

# Energy Efficiency and Housing Advisory Panel

**Recommendations to the NYS Climate Action  
Council for Consideration in the Scoping Plan**

May 3, 2021



**Climate Action  
Council**

# Key Terms as Used in the Recommendations

**All-electric building:** No combustion equipment is used as part of the building heating, cooling, hot water, cooking, and laundry.

**Building decarbonization:** The reduction of carbon emissions (aka GHG emissions), through the conversion of existing equipment and systems powered by combustion processes, to highly efficient equipment and systems powered by emissions-free sources.

**Building electrification:** The conversion of an existing building's heating, cooling, hot water, cooking, and laundry equipment and systems powered by combustion processes, to highly efficient equipment and systems powered by electricity.

**Commercial building:** All buildings or facilities that are not included in the definition for “Residential building”

**Disadvantaged communities (DACs) (interim definition):** Properties located in census block groups that are below the HUD 50% Area Median Income threshold and within DEC PEJAs (income + race/ethnicity) or NYS Opportunity Zones.

**Electric readiness:** The installation of electrical service and panel capacity, conduit, fixtures, and outlets for a future installation of electric equipment for space heating and cooling, hot-water, cooking, and laundry.

**Electric vehicle (EV) readiness:** The installation of electrical service and panel capacity, conduit, fixtures, and outlets for a future installation of EV chargers.

**Embodied carbon:** The sum of all GHG emissions resulting from the mining, harvesting, processing, manufacturing, transportation and installation of materials and buildings.

**Energy efficiency:** Minimized consumption of energy required to perform useful work.

**Energy storage readiness:** The installation of electrical service and panel capacity, conduit, fixtures, and outlets for a future installation of electric batteries.

**HFCs or hydrofluorocarbons:** greenhouse gases, manufactured for use in refrigeration, air conditioning, foam blowing, aerosols, fire protection and solvents.

**Low- to moderate-income (LMI):** LMI households have incomes at or below 80 percent of area median income.

**Multifamily building:** A residential building with five or more dwelling units.

**NYStretch Energy Code:** A model code for voluntary adoption by local jurisdictions in New York State, to be enforced as the local Energy Conservation Construction Code, which sets energy conservation standards more stringent than the NYS Energy Conservation Construction Code.

**Resilience:** The capacity to withstand and recover from events that incur stress and damage.

**Residential building:** A building where the main or dominant use is to provide complete independent facilities for living, sleeping, eating, cooking, and sanitation including single-family and multifamily but not to include transient uses classified as R-1 in the Building Code of NYS

**Single family building:** A residential building with one to four dwelling units.

**State Energy Code:** The NYS Energy Conservation Construction Code promulgated pursuant Article 11 of the Energy Law

# Acronyms

**CO2e:** Carbon Dioxide equivalent

**DAC(s):** Disadvantaged Communities

**EJ:** Environmental Justice

**EV:** Electric Vehicle

**GHG:** Greenhouse gas

**GWP:** Global Warming Potential

**HFCs:** Hydrofluorocarbons

**HVAC:** Heating, ventilation, and air conditioning

**LMI:** Low- to moderate-income

**MMt:** Million Metric Tons

**MWBE:** Minority/Women-Owned Business Enterprise

**PACE:** Property Assessed Clean Energy

**PV:** Photovoltaic

**R&D:** Research and Development

**SDVOB:** Service-Disabled Veteran Owned Business

**T&D:** Transmission and Distribution

**VRF:** Variable Refrigerant Flow

**WAP:** Weatherization Assistance Program

## **Government agencies and authorities:**

**DEC:** Department of Environmental Conservation

**DASNY:** Dormitory Authority of the State of New York

**DFS:** Department of Financial Services

**DOH:** Department of Health

**DOS:** Department of State

**DOT:** Department of Transportation

**DOTF:** Department of Taxation and Finance

**DPS:** Department of Public Service

**HCR:** New York State Homes and Community Renewal

**HPD:** NYC Dept. of Housing Preservation and Development

**HUD:** U.S. Department of Housing and Urban Development

**NYCHA:** NYC Housing Authority

**NYP&A:** New York Power Authority

**NYSERDA:** New York State Energy Research and Development Authority

**PHA:** Public Housing Authority

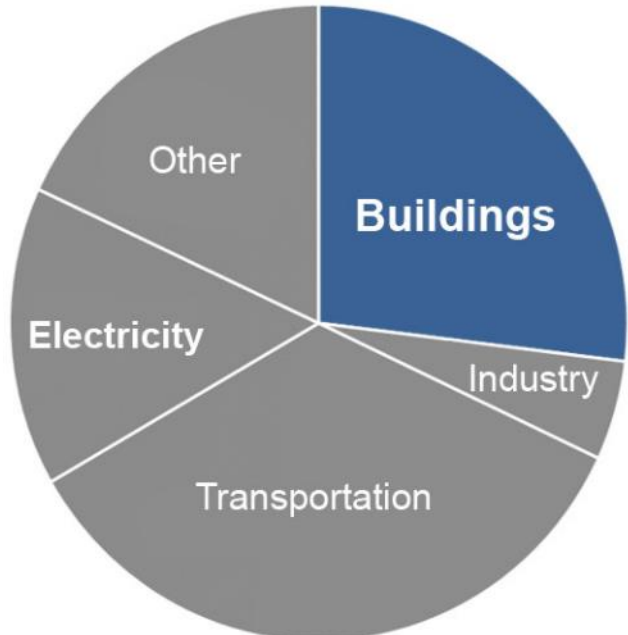
**PSC:** Public Service Commission

**SHPO:** State Historic Preservation Office

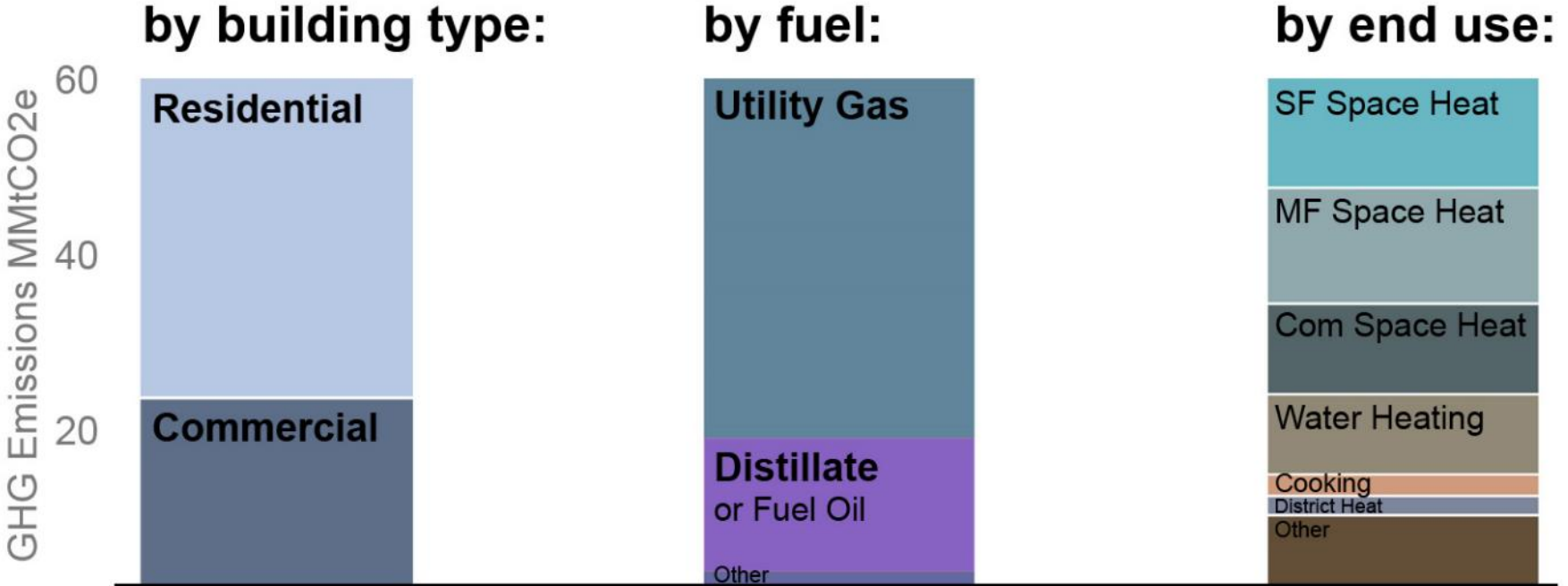
# Emissions from our Buildings Today

- **Onsite fossil fuel combustion is attributed as *direct emissions*** from the buildings sector. Electricity usage (indirect emissions) is accounted for in the electricity generation sector.

- Direct emissions in buildings are dominated by fossil-fuel combustion (mostly gas) for space heating and hot water – thus, **electrification is the largest driver of direct emissions reductions.**



## DIRECT EMISSIONS FROM BUILDINGS



# Beneficial Building Electrification & Energy Efficiency

**Electrification** of heating and hot water systems in nearly all buildings is a key strategy for building decarbonization and depends upon **energy efficiency improvements** in all buildings and **100% zero-emissions electricity** by 2040 under the Climate Act.

## Scope of Panel

- **On-site GHG emissions from combustion** of fossil fuels for heating and hot water in typical building types:

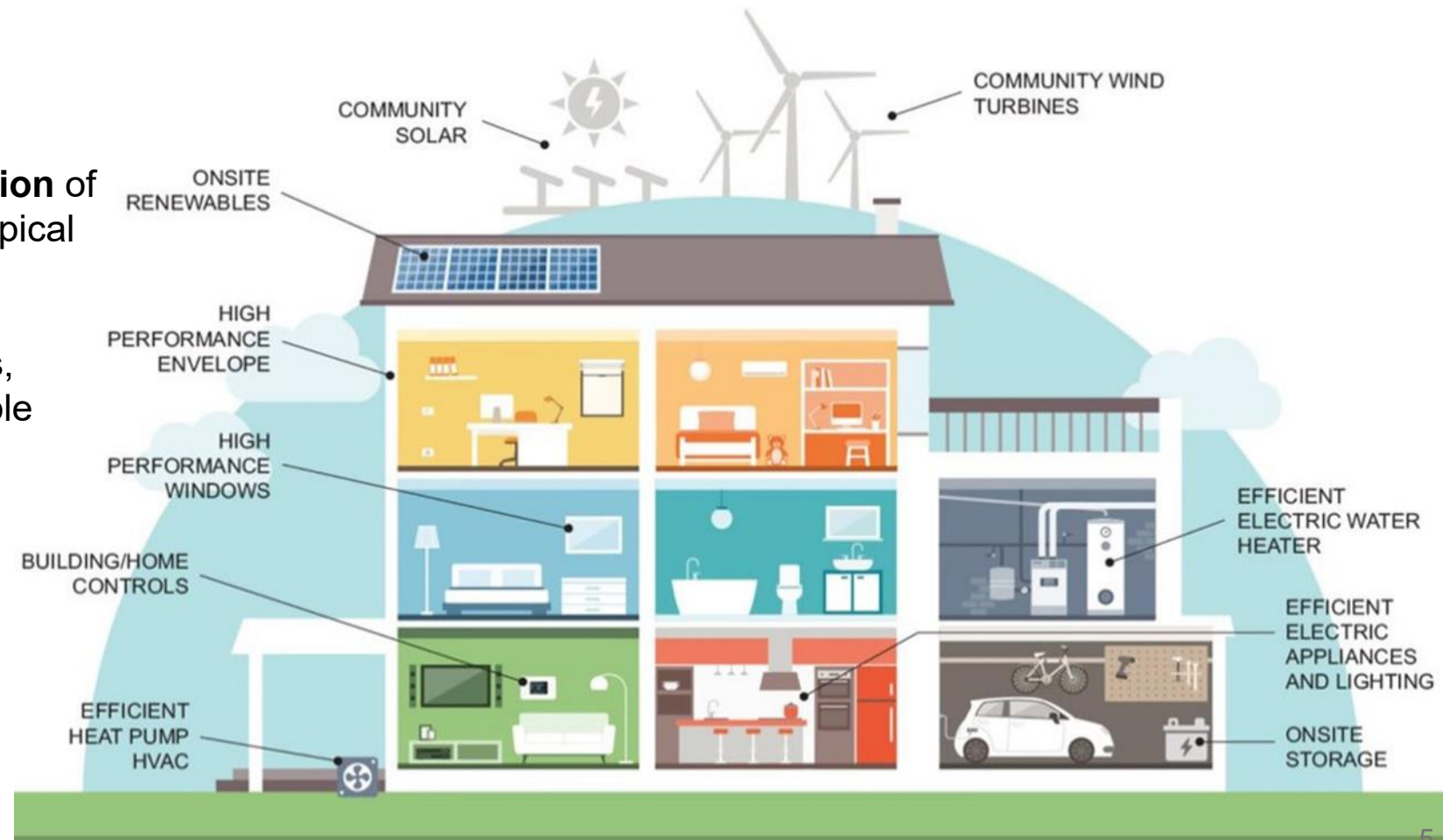
### Residential

(single family; multifamily including coops, condos and rentals; market rate; affordable including regulated and unregulated)

### Commercial and Institutional

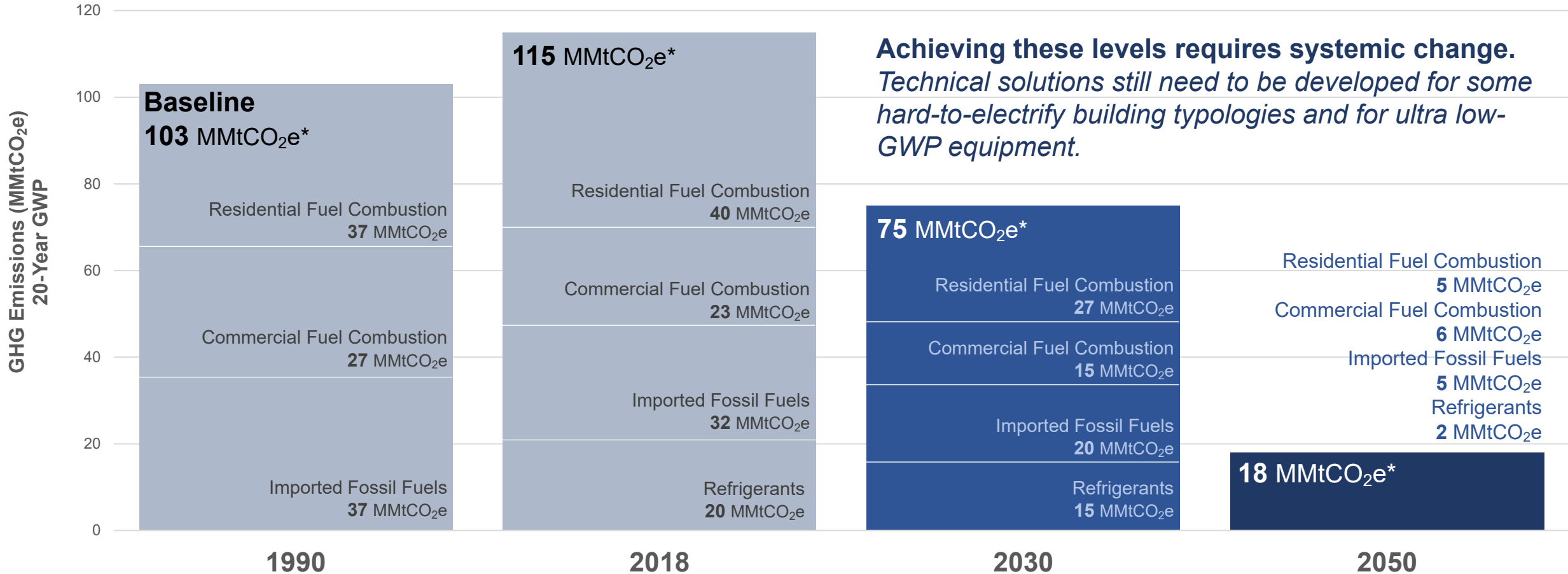
(office, retail, education, etc.)

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



# Aggregate GHG Emissions Impact of Recommendations

## Energy Efficiency & Housing Advisory Panel



\* million metric tons carbon dioxide equivalent

*Draft values subject to public review process for annual emissions accounting*



# Scale of the Solution Demands New Resources

## **6.2 million buildings in New York State**

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

## **Eliminating GHG emissions from New York's building stock by 2050 will require broad, systemic changes.**

- By 2030, more than 200,000 homes *every year* will need to upgrade to all-electric and energy efficient systems
- The 370,000 office, retail, restaurant, school, and other commercial and institutional buildings in New York State will need to cut energy use in half and stop using fossil fuels for heating and hot water
- Widespread awareness in a well-informed public, with clear market signals, can change behaviors and practices, accelerate decarbonization, and lower the costs

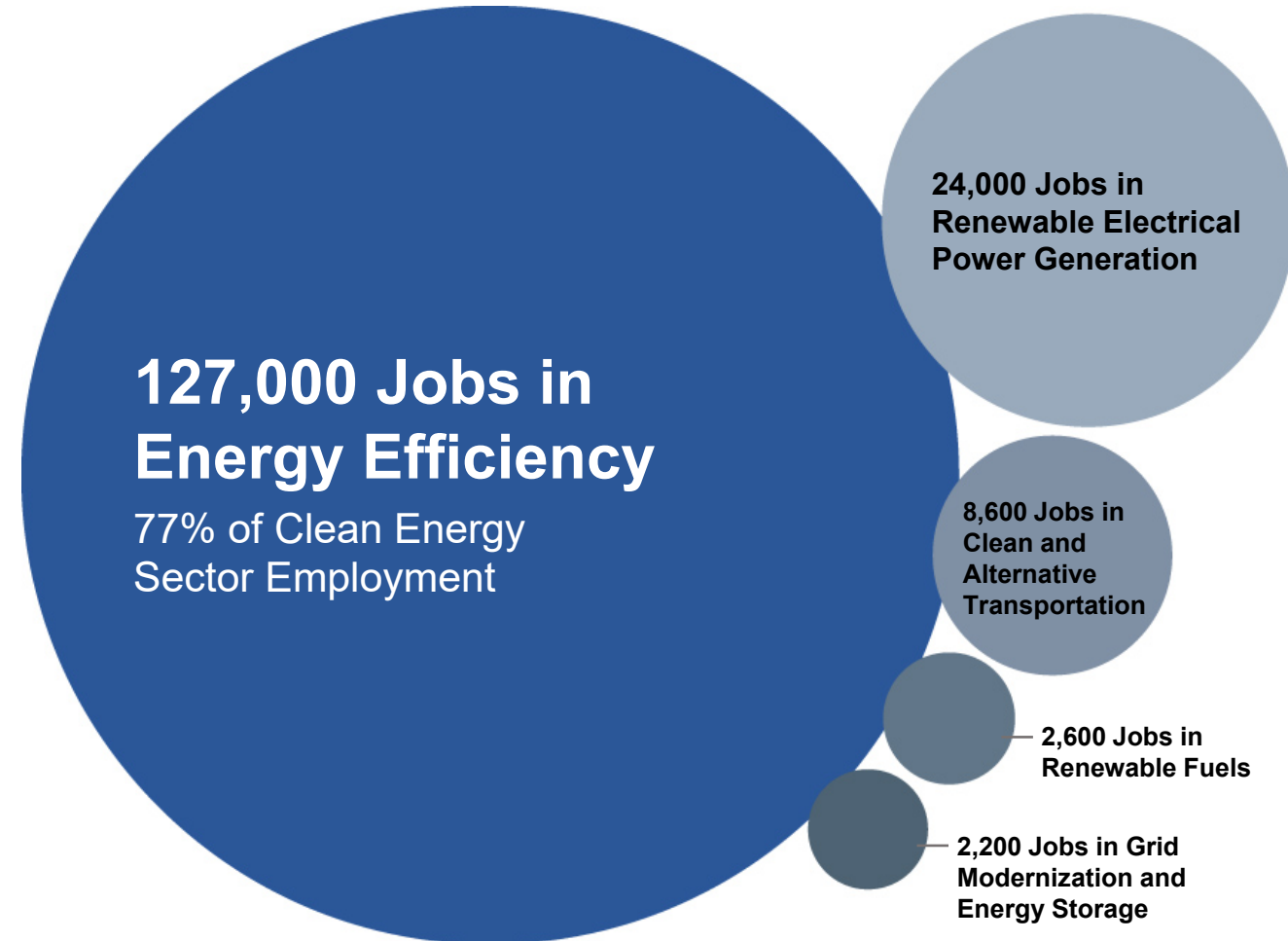
## **An equitable transformation at this scale requires new resources.**

- Focusing the investment of private capital needed to construct, upgrade, and operate highly efficient buildings powered by zero-emissions electricity
- Investing public resources to support market-enabling initiatives and incentives for early adoption of technologies
- Investing public resources to fund building efficiency and electrification in LMI homes, affordable and public housing, and disadvantaged communities – while supporting energy affordability, safe and healthy housing, economic opportunities, and the repair of structural inequalities

# Building Decarbonization and Economic Development

Decarbonizing New York's building stock will deliver **significant job growth and economic opportunity**, in every region of the state.

- New York's **energy efficiency industry employs the largest share** of clean energy workers, accounting for **77% of clean energy sector employment** and **88% of industry establishments**.
- 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**.





# Approach to Recommendations

## Equitably advance building electrification and energy efficiency at scale

- **Address new construction and retrofits for single family housing, multifamily housing, and commercial and institutional buildings**, with attention to:
  - **Equity and affordability:** Identify and mitigate any potential negative impacts on low- to moderate-income (LMI) households and disadvantaged communities (DACs), with special attention to affordability; preventing tenant displacement; repair of structural inequalities; and supporting compact, vibrant, and healthy communities
  - **Practicality:** Identify and mitigate implementation challenges for owners and building operators, including cost/benefits
  - **Minimizing costs:** Identify ways to make building decarbonization upgrades cheaper and cost competitive
  - **Expanding solutions:** Identify ways to bring better technologies and solutions to NYS
  - **Benefits:** Identify both energy and non-energy benefits including health, comfort, and productivity
  - **Sustainable and resilient outcomes:** Identify and avoid outcomes that lead to less sustainable development patterns and development in climate at-risk areas
- Address key enabling policies, including **access to financing and financial incentives, affordability, workforce development**, and broad **public awareness and engagement** that motivates behavioral change
- Consider implementation, with attention to equity, feasibility, commercial availability, and grid readiness
- **Lead by example** in the State's own facilities and construction activities, to reduce GHG emissions from State buildings and to accelerate market adoption of building decarbonization technologies, design approaches, and operational practices
- Recognize that this is a national and global problem. New York State is a leader but will need significant **help and partnership with the Federal government** to bring these recommendations to fruition at an economy-wide scale

# Outreach

- **Public Panel Meetings**
  - 8 public meetings, September 2020 – March 2021
- **Expert Round Tables**
  - 3 round tables in November 2020
  - Builders, installers, designers of single family/multifamily housing; landlords, owners, agents
- **Stakeholder Survey**
  - October – December 2020
  - ~65 responses
- **Carbon Neutral Buildings Roadmap outreach process**
  - 15 stakeholder engagement sessions; notes distributed to Panel members
  - >950 stakeholder participants across sessions
- **Public Engagement Session, February 4, 2021**
  - 270 attended, ~330 including NYS agency staff
  - Written comments received through 2/18/21
  - 110 unique comments (session and email)
  - ~320 comments via two coordinated emails
- **Meetings with REBNY condo/coop managers**
  - February 2020 (x2)
- **Meeting with residential property owner associations**
  - Rent Stabilization Association (RSA), Community Housing Improvement Program (CHIP), New York State Association for Affordable Housing (NYSFAAH) in March 2021

# Consultation with other Panels

## Panel-level Coordination

- Oct. 2020 – CJWG presented at EEH Panel about DACs
- Dec. 2020
  - EEH Panel delegates attended CJWG
  - DEC/DOS/NYSERDA presentation on Resilience and Climate Adaption, with LULG reps
- Jan. 2021
  - Local Building Decarbonization Laws and Services learning session, with LULG
  - EEH Panel reps attended bioeconomy subgroup of Agriculture and Forestry
- Feb. 2021
  - 2/5 subgroup meeting with Power Gen & utilities on gas transition, rates, grid impacts of electrification
  - HFCs learning session, with Waste Panel
- March 2021
  - Engagement session with residential property owner associations, with Power Gen

## Staff-level Coordination

- Land Use and Local Government (LULG)
  - Adaptation and Resilience
  - Clean energy recommendations
- Power Generation Panel
  - LMI/DAC
  - Equitable access to solar
  - Electrification and gas system transition
- Agriculture and Forestry; Energy-Intensive and Trade-Exposed Industries
  - Embodied carbon and mass timber
- Waste
  - HFCs and embodied carbon
- Just Transition Working Group
  - Workforce development

# Mitigation Strategy Summary

	Description	Action type	Emissions impact by 2050	Ease of implementation	Cost*
1	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.	Legislative, regulatory, programmatic	High	Medium/Hard	\$\$\$
2	Require measuring building energy usage, benchmarking energy performance, and making that information accessible via disclosure or labeling.	Legislative, regulatory, programmatic	Low (but enables other mitigation)	Easy	\$
3	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.	Legislative, regulatory	High (overlap with #1)	Hard	\$\$\$
4	Advance a managed and just transition from reliance on HFC use as refrigerants and in all products used in building 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

## Overview

<b>Description:</b>	<b>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.</b>		
<b>Action type:</b>	Legislative, regulatory, programmatic		
<b>GHG reduction by 2030:</b>	Medium	<b>GHG reduction by 2050:</b>	High
<b>Cost and funding considerations:</b>	\$\$\$		
<b>Ease of implementation:</b>	Medium/Hard		
<b>Example case studies:</b>	California, Massachusetts, Norway		

# Mitigation Strategy – Initiative #1 Codes and Standards

Risks / Barriers to success	Possible mitigants
<ol style="list-style-type: none"> <li>1. Legal challenge (e.g., federal preemption)</li> <li>2. Lack of awareness/confidence in market</li> <li>3. Limited workforce/supply chain readiness to design and install efficient, non-fossil solutions</li> <li>4. Cost premium to owners and renters</li> <li>5. Potential negative impacts on LMI households, tenants, DACs and public housing, incl. disproportionate burden of cost premiums and on housing affordability. Specific challenges for LMI rental housing incl. the property owner’s ability to finance and recoup capital costs; equitable distribution of energy costs for heating and cooling with electrification; and risk of triggering rent increases, de-regulation of housing units, gentrification</li> <li>6. Resource constraints prevent local governments from adequate code enforcement</li> <li>7. Opposition from builders, current suppliers of fossil fuels</li> <li>8. Grid reliability and need for substantive upgrades to electric system to meet increase in demand as buildings electrify (T&amp;D, system lines, and customer panel upgrades)</li> </ol>	<ol style="list-style-type: none"> <li>1. Legislation to enable emissions-based codes and standards that are not subject to federal preemption</li> <li>2&amp;3. Clear market signal with phased-in dates for implementation to allow market to adapt, invest and build capacity</li> <li>2. Education for consumers and market participants broadly</li> <li>3. Workforce and supply chain development across builders, trades, professions, contractors, suppliers, retailers</li> <li>4. Control costs by targeting natural investment points in life cycle of a building (e.g., construction, equipment replacement, sales/leasing). Upgrade equipment at its end of life, adopt capital planning for large buildings. Strategic market incentives and subsidies for LMI/DACs. Reduction in capital cost of efficient and electric building equipment/systems (via enabling investments, market scale); change in relative energy costs over time (via rate design, depreciation policies for utility assets, possible economy-wide carbon fee)</li> <li>5. Provide adequate financial and technical assistance for LMI homeowners and building owners within DACs and public housing; provide for alternative compliance pathways and exemptions where there are extenuating circumstances, such as related to housing affordability; collaborate with housing advocates to identify and streamline solutions to allocate heating and cooling costs equitably across building owners and income-eligible residents; monitor for and use policy to mitigate potential risks re: affordable housing, disinvestment in low-income properties, gentrification</li> <li>6. Provide State funding and resources for local code enforcement (staff, training, materials), especially focused on supporting low-income New Yorkers</li> <li>7. Industry education and engagement; transition opportunities for current suppliers of fossil fuels</li> <li>8. Energy efficiency and capital improvements for building resilience to grid failure (high-performance walls/roofs/windows, batteries, PV); incentive structures that encourage ground source heat pumps, which mitigate peak electric demand as buildings electrify; required grid-interactive controls on major electric equipment; investments in the electric grid to ensure reliability and resilience; also see cross cutting recommendation on resilience</li> </ol>

# Mitigation Strategy – Initiative #1 Codes and Standards

The following components would require that new construction (and additions and alterations as applicable) of residential and commercial buildings are built to a highly efficient, zero emission standard and incorporate requirements for building resilience, where feasible.

Components required for delivery	Implementation lead	Time to adopt regulation/action	Other key stakeholders
<b>As soon as possible:</b> Adopt <b>highly efficient State Energy Code for new construction</b> (and additions and alterations as applicable) of residential and commercial buildings.	NYSERDA, DOS	2-4 years	DASNY, local gov'ts, builders, manufacturers, consumers
<b>Starting in 2023:</b> Amend the <b>relevant State codes for new construction</b> (and additions and alterations as applicable) of residential and commercial buildings to require: <ul style="list-style-type: none"> <li>• solar PV on feasible areas;</li> <li>• grid-interactive electrical appliances as feasible (e.g., batteries, hot water heaters);</li> <li>• energy storage readiness;</li> <li>• electric readiness for space conditioning, hot water, cooking, and dryers; and</li> <li>• EV readiness where parking is already provided.</li> </ul>	NYSERDA, DOS	2 years	DASNY, local governments, builders, manufacturers, consumers
Adopt <b>all-electric State codes</b> (prohibit gas/oil equipment for space conditioning, hot water, cooking, and appliances) for <b>new construction</b> (and additions and alterations as applicable), <ul style="list-style-type: none"> <li>• <b>2025</b> - single family</li> <li>• <b>2030</b> - multifamily and commercial buildings.</li> </ul>	NYSERDA, DOS	2-4 years	DASNY, local governments, builders, manufacturers, consumers
Enabling action: Encourage local governments to adopt NYStretch Energy Code, until highly efficient, all-electric codes are adopted statewide.	NYSERDA	ongoing	DOS, DASNY, local governments
Enabling action: Provide State funding for local code enforcement (staff, training, materials) and State credentialing of third-party Energy Code inspectors.	DOS, NYSERDA	6 months	Local governments

*Note: Timeframes associated with recommended regulations will depend on the type of regulation and its governing body and legislation, State Administrative Procedure Act rulemaking requirements and timelines, and ongoing assessment of feasibility, impacts and analysis of what timeframes are needed to meet New York State's climate goals.* 15



# Mitigation Strategy – Initiative #1 Codes and Standards

The following components would 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 certain large buildings.

Components required for delivery	Implementation lead	Time to adopt regulation/action	Other key stakeholders
<b>As soon as possible:</b> Adopt <b>energy efficiency standards for appliances</b> that are exempt from federal preemption (e.g. computers, monitors, fluorescent and LED light bulbs, air purifiers).	NYSERDA, DOS	12-18 months	Builders, manufacturers, retailers, consumers
<b>2030:</b> Require <b>lighting upgrades</b> to current Energy Code standards for existing commercial properties larger than 25,000 sq. ft.	NYSERDA, DOS	4 years	Local governments
<b>2030:</b> Adopt an <b>energy efficiency performance standard</b> for existing commercial properties larger than 25,000 sq. ft. (with credit for building electrification). 2030 will begin compliance periods. Compliance standards will be informed by statewide benchmarking data.	NYSERDA, DOS	6-7 years; after ~3 yrs. of benchmarking data is available	NYPA, DASNY, DOTF, PSC/DPS, local governments, utilities
Adopt <b>zero emission standards</b> that prohibit gas/oil replacements (at end of useful life) of heating and cooling and hot water equipment, <ul style="list-style-type: none"> <li>• <b>2030:</b> single-family</li> <li>• <b>2035:</b> multifamily and commercial buildings.</li> </ul>	NYSERDA, DOS, DEC	2-4 years; promulgate standards at least 5 yrs. before they take effect	Builders, manufacturers, retailers, consumers
Adopt <b>zero emission standards</b> that prohibit gas appliance replacements (at end of useful life) for cooking and dryers, <ul style="list-style-type: none"> <li>• <b>2035:</b> single family and multifamily buildings.</li> </ul>	NYSERDA, DOS, DEC, DOH (lead/support TBD)		Manufacturers, retailers, consumers
Provide for thoughtful development of alternative compliance pathways from recommended codes and standards for extenuating circumstances (including but not limited to housing affordability-related matters, health and safety/emergency needs). This would apply to pre-existing building stock recommendations.	NYSERDA, DOS, DEC, SHPO	Concurrently with regulatory action	Builders, manufacturers, retailers, consumers

*Note: Timeframes associated with recommended regulations will depend on the type of regulation and its governing body and legislation, State Administrative Procedure Act rulemaking requirements and timelines, and ongoing assessment of feasibility, impacts and analysis of what timeframes are needed to meet New York State's climate goals. 16*

# Mitigation Strategy – Initiative #2 Benchmarking & Disclosure

## Overview

<b>Description:</b>	<b>Require measuring building energy usage, benchmarking energy performance, and making that information accessible via disclosure or labeling.</b>		
<b>Action type:</b>	Legislative, regulatory, programmatic		
<b>GHG reduction by 2030:</b>	Low	<b>GHG reduction by 2050:</b>	Low
<b>Cost and funding considerations:</b>	\$		
<b>Ease of implementation:</b>	Easy/Medium		
<b>Example case studies:</b>	New York City, Washington DC, Seattle, Boulder, London		

<b>Risks / Barriers to success</b>	<b>Possible mitigants</b>
<ol style="list-style-type: none"> <li>1. Building owners need access to consumption data statewide</li> <li>2. Lack of awareness in market may limit the effective use of data on energy usage and performance to inform decision making</li> <li>3. Risk of disinvestment in disadvantaged communities if disclosure/labeling makes properties less attractive to potential renters and buyers</li> </ol>	<ol style="list-style-type: none"> <li>1. Ongoing coordination among NYS agencies and utilities to set statewide standards for the provision of energy usage data and to expand provisions in place in NYC (including automatic upload of data for benchmarking) to utilities statewide</li> <li>2. Education for consumers, brokers and building owners on how to use the energy usage and benchmarking information</li> <li>3. Adequate technical and financial assistance for LMI homeowners and building owners in disadvantaged communities to scope and finance energy upgrades</li> </ol>

# Mitigation Strategy – Initiative #2 Benchmarking & Disclosure

Components required for delivery	Implementation lead	Time to adopt regulation/action	Other key stakeholders
<p>Starting in <b>2023</b> - Statewide energy <b>benchmarking and disclosure</b> program - Require owners of multifamily and commercial properties larger than 10,000 sq. ft. to annually report whole building energy and water consumption data to NYSERDA.</p>	NYSERDA	1-2 years	DOS, NYPA, DASNY, HCR, DOTF, PSC/DPS, utilities, local governments
<p>Starting in <b>2025</b> - Require owners of all residential and commercial buildings to obtain and publicly disclose, as part of <b>sale or lease</b> listing of a building, housing unit, or commercial space, the prior-year energy consumption of the building, unit, or space (e.g., at least 12 consecutive months of energy bill data).</p> <p>Starting in <b>2027</b> – 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 <b>sale listing</b>.</p>	DOS, NYSERDA	2 years	PSC/DPS, utilities, local governments
<p>Starting in <b>2025</b> - Require multifamily and commercial properties larger than 25,000 sq. ft. to undertake at least once every ten years a <b>comprehensive building energy assessment</b> (audit) that:</p> <ul style="list-style-type: none"> <li>• evaluates the building’s systems;</li> <li>• identifies opportunities to invest in energy efficiency upgrades; electrification or electrification-readiness for building systems; and</li> <li>• resilience measures.</li> </ul> <p>Filing an assessment report with NYS would be required on a cycle established by NYS or at the time that a building permit is needed for specified work that must conform to Code, whichever comes first.</p>	DOS, NYSERDA	2 years	DOS, NYPA, DASNY, HCR, DOTF, local governments
<p>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.</p>	NYSERDA		DOS, local governments, housing agencies

# Mitigation Strategy – Initiative #3 Gas System Transition

## Overview

<b>Description:</b>	<b>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.</b>		
<b>Action type:</b>	Legislative, regulatory		
<b>GHG reduction by 2030:</b>	Medium (overlap with #1)	<b>GHG reduction by 2050:</b>	High (overlap with #1)
<b>Cost and funding considerations:</b>	\$\$\$; long-term planning expected to mitigate the risk of stranded assets		
<b>Ease of implementation:</b>	Hard		
<b>Example case studies:</b>	Netherlands (revocation of obligation to serve, subsidized gas phase out). To date, no U.S. states have created formal transition plans or limited expansion of gas distribution infrastructure altogether; California, Massachusetts, and NYS (Case 20-00652) have opened PSC proceedings to investigate the role of gas distribution companies in a future clean energy system and long-term gas planning procedures.		

# Mitigation Strategy – Initiative #3 Gas System Transition

Risks / Barriers to success	Possible mitigants
<ol style="list-style-type: none"> <li>1. The utility has an obligation to provide gas service to buildings located within an established distance from the utility’s existing facilities and as governed by NYS statute</li> <li>2. Industry and consumer opposition (e.g., gas industry, developers/construction, manufacturers, large end-users)</li> <li>3. If not coordinated with broader codes and standards, could drive customers to other fossil fuels</li> <li>4. End uses with high dependence on gas (hard-to-electrify)</li> <li>5. Costs burdens placed upon remaining gas customers, with disproportionate burden on LMI households and DACs</li> <li>6. Maintaining reliability and safety of gas system throughout transition</li> <li>7. Grid reliability and need for substantive upgrades to electric system to meet increase in demand as buildings electrify (T&amp;D, system lines, and customer panel upgrades)</li> </ol>	<ol style="list-style-type: none"> <li>1. Legislative change</li> <li>2. Phased planning process that is inclusive of stakeholders including industry, consumer, and LMI/DAC representatives; gas workforce protections and transition plan; consumer education on benefits of the transition</li> <li>3. Broader codes and standards, consumer education</li> <li>4. Gas infrastructure planning effort and strategic investments in innovation can work with these sectors to develop feasible and economic decarbonization options</li> <li>5. Comprehensive equity strategy and resources to enable LMI/DAC households to make energy efficiency upgrades and electrify affordably and expeditiously; planning and regulatory analysis of accelerated depreciation approaches</li> <li>6. Utility planning and operational practices to meet current customer needs and maintain safe and reliable service while minimizing infrastructure investments</li> <li>7. Phased approach to consider and mitigate/manage impacts on the electric grid. Regulators work with utilities on their long-term capital planning to help mitigate costs (e.g., utilities to account for code changes in their infrastructure planning)</li> </ol>

# Mitigation Strategy – Initiative #3 Gas System Transition

Components required for delivery	Implementation lead	Time to adopt regulation/action	Other key stakeholders
<p><b>Undertake a planning study and process</b> to examine the regulatory, legislative, and other policy changes needed for a managed and just transition of the gas system and infrastructure. Planning and subsequent changes would proceed in a phased manner, with attention to:</p> <ul style="list-style-type: none"> <li>• safety, equity, and reliability and affordability of service;</li> <li>• assessment of existing gas infrastructure and options for contraction;</li> <li>• identification of end-users highly reliant on gas, technically feasible alternatives, and economic impacts;</li> <li>• a new requirement that each utility regularly file a proposal for how it would meet the State’s 2030 and 2050 GHG emissions reduction goals within its customer base, incl. annual utility projections for key metrics (e.g., emissions, fossil gas sales and number of customers by customer class);</li> <li>• alternative models for the gas utility’s long-term role, business model, ownership structure, and regulatory compact, as part of a managed transition.</li> </ul>	PSC and DPS, in collaboration with utilities, NYSERDA	Phased (build on PSC Case 20-00652); steps in 2 years to 10+ years	<p>Consumers, builders, local governments</p> <p>LMI/DAC households, public housing authorities, EJ and affordable housing groups</p> <p>Utility workers, unions, local governments</p>
<p>Develop a <b>comprehensive equity strategy</b> to incorporate the needs of LMI households and DACs in the transition, ensuring they are not left behind. This requires meaningful LMI/DAC engagement in the transition process and prioritizing technical and financial assistance to enable LMI/DAC households to make energy efficiency upgrades and electrify affordably.</p> <p>Create an <b>equitable transition plan for the gas industry workforce</b>, including protections, retraining and training that leverages transferrable skills, and job transition opportunities with attention to opportunities at dual-commodity utilities. This requires both a comprehensive system-wide equity strategy and utility-level equity strategies that include adequate accountability and oversight.</p>	PSC and DPS, in collab. with utilities, NYSERDA, DOL	Concurrent with planning process	
<p><b>Minimize new investments in gas delivery infrastructure</b>, not otherwise needed for safety/reliability. Change utility incentives and planning to promote (non-pipes) alternatives to conventional gas infrastructure investment. Align long-term utility planning with the adoption cycle for updated building codes and standards.</p>	PSC and DPS, utilities	Concurrent with planning process	Consumers, builders, solution providers for non-pipes alternatives

# Mitigation Strategy – Initiative #3 Gas System Transition

Components required for delivery	Implementation lead	Time to adopt regulation/action	Other key stakeholders
<b>Stop utilities advertising fossil gas as “clean,” “natural,” “climate friendly,” or in similar terms.</b>	PSC and DPS	6 months	Utilities
<b>Phase-out incentives and rebates for fossil gas equipment</b> that are offered by utilities or NYSERDA.	PSC and DPS	1 year to adopt phased approach	Utilities, NYSERDA, consumers
<b>Undertake analysis and provide resources for building-readiness for electrification</b> (to address common building typologies today and over the next decade) and <b>undertake analysis, planning, and information sharing for electric grid-readiness for electrification</b> (to include sub-feeder level information for each electric distribution utility and to support planned, transparent upgrades to the grid so that building owners know when access to sufficient electrical service will be available to fully electrify their building).	PSC and DPS, NYSERDA, utilities	1-2 years	Local governments, builders, property managers, consumers
Undertake analysis and <b>planning for decarbonization of the ConEd district steam system.</b>	PSC and DPS, ConEd	2-3 years	Steam customers
Level the playing field for adoption of clean heating solutions by <b>eliminating the “100-foot rule”</b> which can bias customer decision-making around heating choices. (The 100-foot rule covers most or all of the cost of new gas connections for residential customers and significant costs for new non-residential firm gas customers).  <b>Clean heating choices should be considered policy in the public interest</b> to support healthy homes, with the provision of heating service to homes (rather than specifically gas or steam service) recognized in State Policy as necessary for the preservation of health and general welfare.	Legislative action, PSC and DPS	2-3 years	Utilities, builders, consumers, local governments
Develop <b>easement rules to allow access for thermal/ground source loops</b> to use utility and public (e.g., municipal) rights of way on reasonable terms.	NYSERDA	2-3 years	PSC and DPS, utilities, local governments



# Mitigation Strategy – Initiative #4 Transition from HFCs

## Overview

<b>Description:</b>	<b>Advance a managed and just transition from reliance on the use of hydrofluorocarbons (HFCs) as refrigerants and in all products used in building construction.</b>		
<b>Action type:</b>	Legislative, regulatory		
<b>GHG reduction by 2030:</b>	Medium	<b>GHG reduction by 2050:</b>	High
<b>Cost and funding considerations:</b>	\$\$		
<b>Ease of implementation:</b>	Hard		
<b>Example case studies:</b>	California Short-Lived Climate Pollutants Strategy; US Climate Alliance SLCP Roadmap; Washington and other state legislative actions to address building codes		

<b>Risks / Barriers to success</b>	<b>Possible mitigants</b>
<ol style="list-style-type: none"> <li>HFC use is currently widespread in products being recommended to electrify space conditioning and in foams that provide insulation for higher efficiency buildings</li> <li>Introduction of a replacement with other deleterious environmental and/or health effects</li> <li>Refrigerants are global commodities; a single state is unlikely to spur manufacturers to shift to low-GWP refrigerant technologies</li> </ol>	<ol style="list-style-type: none"> <li>Resource toolkits, programs and incentives that make low-global warming potential (low-GWP) refrigerant technologies and low-GWP alternatives in building/construction foams available and affordable to customers now; training installers and contractors on handling, equipment maintenance, and disposal; enforcement of HFC disposal</li> <li>Research into long term health effects of exposure to new chemicals in building materials</li> <li>Ongoing collaboration with US Climate Alliance ensures widespread alignment on policy and mitigates impacts to manufacturers and costs for consumers</li> </ol>

# Mitigation Strategy – Initiative #4 Transition from HFCs

Components required for delivery	Implementation lead	Time to adopt regulation/action	Other key stakeholders
Update the relevant <b>NYS codes</b> to allow low-GWP refrigerants.	DOS	3-5 years	Manufacturers and servicers
Require <b>reclamation or destruction</b> of refrigerants from appliances at end-of-life, with verification and reporting, and require leak detection for certain commercial refrigeration (align with Waste Panel recommendations). Provide education and training, technical assistance, and economic support (e.g., incentives to purchase leak detection and reclamation equipment, compensation for refrigerant reclamation) to aid local industry with this transition.	DEC, NYSERDA	1-5 years	Manufacturers, servicers, contractors, property managers
Support <b>workforce training</b> and education for low-GWP refrigerants and technologies and for low-GWP alternatives in building/construction spray foam.	DEC, NYSERDA, SUNY	1-3 years	Manufacturers, servicers, contractors
Expand the scope of the NYS <b>Significant New Alternatives Policy (SNAP) Rule</b> which prohibits certain HFCs in refrigerator/freezers, chillers, commercial refrigeration, and aerosols/foams/solvents; and lower the GWP threshold over time as low and ultra-low GWP options become available. Align NYS policy with anticipated federal (US EPA) policy measures to meet HFC reduction requirements as well as with other US Climate Alliance states, in order to send a strong market signal to manufacturers and industry while mitigating costs of the transition.	DEC	2 years	Manufacturers, servicers, contractors
Support <b>further research</b> into known data gaps, including analysis of typical leak rates and charge size for VRF systems and research into long term health effects of exposure to new chemicals in building materials.	NYSERDA	2 years	Manufacturers, designers, property owners
Continue to support <b>demonstration projects</b> for low-GWP refrigerants in HVAC and hot-water systems, and for refrigerant leakage detection and reduction strategies. Develop case studies in alternative refrigerants and refrigerant management, showing the safety, performance, and cost impacts.	NYSERDA	ongoing	Manufacturers, designers, and property managers

# Enabling Strategy Summary

	Description	Action type	Ease of implementation	Cost*
<b>Cross-cutting:</b> The scale of transformation will require mobilizing private capital and a significant increase in public resources. The CAC should conduct an economy-wide analysis to identify public and private resources and funding mechanisms.				
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 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).*

# Cross-Cutting Recommendation: Economy-wide Analysis to Identify Resources

## **Realizing transformation at this scale - and doing so in ways that advance equity - will require new resources:**

- Focusing the investment of private capital that will be needed to construct, upgrade, and operate highly efficient buildings powered by zero-emissions electricity
- Investing public resources to support market-enabling initiatives and incentives for early adoption of technologies
- Investing public resources to fund building efficiency and electrification in LMI homes, affordable and public housing, and disadvantaged communities – while supporting energy affordability, safe and healthy housing, economic opportunities, and the repair of structural inequalities

**Cross-cutting Recommendation:** Currently identified funding/financing mechanisms will not address the scale of transformation needed.

- The CAC should conduct an economy-wide analysis to identify public and private resources and funding mechanisms, including federal resources and mechanisms to mobilize private capital, at scale. These resources should holistically support the CAC's Scoping Plan including, but not limited to, all sectors, markets, and building types.
- The CAC also should form an advisory body comprised of members with relevant expertise to advance ways to engage private sector sources of capital and financial institutions (e.g., mortgage, municipal, and community development financial institutions), in support of the economy-wide analysis and on an ongoing basis.

# Enabling Initiative #1 Public Financial Incentives

## Overview

<b>Description:</b>	<b>Provide incentives for single family, multifamily, and commercial and institutional building owners that speed uptake and help to transform the market for building efficiency, electrification, and decarbonization, with a focus on enabling uptake that benefits LMI households, affordable housing and public housing, and DACs.</b>
<b>Action type:</b>	Financial, Programmatic, Regulatory
<b>Cost and funding considerations:</b>	<p>\$\$\$</p> <p>The Panel estimates:</p> <ul style="list-style-type: none"><li>• <b>A minimum <u>\$1B annually</u> in funding is needed specifically for programs that serve LMI households, affordable and public housing, and disadvantaged communities, on an ongoing basis.</b></li><li>• <b>Financial incentives to motivate early adoption in market-rate housing and commercial buildings also will be needed for at least the coming decade</b>, supported by public funding at levels comparable to or higher than current energy efficiency and building electrification programs.</li></ul> <p>NYS currently invests (through 2025, across programs administered by NY's Utilities, NYSERDA, HCR, and OTDA):</p> <ul style="list-style-type: none"><li>• ~ \$250M annually for energy efficiency programs that specifically serve LMI households and affordable housing, as part of &gt; \$1B annually to support energy efficiency and building electrification across residential, commercial, and institutional buildings statewide.</li></ul> <p>Also see prior slide on Economy-wide Analysis to identify new resources</p>
<b>Ease of implementation:</b>	Hard, given scale
<b>Example case studies:</b>	NY-Sun, Statewide LMI Portfolio of energy efficiency programs, NYS Clean Heat, Comfort Home Pilot

# Enabling Initiative #1 Public Financial Incentives

## Overview

Risks / Barriers to success	Possible mitigants
<ol style="list-style-type: none"><li>1. Ensuring sufficient funding levels and broader funding sources; specifically, there is a need to expand revenue sources beyond charges on electric and gas ratepayers</li><li>2. Incentive programs can be complicated for consumers to navigate</li><li>3. Incentive programs do not always provide equitable access or funding to those most in need, and the charges to raise the revenue for such programs can be regressive</li><li>4. Barriers to sharing data and administrative “silos” can prevent targeting services and benefits to those households and communities with the highest energy burdens</li></ol>	<ol style="list-style-type: none"><li>1. Potential for assistance from federal government, given interest in advancing the climate agenda and investing in infrastructure</li><li>2. In program design, emphasis on ease of access to available and relevant resources for consumers/installers, particularly for LMI households and buildings in DACs that can need resources from multiple programs</li><li>3. Maximize use and access to existing State programs and incentives to enhance the efficacy of energy efficiency and electrification work; align and streamline WAP, EmPower, and utility programs to optimize use of available resources; review HEAP formulas for the provision of funding for electrification and shell improvements. Create new incentive programs to support both energy and non-energy building improvements that are necessary for building decarbonization</li><li>4. Ongoing coordination among State agencies (NYSERDA, OTDA, NYSDOH, HCR, DPS) and the utilities, including through the State’s Low-Income Energy Task Force, to assess the feasibility of consolidating program applications for relevant energy, housing, and other assistance and for sharing data, with appropriate data-privacy practices</li></ol>

# Enabling Initiative #1 Public Financial Incentives

Components required for delivery	Implementation lead	Time to implement	Other key stakeholders
Identify and pursue modifications to <b>regulatory frameworks</b> for energy efficiency and building electrification programs to further align the programs with State objectives. This includes, but is not limited to, consideration for and implications of accounting for full (societal) costs and benefits of energy upgrades in buildings.	DPS, PSC	2 years	utilities, NYSERDA, DOS, clean energy industry
Create a program to <b>provide direct cash incentives for electrical service upgrades</b> and in-building wiring and equipment, to offset costs associated with preparing a building for electrification (similar to the EV Make-Ready Program).	DPS, PSC, utilities	2 years	Real estate industry, local governments
Expand/create <b>new direct cash incentives for energy efficiency and electrification</b> in residential and commercial buildings, with priority on LMI households, affordable housing, public housing, and DAC's. Incentives that help enable uptake and transform the market broadly will be needed for at least the coming decade, with ongoing resources thereafter for LMI/DACs.	State-level entity (TBD on design)	2 (scale up from ongoing)	NYSERDA, DPS, utilities, housing agencies/authorities, LMI/DAC households, EJ and affordable housing groups
Support and accelerate <b>efficiency, electrification, and resilience in public housing</b> , statewide (e.g., in NYCHA and other Public Housing Authority developments). Identify funding sources to support deeper retrofits and electrification. Support resiliency centers in public housing developments that provide safe temperatures, backup power (including solar-storage pilots), and community spaces to coordinate disaster relief.	PHAs, NYPA, NYSERDA	2 years	PHA residents, HCR, DPS, NYC agencies (DOB, MOS, HPD), utilities, EJ and affordable housing groups
Create a <b>"Retrofit and Electrification Readiness Fund" for LMI households, affordable housing, public housing, and residential buildings in DACs</b> to cover costs of non-energy building improvements that are necessary to install energy measures and broadband installation costs when funding energy projects.	NYSERDA, DPS and PSC, HCR	3-4 years	HPD, LMI/DAC households, EJ and affordable housing groups
<b>Leverage healthy homes services and funding</b> across housing, health, and energy improvements for low-income households to fund green and healthy housing retrofits, e.g.: <ul style="list-style-type: none"> <li>• Build on the NYS Healthy Homes VBP pilot and further leverage NY Medicaid's Value-Based Payment (VBP) program for Managed Care Organizations to contribute to healthy housing services and home energy efficiency improvements;</li> <li>• Expand use and leveraging of both state and federal funding (e.g., use of WAP funds for health and safety improvements, new HUD Older Adult Home Modification Program);</li> <li>• Engage with non-profit hospitals in community health needs assessments.</li> </ul>	NYSERDA, DOH	4 years (scale up from pilots)	OTDA, HCR, HPD, DPS, utilities, community-based organizations, nonprofit hospitals, healthcare professionals



# Enabling Initiative #2 Public and Private Low-cost Financing

## Overview

<b>Description:</b>	<b>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.</b>
<b>Action type:</b>	Financial
<b>Cost and funding considerations:</b>	\$\$\$ + unlock private capital
<b>Ease of implementation:</b>	Hard, given scale
<b>Example case studies:</b>	GJGNY; mobilize low-cost capital at a scale comparable to the NYS Environmental Facilities Corp (Clean Water State Revolving Fund)

<b>Risks / Barriers to success</b>	<b>Possible mitigants</b>
<ol style="list-style-type: none"> <li>1. Lack of awareness in market; predatory lending</li> <li>2. Lender interest</li> <li>3. Perceptions of risk in underwriting to energy performance</li> <li>4. Complexity of developing a large-scale, financing structure with the credit-worthiness elements that institutional investors will view as AAA</li> <li>5. Current economic conditions for building owners</li> </ol>	<ol style="list-style-type: none"> <li>1. Provide for consumer protections in financing products</li> <li>2. Lender education and outreach</li> <li>3. Sufficient resources and case studies available to lenders to provide adequate modeling for underwriters</li> <li>4. Models exist for bond-backed State/local revolving fund</li> <li>5. Scale of transformation will require both unlocking private capital and raising substantial public revenue</li> </ol>

# Enabling Initiative #2 Public and Private Low-cost Financing

Components required for delivery	Implementation lead	Time to implement	Other key stakeholders
Provide support for <b>lenders to underwrite to energy performance standards</b> and applicable regulatory requirements.	HCR, NYSERDA	Ongoing	DFS, private lenders
Continue to scale up <b>green requirements in affordable housing deals</b> while ensuring that sufficient resources are available to maintain, preserve and produce clean, safe and affordable housing. Streamline access to all incentives and resources for regulated affordable housing building decarbonization to go through housing agencies making projects affordable, to also make projects energy efficient, all-electric or electric-ready, and resilient.	HCR, HPD	Ongoing	NYSERDA, DPS, OTDA, NYCMOS
Provide <b>greater access to low-cost financing products</b> for upgrades, including for low-income homeowners and/or DACs (e.g., low-interest financing coupled with credit enhancement/insurance).	NY Green Bank/NYSERDA, HCR	2 years	DFS, Private banks licensed by DFS; CDFIs
Expand the <b>use of performance contracting</b> to achieve goals for State, municipal, and K-12 school building upgrades.	Legislative action	1-2 years	NYPA, NYSERDA, State agencies
Provide a <b>revolving loan fund for building decarbonization</b> : e.g., enable public mandates coupled with access to low-cost capital.	Bond-issuing government authority	4 years	DASNY, DOS, DEC (EFC), NYPA, local gov'ts

# Enabling Initiative #3 Workforce

## Overview

<b>Description:</b>	<b>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.</b>
<b>Action type:</b>	Financial, programmatic, regulatory
<b>Cost and funding considerations:</b>	\$\$; building upon NYSERDA's \$100M clean energy workforce training initiative
<b>Ease of implementation:</b>	Easy to develop programs and robust training infrastructure; medium-effort to coordinate/deliver training and placement services at scale, and operationalize support needed for DAC access
<b>Example case studies:</b>	NYSERDA's clean energy workforce programs

<b>Risks / Barriers to success</b>	<b>Possible mitigants</b>
<ol style="list-style-type: none"> <li>1. Insufficient skilled new entrants to meet labor demand; industry capacity limited by certain workforce gaps (e.g., drilling is a pinch point in geothermal industry capacity)</li> <li>2. Training does not lead to job placement</li> <li>3. DAC residents face additional barriers/challenges to securing or retaining jobs</li> <li>4. Job losses for fossil-fuel related industries</li> <li>5. Cost pressure of upgrades results in wage depression for certain segments (e.g., building service workers)</li> </ol>	<ol style="list-style-type: none"> <li>1&amp;2. Ensure training investments are driven by industry/employers' needs and demand for new workers. Offer curriculum/career guidance in K-12 and technical schools; develop/scale recruitment models. Provide training integrated with hiring support services. Incl. training/mentorship for current workers and leaders in HVAC and delivered fuel companies to transition to heat pumps.</li> <li>3. Prioritize investment in DAC outreach, career pathways and placement support. Invest in foundational skills and wrap-around support (e.g., childcare subsidy, free MetroCard). Require employers taking public subsidies conduct periodic racial bias training.</li> <li>4. Ensure a just transition; prioritize for retraining and job placement. Also see point 1 above.</li> <li>5. Support retention of workers and equitable access to high-quality, family-sustaining jobs (coordinate with Just Transition Working Group).</li> </ol>

# Enabling Initiative #3 Workforce

Components required for delivery	Implementation lead	Time to implement	Other key stakeholders
<p><b>Scale up training</b> for incumbent and new clean energy workers and adjacent industries, through investments in training infrastructure/delivery, career pathways, on-the-job-training, industry partnerships. Support expanded or new training for:</p> <ul style="list-style-type: none"> <li>• Local government workforce of code officials and building inspectors;</li> <li>• Building operations, maintenance, and service workers;</li> <li>• Healthy homes training, to equip energy auditors and health/social workers who make home visits to identify health and safety issues and contractors/installers to address these issues;</li> <li>• Training/industry partnership to increase the number of qualified geothermal drillers;</li> <li>• Training for workers in fossil fuel industries to transfer their skills to clean energy opportunities.</li> </ul>	NYSERDA	2020-2025	DOL, DOS, state agencies, unions, industry/trade orgs, training orgs, local gov'ts, manufacturers, distributors, impact investors/foundations
<p><b>Prioritize DACs/low-income residents</b> and other priority populations for training and job placement by creating community-to-employment pipelines and career pathways; analyze current on-the-job training investments for their effectiveness as an employment pathway and refine as appropriate. Promote good wages, benefits, local and targeted training and hiring through Community Benefits/Workforce Agreements and On the Job Training Funding where appropriate, feasible and permitted by law. Leverage State agencies' spending and regulatory influence to advance commitments around job access and job quality for DACs.</p>	NYSERDA, DOL	2-3 years	ESD, community-based orgs, unions, training providers, community colleges, social service agencies, workforce one-stops, foundations
<p>Increase ranks of <b>MWBE and SDVOB</b> (Service Disabled Veteran Owned Business) and cooperatives through increased access to workforce training and business development support; increase MWBE and SDVOB participation across broader array of State-funded investments and projects.</p>	NYSERDA, DOL, ESD	2 years	State agencies, local govts, workforce, community-based orgs, one-stops, training providers
<p>Require building decarbonization <b>curricula and career services</b> in State-funded education incl. K-12, technical schools, apprenticeships, and engineering and architecture programs at public universities, and encourage this curricula at private universities.</p>	NYSERDA, NYS Board of Regents, SUNY, CUNY	2-4 years	DOL, unions, private colleges & univs, accrediting boards
<p>Require <b>continuing education on building decarbonization</b> (e.g., energy efficiency, electrification, embodied carbon) as part of licensing for architects, engineers, trades, contractors, building ops. and maintenance, real estate professionals (inspectors, brokers, etc.).</p>	DOS, NYSEDA, DOL, local licensing agencies	3 years	unions, industry orgs, accrediting boards
<p>Support <b>retention</b> of experienced building service workers.</p>	NYSERDA, DOL	2 years	Unions, Building Owners, DOS, local licensing agencies

# Enabling Initiative #4 Public Awareness and Consumer Education

## Overview

<b>Description:</b>	<b>Support broad public awareness and consumer education, create strategic partnerships including 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.</b>
<b>Action type:</b>	Programmatic
<b>Cost and funding considerations:</b>	\$\$
<b>Ease of implementation:</b>	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.
<b>Example case studies:</b>	Clean Energy Hub model (under development)

# Enabling Initiative #4 Public Awareness and Consumer Education

Risks / Barriers to success	Possible mitigants
<ol style="list-style-type: none"><li>1. Low awareness of Climate Act, building inefficiencies, climate solutions for buildings, and steps to take</li><li>2. Competing demands on consumers' attention</li><li>3. Perception of natural gas as clean, opposition campaigns from fossil fuel industry</li><li>4. Lack of familiarity with heat pumps or inaccurate perceptions</li><li>5. Partisan polarization in news/info sources</li><li>6. Raised awareness does not translate into action</li><li>7. Reluctance to electrify due to grid reliability / risk of losing heat</li></ol>	<ol style="list-style-type: none"><li>1. Broad-based public outreach campaign with clear customer journey to resources/programs; drive participation through retargeting and repeated exposure; create sense of shared responsibility</li><li>2. Trusted, high-visibility resources/channels (e.g., local elected officials, social media influencers, sponsored content); embed messages in TV/film (e.g., home improvement or cooking shows)</li><li>3. Direct utilities to sunset "clean gas" messaging; public education on the negative indoor air quality and climate impacts of combustion appliances</li><li>4. Ample data/case studies/customer testimonials (e.g., Maine leading on heat pumps); engage validators; offer tours</li><li>5. Early local community engagement (regional working groups, Hubs) to build trust, drive engagement, and provide transparency; use varied channels to deliver message; engage younger generations to influence parents</li><li>6. Streamlined customer access to programs (e.g., one-stop shop/Hub to help DAC customers); deliver info when customers are making energy-related decisions (e.g., during home purchase, at home improvement stores, through utility marketplaces, as part of asset management plans)</li><li>7. Address grid reliability, resilience head-on as part of all messaging; showcase technical solutions and demonstrate improvements to increase public confidence</li></ol>

# Enabling Initiative #4 Public Awareness and Consumer Education

Components required for delivery	Implementation lead	Time to implement	Other key stakeholders
<p>Support and scale up <b>multilingual public and consumer education</b> efforts through large-scale, coordinated awareness, inspiration and education campaign; traditional and broad reaching media, digital communication, “influencer” style campaigns, user-generated campaigns, out of home displays, zines, mailers, virtual tours; resources for installers, distributors, home-visiting workforce, other supply chain actors to educate consumers, customer-facing resources and tools.</p>	<p>NYSERDA, utilities</p>	<p>2 years</p>	<p>Utilities, installers, distributors, manufacturers, real estate industry, unions, trade associations, home improvement retailers.</p>
<p>Create <b>Strategic Partnerships</b> that can have Broad Impact: including utilities (promote decarbonization and sunset 'clean gas' messaging), trusted community leaders and organizations (e.g. churches), cooperative extensions, business councils, industry orgs/large corps, unions, schools/teachers, film and public venues, state and local elected officials. Build on experience from Heat Smart programs.</p>	<p>NYSERDA</p>	<p>2-3 years</p>	<p>Utilities, PSC, community-based orgs, industry orgs, local coop. extensions, Heat Smart campaigns</p>
<p>Ensure messages, messengers, and media <b>reflect DACs</b> in marketing efforts and prioritize education and technical assistance for DACs. Maintain a “one-stop shop” website for clean energy, electrification, and energy efficiency programs, and establish and fund community hubs to offer education, resources, local contractors, technical assistance and program navigator support. Build on the commitment of NYSERDA and NYS Utilities to maintain the NY Energy Advisor website and coordinated marketing for a statewide portfolio of LMI programs, and on NYSERDA’s development of regional Clean Energy Hubs.</p>	<p>NYSERDA</p>	<p>1-2 years</p>	<p>Utilities, community-based grassroots organizations, cooperative extensions, manufacturers, installers, state and local elected officials.</p>
<p>Publicize <b>best practices</b> for efficient building operations and recognize leaders/innovators in efficient operations for early adopters. Create an incentive program/challenge to attract others or encourage others to sign a <b>pledge to commit to neutrality</b>.</p>	<p>NYSERDA</p>	<p>1-2 years</p>	<p>Industry groups, unions, local govts.</p>
<p>Provide <b>technical assistance and resource toolkits</b> for building decision-makers and residents including playbooks for low-carbon solutions in common building types, free in-home or virtual audits to homeowners, and capital planning support for large buildings. Provide info resources and tools to support tenant engagement. Demonstrate low-carbon solutions through challenges, case studies. Develop case studies showing the feasibility, performance, and costs for three paths to transition to all-electric buildings: full electrification, partial electrification, and electrification ready.</p>	<p>NYSERDA, utilities</p>	<p>2-3 years</p>	<p>Building decision-makers; real estate orgs; Service providers (A&amp;E firms, MEPs); tenant organizations; residential contractors.</p>



# Enabling Initiative #5 Innovation

## Overview

<b>Description:</b>	<b>Support research and development (R&amp;D), demonstration projects, and more companies and manufacturers operating in NYS to bring innovative solutions to the marketplace for: highly efficient, all-electric, and resilient buildings; grid-interactive buildings, with revenue opportunities; and reducing embodied carbon in buildings.</b>
<b>Action type:</b>	Programmatic
<b>Cost and funding considerations:</b>	\$\$; building upon NYSERDA's \$60M annual commitment
<b>Ease of implementation:</b>	Easy
<b>Example case studies:</b>	New York Battery and Energy Storage Technology (NY-BEST), ARPA-e, California Public Interest Energy Research (PIER) project, MassCEC

<b>Risks / Barriers to success</b>	<b>Possible mitigants</b>
<ol style="list-style-type: none"><li>1. NYS funding and the NYS market opportunity alone are not large enough to drive needed R&amp;D.</li><li>2. Industry inertia and building-as-usual culture favor familiar building practices and materials.</li><li>3. Need to expedite solutions for certain building typologies.</li><li>4. Cost is the primary driver for choice of solutions and few current solutions successfully compete on current cost and value proposition</li><li>5. Market-driven innovation may leave behind LMI households, DACs</li></ol>	<ol style="list-style-type: none"><li>1. Advocate for federal government R&amp;D funding and work in partnership with like-minded states and entities. Concurrently increase NYS funding of R&amp;D, which has a strong multiplier for jobs and economic development.</li><li>2. Leverage New York's robust innovation ecosystem; codes and standards to sunset fossil fuel use in buildings would provide strong market signal.</li><li>3. Develop NYS demonstrations and case studies for emerging technologies in prevalent building typologies.</li><li>4. Orient innovation toward cost reduction as well as additional value.</li><li>5. Fund innovation opportunities that target solutions for LMI/DACs and locate demonstration projects in DACs.</li></ol>

# Enabling Initiative #5 Innovation

Components required for delivery	Implementation lead	Time to implement	Other key stakeholders
Advocate for, and leverage, <b>Federal and National Laboratory resources</b> focused on identifying and commercializing advancements in technologies for building decarbonization and building resilience.	Chamber	ASAP	NYSERDA, SUNY
Scale up resources to identify and promote <b>tech. transfer</b> for innovative building decarbonization technologies and design approaches that are in use internationally and could be transferred to the NYS market, e.g., via support adapting for NYS standards, demonstrations, market research, partnering with NYS entities, and manufacturing assistance.	NYSERDA, ESD	Scale up from ongoing, over 1-2 years	manufacturers, designers, like-minded states/orgs.
Provide support and outreach for <b>MWBEs, cooperatives, and B Corps</b> , e.g. dedicated access to expert advisory services; internships, fellowships, and board placement in innovative companies; access to venture capital for underrepresented women and minority entrepreneurs, via New York Ventures.	NYSERDA, ESD	Scale up, over 1-2 years	
Continue to support R&D, demonstrations, and technology transfer/commercialization for next generation HVAC systems and building envelopes that deliver high performance, meet technical needs, and lower costs, incl. for: continued improvement in cold climate performance across a range of heat pump products/sizes; improved domestic hot water heat pump technologies; solutions for harder-to-electrify buildings; community thermal loops; advanced heat recovery and ventilation; improved thermal storage for HVAC applications; innovative materials, construction approaches, and manufacturing methods that improve building envelopes; and other technologies.	NYSERDA	Continue ongoing	Federal government, SUNY campuses and researchers, manufacturers, designers, building decision-makers, utilities, like-minded states/organizations
Support R&D, demonstrations, technology transfer/commercialization, and development of standards across manufacturers and equipment for <b>Grid-Interactive Efficient Buildings</b> (GEBs), to deliver energy efficiency, load flexibility, and modulation capabilities that contribute to efficient grid management and grid reliability.	NYSERDA	Scale up from ongoing, over 1-2 years	
Support the development of market signals incl. revenue streams <b>for Grid-Interactive Efficient Buildings</b> , via analysis of opportunities to provide grid services and electric/thermal services to neighboring buildings, assessment of market mechanisms for supporting desired policy outcomes, and pilots/demonstrations to inform rulemaking/ratemaking.	PSC/DPS, NYSERDA, utilities	Scale up, over 1-2 years	
Assess and then support R&D needs with respect to building resilience (with electrification and more frequent extreme weather); <b>flexibility and resilience</b> of the electrical system; and related energy and thermal storage solutions.	NYSERDA, DEC		

# Enabling Initiative #6 Embodied Carbon

## Overview

<b>Description:</b>	<b>Establish procurement requirements and design specifications for State-funded projects and support education, building reuse, R&amp;D, and in-state manufacturing of alternative products in order 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).</b>
<b>Action type:</b>	Education, Financing, Regulatory
<b>Cost and funding considerations:</b>	\$
<b>Ease of implementation:</b>	Easy, via a diversified approach
<b>Example case studies:</b>	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

<b>Risks / Barriers to success</b>	<b>Possible mitigants</b>
<ol style="list-style-type: none"><li>1. Lack of awareness of embodied carbon impacts regarding products in use in building industry (designers, contractors, and manufacturers)</li><li>2. Industry inertia and building-as-usual culture favor familiar building practices and materials.</li><li>3. Inaccurate impression that reducing embodied carbon will cost more and damage economy</li></ol>	<ol style="list-style-type: none"><li>1. Create method to require transparency and therefore engagement with data on embodied carbon as part of daily practice (in all state work).</li><li>2. Lead-by-example by requiring reduction of embodied carbon in State-funded projects. Incorporate into project calculations the value of carbon guidance issued by DEC for use by State agencies, to create awareness of the cost of GHG emissions and embodied carbon.</li><li>3. Harness NYS forestry economy to develop carbon negative building retrofit products in state, thus supporting carbon and economic development and DAC support goals.</li></ol>

# Enabling Initiative #6 Embodied Carbon

Components required for delivery	Implementation lead	Time to implement	Other key stakeholders
<p>Drive embodied carbon reductions through procurement in State-funded projects (<b>leading by example</b>), initially by requiring Environmental Product Declarations (EPD) for structural building materials and products used in the project and promoting the use of available modeling software/design tools for embodied carbon calculations. In parallel, require that State-funded projects follow lower-carbon specifications for the most carbon intense building materials and products (e.g. concrete, foam insulations, glass, window units). Subsequently set a target embodied carbon reduction level (below the established mean carbon budget as illustrated over the previous years) for projects.</p>	<p>Under GreenNY, incl. DASNY, NYSERDA, DOS; explore procurement specs. under Exec.Order 4 and potential links to public bid process for construction projects</p>	<p>~2 yrs. for EPD/tools; ~4-5 yrs. for carbon specs; and rigorous carbon budget reduction goals by 2030</p>	<p>PA NY/NJ, DOT, DEC, OGS, NYPA, NYC DDC, builders, designers, manufactures, local gov'ts. AIA ACEC, AGC...</p>
<p>Support <b>R&amp;D, demonstration projects, and technology transfer/commercialization</b> for enhanced low embodied carbon construction, including preference for re-use of existing buildings.</p>	<p>NYSERDA for products to market, DASNY and SUCF for design practices</p>	<p>~2 yrs.</p>	<p>AIA, ACEC, AGC, like-minded states/orgs.</p>
<p>Provide assistance to expand <b>in-state manufacturing</b> for products that are lower in embodied carbon (e.g., low carbon concrete) or made of carbon sequestering materials also known as biogenic or agriculture-based materials (e.g., hempcrete and sustainable wood products).</p>	<p>SUNY ESF, NYS Wood Products Development Council</p>	<p>2-5 years aggressive build-out</p>	<p>NESEA and other green building organizations, Sustainable Business Council</p>
<p>Identify and pursue financial incentives, changes to building codes, and other strategies specifically to encourage <b>building reuse</b>, beginning in urban centers where returning vacant buildings to use and maintaining the existing building facade and architectural style and can be an additional benefit to the embodied carbon reduction.</p>	<p><i>[to be identified]</i></p>	<p>5 years for projects meeting certain requirements (size, cost, etc.)</p>	<p>Real Estate Associations, IDAs, local governments</p>

# Cross-Cutting Panel Recommendations

Initiative	Panel Recommendation
<b>Federal Agenda</b>	<p>The Panel recommends the CAC <b>advocate for Federal resources and policy support</b> in the scoping plan. Climate change is a national and global problem. New York State is a leader but will need significant assistance and partnership from the Federal government to bring these recommendations to fruition.</p>
<b>Revenue Sources</b>	<p>The Panel recommends the CAC <b>conduct an economy-wide analysis to identify resources</b> and funding mechanisms to support the final scoping plan. While the Panel identified and recommended some potential funding/financing mechanisms, these do not address the full need outlined in the recommendations. Further analysis and expert/stakeholder input is needed to identify resources for this scale of transformation.</p>
<b>Energy Costs and Price Signals</b>	<p>The Panel recommends <b>ongoing PSC attention to rate design and retail rate price signals for both electricity and gas</b>, to ensure affordability as buildings electrify and to promote demand flexibility.</p>
<b>Adaptation and Resilience</b>	<p><b>Adaptation and Resilience recommendations are of material importance</b> as buildings electrify heating systems, and as the frequency of extreme weather events increases the probability and scale of grid outages. At the building level, the Panel recommends several changes in the State codes that support more resilient buildings and efficient, flexible technologies that can enhance grid reliability and resilience, including high-performance walls/roofs/windows to improve passive survivability, solar PV along with energy storage readiness, grid-interactive appliances, and EV readiness to position for vehicle-to-grid/vehicle-to-building applications. The Panel also supports multiple specific recommendations advanced by the cross-panel Adaptation and Resilience group, notably: (i) to develop policies and programs to reduce human risks associated with new patterns of thermal extremes (e.g., community-based cooling and warming centers, weatherization from thermal extremes, cool roofs); (ii) to ensure the reliability, resilience and safety of a decarbonized energy system (e.g., modernize the energy system, energy efficiency upgrades and capital improvements to buildings to endure grid failures and to accept power when the system is re-energized); and (iii) to strengthen meaningful community engagement and public education and build adaptive capacity (e.g., train building operations staff in disaster preparedness, provide home and small business resilience audits/refinancing). The Panel underscores the need for additional research, analysis, and policy development on this critical topic.</p>
<b>Energy Efficiency Upgrades for Existing Homes</b>	<p>Although the Panel's recommendations do not include a regulatory requirement to perform energy efficiency upgrades to existing residential buildings, the Panel <b>underscores the importance of insulation/weatherization and energy efficiency measures</b> to make homes comfortable and to reduce emissions, heating costs, and seasonal demand peaks. Either regulations and/or substantial subsidies likely will be needed in the future to effectuate this at scale. Given market challenges and costs, the Panel recommends that the first step is to require energy benchmarking and disclosure as described in Mitigation Strategy #2, which can then inform future policy deliberations and programs to assist low-income New Yorkers. In the meantime, funding for LMI weatherization/energy efficiency efforts will need to be substantially increased.</p>

# Additional Panel Perspectives Summary

Initiative	Panel Recommendation
<b>Federal Advocacy</b>	Some members of the Panel recommend <b>specific Federal advocacy items</b> , including for increased federal funding for efficiency and electrification upgrades (e.g. for weatherization, HEAP, P-12 schools); attention to federal tax credits (e.g., increase the geothermal commercial tax credit to 30%, boost federal tax credits for affordable housing without reducing unit production); federal support for critical R&D investments (e.g. in ultra low-GWP equipment, long-duration storage, resilience solutions); and to expand guidelines in WAP to allow/increase funding for electrification and healthy homes.
<b>Carbon Fee</b>	<p>Some members of the Panel recommend that the CAC and NYS policymakers consider an <b>economy-wide carbon fee</b>, both to level the relative cost of electricity and gas and to fund investments in building upgrades and workforce initiatives that directly benefit LMI households and disadvantaged communities. If a carbon fee is applied to electricity generation, it will be important to establish an aligned carbon fee applied to fossil fuels combusted in buildings.</p> <p>Some members of the Panel support the <b>Climate and Community Investment Act</b> (introduced in the NYS Senate as S4264A) to raise and direct funding.</p>
<b>Low-Cost Financing and Financial Incentives</b>	Some members of the Panel identified <b>additional financing and financial incentive mechanisms</b> for further consideration by the CAC, including: on-bill “pay as you save” financing (or inclusive financing) products for clean energy upgrades as a service to utility customers, with consumer protections; engaging mortgage lenders to require compliance with regulations and to provide lower interest rates for low-emissions buildings; exploring additional ways to expand PACE-like and municipal financing; extending State and local sales tax exemption and/or income tax credits to heat pump equipment; and creating or modifying property tax abatements to incent early adoption of deep building decarbonization.
<b>Energy Costs and Price Signals</b>	Some members of the Panel proposed <b>specific electric rate design modifications</b> for consideration, including time-varying rates that encourage electricity use when it is least expensive; voluntary demand-based delivery rates for residential customers that reinforce the storage capability of ground source heat pumps; seasonal rates that take advantage of NY’s current summer peak to provide lower prices for winter heating; specific rate classes for electric heating, all-electric buildings, or all-electric affordable housing; and progressive rate design to mitigate potential energy cost increases for LMI households. In addition to an analysis of natural gas distribution asset depreciation policies for ratemaking purposes, some Panel members proposed <b>gas rate design modifications</b> for consideration, including the elimination of block rate structures that provide lower volumetric rates to customers who use more natural gas.
<b>Codes &amp; Standards</b>	Some members of the Panel recommend a <b>more accelerated schedule for adopting an all-electric State Code</b> , starting for single family homes in 2023 and for multifamily and commercial buildings in 2026.



# Additional Panel Perspectives Summary (continued)

Initiative	Panel Recommendation
<b>Integration Analysis</b>	<p>The Panel's recommendations do not fully solve for hard-to-electrify buildings, which may require alternative solutions or transition strategies. The Panel recommends <b>further analysis of viable solutions for hard-to-electrify buildings</b>, to be undertaken by NYSERDA. Some members of the Panel further propose that the Integration Analysis process consider additional solutions that include (but are not limited to) some use of hybrid electric-fossil fuel systems as a transition strategy and some use of low-carbon fuels in buildings (e.g., high-percentage biodiesel blends in heating fuel, renewable natural gas, hydrogen, wood).</p> <p>Initial analysis suggests that for the buildings sector, the package of policies advanced by this Panel are generally consistent with driving an 85% reduction of emissions by 2050 (relative to 1990 levels), but likely will fall short of driving a 40% reduction of emissions by 2030. Some members of the Panel recommend that the Integration Analysis consider the extent to which the following <b>additional policy options could accelerate emissions reductions over the next decade</b>: a more accelerated schedule for adopting an all-electric State Code; a more accelerated schedule for emissions-based standards in existing low-rise multifamily buildings or existing commercial buildings; a requirement that existing residential buildings meet an insulation/air sealing standard (for single family and low-rise multifamily) or a building performance standard (for large multifamily); more funding to drive near-term voluntary adoption of energy efficiency/weatherization; and introduction of a carbon price (in conjunction with regulatory measures) to influence energy conservation as well as capital investment decisions. For these policy options, benefits/costs and practicality of implementation would need to be assessed.</p>



# Benefits & Impacts Disadvantaged Communities

<b>Mitigation Strategy #1 Codes and Standards</b>	Cost premiums for installation of efficient and electric equipment/systems will need to be subsidized with adequate financial and technical assistance for LMI homeowners, public housing, and building owners within DACs;
<b>Mitigation Strategy #4 HFC Transition</b>	Avoid potential disinvestment in low-income properties and disadvantaged communities; Training, job placement and workforce development prioritized in DAC and for priority populations.
<b>Mitigation Strategy #2 Benchmarking &amp; Disclosure</b>	Energy affordability is a challenge for many LMI households and required energy disclosure provides important information (incl. on ongoing energy costs) when buying or renting a home, informing decision-making and budgeting; Energy disclosure may lead to higher prices for efficient homes and apartments, which could price out LMI households.
<b>Mitigation Strategy #3 Gas System Transition</b>	NYS faces a risk that LMI/DAC households will be among those left carrying the rate-base for gas infrastructure, creating an unfair burden; Planning process needs to involve stakeholders from disadvantaged communities, to ensure policies maximize benefits and minimize unintended harm to these communities; Provide dedicated resources to help LMI/DAC households and public housing make energy efficiency upgrades and electrify affordably; refine affordability policy to account for household energy burden.

# Benefits & Impacts Disadvantaged Communities

<p>Enabling Initiative #1 <b>Low-cost Financing</b></p>	<p>Lending tools to incentivize projects benefitting LMI households and/or DACs and public housing to ensure equal participation in decarbonization would provide a convenient alternative financing mechanism that could be appealing and prioritize LMI households and DACs</p> <p>Provide protections from predatory lending</p> <p>Do not create incentives that undermine general affordability and denser living patterns (associated with lower emissions per capita)</p>
<p>Enabling Initiative #2 <b>Financial Incentives</b></p>	<p>Direct cash incentives to LMI households and DACs would encourage energy efficiency upgrades and early transitioning from fossil fuels</p> <p>Early adoption by LMI and DACs would mean these populations are not left on an increasingly costly gas system</p> <p>Do not create incentives that undermine general affordability and denser living patterns associated with lower emissions per capita</p>
<p>Enabling Initiative #3 <b>Workforce</b></p>	<p>Training, job placement and workforce development prioritized in DACs and for priority populations.</p> <p>Quality, good-paying jobs for DAC residents and priority populations</p>
<p>Enabling Initiative #4 <b>Consumer Education</b></p>	<p>Inspire and increase participation in clean energy (more public subsidy going to disadv community residents)</p> <p>Reduced energy costs/burden;</p> <p>Low carbon upgrades improve quality/value of building stock which may further reduce healthcare costs</p> <p>Increased local capacity to participate in and benefit from clean energy transition.</p>
<p>Enabling Initiative #5 <b>Innovation</b></p>	<p>Innovation that drives down the installed cost of building decarbonization upgrades is particularly valuable for disadvantaged communities, which spend a disproportionate share of their income on energy and housing.</p> <p>Affecting manufacturing can address many EJ issues where siting of dirty manufacturing is often in lower-income and black and brown communities.</p> <p>NYSERDA's innovation program is supporting specific product development and demonstration for heat pump units that fit into affordable multifamily retrofits.</p>
<p>Enabling Initiative #6 <b>Embodied Carbon</b></p>	<p>Any reduction in embodied carbon in building materials will, over time, benefit distressed and disadvantaged communities by greening up manufacturing, and reducing negative air/soil/water impacts. Attention should be paid to achieving cost parity for low-embodied carbon products compared to conventional. Solutions will need to address remediation of present building conditions where needed to facilitate reuse and also can return vacant buildings to use.</p>

# Benefits & Impacts Health & Co-Benefits

<b>Mitigation Strategy #1 Codes and Standards</b>	Improved outdoor and indoor air quality resulting in better health outcomes; Improved building occupant comfort and productivity; Safety benefits from removing indoor combustion sources, such as reduced risk of fire and carbon monoxide poisoning; Reduced environmental damages associated with fossil fuel combustion and production, including spills and groundwater contamination
<b>Mitigation Strategy #2 Benchmarking &amp; Disclosure</b>	Energy disclosure and market competition are likely to attract buyers/renters for efficient homes, apartments, and commercial spaces; energy-efficient properties have higher occupancy levels, rental premiums, and sale prices relative to less-efficient properties.
<b>Mitigation Strategy #3 Gas System Transition</b>	Avoiding gas infrastructure build-out and requiring new homes to be all-electric will lead to improved outdoor and indoor air quality resulting in better health outcomes; Safety benefits from removing indoor combustion sources, such as reduced risk of fire and carbon monoxide poisoning; Reduced environmental damages associated with fossil gas combustion and production.
<b>Mitigation Strategy #4 HFC Transition</b>	Proper management of refrigerant-containing appliances will decrease overall pollution from disposal of this material. Adverse health effects of exposure to new chemicals need to be further understood.

# Benefits & Impacts Health & Co-Benefits

<p>Enabling Initiative #1 <b>Low-cost Financing</b></p>	<p>Electrification, efficiency, and readiness measures would improve the quality of life for people living and working in many buildings, improve air and environmental quality, and address other environmental hazards (e.g. mold/asthma triggers)</p>
<p>Enabling Initiative #2 <b>Financial Incentives</b></p>	<p>Electrification, efficiency, and readiness measures designed and installed by a well-trained workforce would improve the quality of life for people living and working in many buildings, improve air and environmental quality, and address other environmental hazards (e.g. mold/asthma triggers, vulnerability to extreme heat/cold)</p>
<p>Enabling Initiative #3 <b>Workforce</b></p>	<p>Cross-training of clean energy workforce on health and in-home health workforce on energy to more effectively identify and address home health hazards</p> <p>Skilled workforce will result in healthier, more comfortable buildings for occupants</p>
<p>Enabling Initiative #4 <b>Consumer Education</b></p>	<p>Promotes messaging that building electrification improves indoor and outdoor air quality and supports human health,</p> <p>Highlights improved comfort; provides tenants greater control over their heat, higher cognitive functioning with better air quality</p> <p>Highlights efficiency in new technology that delivers cooling as well as heating</p> <p>Demonstrates need for improved resiliency</p>
<p>Enabling Initiative #5 <b>Innovation</b></p>	<p>Cleaner air as onsite combustion is phased out</p> <p>Innovation is expected to deliver healthy, more comfortable buildings for occupants via solutions that are technically feasible and economic for a broad range of building typologies</p> <p>Retrofits will add value to properties</p>
<p>Enabling Initiative #6 <b>Embodied Carbon</b></p>	<p>A transition to wood-based products, and other biogenic carbon products, can directly improve well-being of building occupants through stress reduction and connection to Nature. Additionally, wood and linoleum, for example, kill off bacteria on their surfaces significantly faster than steel or plastics (99.9% dead after 3 minutes on wood, none died on plastics). Many natural, low-embodied carbon products have significantly lower off-gassing than synthesized products such as spray foam insulation.</p>

# Benefits & Impacts Just Transition: Businesses and Industries, Workers

<p>Mitigation Strategy #1 <b>Codes and Standards</b></p>	<p>Couple codes/standards with workforce development to grow the workforce equipped to deliver electrification and energy efficiency services and to ensure incumbent workers have paths to transition;</p> <p>Training/upskilling of design professionals, HVAC, and construction industries;</p> <p>New industries and jobs in the clean energy economy</p>
<p>Mitigation Strategy #2 <b>Benchmarking &amp; Disclosure</b></p>	<p>Better market information about building performance unlocks demand for energy-efficiency services and skilled workers such as design professionals, energy auditors and building raters, facility managers, and HVAC and construction workers (with appropriate protections against potential predatory targeting of LMI/DAC households);</p> <p>Training/upskilling new and incumbent workers in these fields to meet demand, as well as real estate professionals.</p>
<p>Mitigation Strategy #3 <b>Gas System Transition</b></p>	<p>Displaced gas utility workers must have a just transition path to other positions within the utility or alternate employment. Examples include utilities coupling the roll out of smart meters with job retraining for meter readers to fill other positions and agreements negotiated in the planned closure of the Diablo Canyon nuclear plant in California and of the TransAlta coal plant in Washington.</p>
<p>Mitigation Strategy #4 <b>HFC Transition</b></p>	<p>New jobs and industries created in refrigerant service, recovery, and destruction. Training opportunities in new technologies provide access to a growing jobs field.</p>

# Benefits & Impacts Just Transition: Businesses and Industries, Workers

<p>Enabling Initiative #1 <b>Low-cost Financing</b></p> <p>Enabling Initiative #2 <b>Financial Incentives</b></p>	<p>Through program design, the following JTWG Principles can be addressed:</p> <p>#4: Realize vibrant, healthy communities through repair of structural inequalities</p> <p>#8: Climate Adaption Planning and Investment for a Resilient Future</p> <p>#10: Mutually-Affirming targets for State Industrialization and Decarbonization</p>
<p>Enabling Initiative #3 <b>Workforce</b></p>	<p>Job growth and economic development in every part of NYS</p> <p>Business development and growth for MWBE and cooperatives.</p> <p>Will build local capacity to ensure stakeholder-engaged just transition planning process</p> <p>Job losses in fossil fuel industries (fuel oil supply chain, conventional HVAC industry); mitigate through direct investment in retraining and new business development</p>
<p>Enabling Initiative #4 <b>Consumer Education</b></p>	<p>Will ensure a stakeholder-engaged transition planning process</p> <p>Gets in front of mandates and creates the opportunity for a timely transition away from fossil fuels</p> <p>Builds awareness for building decarbonization</p>
<p>Enabling Initiative #5 <b>Innovation</b></p>	<p>Clean energy industries are poised for significant growth; investment in innovation and anchoring an in-state supply chain of growing businesses and manufacturing will make it easier for the State to achieve its climate goals while also attracting new investments and jobs.</p>
<p>Enabling Initiative #6 <b>Embodied Carbon</b></p>	<p>A just transition can be created by working toward knowledge and transparency first, allowing the market to recognize the importance of embodied carbon reductions. The cost burden for transparency can be mostly met by manufacturers, is relatively minor, and is already well underway. Connecting financial mechanisms to transparency can put the biggest effort onto the biggest projects, thereby creating a balanced approach. There is little/no effect on workers beyond education of the market, which will happen through specifications on projects. In addition, wood-based products are beneficial to New York's forestry industry.</p>

# Benefits & Impacts **Other**

<p>Mitigation Strategy #1 <b>Codes and Standards</b></p>	<p>Education for consumers, trades, professions, contractors, suppliers, retailers; Invest in building resilience and community-scale resilience to avoid grid failure; Prioritize investments in the reliability, resilience, and affordability of the NYS electric grid</p>
<p>Mitigation Strategy #2 <b>Benchmarking &amp; Disclosure</b></p>	<p>Benchmarking building energy on a regular basis helps to identify energy efficiency opportunities and is correlated with reduced energy consumption by an average of 2% to 3% annually across multiple benchmarking efforts; Benchmarking data provides market actors and government agencies insight into how buildings perform, enabling more informed investment decisions, lead generation, targeting of public resources, and public policy development; Education for consumers around using energy data, real estate transactions, and hiring a professional energy rater/auditor also will support informed decision-making.</p>
<p>Mitigation Strategy #3 <b>Gas System Transition</b></p>	<p>Cross-sector: Implement energy infrastructure planning, land use planning, and building codes in ways that are complementary and support larger policy goals (e.g., infrastructure, economic development).</p>
<p>Enabling Initiative #1 <b>Low-cost Financing</b></p>	<p>Resiliency note: Financing could be tied to being located outside the Special Flood Hazard Area to encourage relocation. This could also leave households behind that do not or cannot relocate.</p>
<p>Enabling Initiative #2 <b>Financial Incentives</b></p>	<p>Program design for incentive programs should be collaborative and engage a wide variety of stakeholders in order to best serve LMI households and DACs</p>
<p>Enabling Initiative #4 <b>Consumer Education</b></p>	<p>Increased awareness and education will increase demand and adoption of new technology and practices Increased demand will reduce cost and stimulate the economy Builds support for decarbonizing the built environment Promote workforce needs and support job growth</p>
<p>Enabling Initiative #6 <b>Embodied Carbon</b></p>	<p>Creating market awareness of carbon in products will be the most effective strategy for activating responses in all industries. Once products have a clear role in our carbon reduction, every sector will change, from building, to transportation, to manufacturing, to food production.</p>



# Appendix

# Energy Efficiency and Housing Advisory Panel Members

**CHAIR**

## **RuthAnne Visnauskas**

Commissioner  
Homes & Community Renewal

## **Janet Joseph**

Senior Vice President for Strategy &  
Market Development  
NYSERDA

## **Peggie Neville**

Deputy Director of Efficiency &  
Innovation  
Department of Public Service

## **Gina Bocra**

Chief Sustainability Officer  
NYC Department of Buildings

## **Kyle Bragg**

President, 32BJ SEIU

## **Amy Sugimori**

Director of Policy and Legislation

## **Molly Dee**

Head of Deep Carbon Reduction  
Jaros, Baum & Bolles

## **Dan Egan**

Senior Vice President of Energy &  
Sustainability  
Vornado Realty Trust

## **Bret Garwood**

Chief Executive Officer  
Home Leasing, LLC

## **Clarke Gocker**

Director of Policy and Strategy  
PUSH Buffalo

## **Jin Jin Huang**

Vice President for Generation  
Development  
Ecosave, Inc.

## **Elizabeth Jacobs**

Executive Director  
Akwesasne Housing Authority

## **Jamal Lewis**

Sr. Policy & Technical Assistance  
Specialist  
Green & Healthy Homes Initiative

## **Sadie McKeown**

EVP, Lending & Initiatives  
The Community Preservation  
Corporation

## **Bill Nowak**

Executive Director  
NY Geothermal Energy  
Organization

## **Daphany Sanchez**

Executive Director  
Kinetic Communities Consulting

## **Laura Vulaj**

Senior Vice President & Director of  
Sustainability  
SL Green Realty Corp.

# Category definitions (1 of 2)

Emissions impact (1990 baseline)\* – EE&H Panel adopted a 1990 baseline to benchmark to economy-wide targets

## Low

Strategy results in <10% of the reductions needed from the sector for each target year (2030 and 2050)  
OR  
Less than 1.5 million metric tons (MMT) of emissions reductions in 2030 or 3 MMT 2050

## Medium

Strategy results in 10-33% of the reductions needed from the sector in at least one of the target years  
OR  
greater than 1.5 but less than 4 MMT of emissions reductions in 2030 or over 3 but less than 8 MMT in 2050

## High

Strategy results in >33% of the reductions needed from the sector in at least one of the target years  
OR  
over 4 MMT of emissions reductions in 2030 or over 8 MMT in 2050.

Ease of implementation

## Easy

- Strategy has been implemented many times and/or can build off an existing NYS program
- Proven and widely available technology
- Key stakeholders are strong supporters; no strong opponents

## Medium

- Strategy is new to New York State but has been successfully implemented in other comparable states/countries
- Proven technology with known GHG impact, but still small-scale
- Key stakeholders are neutral, or balanced mix of supporters and opponents

## Hard

- Strategy is unproven in comparable settings
- Early-stage technology (e.g., need for pilots to prove feasibility and significant capital to scale up)
- Key stakeholders oppose the strategy

\*Estimated reductions may also account for a Business-As-Usual scenario that predicts emissions growth in the sector

# Category definitions (2 of 2)

**Mitigation Strategy Cost – expressed for EE&H Panel as equivalent annualized cost**

\$

- <\$250M total resource cost
- Most resources required for successful implementation are already on hand

\$\$

- \$250M - \$1B total resource cost
- Requires some new resources for successful implementation

\$\$\$

- Over \$1 Billion total resource cost
- Requires high degree of new resources (people, equipment, technology)
- Strategies with cost >\$10B should indicate the range of anticipated costs

**Enabling Strategy Cost – expressed for EE&H Panel as new State resources through 2030**

\$

- <\$25M total cost
- Most resources required for successful implementation are already on hand

\$\$

- \$25M - \$100M total cost
- Requires some new resources for successful implementation

\$\$\$

- Over \$100M total cost
- Requires high degree of new resources or is a demonstration project
- Strategies with cost >\$250M should indicate the range of anticipated costs