

Residential Market Advisory Group

Q2 2021 Meeting

June 23, 2021



NYSERDA

Welcome and Agenda

- > Meeting Overview
- > Recap of Q1 2021 Meeting
- > Carbon Neutral Buildings Roadmap
- > Update on Energy Efficiency and Housing Advisory Panel Recommendations
- > Residential Federal Energy Policy Updates
- > Status Update on RMAG Activities
- > Revisit RMAG Priority Items
- > Wrap up and Next Steps

Ground Rules

- > This webinar will be recorded, and approximately 2 hours.
- > Participants should engage actively and respectfully.
- > All participants will be muted as they enter the webinar. The facilitation team may mute / unmute participants as needed to manage audio quality.
- > Use the “chat” and “raise hand” function to join in the discussion queue.
- > Participants will be placed in breakout groups for a prioritization exercise where they can collaborate and share ideas.
- > Notes will be taken during the webinar to produce a meeting summary. Specific comments will not be attributed in the meeting summary.

Webinar Guidelines

The screenshot displays the Cisco Webex Meetings interface. At the top, the browser title bar shows "Cisco Webex Meetings" and "Meeting Info". The main menu includes "File", "Edit", "Share", "View", "Audio & Video", "Participant", "Meeting", "Breakout", and "Help". The status bar at the bottom shows "Connected".

Two dialog boxes are open:

- Audio connection:** This dialog box has a title bar with "Audio connection" and a close button. It features a red speaker icon with a white "X" over it. Below the icon, the text reads "You're not connected to audio." Underneath, there is a section titled "Audio options" with two choices: "Use computer audio" (selected) and "Call in".
- Call In:** This dialog box has a title bar with "Call In" and a close button. It contains the heading "Call in from another application" with an information icon. Below this, there are two sections:
 - 1. Call:** Includes "US Toll" and the number "+1-415-655-0001", with a link "Show all global call-in numbers".
 - 2. Enter:** Includes "Access code 146 736 6526 #" and "Attendee ID 668439 #".

Two red arrows originate from a dark blue box on the left labeled "Connect Audio". One arrow points to the "Use computer audio" option in the "Audio connection" dialog, and the other points to the "Call in" option. A second red arrow points from a dark blue box at the bottom right labeled "Merge Audio" to the "Call In" dialog box.

At the bottom of the interface, a toolbar contains buttons for "Connect audio", "Start video", "Share", "Record", and "Participants".

Webinar Guidelines

The screenshot displays the Cisco Webex Meetings interface. The main window title is "Cisco Webex Meetings" with a sub-title "Meeting Info" and a "Hide menu bar" option. The menu bar includes "File", "Edit", "Share", "View", "Audio & Video", "Participant", "Meeting", "Breakout", and "Help". The status bar at the top right shows "Connected".

The main content area features a large circular watermark with the text "W2".

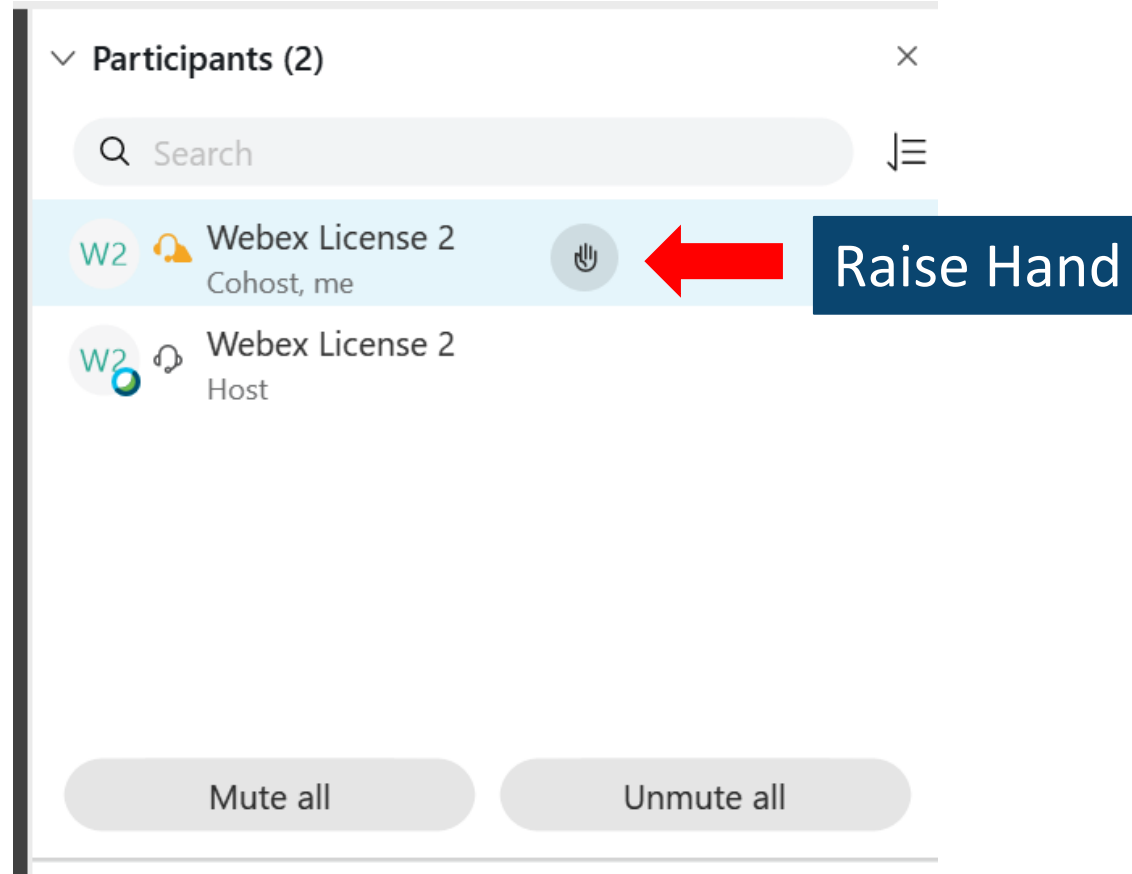
The right sidebar contains two sections:

- Participants (1)**: Includes a search bar and a list of participants. One participant is listed: "Webex License 2" (Host, me).
- Chat**: Includes "Mute all" and "Unmute all" buttons, a "To:" dropdown menu set to "Everyone", and a text input field labeled "Enter chat message here".

At the bottom, the toolbar includes buttons for "Mute", "Start video", "Share", "Record", and a red "X" button. A red box highlights the "Participants" and "Chat" buttons in the bottom right corner of the toolbar.

Two red arrows point from the left towards the "Participants" and "Chat" sections in the sidebar.

Webinar Guidelines



Webinar Issues? Contact: treddick@kearnswest.com

ICEBREAKER

Who is here with us today?

Q1 2021 RMAG Meeting Recap

- **Presentations on:**
 - Update on the Climate Act: Preliminary Policy Options for Buildings Sector
 - Workforce development opportunities
 - NYS Clean Heat Statewide Consumer Awareness and Education
 - Heat Pump Planner
- **Working Group Updates:**
 - QA Working Group Completed, will launch a QA Expert Panel soon
 - EmPower+ Redesign Working Group was completed
 - Call for Participants on 6 priority items (2 moving forward)
- **RMAG Charter Review**

RMAG Charter

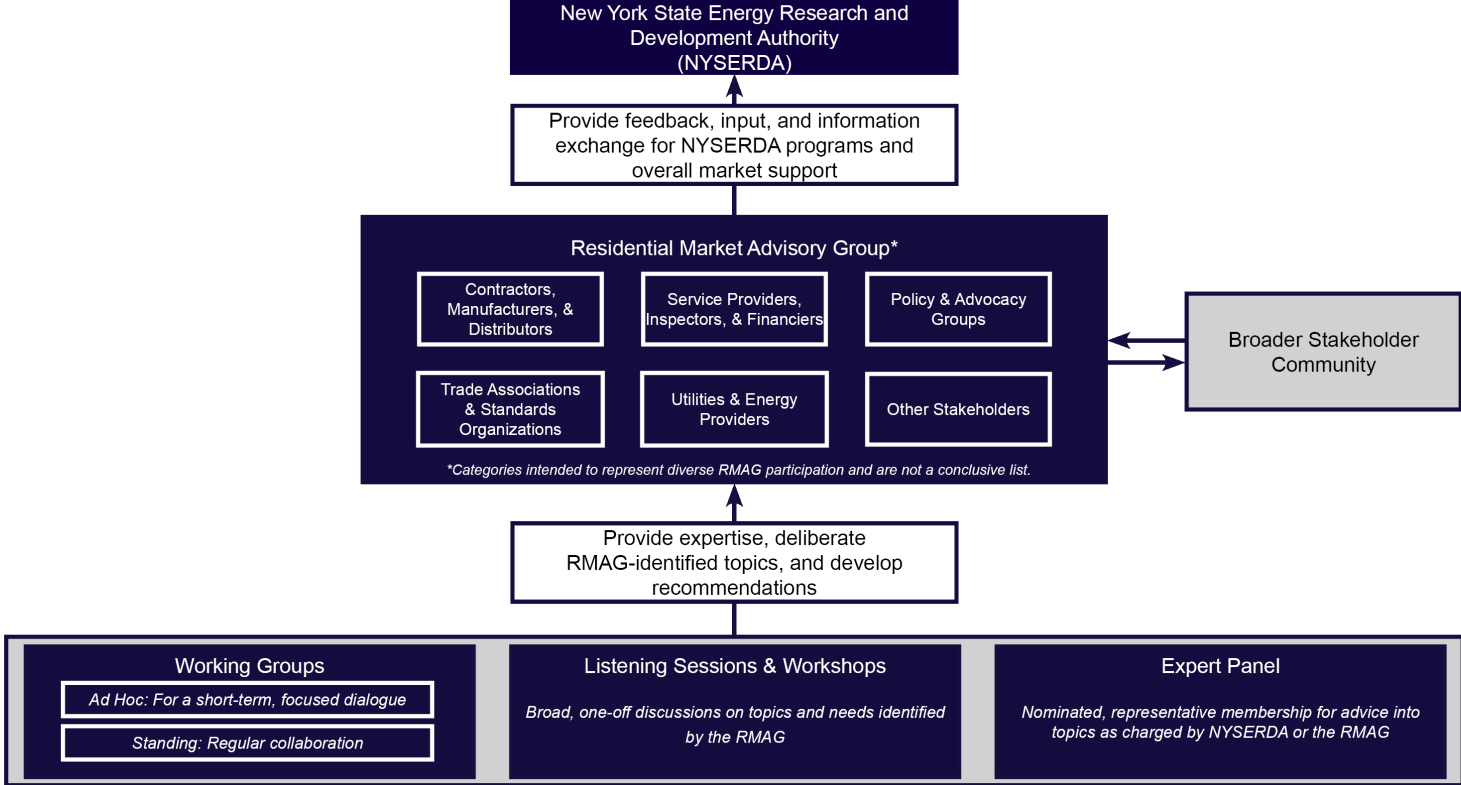


Figure 1: Information flow between stakeholder groups

Carbon Neutral Buildings Roadmap

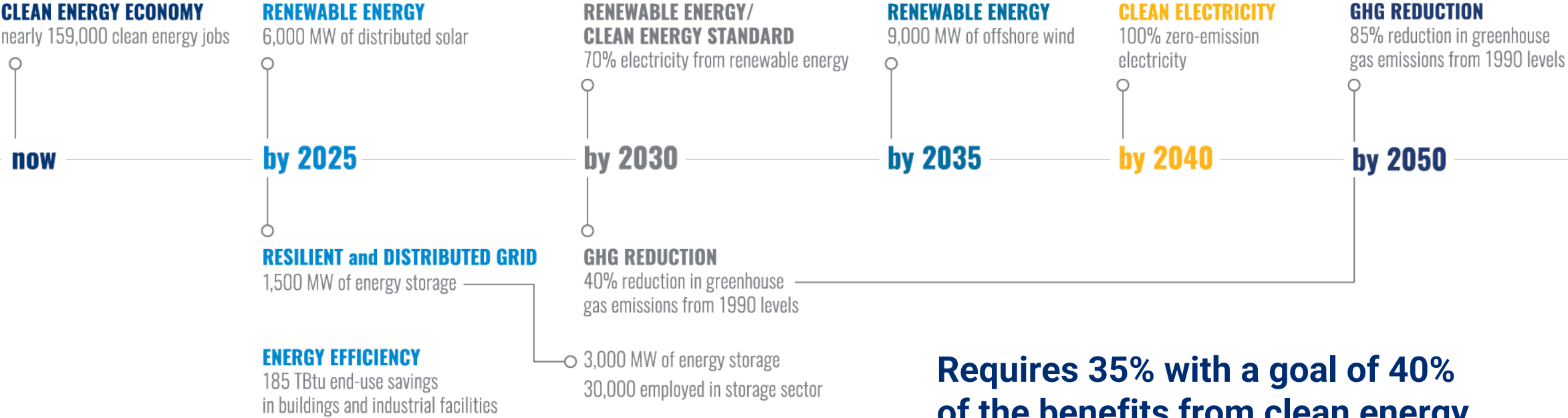
Greg Hale - NYSERDA

RMAG Q2 Meeting

June 23, 2021

New York State Clean Energy Goals

Climate Leadership and Community Protection Act (Climate Act)



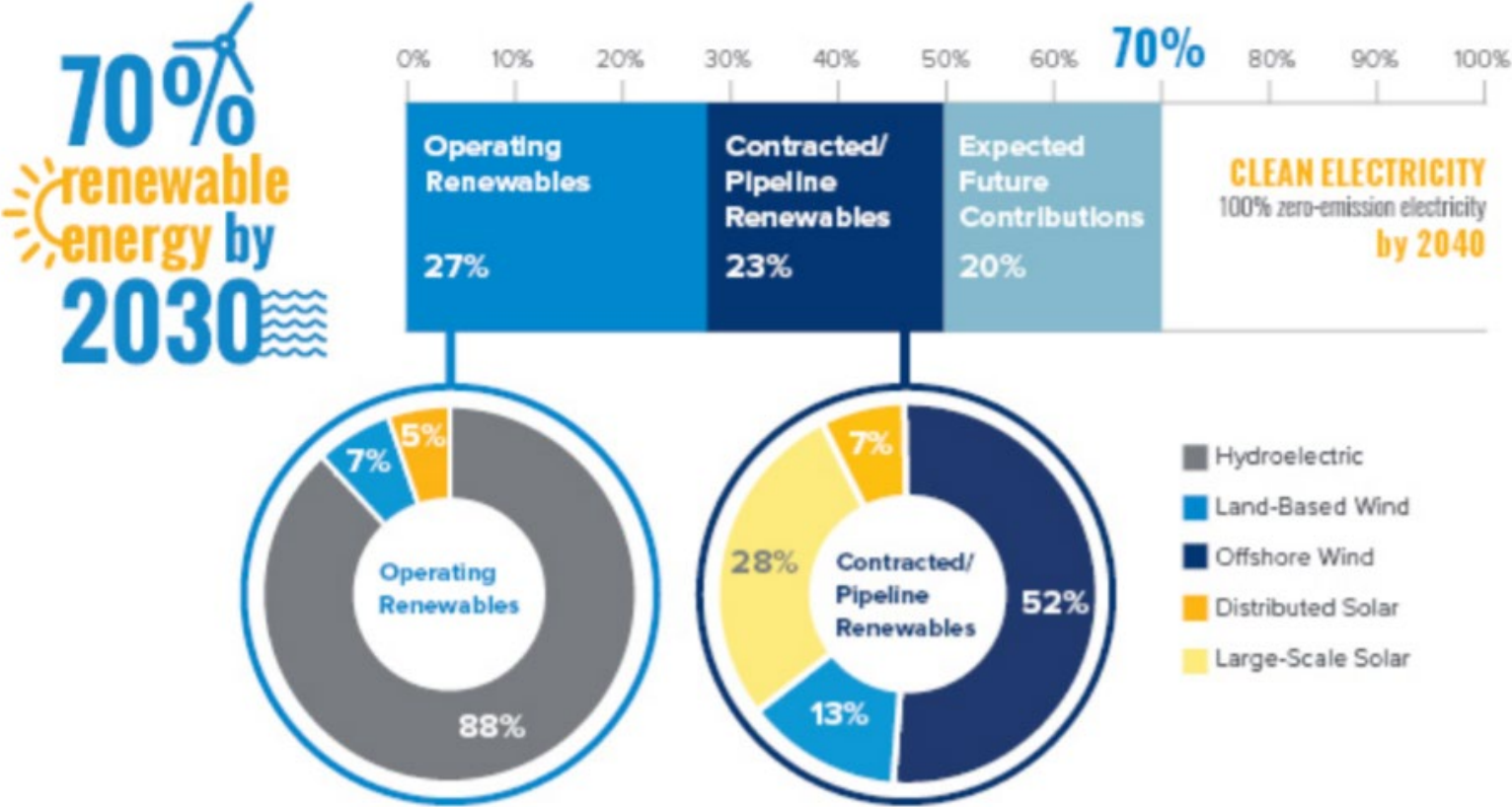
Requires 35% with a goal of 40% of the benefits from clean energy investment to flow to disadvantaged communities.

Established a Climate Action Council

- The **22-member Council** is developing a scoping plan to put New York on a path to carbon neutrality.
- Co-chaired by Department of Environmental Conservation and NYSERDA.
- Includes two governor, four Senate, and four Assembly appointments as well as representatives from a broad set of New York State agencies:
 - Department of Transportation
 - Department of Health
 - Empire State Development
 - Department of Agriculture and Markets
 - Homes and Community Renewal
 - Department of Labor
 - Public Service Commission
 - NY Power Authority
 - Long Island Power Authority
 - Department of State

New York's Clean Energy Standard

Combined with the existing baseline of renewable facilities, the current pipeline of renewables already under contract and in-development projects will power 50% of New York's electricity once operational.





New York State's carbon reduction target requires transformation of the built environment

- Climate Act goals look to **reduce carbon emissions by 85%** by 2050 across all sectors, **including buildings sector**.
- Direct emissions from buildings contribute **~30% of NYS economywide** emissions.
- Roadmap is prioritizing building decarbonization **policy recommendations** and **technology RD&D** centered on cost reduction, innovation, grid flexibility, equity, and societal benefits.

Transforming the buildings market by 2050

New Construction

Design and deliver economic, zero emissions buildings.

Existing Buildings

Retrofits in existing buildings are critical to success.

Strategic Sector Focus

- Single-family residential
- Low- and mid-rise multifamily
- Office buildings
- Higher education

Roadmap scope

A **common definition** and understanding of carbon neutral buildings

Studies to showcase **construction practices and technologies useable today, and the potential for technology cost reductions**

Modeled solutions focused on **building electrification** and **grid implications**

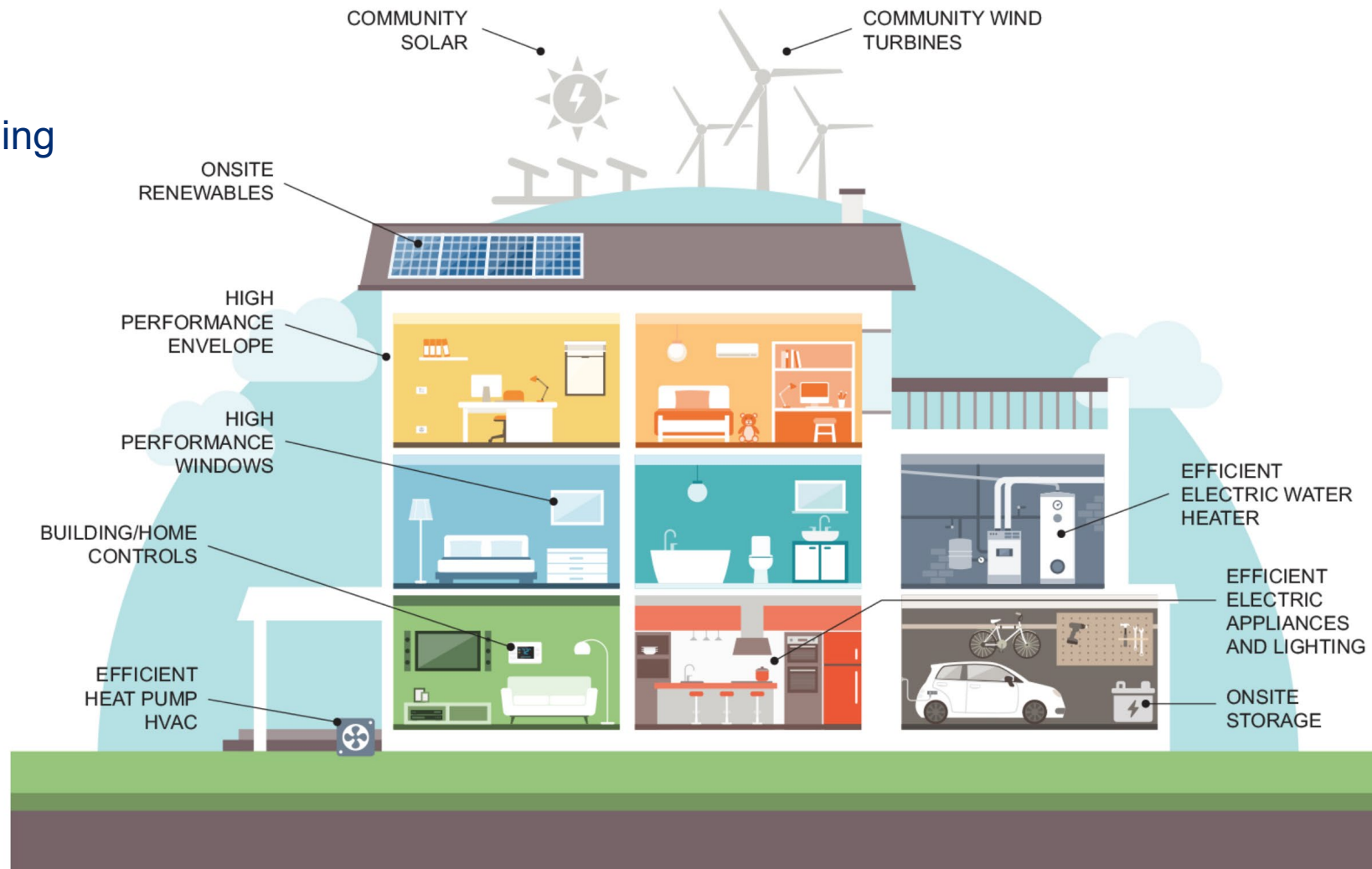
Explains the **business case** for carbon neutrality

Recommends **policy solutions** to ratchet down emissions and reduce cost

A carbon neutral building is one where the design, construction, and operations do not contribute to emissions of greenhouse gases that cause climate change.

Attributes of a carbon neutral building

- 1 Maximizes energy efficiency
- 2 No fossil fuel combustion for building energy services (all-electric end uses)
- 3 Produces or procures zero-emission electricity
- 4 Designed with flexible loads and/or storage that can respond to grid conditions
- 5 Features resiliency measures that protect building occupants
- 6 Designed with attention to embodied carbon and refrigerants



Source: NYSERDA

Metrics for carbon neutral

Metrics to drive three objectives to achieve Climate Act goals.

- 1 Minimize energy consumption and peak loads.
- 2 Electrify all possible end uses with 100% zero emission supply, or lowest carbon fuels for that remaining consumption.
- 3 Facilitate the real-time ability for the building to shift or offset energy loads to be responsive to grid needs and pricing.

A suite of metrics is needed to send clear market signals.

- Site Energy Use Intensity (EUI) and GHG emissions from onsite combustion
- Progress toward decarbonizing the electricity grid
- In combination with any of the above, a measure of Grid Peak Contribution

Future additions to metrics

Roadmap describes a suite of metrics to determine success in achieving carbon neutrality. Research to define future metrics will include:

1

Optimized peak load flexibility in buildings and grid support

2

Low embodied carbon materials

3

Low global warming potential (GWP) refrigerants

4

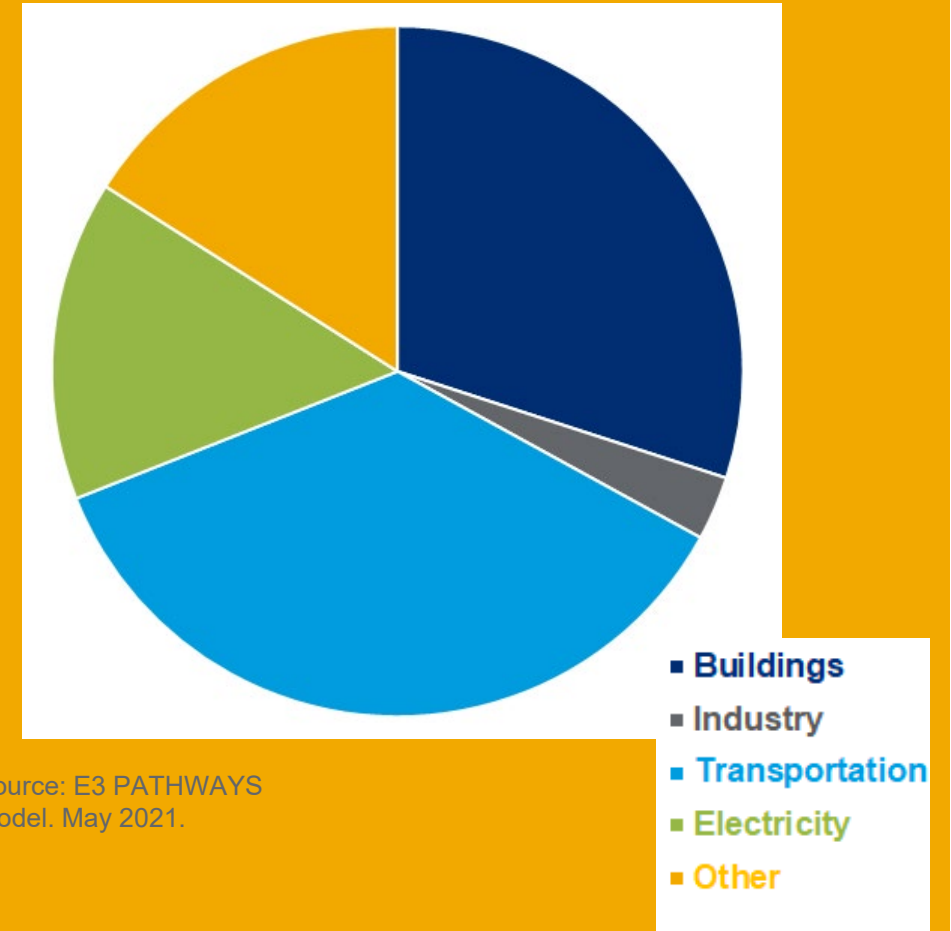
Prevention of refrigerant leaks

Emissions from onsite combustion

~30%

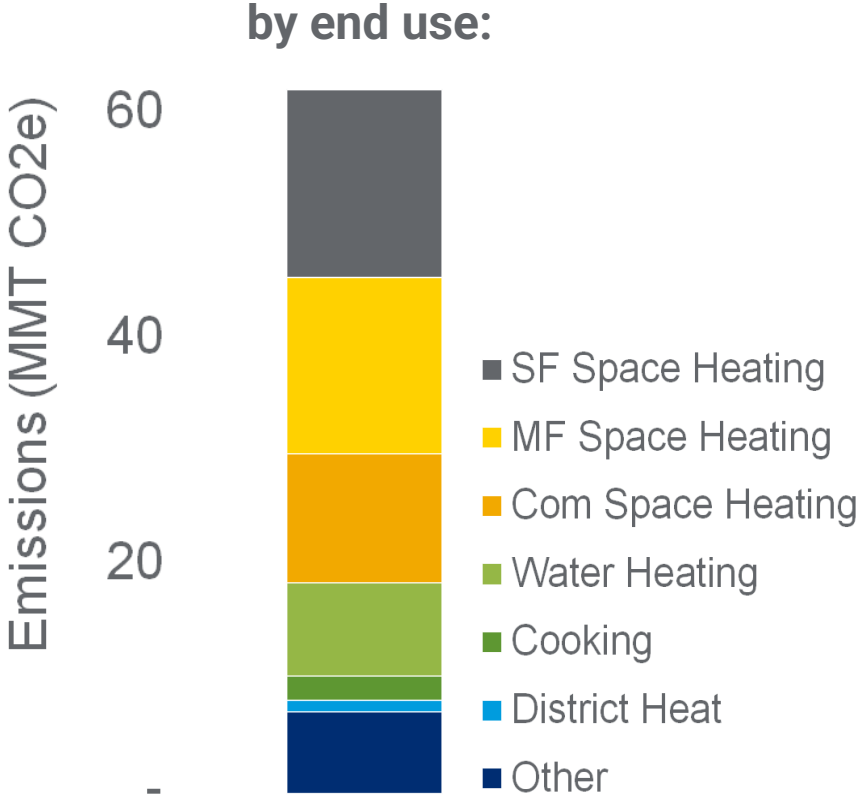
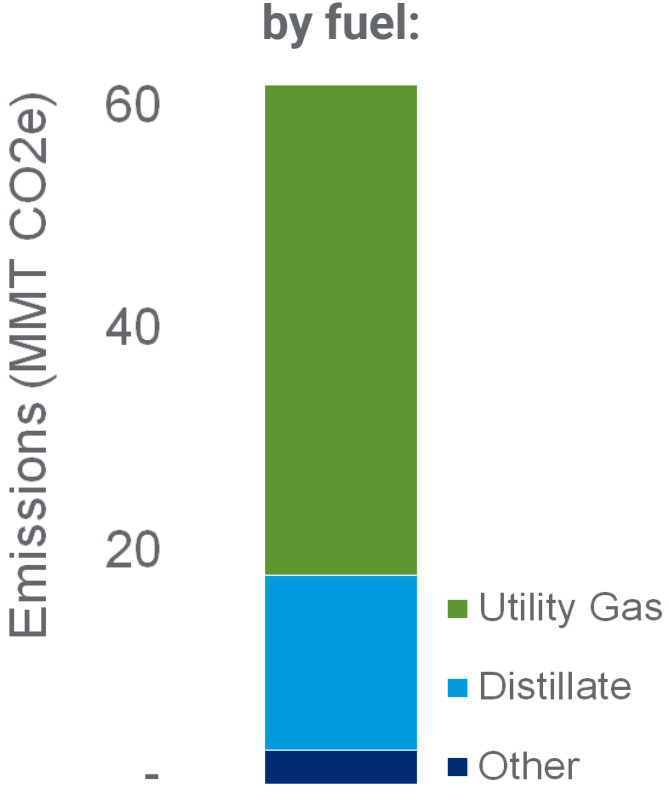
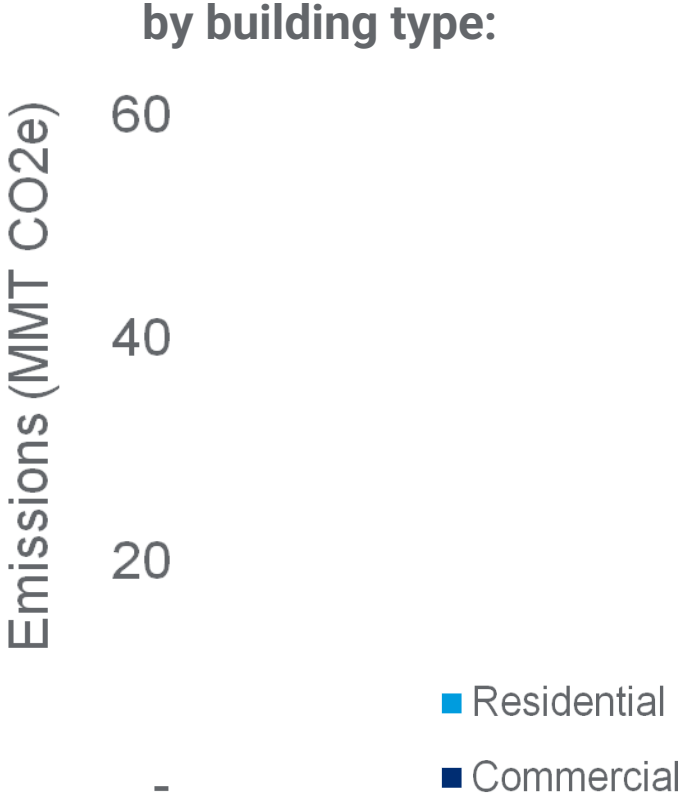
of economy-wide emissions come from direct emissions from residential and commercial buildings through onsite fossil fuel combustion and HFCs.

Economy-wide Greenhouse Gas Emissions



Source: E3 PATHWAYS
Model, May 2021.

Residential and commercial building emissions from onsite combustion



Source: E3 PATHWAYS Model. May 2021

Targeting existing buildings

Retrofits of existing buildings are essential to reduce carbon and manage costs.

- Approximately two-thirds of the building area that exists today will still exist in 2050¹.
- Leverage occupant turnover or planned renovations to minimize disruption and optimize opportunities for upgrades.
- Behavior and practice change lead to decarbonization.



6.2 million buildings in New York State

- 4.9 million single family homes
- 250,000 multifamily buildings
- 370,000 commercial and institutional buildings

Scale is required:

- From 2030 onward, over 200,000 homes per year upgraded to be all-electric and energy efficient.
- By 2050 over 600,000 commercial, institutional, and multifamily buildings need to cut energy use in half and end fossil fuel use.

¹Architecture 2030.

https://architecture2030.org/buildings_problem_why/

Outcomes from technology advancement

Cost Reduction

Will help bring down the upfront cost of technologies through manufacturing and supply chain innovation, industry education, removing regulatory roadblocks and reducing technology risks.

Improved performance

Some technologies are commercially available but need ongoing development to improve performance and lower operational cost.

Minimize disruption

Focus on technologies that allow for retrofits without occupant displacement such as integrated mechanical systems and prefabricated panelized solutions.

Low-GHG strategies

Refrigerants and embodied carbon are critical areas of focus in addition to the operational carbon aspects of building decarbonization.

Carbon neutral buildings are a better solution – higher quality with better attributes and resulting in more value

Today, there is typically an upfront cost premium to achieve carbon neutral buildings, however...

- Carbon neutral buildings provide many unquantified co-benefits (e.g. improved health, productivity, safety, and comfort)
- Community, building, home and grid resiliency is greatly improved by high performance envelopes, grid interactive controls and onsite thermal and battery storage
- Technology first costs are expected to decline 15-30% by 2030
- Available incentives and tax credits generally offset 25-50% of the upfront cost premium
- Carbon neutral buildings are maturing into cost-effective and highly reliable solutions today
- Real world projects are less expensive and out-perform modeled expectations in many cases

Co-benefits of carbon neutral buildings

1

Minimize liability & future proof

Safeguard against a changing energy market where gas and other fossil fuels are likely to become less accessible and more expensive over time.

2

Maximize usable square footage

Electric HVAC equipment maximizes available square footage (e.g. heat pump units installed on walls near ceiling vs. steam radiator taking up floor space).

3

Health benefits

All-electric appliances, especially electric stoves and cooktops, reduce indoor air pollutants. Good building envelopes protect against pest infestation and other asthma triggers.

4

Increased resilience

Weatherization and solar + storage help keep the power on and temperatures consistent in the event of a power outage or extreme weather event.

5

Occupant comfort

Improved comfort from increased air-flow/movement, addressing previously unmet cooling needs (through heat pumps), and noise reduction.

6

Safety

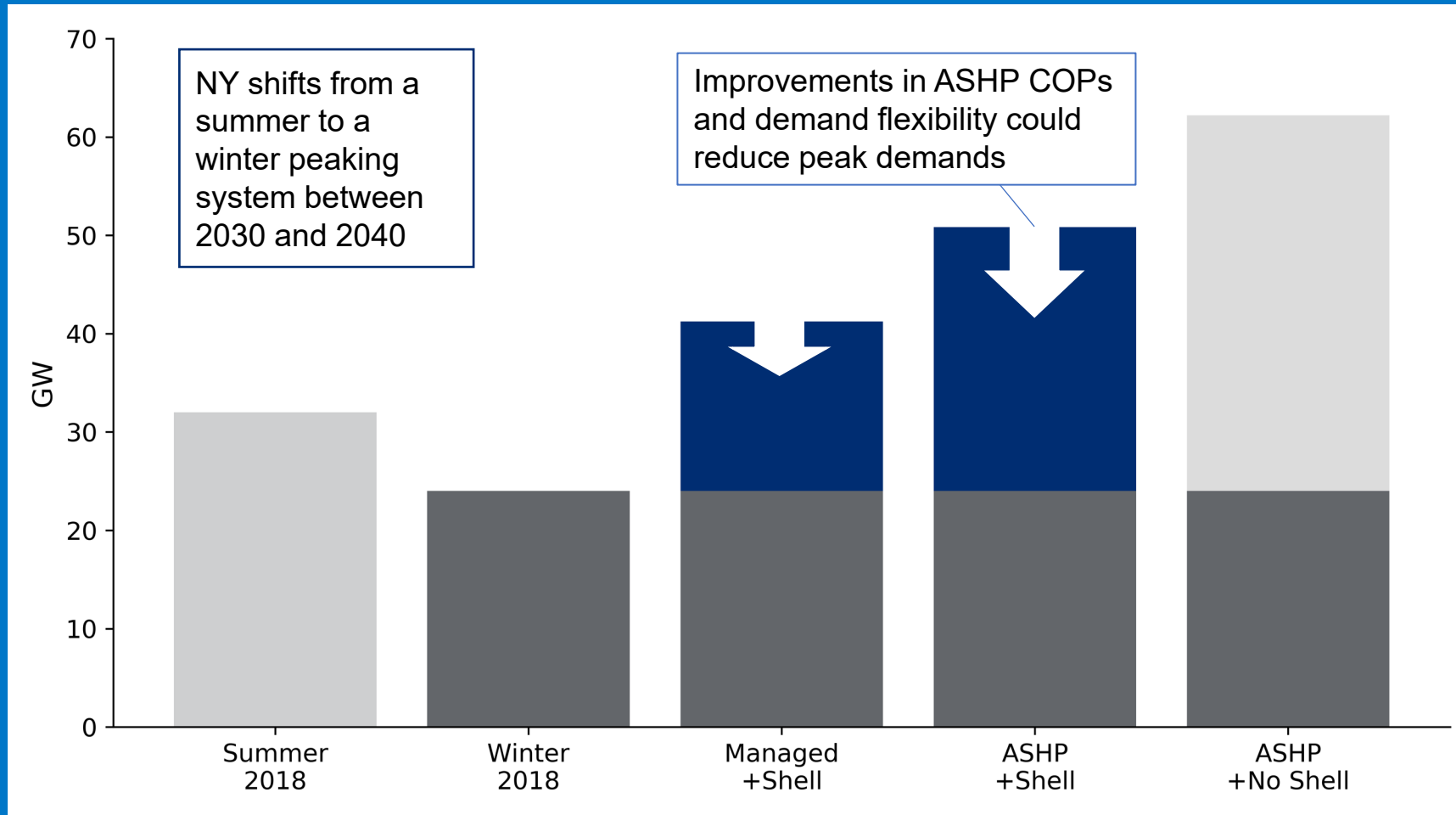
Reduced risks associated with aging gas infrastructure leaks; induction cooktops reduce instances of fire and burns.

Making demand flexibility inherent

- Reduces and manages peak demand, thereby saving system cost, lowering peaker plant operation, and improving health
- Helps reduce the grid impacts of electrification
- Supports grid decarbonization by balancing the use of variable renewable generation sources
- Provides cost-effective alternatives that could help building owners meet legislative mandates



2050 NYS building heating peak demand scenarios



Electrification will add new peak demands to NYS's electric system

The magnitude of those impacts depends on what types of heat pump technologies are deployed and shell investments.

Peak demand of buildings will impact the electric generation and network investments required to achieve NYS's climate goals.



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ASHP + No Shell: air-source heat pumps that meet the NEEP cold-climate specification minimum

ASHP + Shell: a scenario where 45% of residential and 65% of commercial buildings have an efficient shell

Managed: mixture of air-source heat pumps (40%), ground-source heat pumps (30%) and air-source heat pumps that are paired with a combustion source of supplemental heat (30%). The scenario has the same shell measures as ASHP + Shell.

Single Family Home Solution Sets

Example Modeled Scenarios:

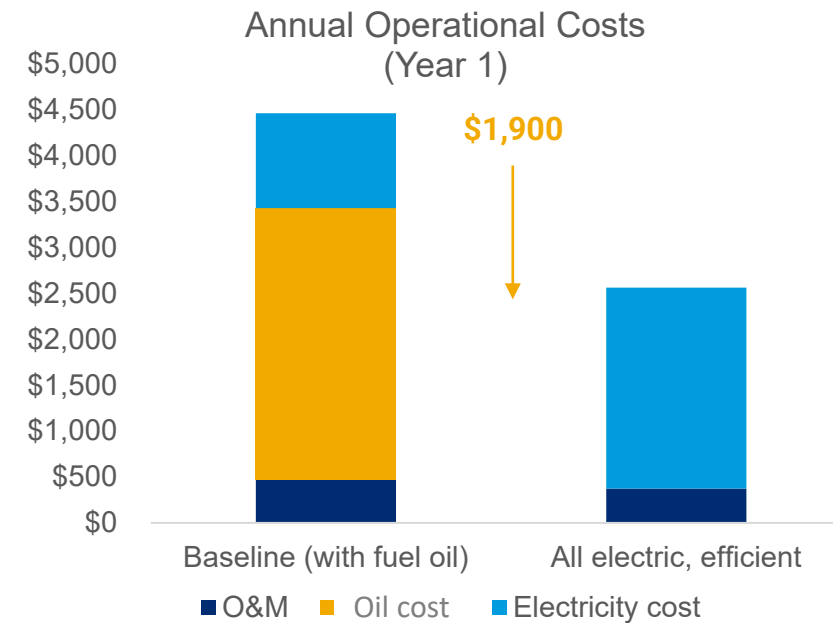
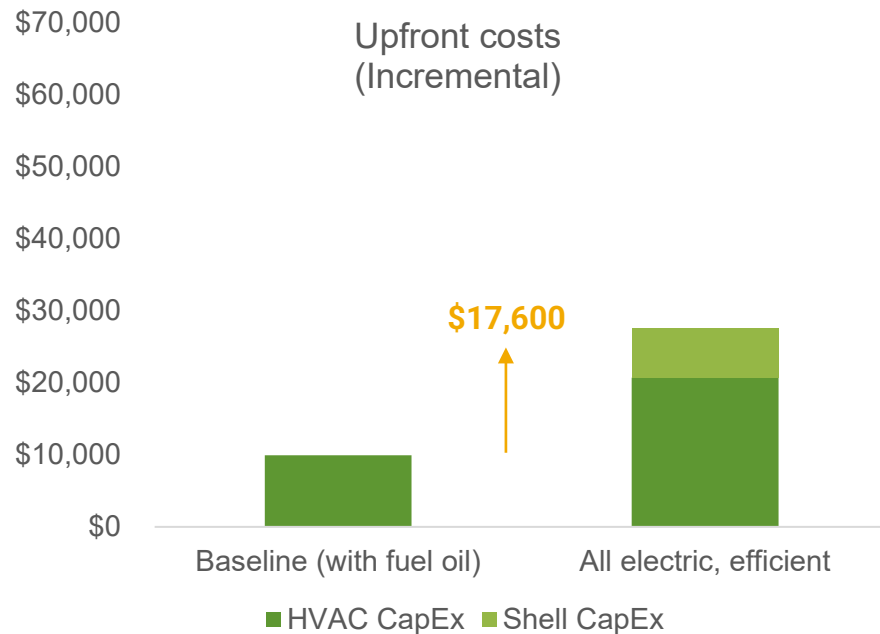
- Over 2/3 of energy in single family homes is used for space and water heating
- Technologies to electrify loads are viable today
- A comfort level of shell efficiency coupled with electrification lowers operating costs when compared to oil heat
- Electrification of single-family new construction is nearing cost parity with conventional fossil fuel construction (not shown)

	All-Electric Retrofit with Comfort Shell	All-Electric Retrofit with Code Compliant Shell	Ground Source Heat Pump with Comfort Shell
Load reduction strategies	<ul style="list-style-type: none"> ▪ Comfort shell – air sealing and attic insulation 	<ul style="list-style-type: none"> ▪ Code compliant* walls, roof, windows and air sealing 	<ul style="list-style-type: none"> ▪ Comfort shell – air sealing and attic insulation
Building electrification technology	<ul style="list-style-type: none"> ▪ Cold climate air-source heat pump ▪ Heat pump water heater 	<ul style="list-style-type: none"> ▪ Cold climate air source heat pump ▪ Heat pump water heater 	<ul style="list-style-type: none"> ▪ Ground source heat pump ▪ Heat pump water heater
Advanced controls	<ul style="list-style-type: none"> ▪ Not modeled 	<ul style="list-style-type: none"> ▪ Not modeled 	<ul style="list-style-type: none"> ▪ Not modeled
Distributed energy resources	<ul style="list-style-type: none"> ▪ Not modeled 	<ul style="list-style-type: none"> ▪ Not modeled 	<ul style="list-style-type: none"> ▪ Not modeled

*Per current New York State Energy Conservation Construction Code for new construction

Decarbonization retrofits of single-family homes with oil heat are often cost effective today even before incentives

Retrofit of pre-1980 home with ducted ccASHP plus HPWH with comfort shell upgrade in Climate Zone 6A, Upstate NY

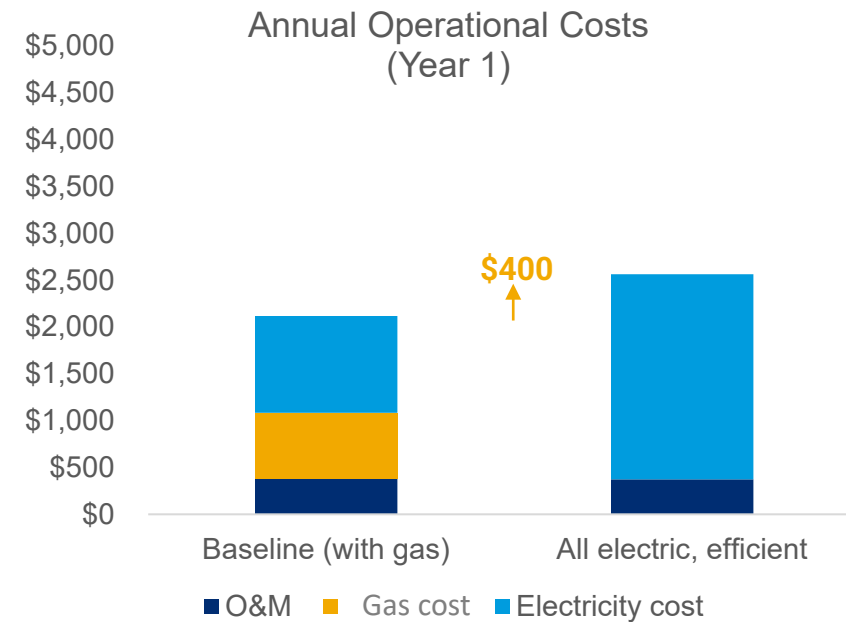
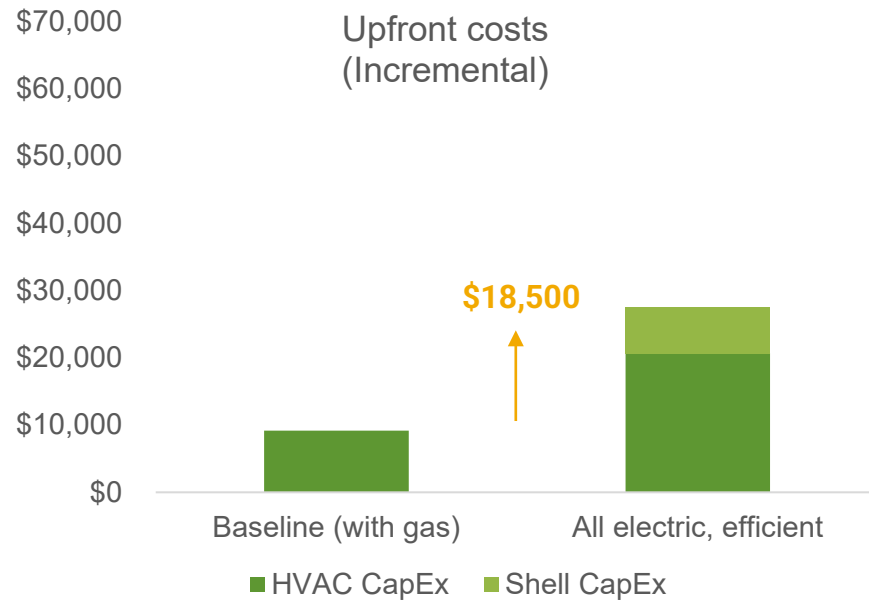


- **Comfort shell upgrades of air sealing and attic insulation reduce energy load and heat pump sizing, saving both upfront and operational costs**
- **For homes currently heated with oil, comfort shell upgrades in conjunction with electrification have a 9-year simple payback**

Modeled results do not include technology cost reduction, incentives, tax credits, integrated design, and cost savings due to co-benefits or grid optimization

Decarbonization retrofits of single-family homes with gas heat may increase both upfront and operating costs, highlighting the need to reduce project installation costs and account for co-benefits

Retrofit of pre-1980 home with ducted ccASHP plus HPWH with comfort shell upgrade in Climate Zone 6A, Upstate NY

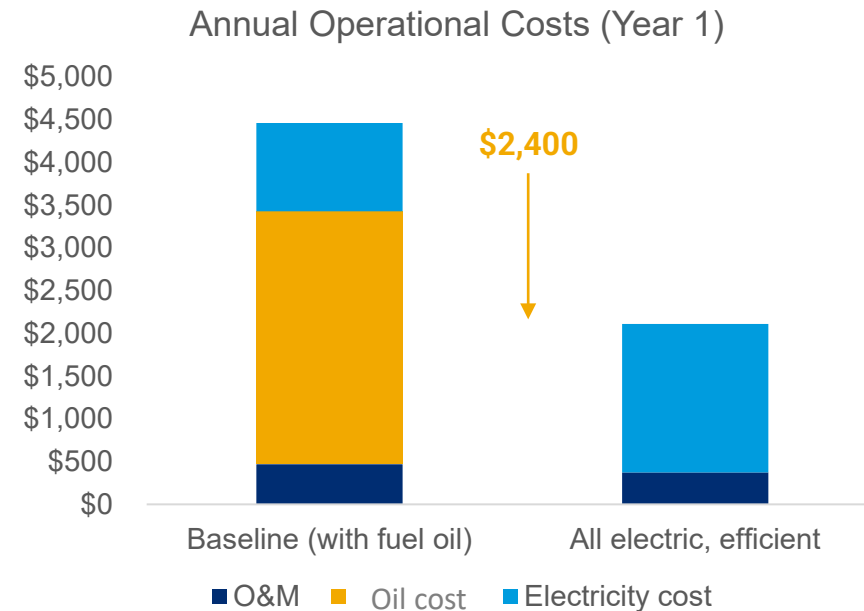
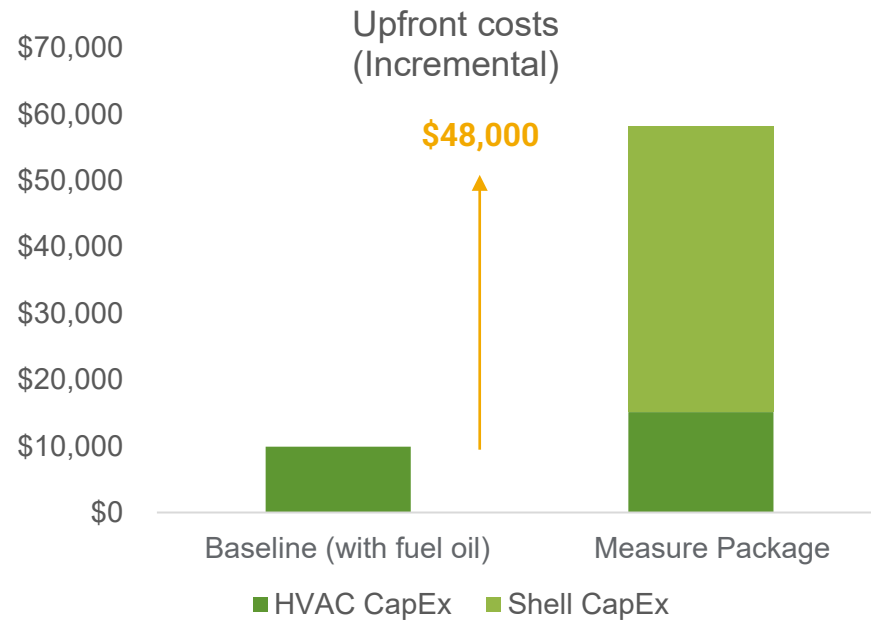


- **Electrification of the home improves indoor air quality and reduces risk of fire and burns**

Modeled results do not include technology cost reduction, incentives, tax credits, integrated design, and cost savings due to co-benefits or grid optimization

Even with longer paybacks, home comfort and resiliency are improved by high performance building shell

Retrofit of pre-1980 home with a ducted ccASHP plus HPWH with upgrade to a code compliant shell in Climate Zone 6A, Upstate NY

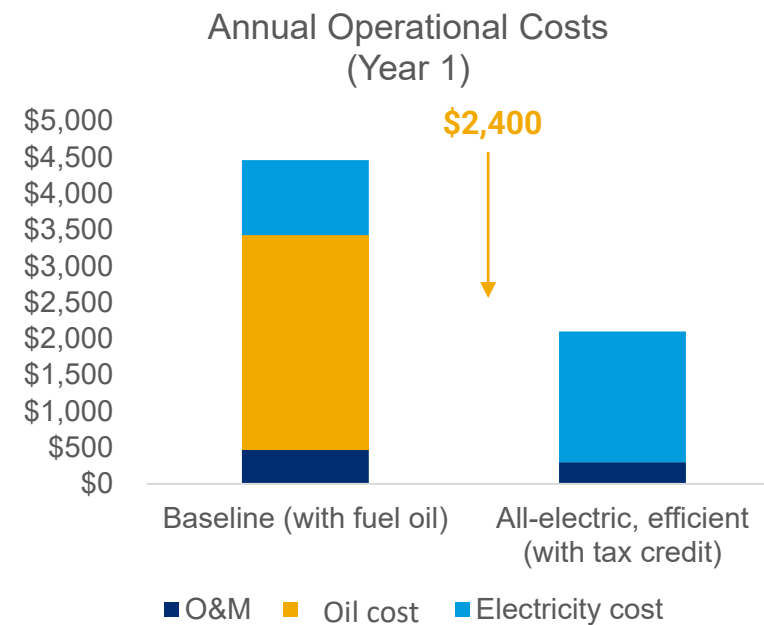
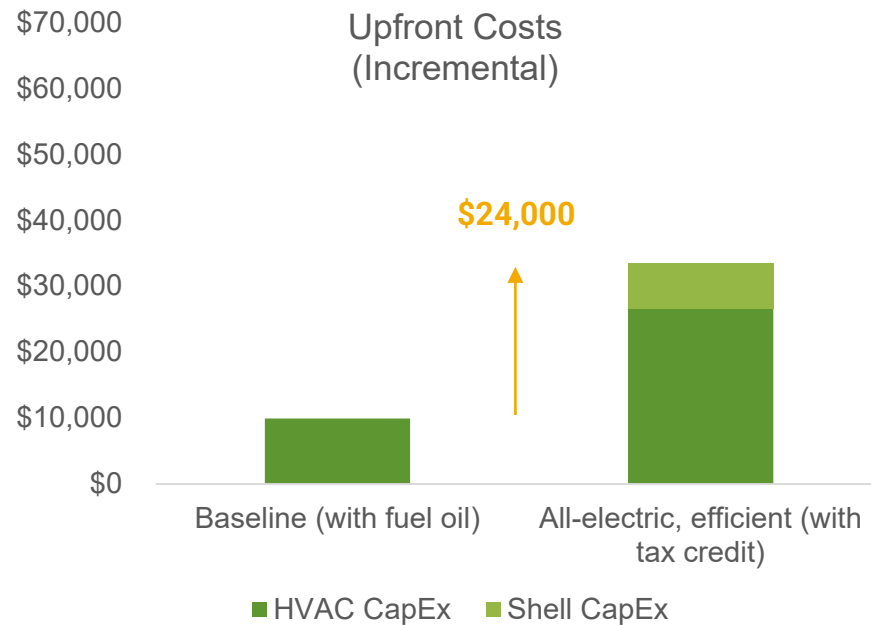


- Coupled with electrification, code compliant shell upgrades save \$500/yr more than comfort shell upgrades (if switching from fuel oil) but have a significantly longer payback
- Code compliant shells provide comfort benefits as well, and significantly reduce grid impacts

Modeled results do not include technology cost reduction, incentives, tax credits, integrated design, and cost savings due to co-benefits or grid optimization

Ground-source heat pump retrofits after tax credits can have a comparable payback to air source heat pumps in homes with existing ducts

Retrofit of pre-1980 home with GSHP (provides space heating and cooling and hot water) with comfort shell upgrade in Climate Zone 6A, Upstate NY, with tax credit



- **Ground-source heat pump systems coupled with comfort shell upgrades show a 10-year simple payback when switching from oil heat that can use existing ducts; after federal tax credits, but not including incentives**

Modeled results do not include technology cost reduction, incentives, integrated design, and cost savings due to co-benefits or grid optimization

Single Family Homes → Carbon Neutrality

Benefits

- Improved health for occupants due to better indoor air quality
- Improved comfort due to better shell
- Improved passive survivability due to better shell
- Reduced fire and/or burn risk due to induction stove tops
- Annual utility bill savings (for oil baseline) with shell upgrades

Challenges

- Market fragmentation due to diverse housing stock
- Huge volume of homes that need to be retrofitted (>200,000 per year)
- Contractors lack familiarity and direct experience with all-electric products and high performance building shell retrofits
- Remediation of pre-existing conditions may add additional costs
- Low relative cost of gas compared to electricity (the economics for oil to heat pump conversion are better than for a gas baseline)



NYSERDA

NYS is developing a Building Electrification Roadmap

- > 10-year Roadmap outlining **market-development milestones** and **public policies & investments** to advance building electrification in NYS
- > Chart a path to **transform how New Yorkers heat and cool buildings** through the adoption of energy-efficient **heat pumps**
- > Pose a **2030 market vision** and **target**: cost-effective, attractive solutions across market segments and for most building types
- > **Engage the industry and stakeholders** to be relevant and customer-oriented

Release of first draft of Building Electrification Roadmap in Fall 2021

- Detailed slide deck as the first deliverable, for stakeholder input



We need to hear from you!

All New Yorkers must take a no regrets approach to fighting climate change. Here are actions you can take:

- 1 Provide feedback via our website at <https://www.nyserderda.ny.gov/All-Programs/Programs/Carbon-Neutral-Buildings>
- 2 Share this presentation with colleagues, customers, and others in your network.
- 3 Learn about NYSERDA programs that will help us realize the Roadmap goals www.nyserderda.ny.gov/all-programs

RMAG Q2 '21: Update on Energy Efficiency and Housing Advisory Panel Recommendations

Excerpted from Recommendations presented to the NYS Climate Action Council in May 2021

Full Presentation and Full Text Recommendations at [Climate.NY.gov](https://climate.ny.gov)

Emily Dean, Director of Market Development, NYSERDA

Beneficial Building Electrification and Energy Efficiency

100% zero-emissions electricity by 2040 under the Climate Act.

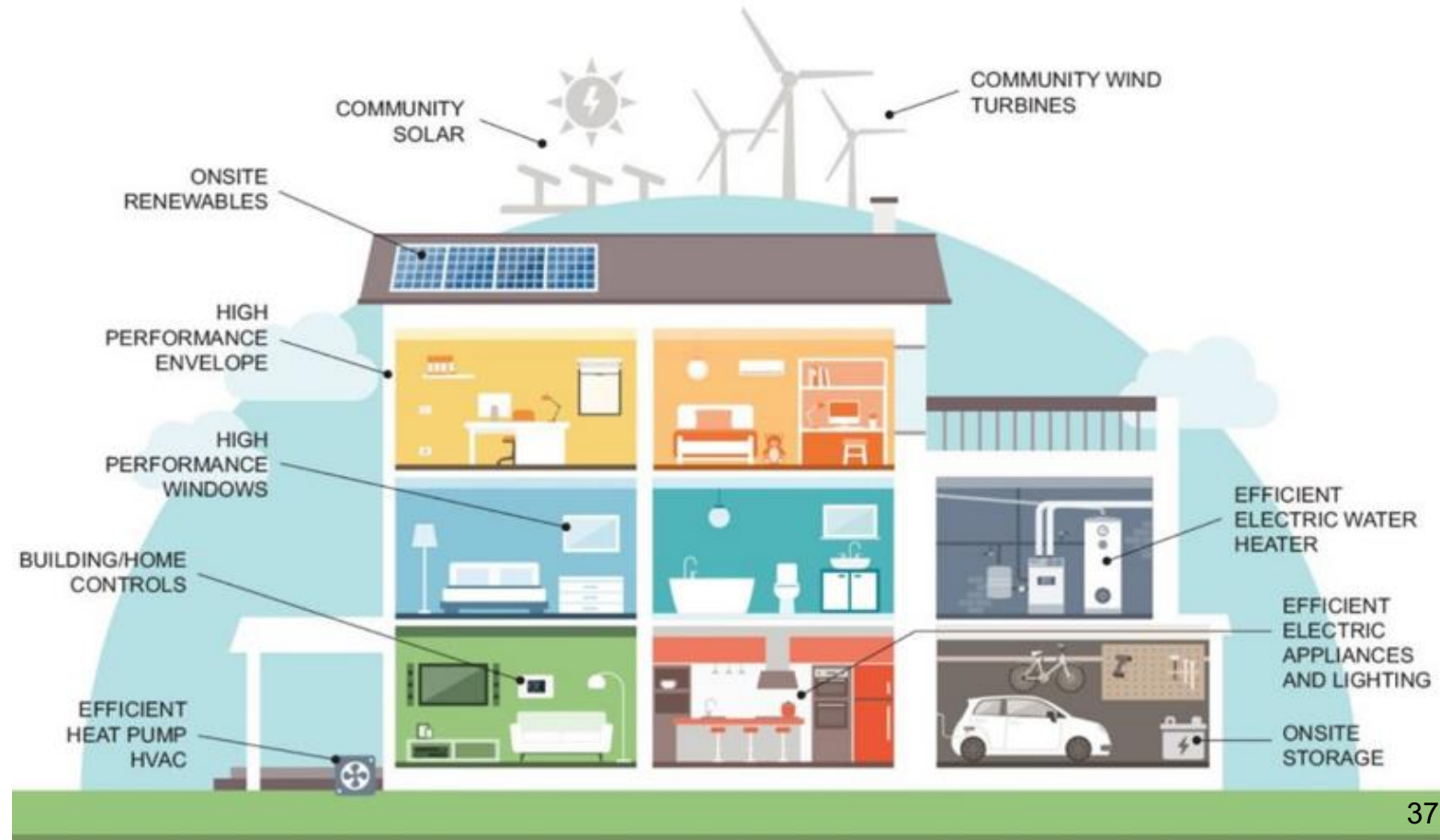
Electrification of heating and hot water systems is the key strategy for building decarbonization and **energy efficiency improvements** in all buildings.

Scope of Panel:

Eliminate on-site GHG emissions from the combustion of fossil fuels

- Residential
- Commercial and Institutional

The Panel adopted a building-level focus; further analysis is needed in campus and community thermal networks, and specialized uses in industry and critical care.



Scale of the Solution Demands New Resources

6.2 million buildings in the state

- 4.9m single family homes
- 250k multifamily buildings
- 370k commercial/institutional buildings

Eliminating GHG emissions from New York buildings by 2050 requires broad, systemic changes.

- By 2030, more than 200,000 homes per year upgraded to all-electric and energy efficient
- The 370,000 commercial/institutional buildings cut energy use in half and end fossil fuel use
- Behavior and practice change lead to decarbonization

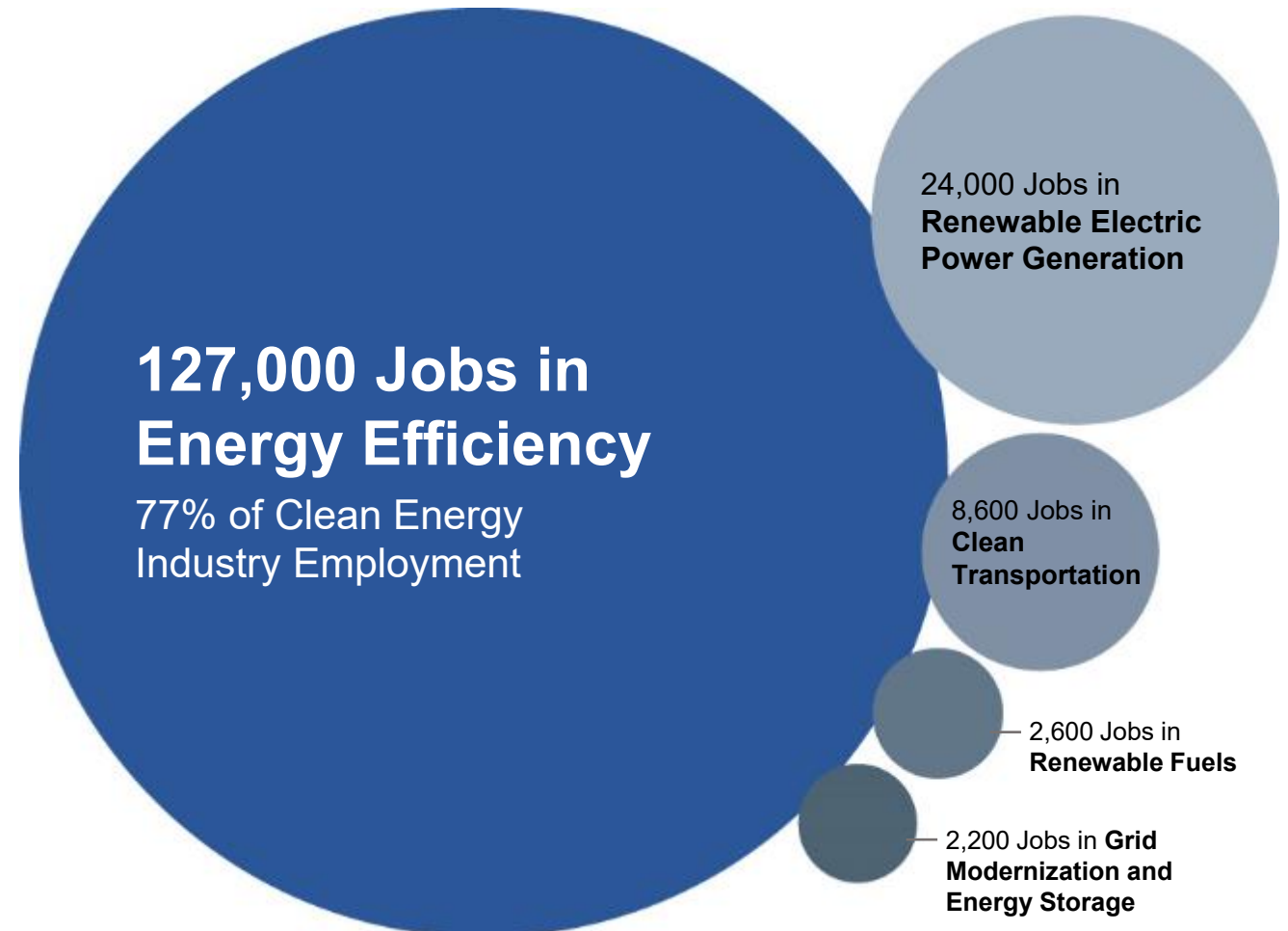
Equitable transformation at this scale requires new resources.

- *Private capital investment* focused on highly efficient buildings
- *Public incentives* for early adoption
- *Public investments* in building efficiency and electrification in LMI homes, affordable and public housing, and disadvantaged communities

Building Decarbonization and Economic Development

Decarbonizing New York's building stock delivers **significant job growth and economic opportunity** throughout the state.

- New York's **energy efficiency industry employs the largest share** of clean energy workers (**77%**).
- The efficiency sector continues to **add workers installing high-efficiency HVAC equipment and heat pumps**, which account for **over half of the sector's employment**.



Mitigation Strategy Summary

	ACTION TYPE	EMISSIONS IMPACT BY 2050	EASE OF IMPLEMENTATION	COST*
1 Phase out fossil fuel use in buildings	Legislative, regulatory, programmatic	High	Medium/Hard	\$\$\$
2 Require benchmarking	Legislative, regulatory, programmatic	Low	Easy	\$
3 Shift reliance on fossil gas to a clean energy system	Legislative, regulatory	High	Hard	\$\$\$
4 Shift reliance on HFC use as refrigerants and in all products used in construction	Legislative, regulatory	High	Hard	\$\$

* Cost estimates for mitigation strategies reflect total resource costs statewide, expressed as an equivalent annualized cost.

The total resource cost approach measures costs to upgrade buildings and utility infrastructure net of energy savings, across all entities (public and private sector).

The categories used for **equivalent annualized total resource cost** are:

\$ (<\$250M, resources are already on hand), \$\$ (\$250M - \$1B, requires some new resources), and \$\$\$ (>\$1B, requires high degree of new resources).

Mitigation Strategy – Initiative #1 Codes and Standards

Enact **enabling legislation** and adopt **codes, standards, and regulations** to improve energy efficiency, reduce emissions, and enhance building resilience. Adopt regulations that **phase out fossil fuel use** in buildings, requiring energy-efficient electric heating and cooling, electric hot water heating, and electric appliances.

GHG REDUCTION BY 2030	GHG REDUCTION BY 2050	COST/FUNDING CONSIDERATION
MEDIUM	HIGH	\$\$\$
ACTION TYPE	IMPLEMENTATION EASE	CASE STUDY EXAMPLES
Legislative Regulatory Programmatic	MEDIUM/ HARD	California Massachusetts Norway

Mitigation Strategy – Initiative #1 Codes and Standards

New construction* of residential and commercial buildings are built to a **highly efficient, zero emission standard** and incorporate requirements for building resilience, where feasible.

ASAP – adopt highly efficient **State Energy Code for new construction*** of residential and commercial buildings.

2023 – amend the **State codes for new construction*** of residential and commercial buildings to require:

- **solar PV** on feasible areas
- feasible grid-interactive electrical appliances
- energy storage readiness
- **electric readiness** for all appliances
- EV readiness where parking is already provided.

Adopt all-electric State codes for new construction*

- **2025** – single family
- **2030** – multifamily and commercial buildings.

Enabling action: Encourage local governments to adopt NYStretch Energy Code, until highly efficient, all-electric codes are enacted statewide.

Enabling action: State funding for local code enforcement (staff, training, materials) and State credentialing of third-party Energy Code inspectors.

*“New Construction” includes additions and alterations as applicable

Mitigation Strategy – Initiative #1 Codes and Standards

Require the sale and installation of energy efficient and **zero emission new equipment**, when replaced **at the end of useful life** in residential and commercial buildings, as well as **efficiency upgrades** for many large buildings.

ASAP – Adopt energy efficiency standards for appliances exempt from federal preemption (e.g., computers, monitors, air purifiers).

2030 – Require lighting upgrades to current Energy Code standards for existing commercial properties (>25,000 sq. ft.).

2030 – Adopt an energy efficiency performance standard for existing commercial properties (>25,000 sq. ft.).

Adopt zero emission standards prohibiting gas/oil replacements (at end of useful life) of heating, cooling and domestic hot water equipment,

- **2030 – single family**
- **2035 – multifamily and commercial buildings.**

2035 – Adopt zero emission standards prohibiting gas appliance replacements (at end of useful life) for cooking and dryers in residential buildings.

Provide for thoughtful development of alternative compliance pathways from recommended codes and standards for extenuating circumstances (including housing affordability-related matters; health and safety/emergency needs). This applies to pre-existing building stock recommendations.

Mitigation Strategy – Initiative #2 Benchmarking and Disclosure

Require measuring building energy usage, **benchmarking energy performance**, and making that information accessible via disclosure or labeling.



GHG REDUCTION BY 2030	GHG REDUCTION BY 2050	COST/FUNDING CONSIDERATION
<p>LOW (but enabling)</p>	<p>LOW</p>	<p>\$</p>
ACTION TYPE	IMPLEMENTATION EASE	CASE STUDY EXAMPLES
<p>Legislative Regulatory Programmatic</p>	<p>EASY to MEDIUM</p>	<p>NEW YORK CITY, SEATTLE, WASHINGTON DC, BOULDER, LONDON</p>

Mitigation Strategy – Initiative #2 Benchmarking and Disclosure

Components required for delivery:

2023 – Statewide energy benchmarking and disclosure program - Building owners (>10,000 sq. ft.) to annually report whole building energy and water consumption data to NYSERDA.

2025 – Require owners to obtain and publicly disclose, as part of sale or lease listing, the prior-year energy consumption of the building, unit, or space.

2027 – Require owners of single-family buildings to obtain and disclose an energy performance rating (e.g., a Home Energy Rating System (HERS) index) as part of sale listing.

2025 – All buildings (>25,000 sq. ft.) complete a comprehensive building energy assessment (audit) at least once a decade that:

- evaluates the building's systems;
- identifies opportunities to invest in energy efficiency upgrades; electrification or electrification-readiness for building systems; and
- resilience measures.

Policy implementation: Ensure consistency and alignment, where appropriate, across State and local government requirements (e.g., NYC local laws), incl. in reporting templates and timeframes. Use statewide benchmarking data to inform subsequent programmatic and policy design.

Mitigation Strategy – Initiative #3 Gas System Transition

Advance a managed, phased, and just transition from reliance on fossil gas and the gas distribution system to **a clean energy system**, including elimination of embedded subsidies for fossil gas.

GHG REDUCTION BY 2030	GHG REDUCTION BY 2050	COST/FUNDING CONSIDERATION
MEDIUM (overlap with #1)	HIGH (overlap with #1)	\$\$\$ Long-term planning expected to mitigate the risk of stranded assets
ACTION TYPE	IMPLEMENTATION EASE	CASE STUDY EXAMPLES
Legislative Regulatory	HARD	Netherlands (revocation of obligation to serve, subsidized gas phase out)

Mitigation Strategy – Initiative #3 Gas System Transition

Components required for delivery:

Undertake planning study and process to examine regulatory, legislative, and other policy changes needed for a managed and just transition of gas system and infrastructure, with attention to:

- safety, equity, reliability, and affordability of service;
- gas infrastructure and options for contraction;
- end-users and economic impacts;
- utility proposals to meet emissions reduction goals;
- alternative models for gas utilities in the long-term.

Develop a **comprehensive equity strategy** to incorporate needs of LMI households and DACs:

- Meaningful LMI/DAC engagement in transition process
- Prioritize technical and financial assistance.

Create **equitable transition plan for the gas industry workforce** (incl. protections, training, job transition opportunities).

Minimize new investments in gas delivery infrastructure, not otherwise needed for safety and reliability. Change utility incentives and planning.

Mitigation Strategy – Initiative #3 Gas System Transition

Components required for delivery:

Stop utilities advertising fossil gas as “clean,” “natural,” “climate friendly,” or in similar terms.

Phase-out incentives and rebates for fossil gas equipment offered by utilities or NYSERDA.

Undertake analysis and provide resources for building-readiness for electrification and undertake analysis, planning, and information sharing for **electric grid-readiness for electrification.**

Undertake analysis and **planning for decarbonization of ConEd district steam system.**

Level playing field for adoption of clean heating solutions by **eliminating the “100-foot rule”** which can bias customer heating choice decision-making.

Clean heating choices should be considered policy in the public interest to support healthy homes, with the provision of heating service to homes recognized in State Policy as necessary for preservation of health and general welfare.

Develop **easement rules to allow access for thermal/ground source loops** to use utility and public (municipal) rights of way on reasonable terms.

Mitigation Strategy – Initiative #4 Transition from HFCs

Advance a **managed and just transition from reliance** on the use of hydrofluorocarbons (HFCs) as refrigerants and in all products used in building construction.

GHG REDUCTION BY 2030	GHG REDUCTION BY 2050	COST/FUNDING CONSIDERATION
MEDIUM	HIGH	\$\$
ACTION TYPE	IMPLEMENTATION EASE	CASE STUDY EXAMPLES
Legislative Regulatory	HARD	California Short-Lived Climate Pollutants Strategy; US Climate Alliance SLCP Roadmap; Washington State

Mitigation Strategy – Initiative #4 Transition from HFCs

Components required for delivery:

Update **NYS codes to allow low-GWP refrigerants.**

Require reclamation or destruction of refrigerants from appliances at end-of-life, with verification and reporting, and require leak detection for certain commercial refrigeration.

Provide training, technical assistance, and economic support to aid local industry with this transition.

Support **workforce training and education** for low-GWP refrigerants and technologies and for low-GWP alternatives in building/construction spray foam.

Continue to support **demonstration projects for low-GWP refrigerants** in HVAC and hot-water systems, and for refrigerant leakage detection and reduction strategies.

Expand the **scope of NYS Significant New Alternatives Policy (SNAP) Rule** which prohibits certain HFCs in refrigerator/freezers, chillers, commercial refrigeration, and aerosols/foams/ solvents; and lower GWP threshold over time as low/ultra-low GWP options become available.

- Align NYS policy with anticipated federal policy
- Send strong market signal while mitigating costs

Support further research into known data gaps (e.g., leak rates and charge size for VRF systems, **long term health effects** of exposure to new chemicals).

Enabling Strategy Summary

	ACTION TYPE	EASE OF IMPLEMENTATION	COST*
1 Public Financial Incentives	Financial, regulatory, programmatic	Hard (given scale)	\$\$\$
2 Public and Private Low-cost Financing	Financial	Hard (given scale)	\$\$\$ + mobilize private capital
3 Workforce	Financial, regulatory, programmatic	Medium	\$\$
4 Consumer Education	Programmatic	Medium	\$\$
5 Innovation	Financial, programmatic	Easy	\$\$
6 Embodied Carbon	Financial, regulatory, programmatic	Easy	\$

Cross-cutting recommendations also address identifying resources, federal support, energy prices, resilience, and the importance of energy efficiency.

* Cost estimates for enabling strategies reflect new State resources above current levels of investment, through 2030. State investments in market enabling strategies will be needed for at least the coming decade, with ongoing State resources thereafter to support LMI households and DACs. The categories used for **new State resources (through 2030)** are: \$ (<\$25M, resources are already on hand), \$\$ (\$25M - \$100M, requires some new resources), and \$\$\$ (>\$100M, requires high degree of new resources).

Enabling Initiative #1 Public Financial Incentives

Provide incentives for single family, multifamily, and commercial and institutional building owners that speed uptake and help transform the market for building efficiency, electrification, and decarbonization.

Focus on uptake benefitting LMI households, affordable and public housing, and DACs.

COST/FUNDING CONSIDERATION

\$\$\$

- Minimum of **\$1B/yr needed for programs serving LMI households, affordable and public housing, and DACs**, on an ongoing basis.
- **Financial incentives to motivate early adoption in market-rate housing and commercial buildings will be needed for at least the coming decade.**

*NYS currently invests ~\$250M/year for energy efficiency programs that serve LMI and affordable housing, as part of > \$1B annually to support energy efficiency and building electrification across residential, commercial, and institutional buildings

ACTION TYPE

Financial,
Programmatic,
Regulatory

IMPLEMENTATION EASE

HARD
given scale

CASE STUDY EXAMPLES

NY-Sun, Statewide LMI Portfolio of energy efficiency programs, NYS Clean Heat, Comfort Home Pilot

Enabling Initiative #2 Public and Private Low-cost Financing

Low-cost financing for energy efficiency, electrification, electrification readiness, solar PV, and related improvements in buildings to provide single family, multifamily, and commercial and institutional building owners with access to low-cost capital at the scale needed to **pay for the building upgrades** necessary for decarbonization.

COST/FUNDING CONSIDERATION
\$\$\$ + unlock private capital

IMPLEMENTATION EASE
HARD given scale

ACTION TYPE
Financial

CASE STUDY EXAMPLES
GJGNY; mobilize low-cost capital at a scale comparable to the NYS Environmental Facilities Corp (Clean Water State Revolving Fund)



Enabling Initiative #3 Workforce

Support workforce **education, training, job placement** and development that equip the state's current and future workforce to design, install, inspect, maintain and operate healthy, comfortable, low-carbon buildings while increasing clean energy job placement for DACs and advancing industry diversity.

COST/FUNDING CONSIDERATION

\$\$

build on NYSERDA's \$100M clean energy workforce training initiative

CASE STUDY EXAMPLES

NYSERDA clean energy workforce programs

ACTION TYPE

Financial
Programmatic
Regulatory

IMPLEMENTATION EASE

Easy to develop programs and training infrastructure;
Medium-effort to coordinate/deliver training and placement services at scale, and support needed for DACs

Enabling Initiative #4 Public Awareness and Consumer Education

Support broad public awareness and consumer education, create strategic partnerships with trusted community leaders, and scale-up targeted outreach and decision-making support to **increase market demand** and accelerate the transition to low-carbon, energy-efficient, all-electric buildings.

COST/FUNDING CONSIDERATION

\$\$

CASE STUDY EXAMPLES

Clean Energy Hub model
(under development)

ACTION TYPE

Programmatic

IMPLEMENTATION EASE

Easy to develop content;
Medium-effort to develop integrated strategic plan and coordinate aligned messaging and dissemination;
high touch/volume, delivered through range of channels to effectively reach broad range of audiences

Enabling Initiative #5 Innovation

Support **research & development**, demonstration projects, and **more companies and manufacturers operating in NYS** to bring innovative solutions to the marketplace for buildings to

- be highly efficient, all-electric, and resilient
- be grid-interactive, with revenue opportunities, and
- reduce embodied carbon.

COST/FUNDING CONSIDERATION

\$\$
building upon NYSERDA's \$60M
annual commitment

ACTION TYPE

Programmatic

IMPLEMENTATION EASE

Easy

CASE STUDY EXAMPLES

New York Battery and Energy Storage Technology (NY-BEST), ARPA-e, California Public Interest Energy Research (PIER) project, MassCEC

Enabling Initiative #6 Embodied Carbon

Establish procurement requirements and design specifications for State-funded projects and support education, building reuse, R&D, and in-state manufacturing of alternative products to **lower the embodied carbon of products and materials** used in the buildings sector and to create broad carbon literacy regarding the impact of materials, while increasing attention to carbon-sequestering products (e.g., cross-laminated timber, hempcrete).

COST/FUNDING CONSIDERATION	IMPLEMENTATION EASE
\$	Easy via diversified approach
ACTION TYPE	CASE STUDY EXAMPLES
Education Financing Regulatory	Port Authority NY/NJ calls for EPDs in some specifications; NYSERDA takes embodied carbon into account in awarding support for building construction projects; EC3 is a viable, free tool gaining traction

Enabling Initiative #6 Embodied Carbon

Components required for delivery:

Drive embodied carbon reductions through **procurement in State-funded projects.**

- State-funded projects to follow **lower-carbon specifications** for the most carbon intense building materials and products.
- Set a target embodied carbon **reduction levels** for projects.

Support **R&D, demonstration projects, and technology transfer/commercialization** for enhanced low embodied carbon construction, including preference for re-use of existing buildings.

Provide assistance to **expand in-state manufacturing** for products that are lower in embodied carbon or made of carbon sequestering materials also known as biogenic or agriculture-based materials.

Identify and pursue **financial incentives, changes to building codes**, and other strategies to encourage building reuse.

Cross-Cutting Panel Recommendations

PANEL RECOMMENDATIONS

Advocate for **Federal resources** and policy support in the scoping plan.

Continue PSC attention to rate design and retail **rates for electricity and gas**.

Resilience is of critical importance. Amend **State codes** to enhance building-level resilience and grid reliability/resilience.

Support recommendations of the **Adaptation and Resilience group**.

Broad adoption of **insulation/weatherization and energy efficiency in homes**; increased **funding for weatherization and energy efficiency** in LMI homes; **energy disclosures** can inform future policy.

Additional Panel Perspectives Summary

SOME MEMBERS OF THE PANEL RECOMMEND FOR FURTHER CONSIDERATION...

Specific **Federal Advocacy** items.

An **economy-wide carbon fee**.

Additional mechanisms for **financing and financial incentives**.

Specific modifications to **electric and gas rate design**.

A more **accelerated schedule for an all-electric State Code**.

In the Integration Analysis process, attention to:

- Viable **solutions for hard-to-electrify buildings**, incl some use of low-carbon fuels
- Additional policy options that could **accelerate emissions reductions** by 2030.

Climate Action Council – Timeline and Next Steps

- All Advisory Panels presented recommendations to Climate Action Council (CAC) in April and May 2021
- CAC, supported by NYSERDA, is underway on an integration analysis to identify economy-wide scenarios for achieving 40x30 and 85x50 GHG reduction mandates to inform Draft Scoping Plan
- Draft Scoping Plan released for public comment in 2022

Thank you!

Residential Federal Energy Policy Updates

Residential Federal Energy Policy

NYSERDA Residential Market Advisory Group

June 23, 2021

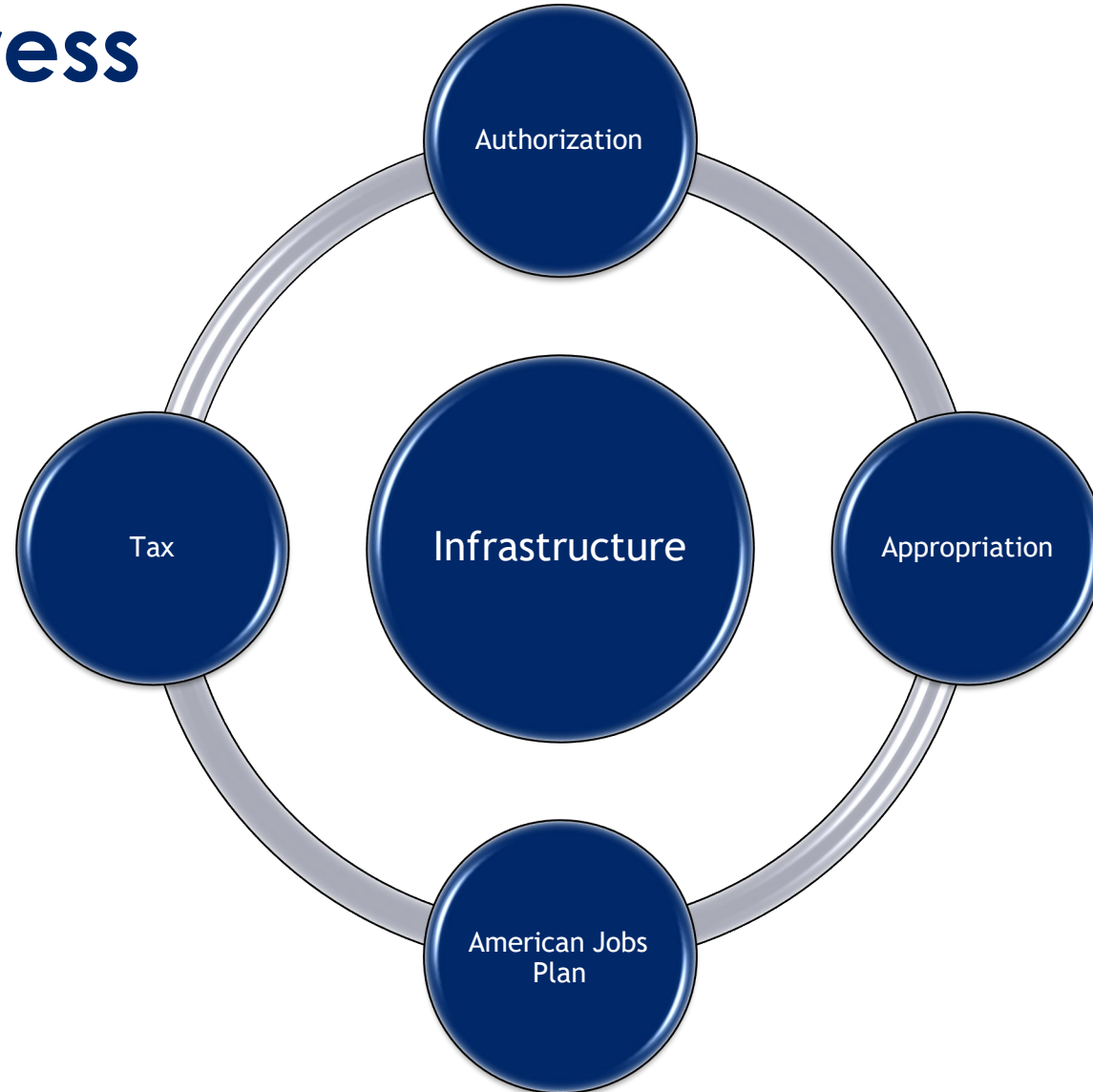
Kara Saul Rinaldi, President & CEO, AnnDyl Policy Group

Agenda

- ▶ Election Results
- ▶ 117th Congress
- ▶ Policy/Legislative Deep Dive
- ▶ Outlook

117th Congress

House
Senate
White House



HOPE for HOMES Act - H.R. 3456/S.1762

- ▶ Bipartisan and bicameral
- ▶ Passed the House in the 116th Congress in *H.R.2 INVEST in American Act* and *H.R. 4447 the House Energy package* and is currently included in both the House LIFT Act and Clean Futures Act in this 117th Congress.
- ▶ Included in President Biden's Budget Request.

- ▶ **Home Online Performance-Based Energy-Efficiency (HOPE) Training - \$500 Million**
 - Immediate support for small businesses; equitable access to training
 - Grants for provider organizations to develop online training curriculums
 - Provide up to \$10,000 to contracting companies to cover training costs for rehired/retained employees
 - \$1,000 stipend for contractors who complete HOPE Training

HOPE for HOMES Cont.

- ▶ **HOMES Rebate Program - \$8.4 Billion (over 6 years)**
- ▶ Rebates to homeowners and owners of multifamily properties who invest in energy efficiency upgrades
- ▶ Partial Performance, Federal Program
- ▶ State-Run Program
 - Modeled
 - ❖ 20% savings = \$2000, 35% savings = \$4000
 - Measured
 - ❖ Per KWH/equivalent based on state average home 20% savings = \$2000.
- ▶ Multi-Family Included
- ▶ Moderate Income Families
- ▶ Access to Utility Data Best Practices

Tax – Chairman Wyden’s The Clean Energy for America Act

Energy Efficient Home Improvement Credit

(sec. 302 of the bill 25C of the Code)

On May 26, 2021, the Senate Finance Committee held a markup and Committee vote, passing

- ▶ Total credit in a tax year is \$1,500 for all qualified property.
- ▶ For any qualified property, it is 30% or \$600, whichever is less.
- ▶ The \$1500 and \$600 will be adjusted for inflation in 2023.
- ▶ Air-source heat pump, the maximum is \$800, which is also adjusted for inflation.
- ▶ Ground source qualified geothermal heat pump property increased to \$10,000 (adjusted for inflation) and the \$1,500 does not apply
- ▶ **Applies to property placed in service after December 31, 2021**

Workforce Legislation

- ▶ Blue Collar to Green Collar Jobs Development Act of 2021 - H.R. 156
 - (Chairman Rush) – Would establish an Energy Workforce Grant Program to assist businesses seeking to educate and train new hires and existing employees in the energy efficiency and renewable energy industries.
- ▶ GREEN Neighborhoods Act of 2021 (pending introduction)
 - (Rep. Perlmutter) – would establish a grant program for registered apprenticeship programs in EE building, retrofit construction industry, EE assessment industry, ground source heat retrofits, and air source heat pump installation and maintenance industry, among others. Also calls for a GAO study on workforce issues facing the residential EE industry
- ▶ Senate Energy Bill
 - Skills Training Program – would establish a grant program to support classroom instruction and on-the-job training related to certifications to install energy efficient buildings technologies

SAVE Act

- ▶ To be included in Rep. Perlmutter's GREEN Neighborhoods Act and pending standalone introduction in the Senate by Sen. Bennet. Also being considered for inclusion in infrastructure.
- ▶ Would establish a voluntary program under HUD to account for a home's energy features (including energy efficiency and renewable energy) during the appraisal process.
- ▶ Would help place a value on energy efficiency and energy generation features in the residential marketplace, accelerating the supply of and demand for energy-efficient new homes and renovations of existing homes.

Appropriations

Activity	FY2021 Enacted	FY2022 Request	Percent Increase
Building Technologies Office	\$290M	\$382M	31.7%
Residential Building Integration	\$40M	\$72M	80%
Systems Integration R&D (within RBI)	\$26.696M	\$32M	19.86%
Technical Assistance (within RBI)	\$7.922M	\$30M	278.69%
Modeling and Analysis (within RBI)	\$5.382M	\$10M	85.8%

NOTE: HOPE for HOMES Act was included in two of President Biden's top level budget documents.

Activity	FY2021 Enacted	FY2022 Request	Percent Increase
Weatherization and Intergovernmental Programs	\$377.5M	\$808.5M	114%
Weatherization Assistance Program (WAP)	\$310M	\$390M	25.8%
Training and Technical Assistance	\$5M	\$10M	100%
Weatherization Readiness Fund		0 \$21M	N/A
State Energy Program (SEP)	\$62.5M	\$362.5M	480%
Build Back Better Challenge Grants (within SEP)		0 \$300M	N/A
Local Government Energy Program		0 \$25M	N/A

Outlook

- ▶ Timeframe for Infrastructure
- ▶ Timeframe for Appropriations
- ▶ Timeframe for Tax Policy
- ▶ Bi-partisan Compromises
- ▶ Election Year/ Mid-term

Questions / Comments?

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RMAG Work Status Updates

RMAG Priorities in Progress



Normalizing Heat Pumps

- Ally Network
- Experiential Demonstrations
- Testimonials from Customers
- Community meetings
- Talk to Heat Smart campaigns



Ramping Up to Meet Our Goals

- Non-Traditional Partners
- Partner with Intermediate Customers
- Large Scale Pilot
- Workforce development forum



The New Normal

- Lower-Touch Engagement
- Common Language
- Research of Network-Building Successes
- Post Installation Data



2021 Active Groups

- Contractor Working Group
- Large Scale Pilot Working Group
- Quality Assurance Expert Panel (to be kicked off soon)
- EmPower+ Redesign Expert Panel (Completed)



NYSERDA

Other RMAG Priorities, not yet started

- > Buying Groups
- > Engagement Playbook
- > Heat Pump Boot Camp*
- > Peer to Peer Group*
- > Pools of Trained Contractors*
- > Standards of Interoperability
- > Supply Chain Resiliency
- > Training for Service Technicians*

*Low interest in participation

RMAG Priorities Exercise

This exercise has the following goals:

1. Establish new priorities based on current industry needs and future policy direction.
2. Reprioritize/eliminate priorities that are no longer as pertinent and/or have not had traction to target energy for new priorities.

Priorities Exercise Recap

Breakout Group 1

Breakout Group 2

Breakout Group 3

Closing Remarks

operate non profit quality
comfort consultant Together ideas
Homes research Development
Community Sustainability technical united
policy Resiliency implementation smart home scale
skilled Heat Pumps Carbon Neutral Insulation sharing
home outreach real estate Electrification credentials Business HVAC
trades lighting Contractors energy efficiency professional provider Jobs
utility financing distributors technical assistance achievement equality smart
Residents New York State business development public benefit ratings DFHW
future maintenance Residential Market Airsealing educate
Education working group mission service manufacturers standards CI
Houses listening communities Advisory Group Collaborate construct vision
goals maintain appliances next generation awareness targets
health automated consumer protection clean energy improve
clean Advisory cost savings decarbonization carbon free Workforce
Economy Residential electrification opportunity software
Energy government climate action diagnostic Climate
renovation market support benchmark safety
design diversity Weatherization feedback value
forum finances Environment upgrades
workshop geothermal Experts
audits Leadership
codes builders retail

Upcoming Engagement Opportunities

- > Webinar featuring presentations from RMAG members, August 19 at 1:00 p.m. Invitation to follow.
- > Next RMAG Meeting is planned for September 2021
- > Contractor Working Group, monthly
- > Large Scale Pilot working group

To participate, email resmarket@nyserda.ny.gov

Thank you!