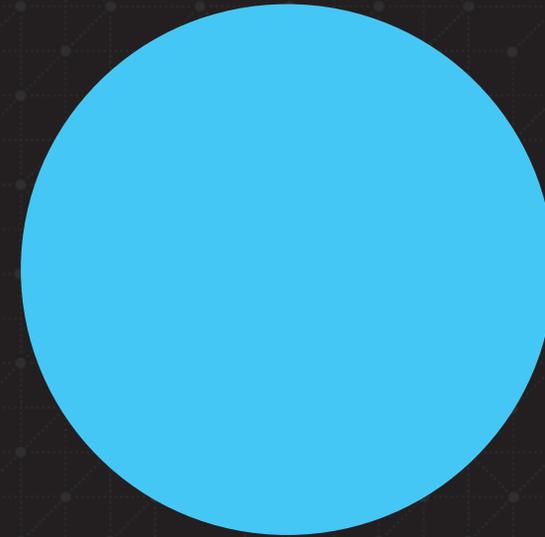
MMH = Mobile and manufactured homes

ZEM = Zero energy modular

ROC = Resident owned community, typically a co-op



Zero Energy
Modular



Factory-Built Home Types



Mobile Home

No code, pre-1976



Manufactured Home

Meets HUD code at time of construction, 1976 and later



Modular Home

Meets state and local codes at time of construction

ZEM as a Resiliency Response

- Created following Tropical Storm Irene
- MMH residents already subject to:
 - Higher energy burden
 - Twice the energy cost per square foot
 - Greater need for weatherization and LIHEAP assistance



Insulation



High efficiency appliances & lighting

Airtight construction



Fresh air ventilation

Continuous thermal envelope



Air source heat pump heating & cooling



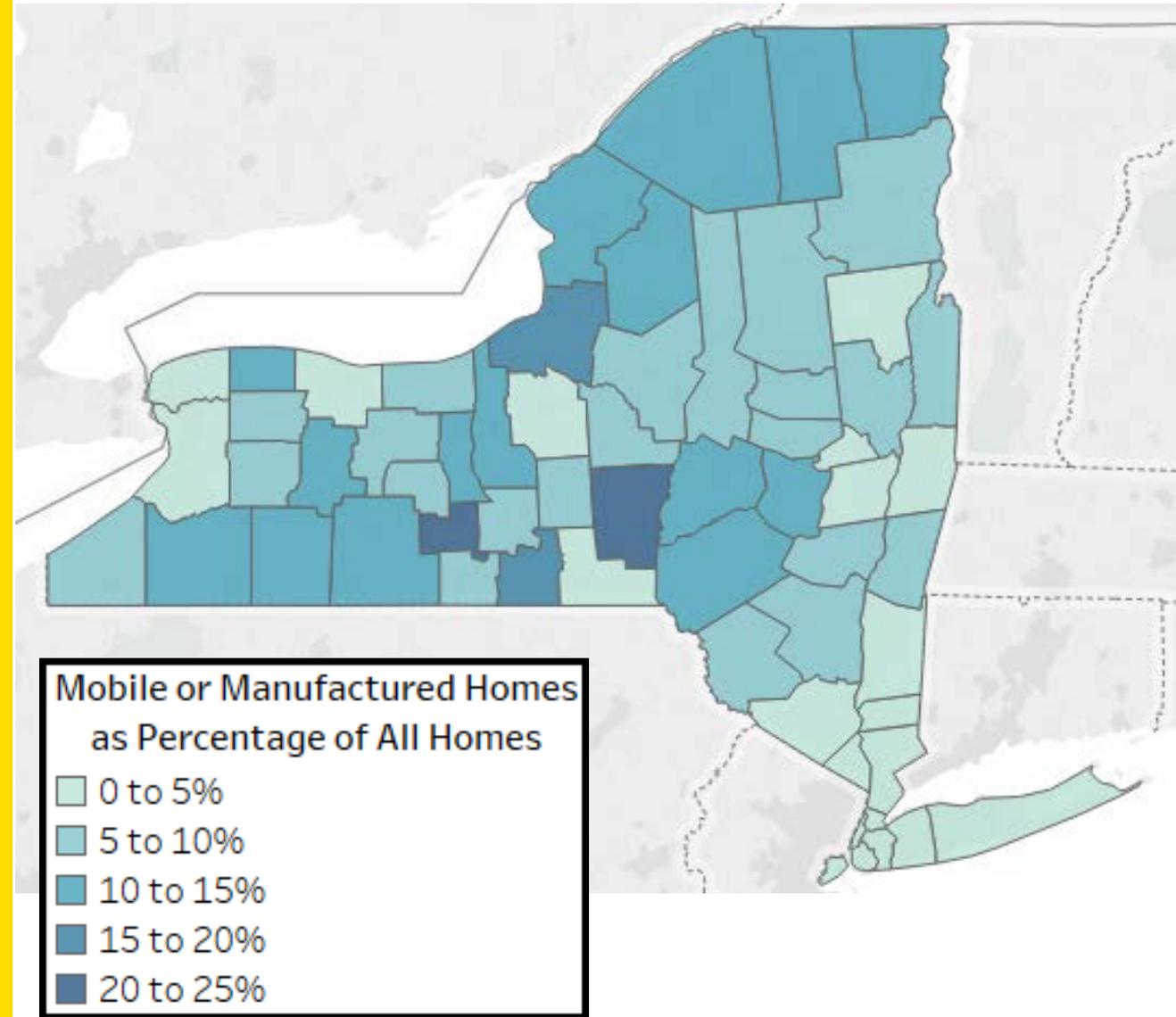


Market Analysis

152,810 occupied
MMHs in New York
State

Just 2% of housing
units statewide

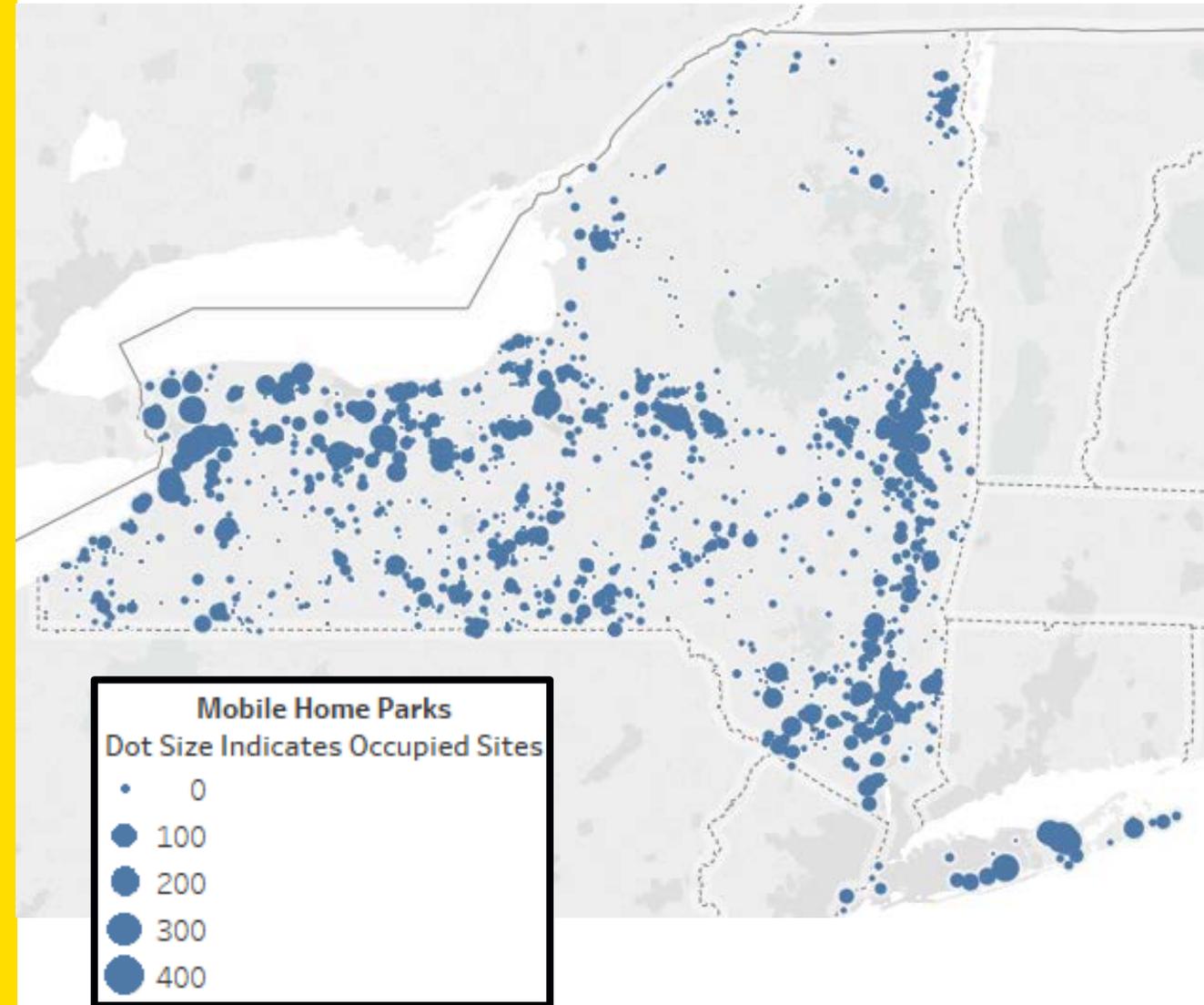
But, 5 – 15% in most
upstate counties



Median vintage is
1985

26% rented; 74%
owned or financed

36% located in
registered mobile
home parks

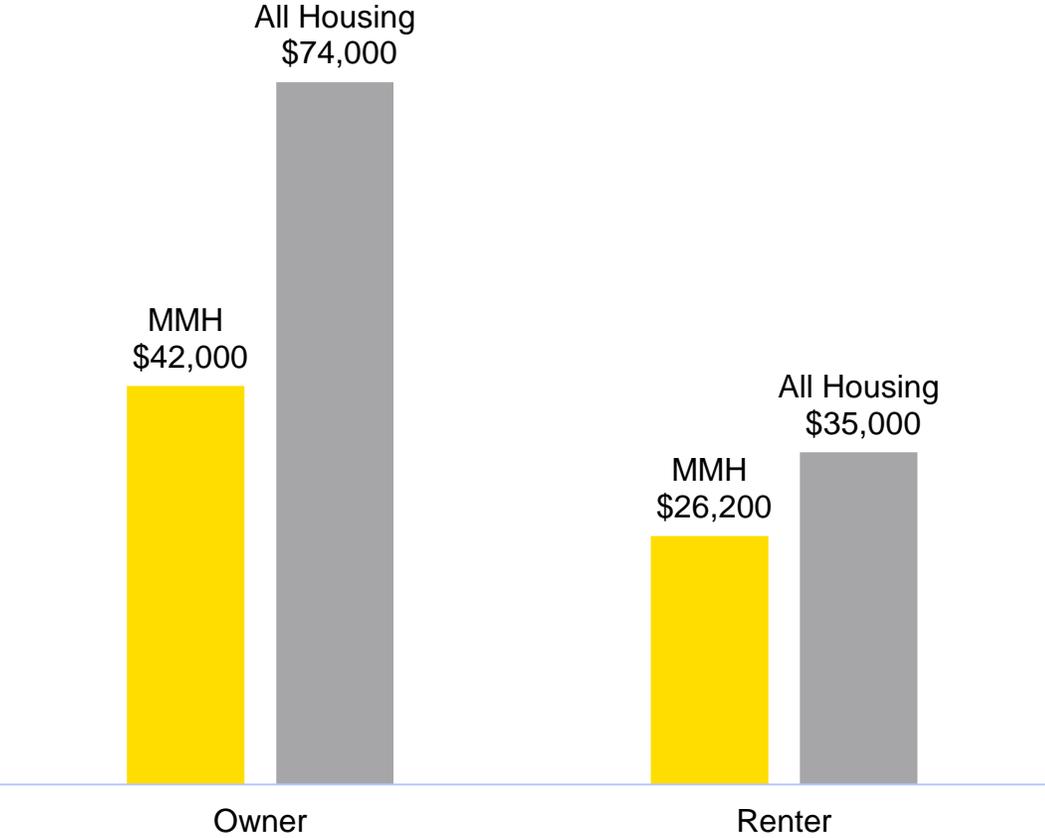


MMH residents
face a higher
energy burden

MMH LMI Households
11.5%

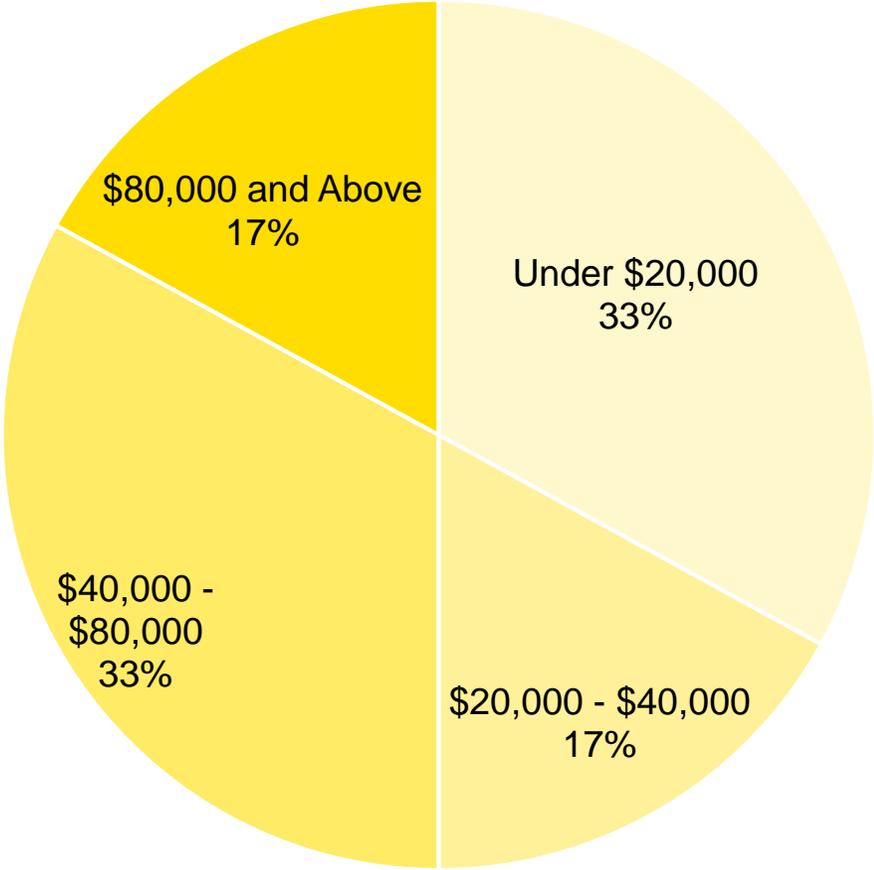
All LMI Households
9.2%

MMHs Serve Low *and* Moderate Income Residents



Median Household Income

Source: 2015 AHS

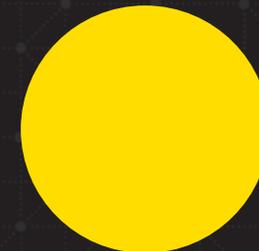
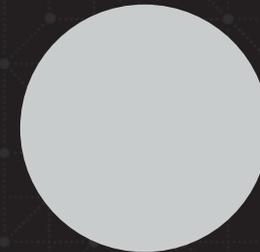
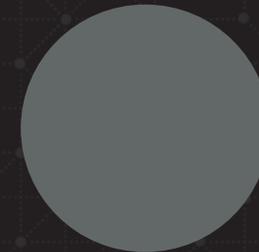
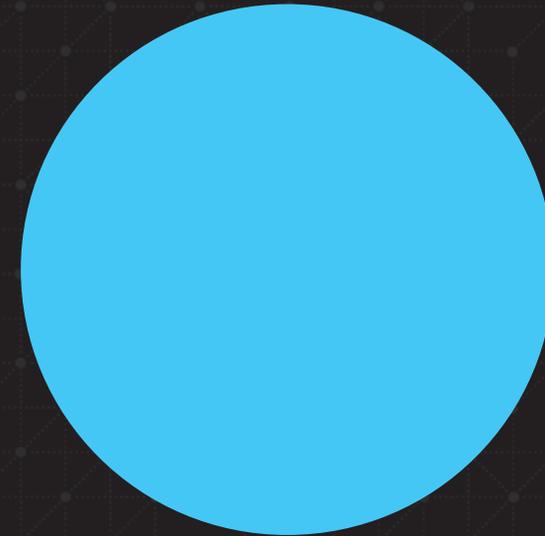


Household Income, MMH Households

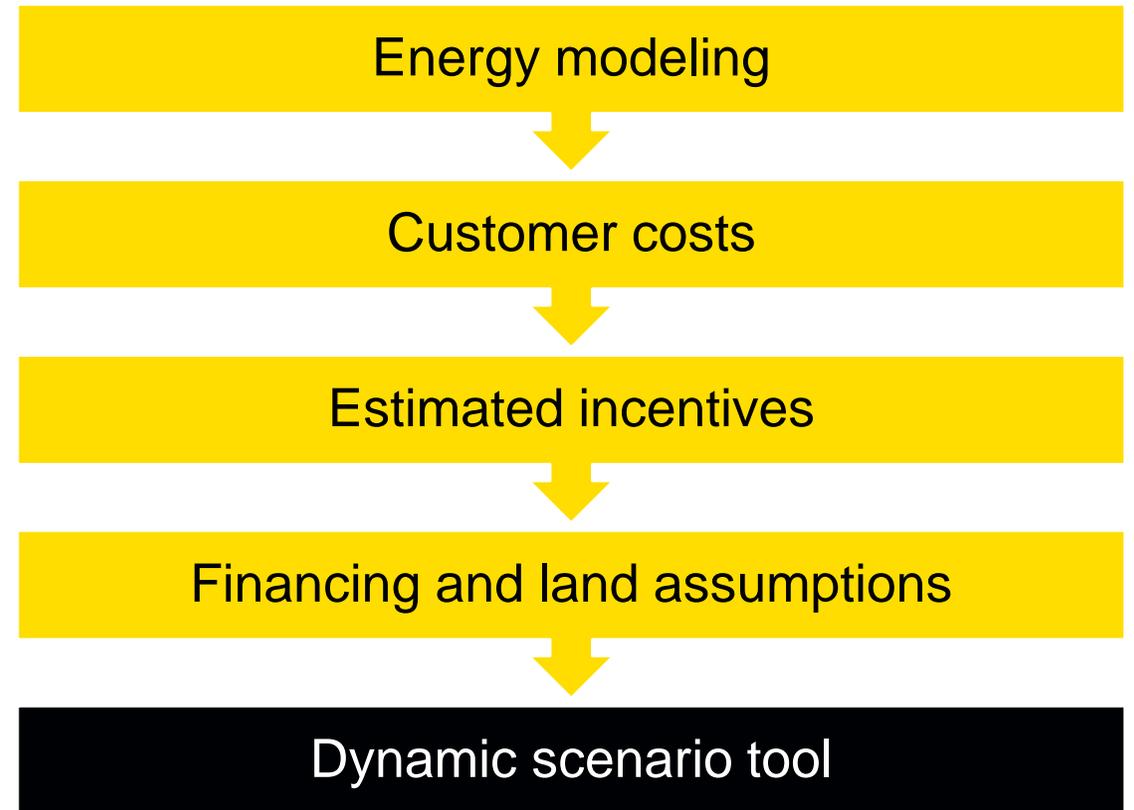
Source: 2015 AHS



Homeowner Economics



Compared to a standard manufactured home,
ZEM homes cost less to live in



Building Technical Specifications

	HUD Code Home	ZEM Home
14' x 70'; 980 sf; 2 bedroom; open crawl foundation		
Envelope		
Floor	R-22	R-40
Walls	R-19	R-43
Windows	U-0.35	U-0.21
Ceiling	R-30	R-60
Infiltration	8 ACH ₅₀	0.60 ACH ₅₀
Mechanical		
Heating	75 AFUE	13.5 HSPF
Cooling	13 SEER	30.5 SEER
Hot Water	0.92 EF	2.75 EF
Duct Insulation	R22 / R8	N/A
Duct Leakage	0.12	N/A
Ventilation	Exhaust; 50 CFM, 50 W	Balanced, 50 CFM, 62 W
Lights & Appliances		
Efficient Lighting	34%	100%
Appliances	Conventional	ENERGY STAR +
PV System		
Climate Zone 4A; 5A; 6A	N/A	5 kW; 6 kW; 7.5 kW

Overall Heat Transfer Coefficient (U _o)	
HUD	0.079
ZEM	0.039

Energy Modeling Results

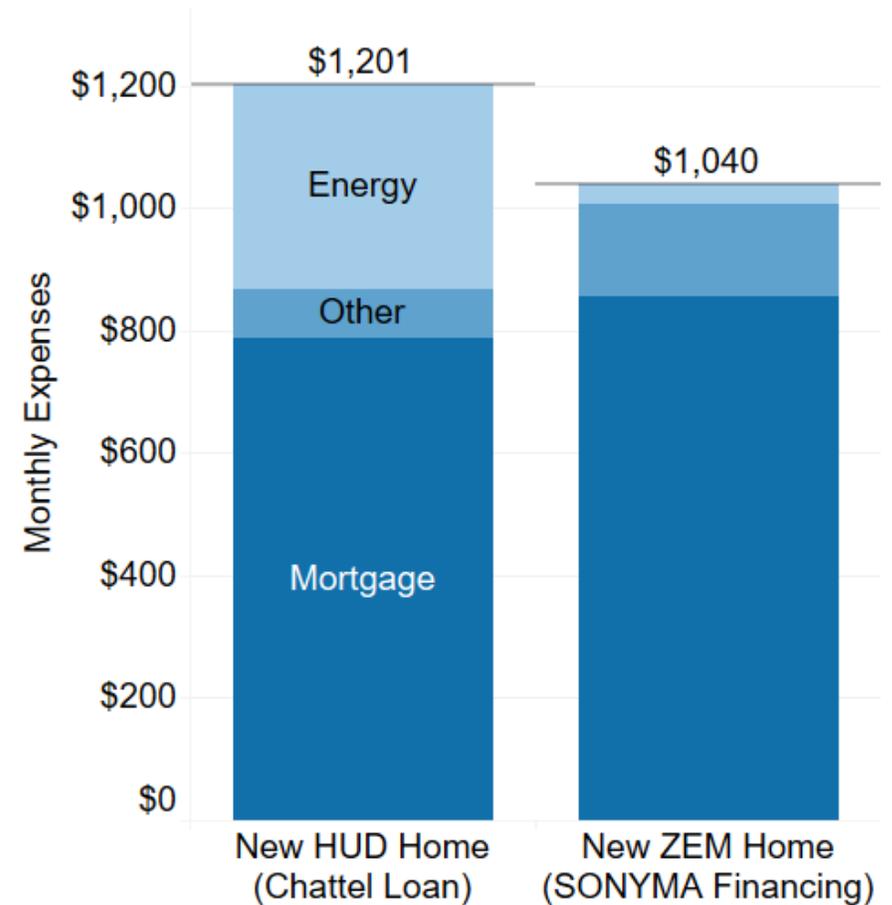
	Climate Zone 4A		Climate Zone 5A		Climate Zone 6A	
	HUD	ZEM	HUD	ZEM	HUD	ZEM
Fuel Consumption						
Electricity (kWh)	7,935	5,729	7,970	6,229	7,910	6,680
Propane (gal)	459	-	624	-	718	-
PV Production (kWh)	-	(5,912)	-	(6,688)	-	(6,429)
Total (MMBtu)	69	(1)	84	(2)	93	1
Fuel Costs						
Electricity	\$1,432	\$1,034	\$1,439	\$1,124	\$1,428	\$1,206
Propane	\$1,424	\$0	\$1,935	\$0	\$2,228	\$0
PV Production	\$0	-\$1,067	\$0	-\$1,207	\$0	-\$1,160
Total	\$2,857	-\$33	\$3,373	-\$83	\$3,655	\$45
Energy Cost Savings						
	\$2,890		\$3,456		\$3,610	

Baseline heating fuel/system: Propane furnace

Fuel cost assumptions: \$0.18/kWh, \$3.10/gal propane, \$3.22/gal fuel oil

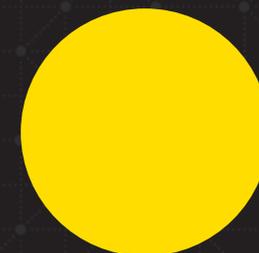
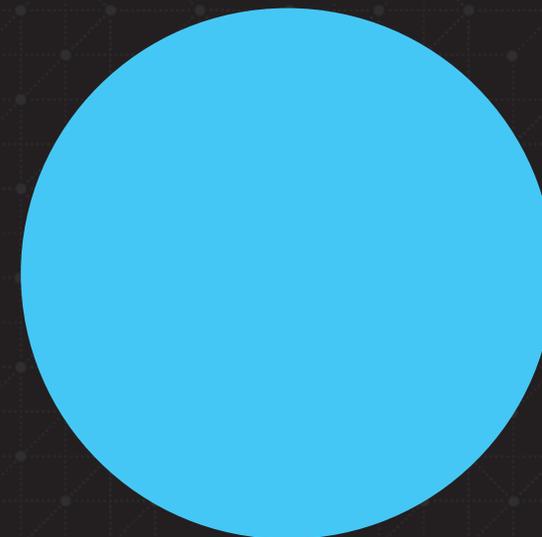
Cash Flow Results

- Higher first cost is more than offset by lower combined mortgage and energy costs
 - Lower financing cost
 - ZEM Home: 30 Years at 4.75%
 - Traditional HUD Home: 15 Years at 9%
 - Low or no energy costs
 - ZEM: \$34/month, mostly electricity service charges
- Residents pay less each month to live in a more comfortable, efficient home





Opportunities



Where are there opportunities?

Owned Unit Owned Land	Owned Unit Leased Land
Leased Unit Owned Land	Leased Unit Leased Land

Owned Unit / Owned Land

91,000 MMH

estimated units in NYS

Opportunities & Barriers

- ZEM to replace owned MMH on owned land
- ZEM would qualify for conventional mortgage financing
- Leverage existing infrastructure and land
- Need funds for disposal of existing unit
- Existing MMH may be owned outright, owners adverse to debt
- Requires individual outreach; program difficult to scale

Medium opportunity for ZEM pilot

Owned Unit / Owned Land (ROC or Coop)

1,000 MMH

estimated units in NYS

Opportunities & Barriers

- ZEM to replace owned MMH in Resident Owned Community (ROC)
- Leverage existing infrastructure and land
- Vacant lots attractive for ZEM
- Need conventional mortgage product
- Existing MMH may be owned outright, homeowners adverse to debt
- Easy to scale through ROC partners

High opportunity for ZEM pilot

Owned Unit / Leased Land (Park Conversion)

1,900 Private Parks

Opportunities & Barriers

- Focused effort to increase conversion of private parks to ROC or non-profit ownership
- Units could be mix of rental and owned
- Could be scaled through ROC and other affordable housing developers
- Need increased funding to finance park purchase
- Need better understanding of private park sales

High (?) opportunity for ZEM pilot

Urban Infill / Neighborhood Development

Technical Potential TBD

Opportunities & Barriers

- Abandoned or “zombie” properties are a problem for cities
- ZEM home would be less expensive than stick built, and build tax base and improve streetscape
- ZEM would qualify for conventional mortgage financing
- Leverage existing infrastructure and land

High (?) opportunity for ZEM pilot

Statewide Impacts of ZEM

- ZEM Development Opportunities
 - Estimate technical potential for ZEM to replace existing MMH in multiple land homeownership scenarios
 - Estimate technical potential for infill in urban downtowns
- ZEM Energy Savings
 - Estimate for multiple baseline scenarios
- Estimate number of ZEMs
 - 11-year scenario planning

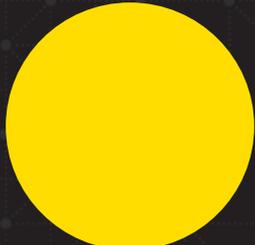
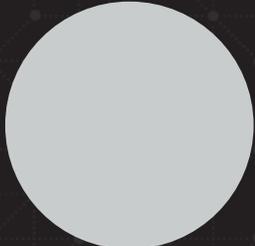
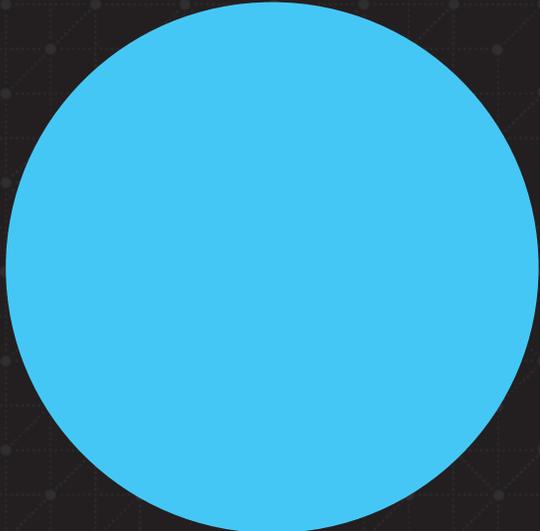
Statewide Impacts of ZEM

**Preliminary Draft
Estimated Benefits of ZEM
2019-2030**

Number of years	11
Number of homes	10,000
Electric savings (kWh)	68,435,697
Oil savings (gal)	2,845,738
Propane savings (gal)	2,834,211
Energy cost savings	\$28,942,986
Avoided emissions (lbs. CO ₂)	185,107,471



Discussion



Questions

- How could ZEM fit into the work you are already doing?
 - For example, ZEM homes as
 - Mobile home replacement
 - New construction affordable housing (infill or PUD)
 - Nonprofit purchase of an existing mobile home park to redevelop with ZEM for rental or homeownership
- Is there enough regional demand to support a local modular factory to build ZEM homes?

Thank you!

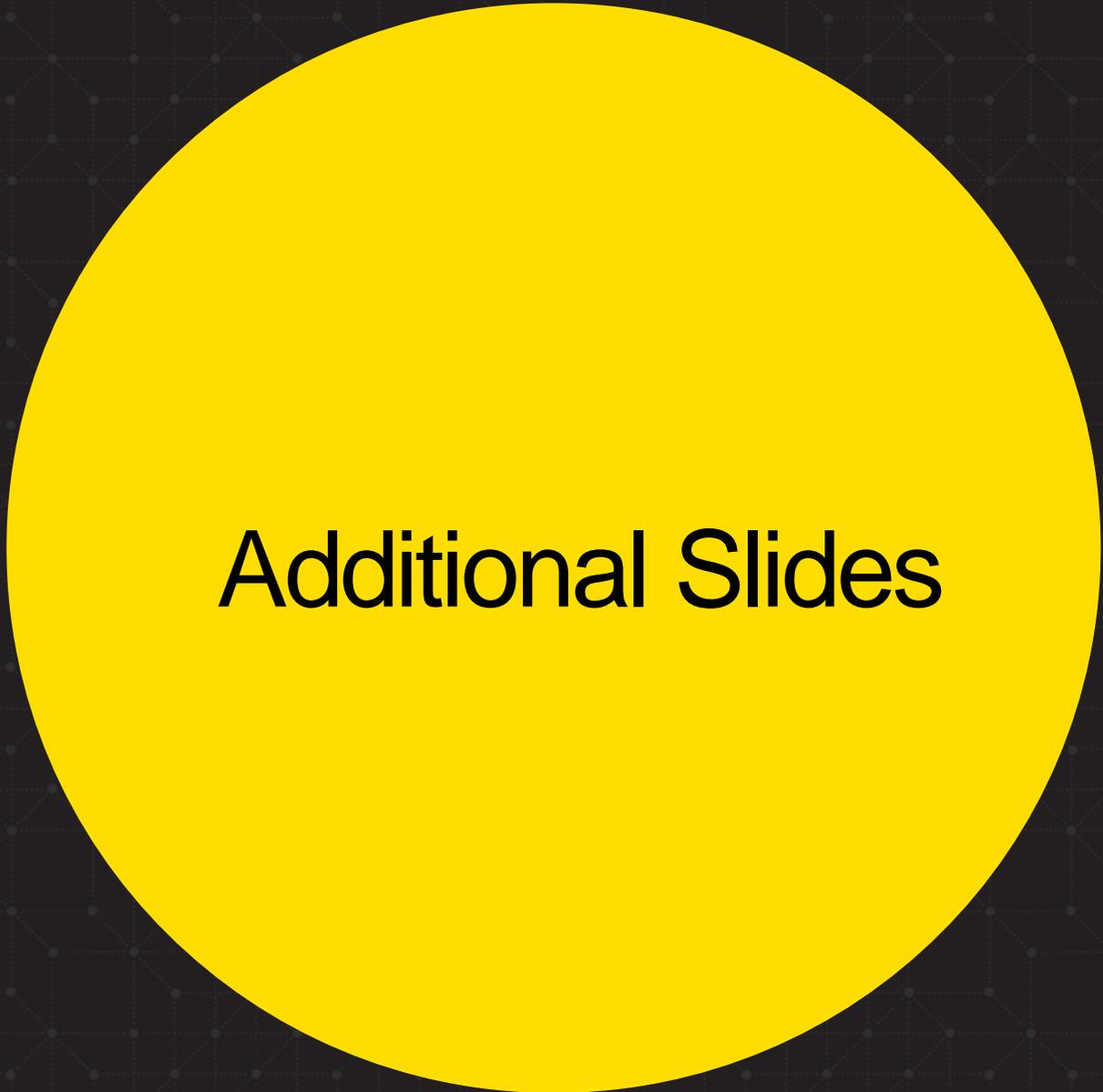
Alison Donovan

adonovan@veic.org

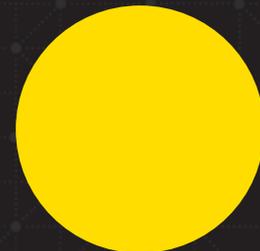
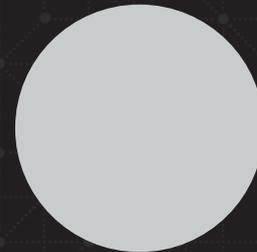
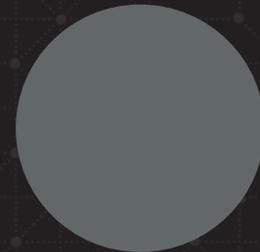
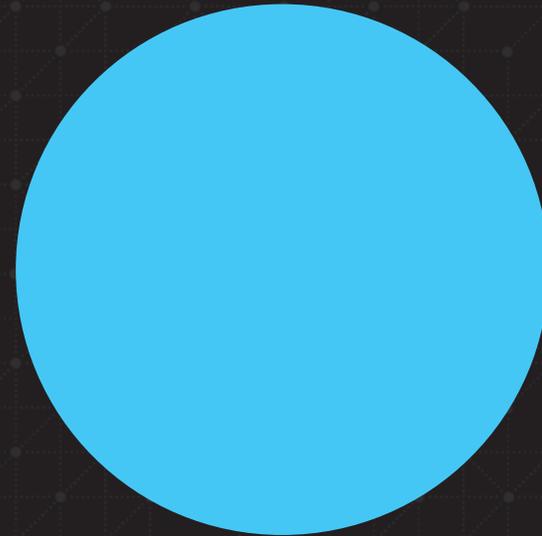
Interested in ZEM progress?

Contact John to sign up for
the NYS ZEM listserv:

John.Scicchitano@nyserda.ny.gov



Additional Slides



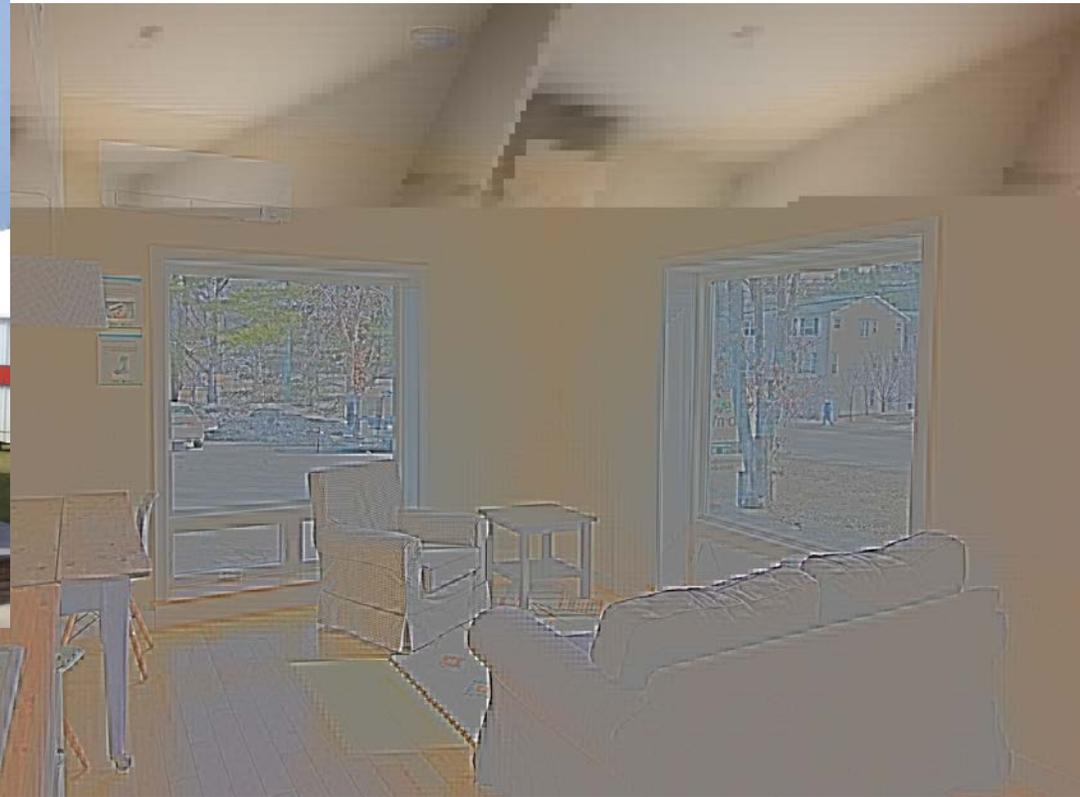
Home Replacement in Coop Park



New Park or Duplex Development



Urban and Village Infill





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