NEW YORK STATE OF OPPORTUNITY. | NYSERDA

A Decade of Results: A Retrospective of NYSERDA's Multifamily Performance Program

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November 1, 2017

Presented at the 2017 ACEEE National Conference on Energy Efficiency as a Resource

Intro to TRC

For nearly 50 years, TRC has partnered with utilities, businesses, and agencies to provide national engineering and consulting services to four primary markets:

WHO WE ARE:

- Engineers, building scientists, technology & systems experts, strategic advisors, business managers, customer engagement & marketing experts, program managers
- 120+ offices; 4100+ employees
- #10 Top Designer in Power, by ENR

TRC Energy Services

GENERATION

We provide full lifecycle support from power system and critical issues studies, through permitting, engineering, construction support, air measurements, auditing, operations, remediation and facilities decommissioning to help you provide safe, reliable power while meeting clean energy requirements.

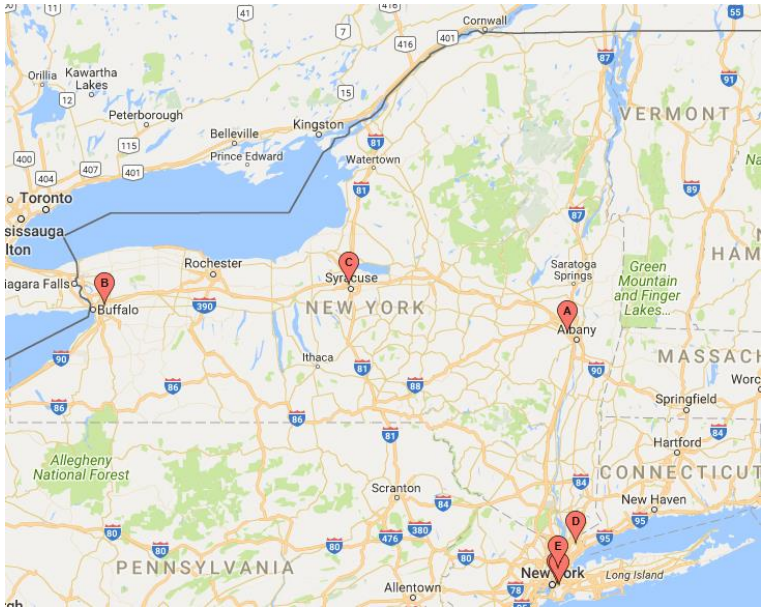
UTILITIES

TRC is one of the leading engineering and environmental services firms supporting extensive upgrades to the nation's electric grid system. We deliver project management, engineering design, survey, permitting, material procurement and construction management solutions for complex projects including transmission and distribution, substations, protection and controls and telecommunications.

EFFICIENCY

As a partner to utilities, agencies and business, TRC supports the full spectrum of energy efficiency and distributed energy resource opportunities. We offer holistic, integrated energy services from research to planning, design and delivery that serve multifamily residential, commercial and industrial end-users and communities.

2007-2017



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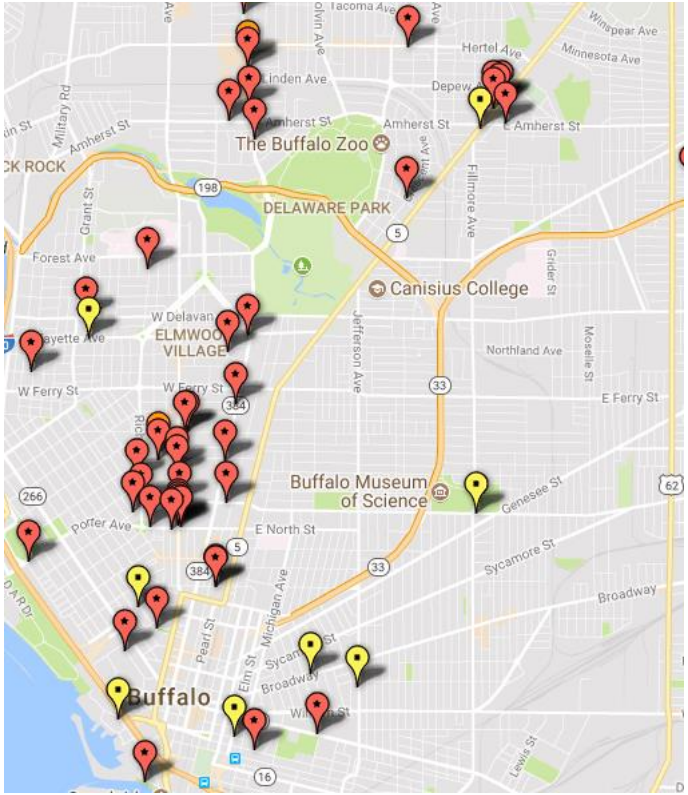

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Key Metrics

Existing Buildings

- 23% Actual Average Savings
- 1,360 Projects
- 6,789 Buildings
- 247,771 Units
- 174 million square feet

New Construction

- 170 ENERGY STAR Buildings
- 156 ENERGY STAR in progress
- 450 Projects
- 469 Buildings
- 37,844 units
- 36 million square feet

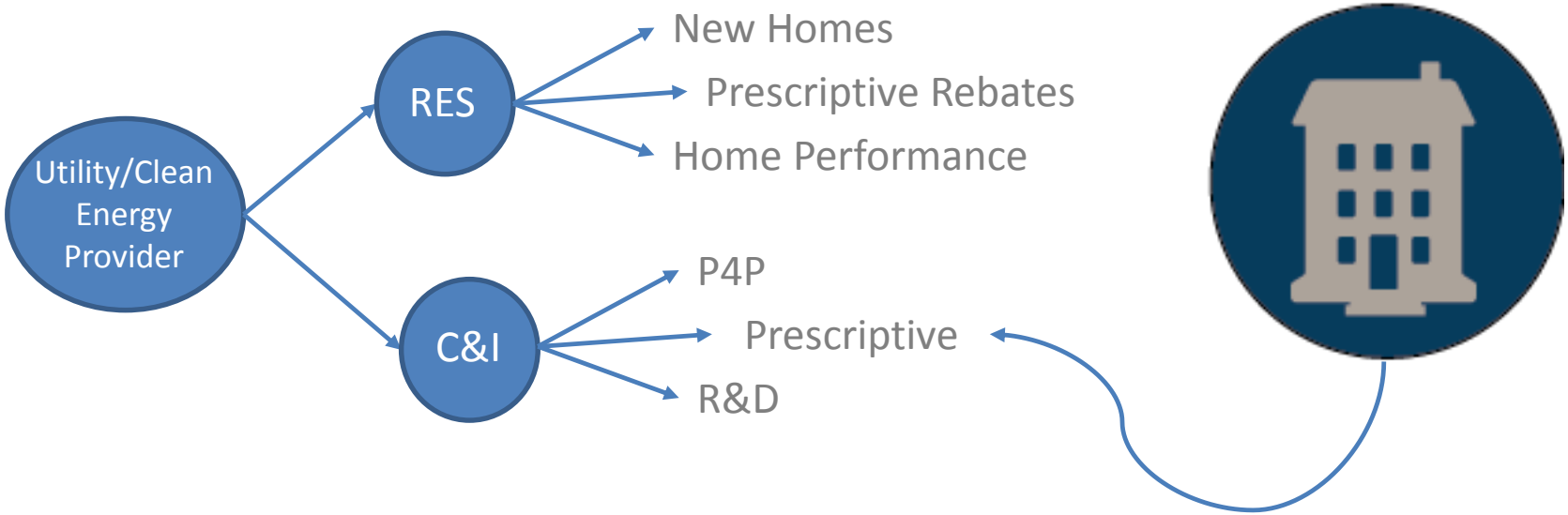
The World in 2006

iPhone

2006

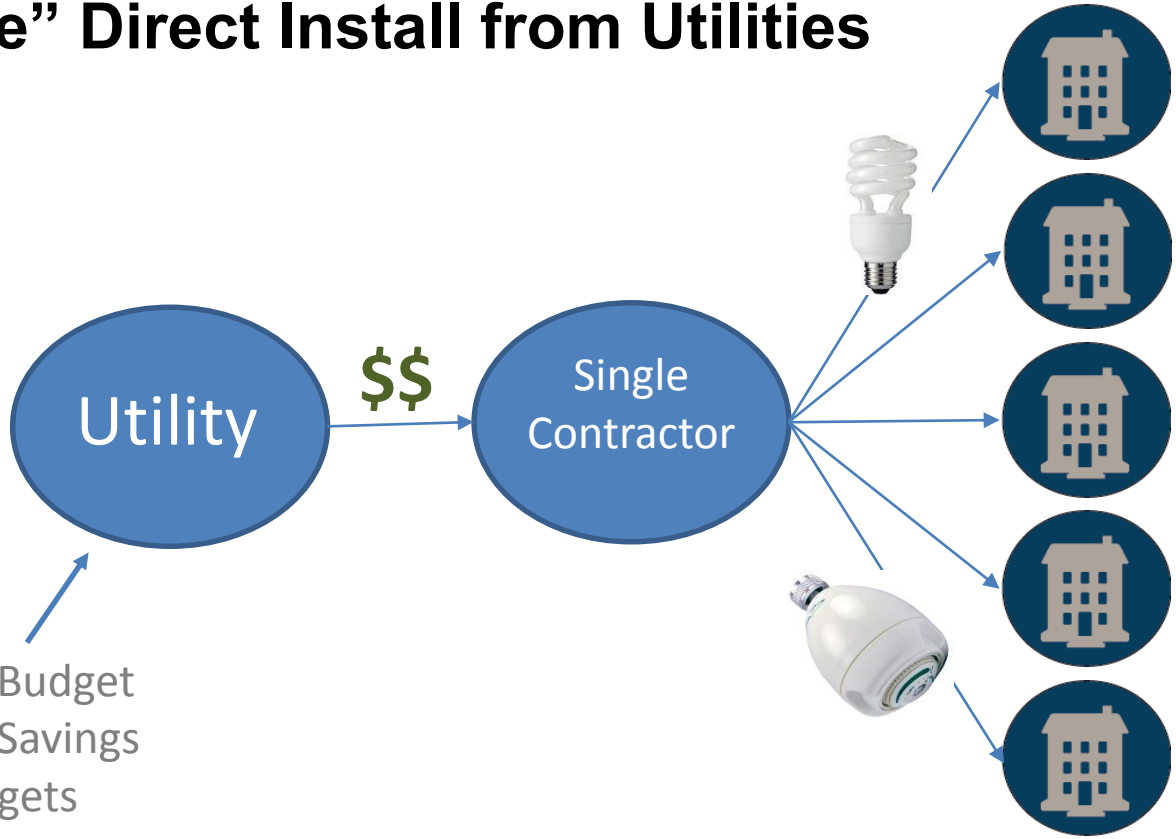
Multifamily Programs

2006



“Free” Direct Install from Utilities

2006



- EE Budget
- EE Savings Targets

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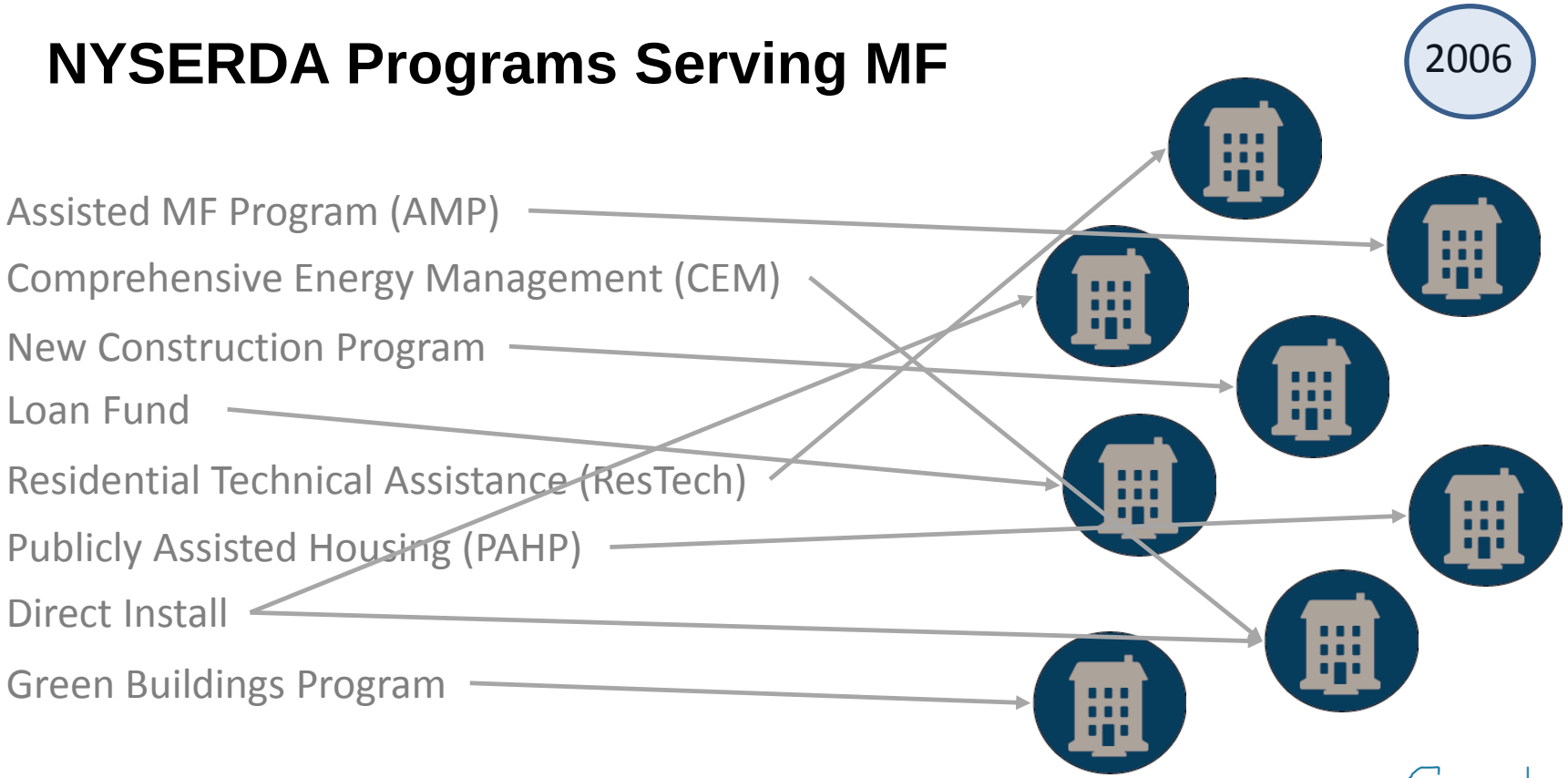
NYSERDA Programs Serving MF



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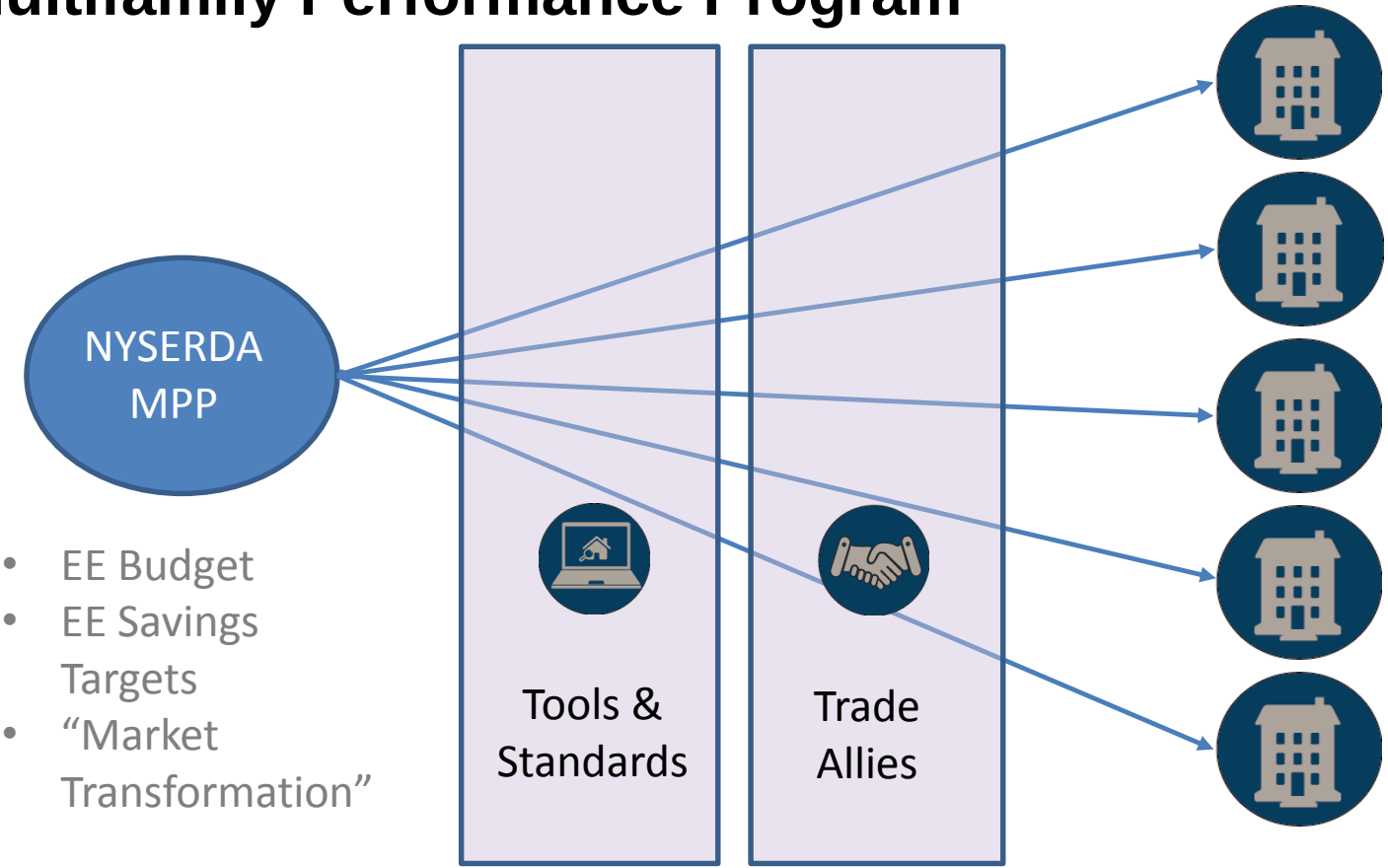
Multifamily Performance Program

2007



- EE Budget
- EE Savings Targets
- "Market Transformation"

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Initial Program Design

2007

Design Challenge – Need to…	Solution
Consolidate into a single program	Serves Existing and New Buildings
Reward actual savings not audits	Pay for Performance
Push deeper savings	Whole Building – no Rebates!
Develop the Energy Workforce	Relies on Trade Ally Network
Achieve deeper savings	High savings targets - measured
Provide simple incentive structure	Incentive paid $/unit
Support projects throughout process	Incentive timeline follows project cash flow
Ensure installation actually occurs	Use of a project champion, reward for installation

New York State Energy Research and Development Authority

New York Energy $mart
Public Service Commission — NYSERDA

MULTIFAMILY PERFORMANCE PROGRAM

EXISTING BUILDINGS COMPONENT

ENERGY REDUCTION PLAN

Amherst Garden Apartment
86 E Amherst Street
Buffalo, NY 14214

Owner: Yuakov Einhorn
Phone: (716) 837-2130

Audit Date: July 17, 2008

Report Prepared by: Building Performance Specialists
Report Date: September 19, 2008

Revision # 1 Based on Version 2.0 of the Energy Reduction Plan Guidelines

Table 4. Benchmarking Tool & Design Assistant

NYSERDA Multi-Family Building Performance Benchmarking Tool - Ver. 2.1

The NYSERDA Multi-Family Building Energy Use Benchmarking Tool quantifies the projected performance of a user-defined building relative to all HUD 5-plus unit multi-family residential buildings nationwide. A score of 75 denotes performance at the top 25th percentile of 5-plus unit multi-family buildings. A score of 50 denotes performance at the 50th percentile (the mid-point). To use this tool, you will need to calculate your building's annual energy consumption. Provide entries for your building in the "white cells" below. Click on underlined headings for help.

Building(s) Description

Building Name: 86 E Amherst "optional entry"
5-digit Zip Code: 14214 Not Sure?
Mapping Location: Buffalo, NY

Entire Building Gross Floor Area (sqft)	Number of Family Units	Percent of Units with Laundry Hookups	Percent of Gross Floor Area Heated	Percent of Gross Floor Area Cooled
250,425	202	100.0	66.0	

Weather Description

	Typical	Pre-Retrofit	Post-Retrofit
Annual HDD:	6747	6321	
Annual CDD:	477	544	

IMPORTANT: Annual entries should correspond to the same time period as the pre-/post-retrofit annual consumptions reported below. Pre- or post-retrofit values must be provided to score your building.

Annual Energy Consumptions and Costs ----- **IMPORTANT: Entries should represent 12 continuous months of consumption**

	Pre-Retrofit				Post-Retrofit			
	Electricity	Natl Gas	Fuel Oil	District Steam	Electricity	Natl Gas	Fuel Oil	District Steam
Units:	MMBtu	MMBtu	Gal #2	klbs	kWh	MMBtu	Gal #2	klbs
Energy	3,429	23,102						
Cost ($)	131,633	309,098						
No. of buildings	12	12						

IMPORTANT: Number of buildings represented by the reported energy use values above should always be equal for all reported fuels.

Calculated unit cost:	36.39 $/unit	13.38 $/unit	$/unit	$/unit	$/unit	$/unit	$/unit	$/unit

Results

	Pre-Retrofit		Post-Retrofit	
	Your Building	Average	Your Building	Average
Score Against Peers	74	50		50
Building Site Energy Use (MMBtu/year)	26,531	NA		NA
Building Source Energy Use (MMBtu/year)	35,645	47,583		43,306
Site Energy Use Intensity (kBtu/ft2-year)	105.9	NA		NA
Source Energy Use Intensity (kBtu/ft2-year)	142.3	190.0		172.9

Weather-normalized Percent Source Energy Use Reduction After Retrofit:

Design Assistant — *Projected Annual Energy Consumption*

	Electricity	Natl Gas	Fuel Oil	District Steam
Units:	MMBtu	MMBtu	Gal #2	klbs
Energy	3,187	14,369		

Projected Percent Source Energy Reduction	28%
Projected Score Against Peers	85
Projected Building Site Energy Use (MMBtu/year)	17,557
Projected Building Source Energy Use (MMBtu/year)	25,634
Projected Site Energy Use Intensity (kBtu/ft2-year)	70.1
Projected Source Energy Use Intensity (kBtu/ft2-year)	102.6

Table 3. Detailed List of Recommended Measures for Entire Project

	Measure	Installed Cost (incl. design)	Energy Savings		Demand Savings	Water/ Sewer Savings	O&M Savings	Cost Savings	Payback	S.I.R.	Life Cycle Savings	Years for LCC
			MMBtu	kWh	kW	1000 gals	$	$	years		$	years
	Measures to be undertakend by buildings - savings accrue to building											
1	Attic Insulation	$74,400	1870.4	0	0.0	0.0	$0	$25,026	2.97	5.00	$297,923	20
2	Wall Insulation	$86,000	1155.6	0	0.0	0.0	$0	$15,462	5.56	2.67	$144,034	20
3	Air Sealing Measures	$35,900	1962.7	0	0.0	0.0	$0	$26,260	1.37	7.78	$243,379	13
4	Programmable Thermostat Control	$13,120	713.2	0	0.0	0.0	$0	$9,543	1.37	6.20	$68,280	10
5	Heating Plant Improvement	$43,740	3036.3	0	0.0	0.0	$0	$40,625	1.08	7.92	$302,803	10
6	Incandescent Lighting Replacement	$6,060	-198.8	70781	14.9	0.0	$0	$6,613	0.92	7.66	$40,361	8
7	Water Heater Clean and Tune	$10,000	68.3	0	0.0	0.0	$0	$914	10.94	0.26	-$7,413	3
8	Hot Water Pipe Insulation	$8,000	30.3	0	0.0	0.0	$0	$405	19.73	0.43	-$4,542	10
9	Low Flow Aerators & Showerheads	$600	95.3	0	0.0	2,073.0	$0	$6,066	0.10	62.99	$37,193	7
	ent	$37,200	0	0	0.0	558.5	$0	$2,304	16.15	0.53	-$17,546	10
	lertaken by buiding - savings accrue to tenants											
	nergy savings											
	allation	$8,080									-$8,080	3
	Repair	$4,025									-$4,025	3
	and Tune	$2,500									-$2,500	3
	Upgrade	$18,150									-$18,150	3
	w Repair	$2,125									-$2,125	10
		$500									-$500	10
	ents	$350,400	8,733	70,781	14.9	2,632	$0	$133,219			$1,069,090	
		$0	*Overall project management, all fees associated with specific measures should be noted above.*									
		$34,240										
		$384,640	8,733	70,781	14.9			$133,219			$1,034,850	

SECTION II. EXISTING CONDITIONS

This assessment consists of 202 units in 12 row-house buildings at the Amherst Garden Apa complex. The buildings, located at 86 E. Amherst Street, Buffalo, New York, were assesse purpose of developing a comprehensive energy assessment and potential scope of work for e saving measures.

To determine the most appropriate and effective scope of work to achieve this project's target, a comprehensive energy assessment has been conducted. On July 17, 2008, Fred Fel Buffalo Energy, Inc. visited the project site and conducted a detailed energy assessment of t

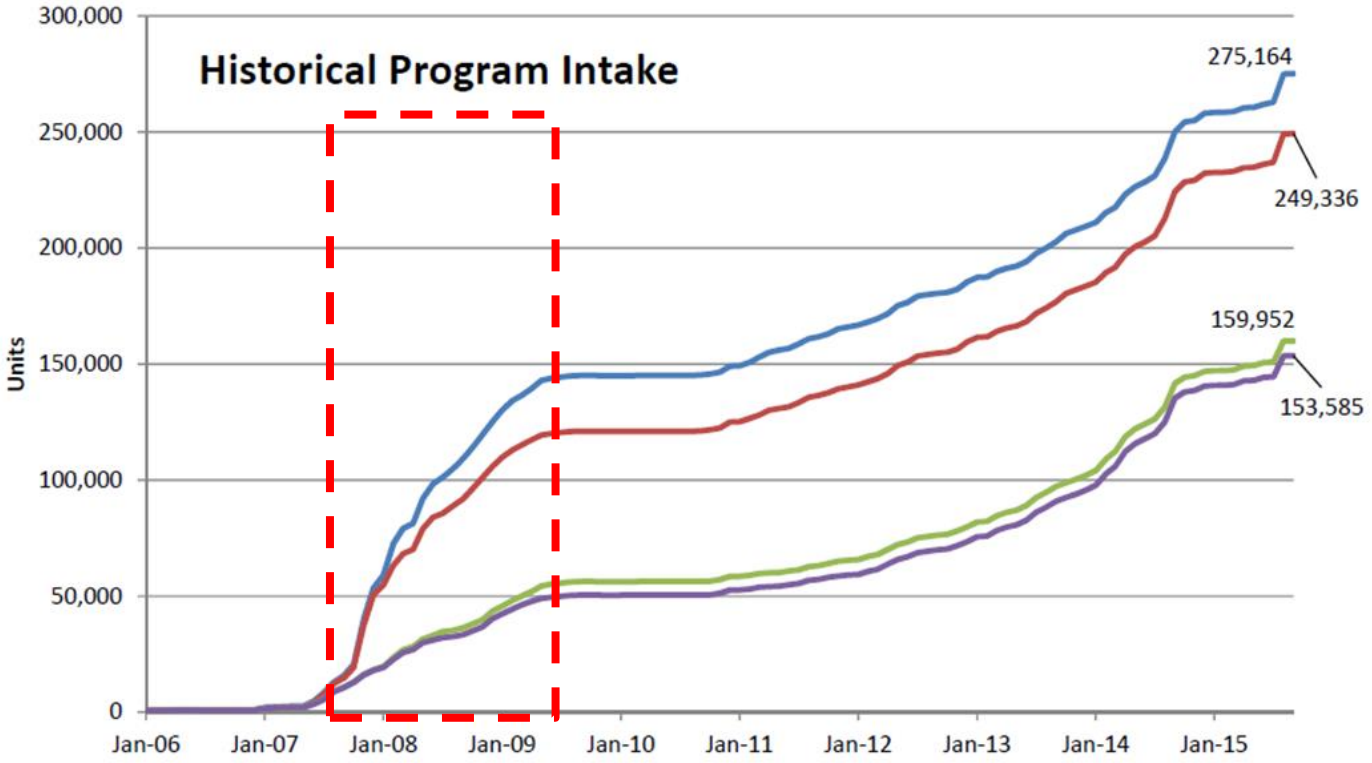
The 12 building sections are labeled A-L. Each section contains between 8 and 26 units. Each unit is 2 stories with a full basement. The second floor has 2 bedrooms and a bath. On the first floor is a kitchen, dining and living room. The unfinished basement has washer and dryer hookups.

The complex was built in early 1940. It sits in an old residential section of Buffalo surrounded by densely populated single family homes. There is minimal green space, although small grassy areas exist and a

RDA

We have lift off!

2007



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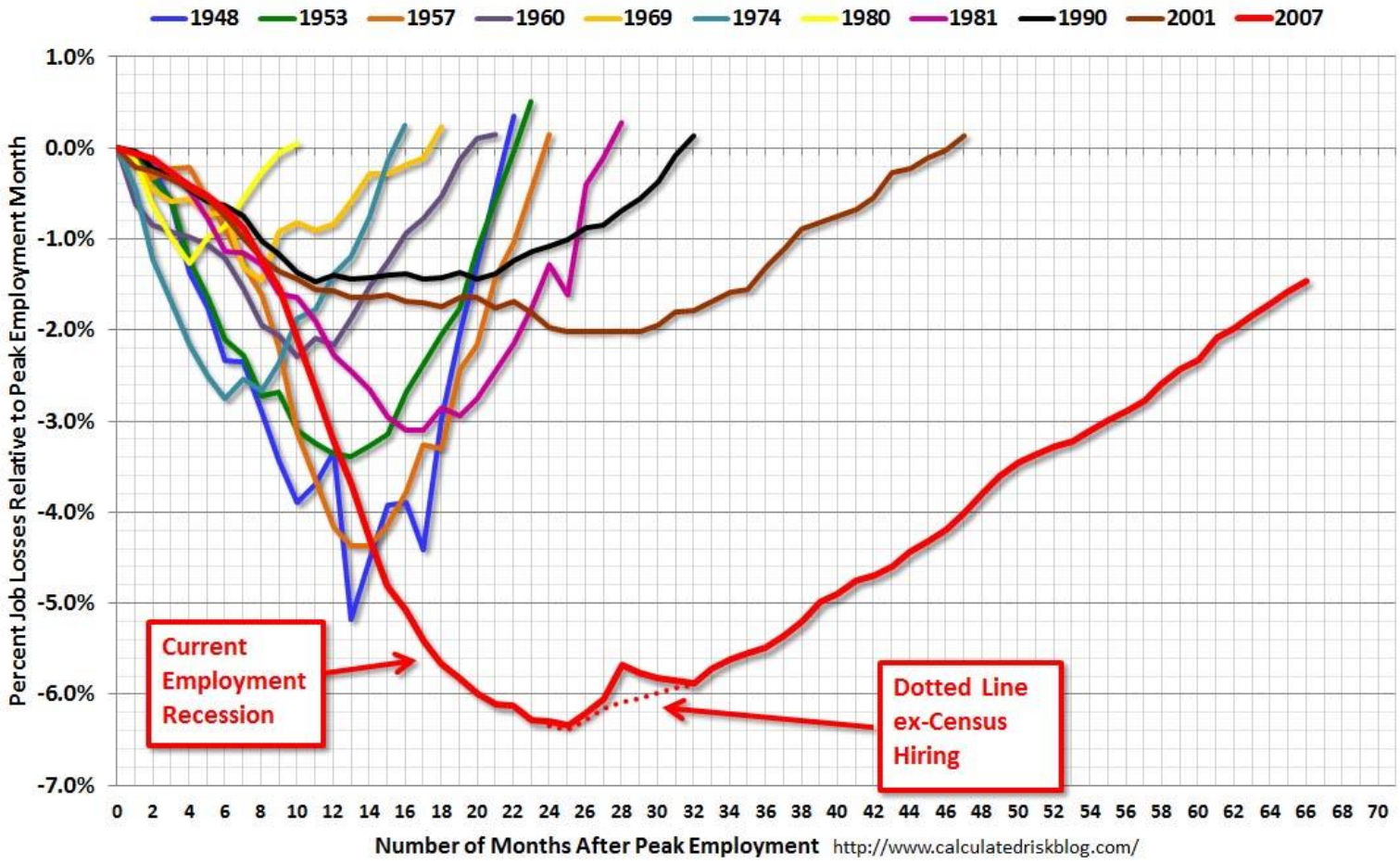
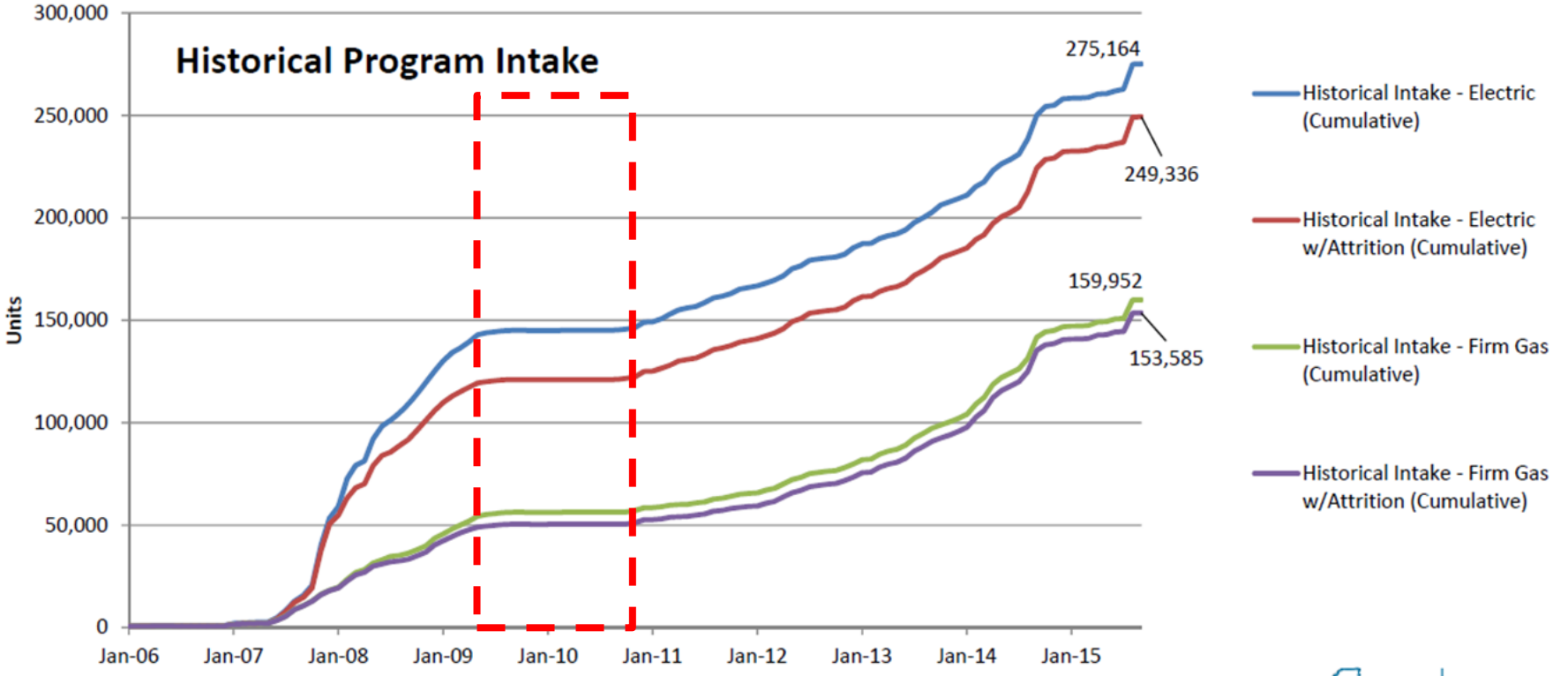
2008


Percent Job Losses in Post WWII Recessions
1948
1953
1957
1960
1969
1974
1980
1981
1990
2001
2007
Percent Job Losses Relative to Peak Employment Month
1.0%
0.0%
-1.0%
-2.0%
-3.0%
-4.0%
-5.0%
-6.0%
-7.0%
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70
Number of Months After Peak Employment
http://www.calculatedriskblog.com/
Current Employment Recession
Dotted Line ex-Census Hiring

Flat Line Years



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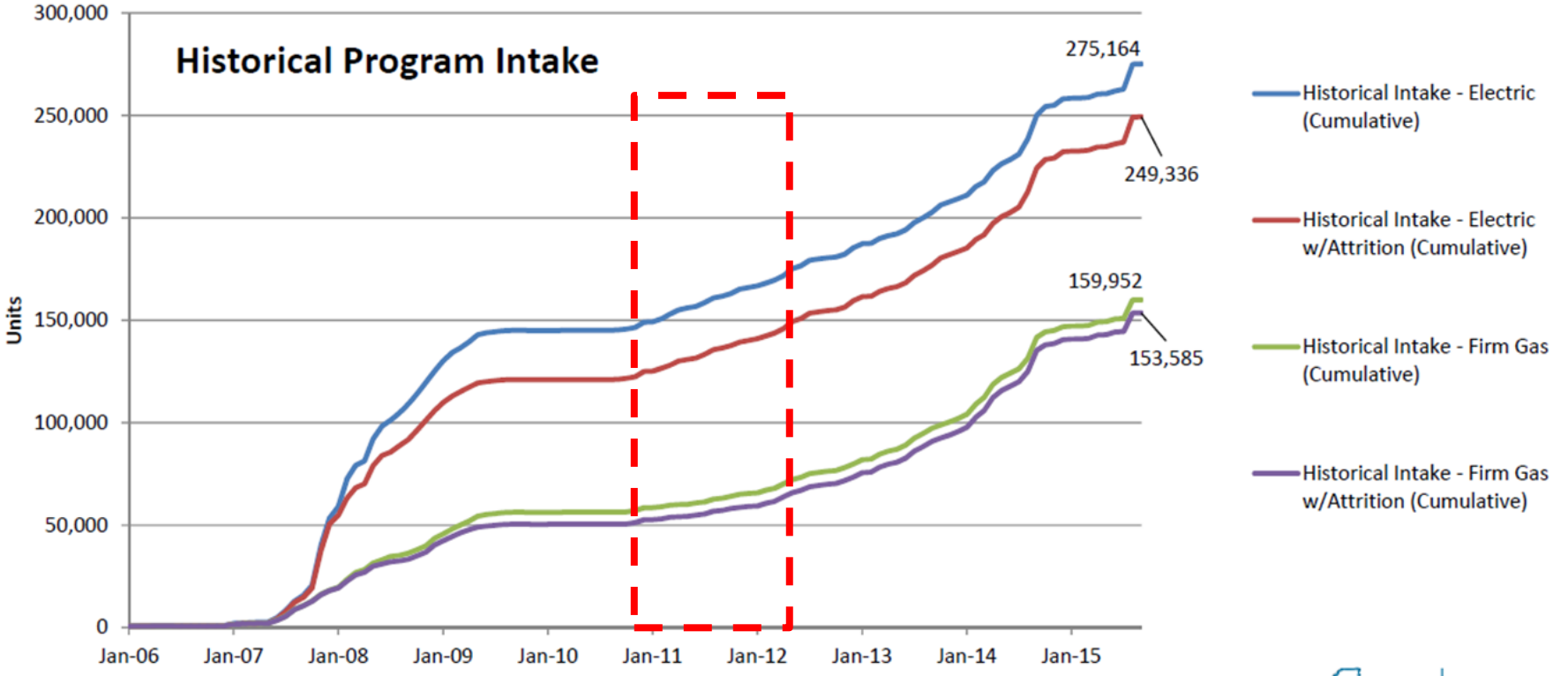
Recovery Begins 2010-12



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2012 – Superstorm Sandy

- >12 foot storm surge
- 2.2 M people without electricity
  - Parts of Rockaways & Staten Island without power for weeks
- $32B in damage in NYS
- >88,000 buildings affected
  - More than 400 NYCHA buildings (~35,000 units) lost power, heat, or hot water during Sandy
  - Destroyed 100s of buildings; damaged 1000s

2012 - Cuomo's mandate to Public Service Commission

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REV Emerges

SUPPORT THE GROWTH OF
CLEAN ENERGY INNOVATION

CUT
GREENHOUSE GAS EMISSIONS
80% BY 2050

MAKE ENERGY
MORE AFFORDABLE
FOR ALL NEW YORKERS

50% renewable energy by 2030

Support for three different types of clean energy:

> Building New Renewables

> Preserving Existing Renewables

> Maintaining Safely Operating Nuclear Plants

Building a clean, resilient, and affo

The State Energy Plan is a comprehensive roadmap to
Plan coordinates every State agency and authority that
regulatory reform to integrate clean energy into the co
actively deploying innovative energy solutions across t

In 2014, Governor Andrew M. Cuomo launched New Yo
an integrated energy network able to harness the com

The Plan, as a roadmap for REV, fosters economic pros
together through public-private partnerships to achieve

The initiatives outlined in the State Energy Plan, along
State on a path to achieving the following clean energy

Reforming the Energy Vision

BUILDING A CLEAN, MORE RESILIENT, AND AFFORDABLE ENERGY SYSTEM FOR ALL NEW YORKERS.

Reforming the Energy Vision (REV) is Governor Andrew M. Cuomo's comprehensive energy strategy for New York. REV helps consumers make more informed energy choices, develop new energy products and services, and protect the environment while creating new jobs and economic opportunity throughout the State.

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REV 2030 Goals Established

- 40% reduction in GHG Emissions from 1990 levels
- 50% of electricity must come from renewable sources
- 23% reduction in energy consumption of buildings from 2012 levels

Far greater Market Animation is required

REV – NYSERDA, DPS, and The Utilities Shift Focus

- To achieve these goals we need everyone, not just NYSERDA
- Distributed Energy Resources (DER), decentralized & cleaner
- Non-wire alternatives – DER instead of utility system upgrades
- NYSERDA Clean Energy Fund
  - DPS allows for more flexibility
  - Fuel Neutrality
  - Grid Innovation
  - Shift from Programmatic Approach to mid-market interventions
  - Affordable MF Programmatic Strategies retained
  - More market animation and innovation in MF sector

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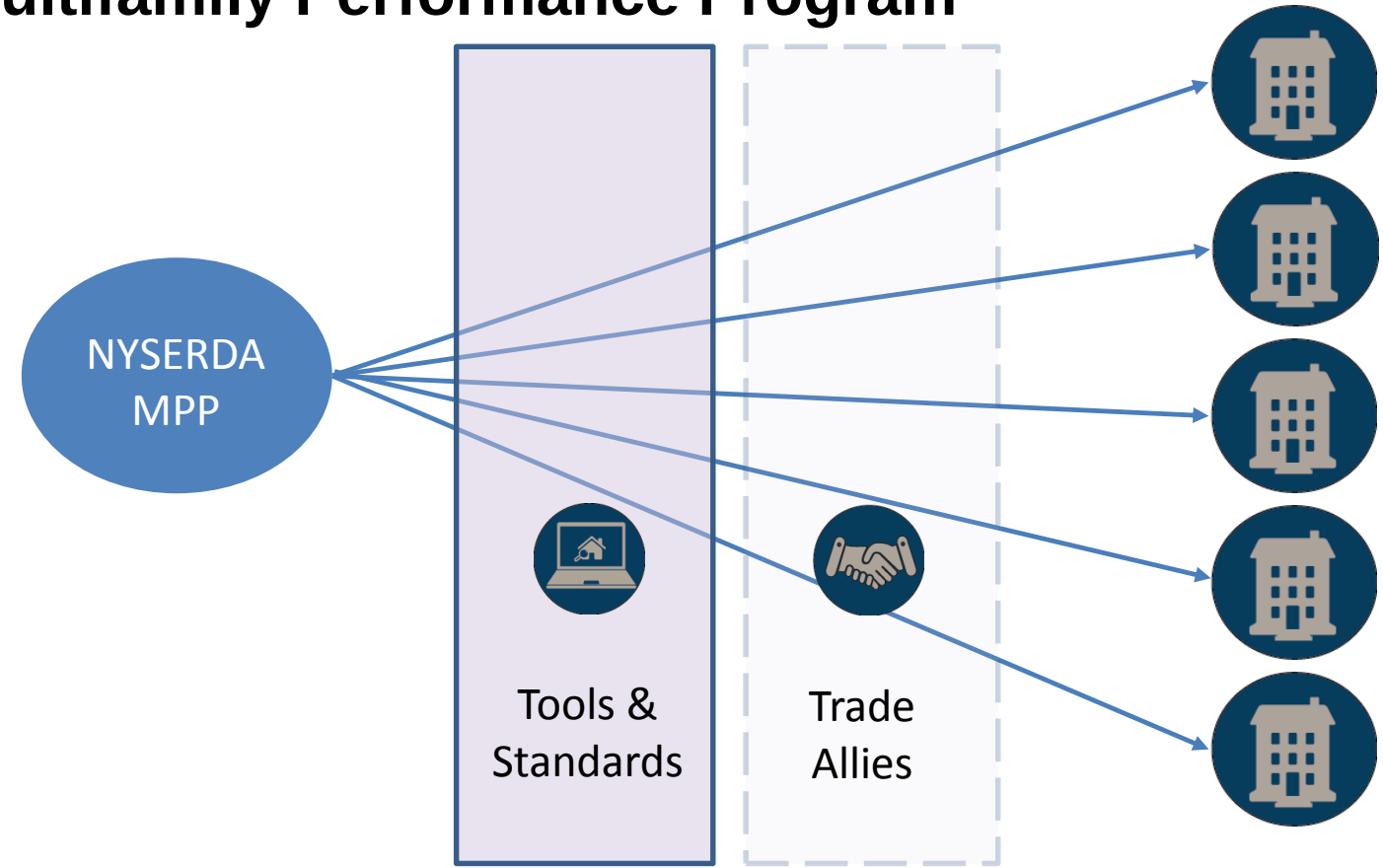
MPP – Under REV

- New innovative components to more broadly animate the market
  - Deeper savings, brighter bright spots, foster even greater innovation
    - High Performance Component > 40% savings
    - RetrofitNY – Deep energy retrofit = NZB or near
    - Realtime energy management – technology demonstration & commercialization
- MPP “core offering” adjusted
  - Much lower incentives, much higher performance requirements
  - Too far, too fast……

Multifamily Performance Program

2017



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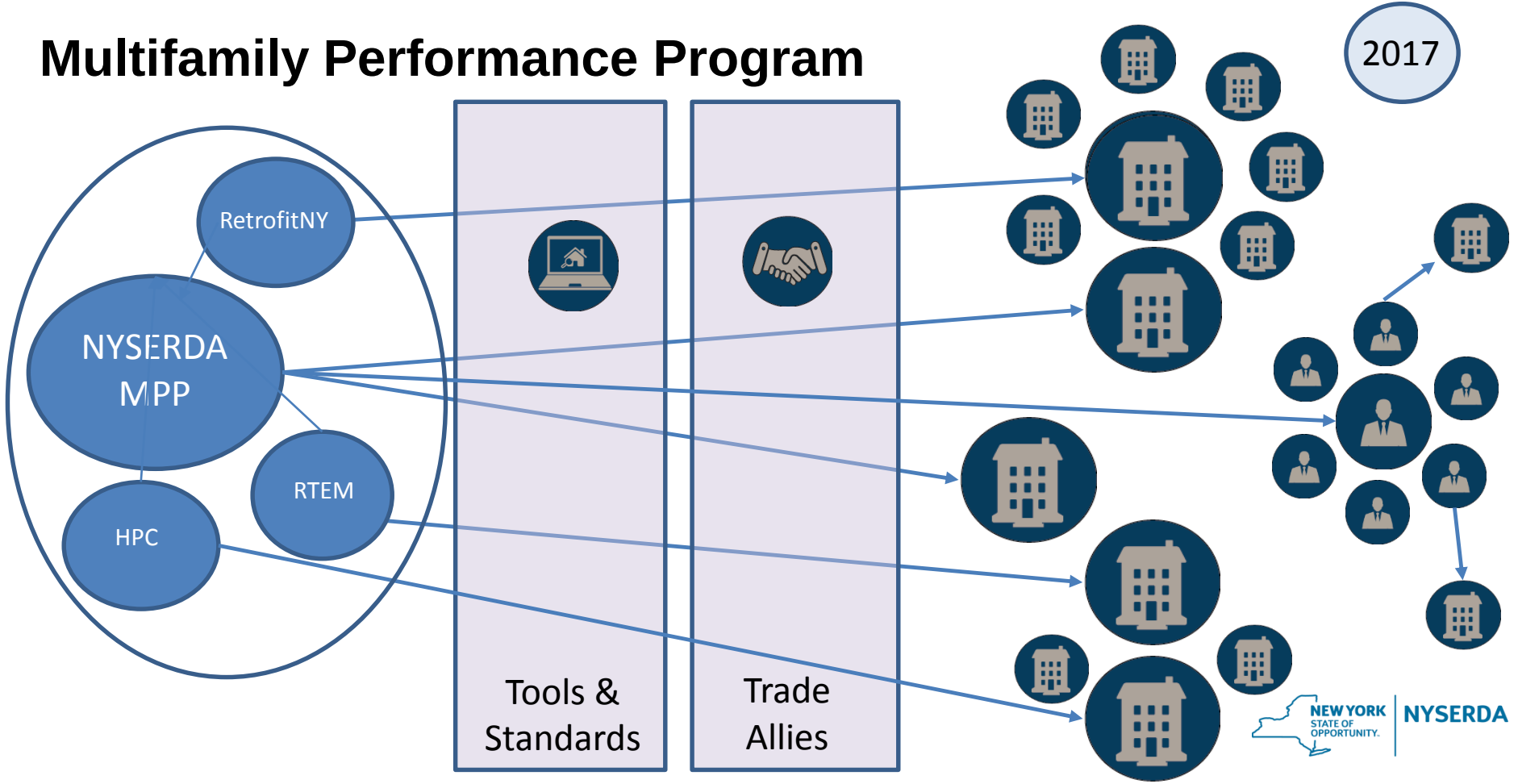
Multifamily Performance Program



Lesson 1: Design is a Process not a Destination

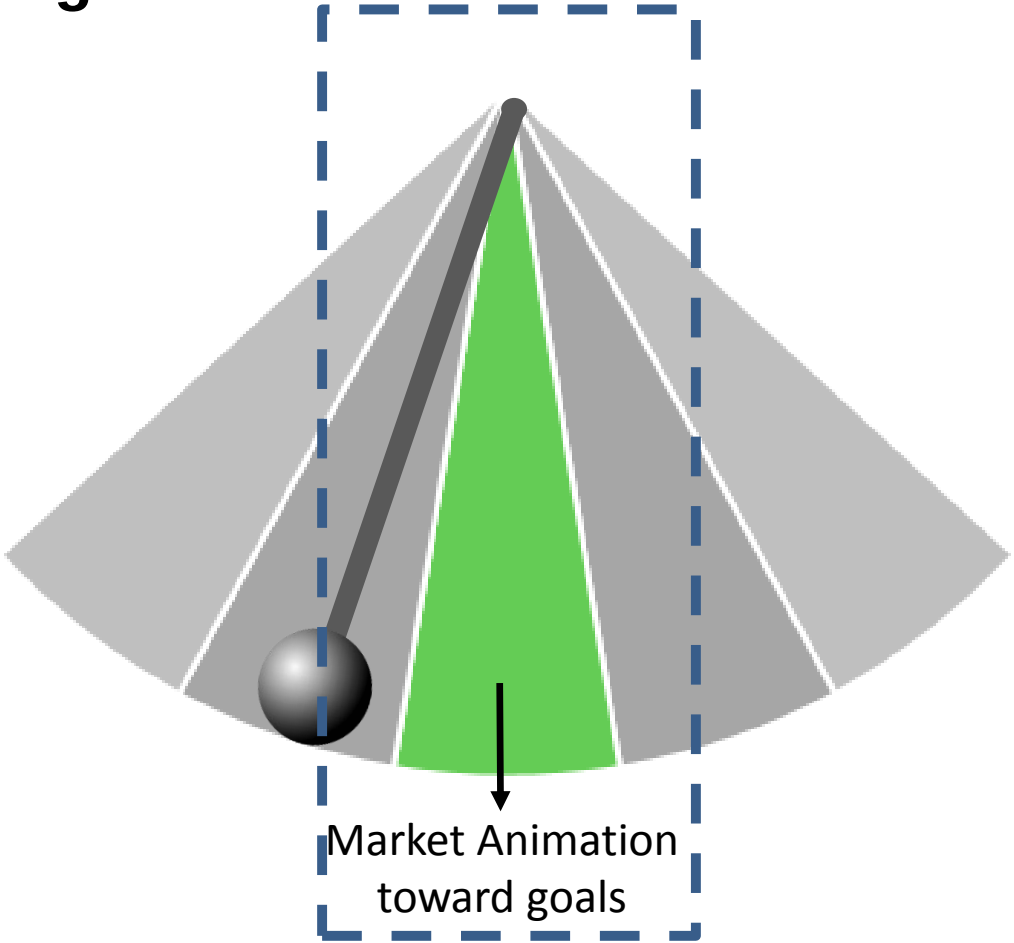
Evolving Market

Fed Policy

Economic Forces

Natural Forces

Business Trends



Climate Change

State Policy

Tech Innovation

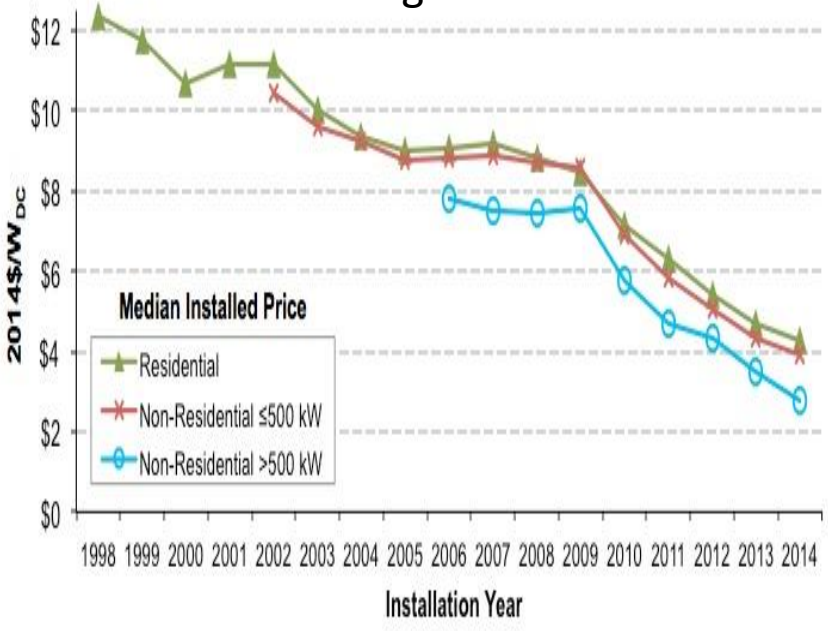
Housing Market

Budgets

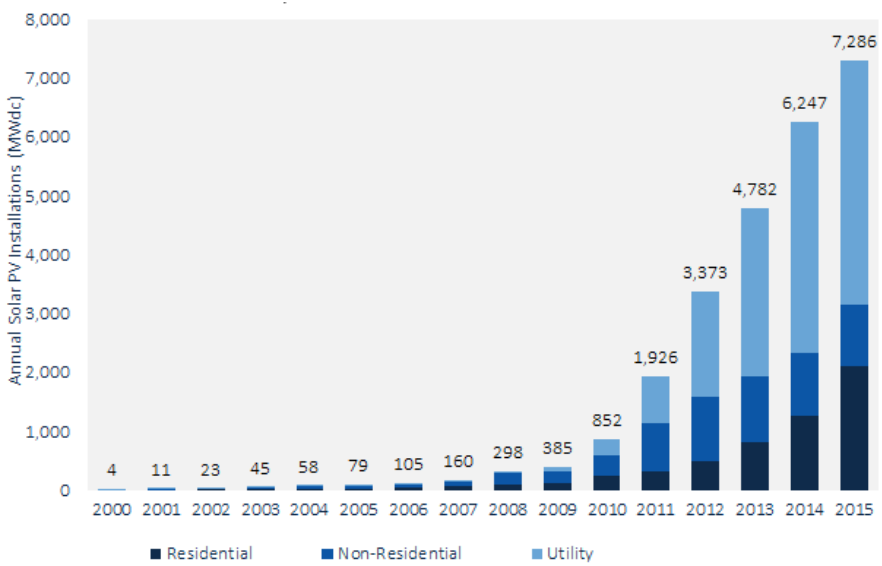
Local Policy

Lesson 2: Never Underestimate Market Innovation

Declining Cost of Solar



U.S. Solar PV Installations, 2000-2015



Source: GTM Research / SEIA U.S. Solar Market Insight *report*

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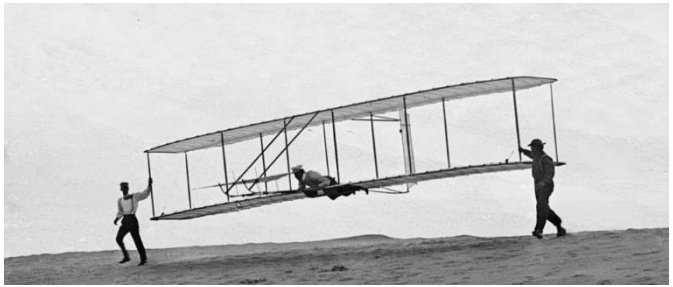
Lesson 3 – MF Market Requires a Sector Specific Approach and Multiple Strategies

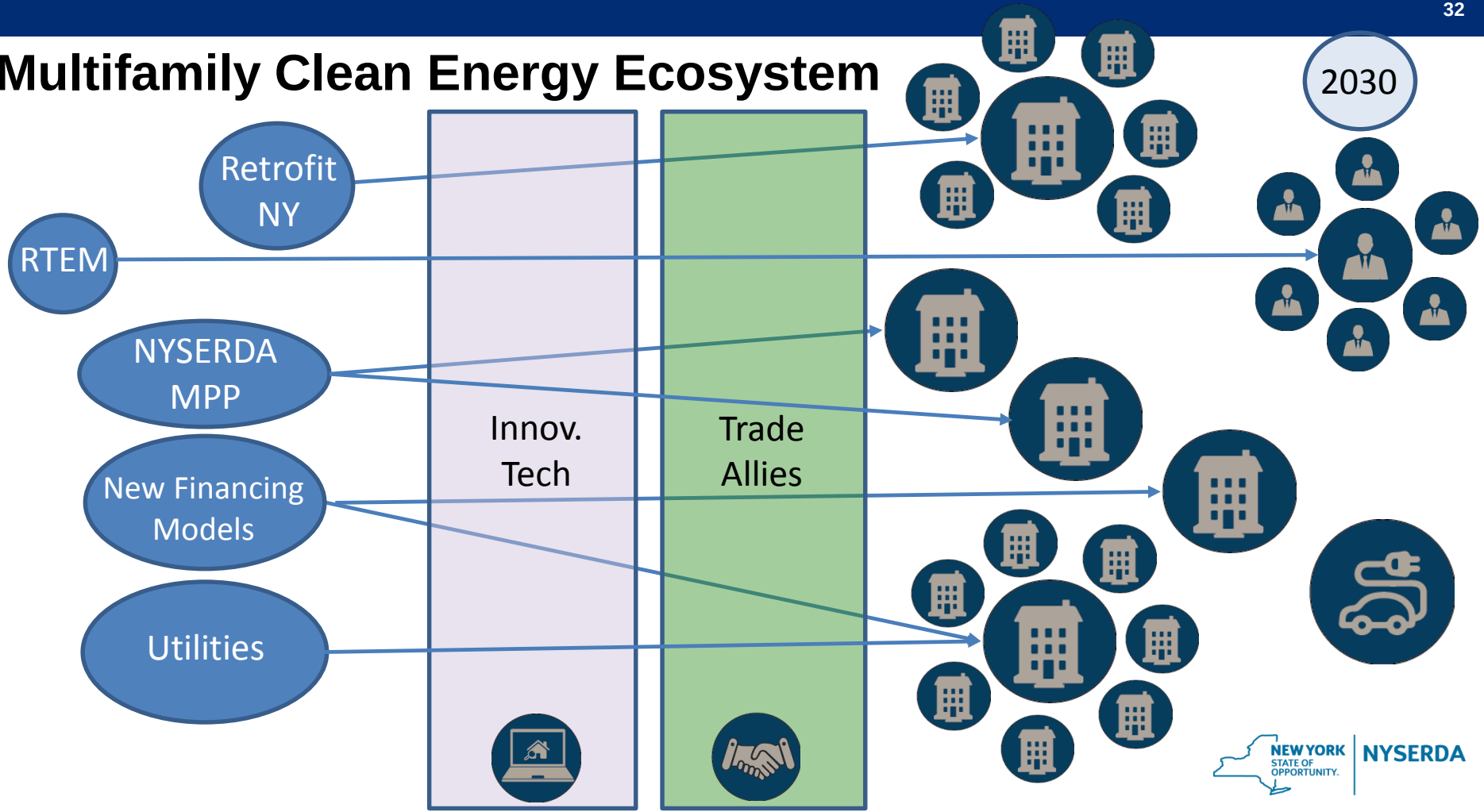
Lesson 4: Simple is Better but not to be confused with “Dumb”

iPhone

Lesson 5
Programs, Policies and other market interventions are experiments – must take risks and be willing to “fail”



Multifamily Clean Energy Ecosystem




Offshore Wind
Fossil Fuel Power Plant
Ground Mount PV
Hydroelectric Power
Industrial Plant
Transmission Network
Pumped Storage
Efficiecy Demand Responsel Storage
Bio Gas Plant
Charging Station
Land-mounted wind
Roof Mount PV
Electric Vehicle Charging Station
Distribution Network
Power Home-based Combined Heat &