

New York State Climate Action Council

July 22, 2021
Meeting 13



**Climate Action
Council**

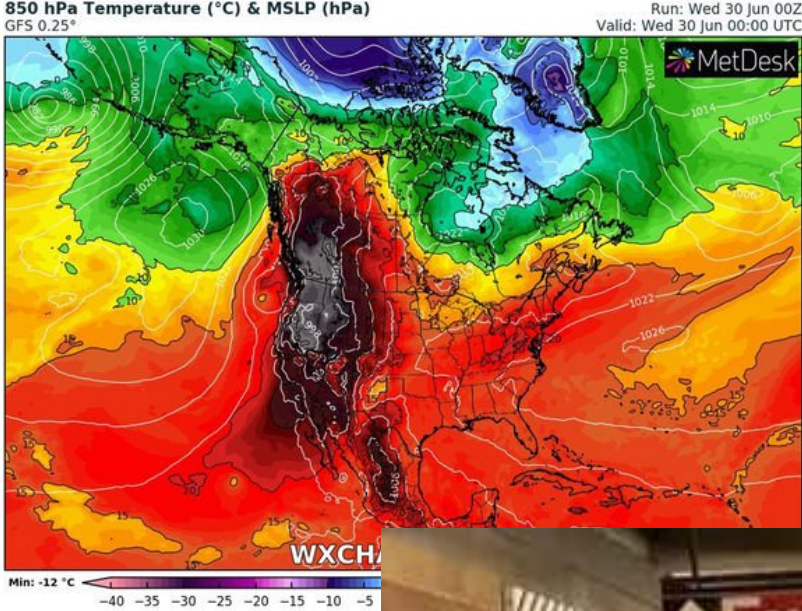
Agenda

- > Welcome
- > Consideration of June 8 and June 28, 2021 Minutes
- > Co-Chair Remarks and Reflections
- > Presentation and Discussion: Climate Justice Working Group
 - Power Generation Advisory Panel Recommendations Feedback
- > Presentation and Discussion: Integration Analysis
- > Next Steps

Consideration of June 8, 2021 and June 28, 2021 Minutes

Co-chair Remarks and Reflections

Extreme Weather



Photograph: Rhein-Erft-Kreis Handout/EPA



Photograph: NOAA



Recent Announcements

- > [Governor Cuomo Announces Three Gigawatts of Solar Installed in New York Generating Enough Clean Energy to Power More Than Half a Million Homes](#)
State's Solar Growth Up Over 2,100 Percent and Cost of Solar Down 69% Since Launch of NY-Sun Initiative
- > [Governor Cuomo Announces Nearly \\$4 Million Awarded to Grow Community Heat Pump Networks Across New York State](#)
Winning Projects to Explore Clean Energy Options at 600 Buildings with Two-Thirds of Funding Directed to Projects that Support Disadvantaged Communities
- > [Governor Announces More Than \\$7 Million Available to Advance Low Carbon Solutions for Multifamily Buildings](#)
Funding Complements Existing Capital Planning Support and Resources to Provide Step-by-Step Pathway to Decarbonize Buildings
- > [Long Duration Energy Storage Technology and Product Development \(PON 4169\)](#)
NYSERDA makes \$12.5m available in funding to stimulate and grow innovative, long duration energy storage solutions



**Climate Justice
Working Group
Feedback – Power
Generation
Advisory Panel**

Climate Justice Working Group

Input to the NYS Climate Action Council on Power Generation Panel Recommendations

July 22, 2021



**Climate Action
Council**



Overall Impressions:

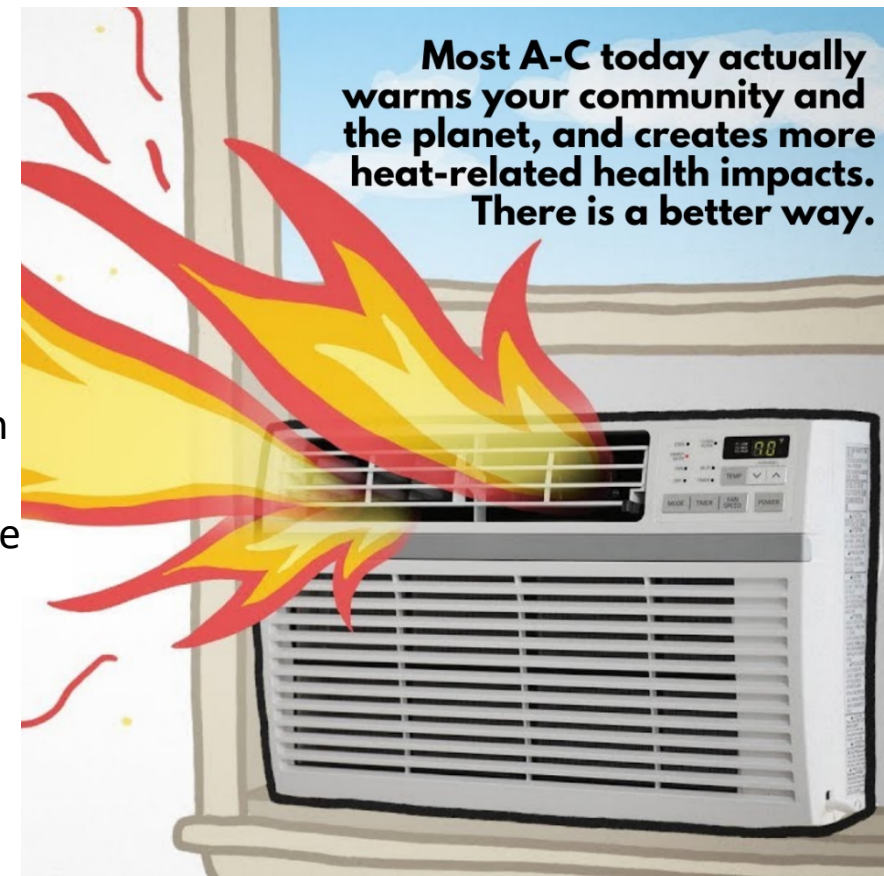
Makes real progress in several key areas *and yet....*

- Expansion of workforce development
- Affordability
- Community solar access
- Rapid expansion of renewable energy
- Phase out of existing fossil fuel plants

- The door to false solutions is still open
- There isn't enough emphasis on public power/energy democracy & consideration that LMI program size needs to be commensurate with need
- Cumulative impacts are not considered in the recs

Access and Affordability for All

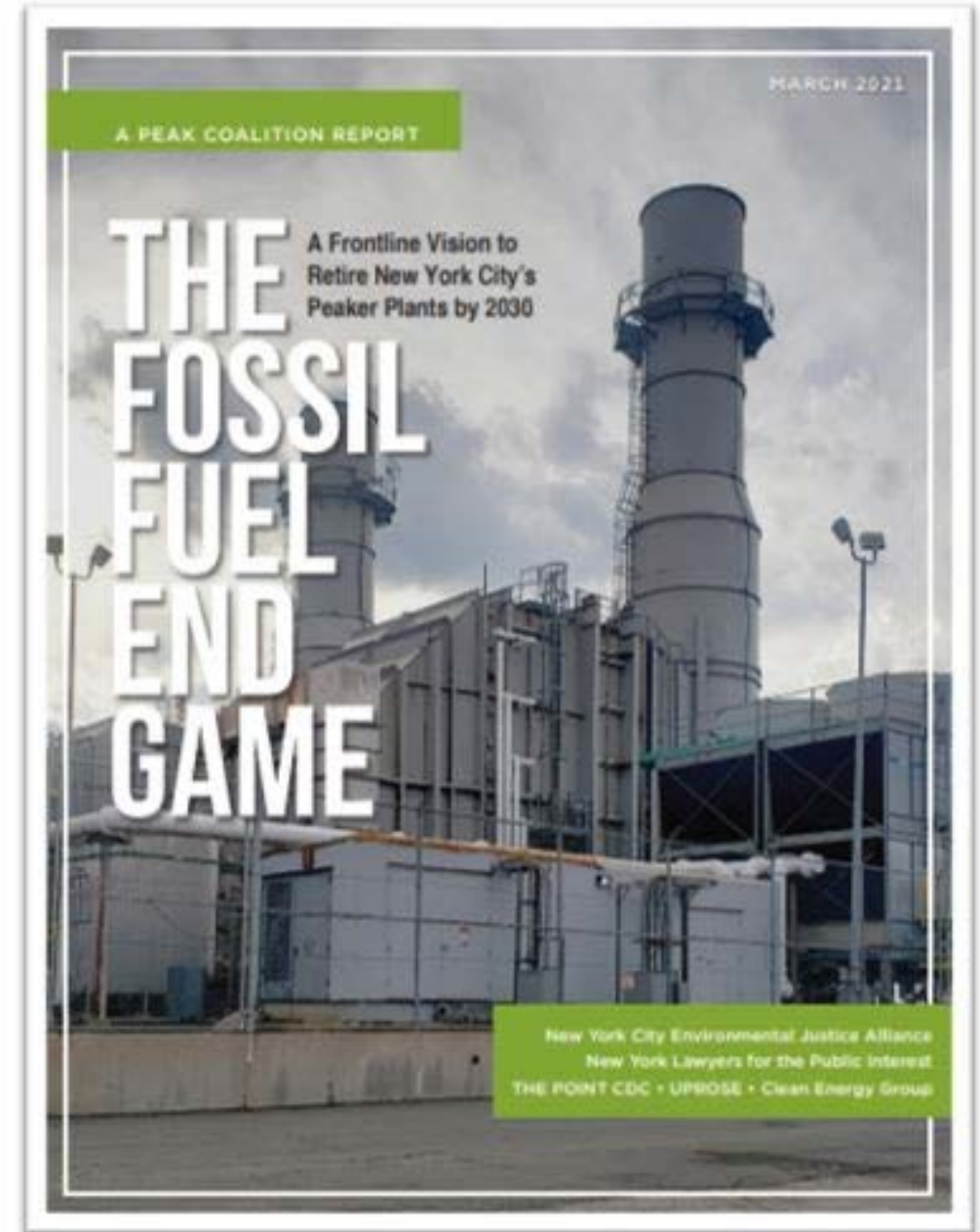
- Reduce the overwhelming share of household income that POC and low-income communities spend on electric power (over 6% for many)
- Prioritize modifications to NYS Home Energy Assistance Program, including:
 - Re-orient grants to only support installation of green technology
 - Help eligible households pay their bills over the hot summer months, in addition to the cost of a new AC unit
- Remove silos that agencies work in so households are aware of all programs they're eligible for. Currently, unless one agency communicates with all others, customers can be on their own to learn about programs they're eligible for like EmPower
- Direct DPS to study and consider alternative rate structures that are more progressive and to support green energy.
- PG panel guidance on 40% investment recommendation requires further input from CJWG:
 - Interagency definition of public investments is needed
 - We agree with the inclusion of transparency, accounting, and remediation efforts in the event of a failure to meet targets
- Expand existing pre-development programs for energy projects which are owned by municipalities, Indigenous tribes, CBO's, and NGOs
- Hire more EJ teams within agencies: for example, appoint an EJ lead at DPS
- Provide **SIGNIFICANT** incentives for LMI households to upgrade their appliances



Specialists in energy equity, energy justice, energy democracy and/or environmental/climate justice need to be intentionally hired!

Retirement of fossil fuel-fired facilities

- We support the rec. to rapidly launch an assessment and planning process to effectively and equitably reach zero emissions from power generation by 2040
- Process for the promulgation of DEC led GHG regulations for 2040 must be clear, and the end date enforceable.
- Also, make the planning process iterative so all of the utilized regulations and mechanisms are evaluated and revised as needed every 2 years in order to reach the 2040 goal
- Place moratorium on new fossil fuel plants
 - This is critical until final CAC recommendations are adopted. No new fossil fired facilities should be permitted under the moratorium absent a valid, demonstrable system reliability need that can't be reasonably met by non-polluting power.
- Address current and prospective emissions from cryptocurrency mining operations to prevent the facilities from exploiting a loophole in PSC oversight to repower fossil generating facilities behind the meter. Place a moratorium on these operations until the conclusion of a full generic EIS to determine whether these operations can be mitigated to comply with the CLCPA



Distributed Generation/Distributed Energy Resources

We support these, and urge the prioritization of the following recommendations:

- Compensation – Address improvements to VDER stack to more accurately reflect value provided by DERs, incorporating DEC’s SCC calculation and avoided transmission costs. Introduce an EJ/DAC adder to value stack.
- Target incentives to stimulate high value DER projects (like dual use solar/ag, multifamily housing, heat pumps/geothermal, etc. and pair them with LMI and EJ electrification goals. Expand NYSERDA’s Solar Energy Equity Framework.
- Create dynamic rate structures and programs that provide appropriate price signals and stimulate DER usage
- Ensure a process is in place that assures LMI community solar savings don’t in any way prevent access to other LMI energy savings programs like NY’s Heating Assistance Program

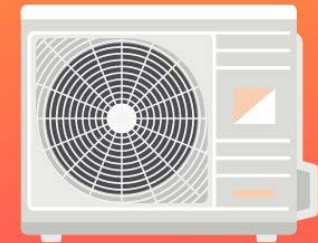
DID YOU KNOW HEAT PUMPS CAN PROVIDE HEATING & COOLING IN ONE SYSTEM?

Join PUSH for Clean Heat’s Heat Pump 101 Online Session!

Online Wednesday, July 14th 6pm

Register ahead of time bit.ly/whatisaheatpump

Learn what a heat pump is, and how they can help you get your home ready to meet the New York State's goal of getting to 100% zero emission electricity by 2040



Questions? Email info@pushforcleanheat.org



Reliability for the Future Grid

- Make NYISO more transparent – with more checkpoints and opportunities for public input and critiques. NYISO's needs assessment must be better disseminated and shared with local energy advocates
- Sync CLCPA Scoping Plan and mandates to the State Energy Plan
- **We support** the PG panel rec to improve reliability and resilience to climate impacts, via continued infrastructure investment (prioritize these projects in historically overburdened POC communities where access to basic amenities are less) with design criteria that can be adopted to reflect evolving climate impacts
- Invest in community outreach to provide effective communication and support for communities impacted by extreme weather events
- Address the impact of extreme heat beyond overcapacity to the grid, like increased water demand for cooling of power plant systems and sagging power lines that elevate fire risk from tree strikes



- *Storm hardening infrastructure investments must be FIRST implemented in historically burdened/black & brown communities, since they have less access to cooling for summer storms, heating for winter storms, transportation, or savings*

Green Infrastructure



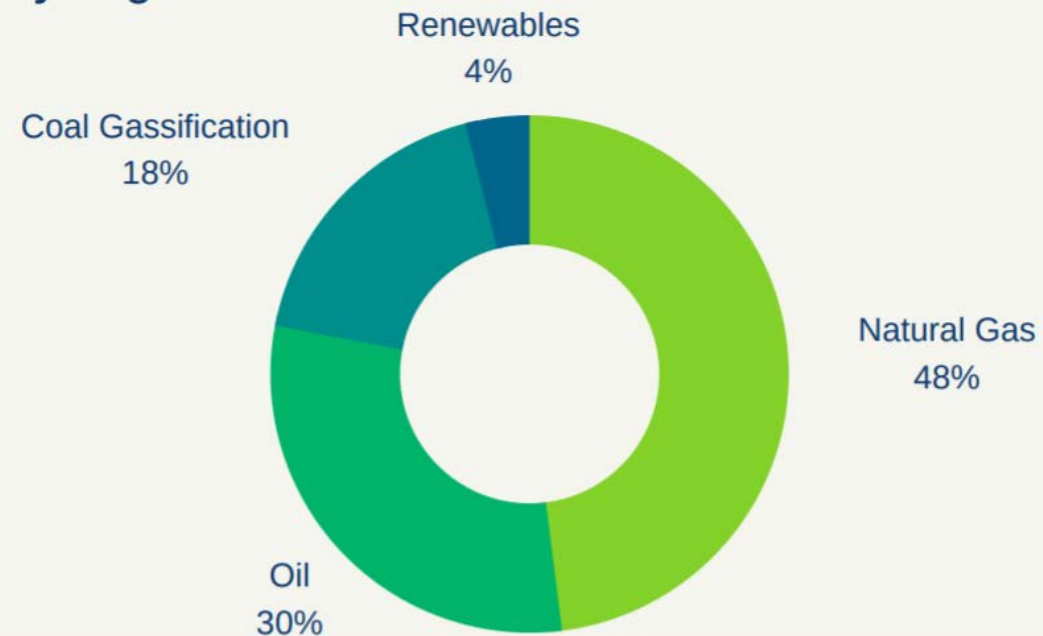
Technology Solutions (only support the real ones in order to achieve justice!)

•We are concerned about the promotion of false solutions and believe that:

- The 70% clean energy by 2030 target should be achieved with existing technologies
- And the 100% by 2040 target should be achieved by focusing on developing needed solutions for dispatchable technologies
 - Certain demonstration projects distract from clear renewable energy goals – **the PG panel recommendation focused on lifecycle air quality and health impacts of unproven technologies should be pursued as a priority.**
- Fossil fuel industry supported technology fixes are based on false premises and are legally questionable under the CLCPA and often don't reduce the pollution burden in EJ communities as noted in the NY Renews False Solutions Report.
 - **Fuels that are false solutions** emit as much as or more carbon than fossil fuels, create local air pollution from combustion, are not economically viable, divert land from food production and carbon sequestration, and deplete fresh water supplies.
- The recommendations concerning nuclear energy must be strengthened:

- Conduct lifecycle analysis of the environmental, health, safety, emissions, and EJ impacts of this fuel
- Proactively plan for the scheduled shut down of the four reactors in upstate NY. The next two retirements will occur in 2029 unless the State shells out billions in subsidies. This includes planning for a Just Transition for impacted workers and communities.
- Account for the inflexibility of nuclear power generation as grid needs evolve when more renewable energy comes online
- The Onondaga Nation should be consulted on the nuclear waste storage and transport impacting their traditional lands.

Hydrogen Production as a % of Total Metric Tonnes



- Hydrogen may have a valuable role to play in the deep decarbonization of heavy transport and industrial processes, but runaway plans for its extensive use in the power sector raise grave concerns. It has a significant water footprint and its combustion in power plants produces nitrogen oxide emissions up to six times greater than methane. NYPA already embarking on a hydrogen combustion demonstration project despite these concerns is a red flag



Workforce Development

We support the recommendations to provide education and career opportunities in clean energy for DACs and fossil fuel sector employees

• *DACs, workers, MWBEs need state agencies involved* in any aspect of large- or small-scale clean energy projects to fully leverage their capacity to lock in enforceable commitments around access to quality jobs and ensure public investments in workforce development generate the desired ROI



- Fully leverage tools like community workforce agreements, community benefit agreements, first source hiring, and project labor agreements to increase access to construction and permanent jobs for DAC members; Develop agreements in partnership with frontline communities, industry, and organized labor
- Further emphasize green worker-owned cooperatives that can be hired for public & private projects and economic ownership of local clean energy projects to prevent displacement during 'revitalization' projects

Energy Delivery & Hosting Capacity

We support this series of recommendations as they're key to building out renewables. **Some concrete actions we'd add:**

- Pro-actively identify key transmission and distribution upgrades, improvements, and new line construction needed to deliver renewable energy across the state and maximize the retirement of fossil fired resources
- Approach interconnection with an intelligent, justice oriented lens:
 - Adopt PSC regulations to allow for advanced metering to enable cost effective and time efficient solar interconnection options
 - Work with CBO's to tailor regulatory changes in favor of community led clean energy projects and ensure they are sufficiently resourced to engage
 - Subsidize community led solar projects for customer side upgrades and equipment and exempt them from all utility side interconnection costs
 - Subsidize offshore wind interconnection upgrades, as placing the cost burden entirely on the industry may delay CLCPA mandated deployment targets
 - Study grid vulnerabilities in DACs and prioritize improvements in those areas

FACT SHEET

OFFSHORE WIND IN NEW YORK STATE



Offshore Wind is Ready to Power New York



Growth of Large-Scale Renewable Energy Generation, Siting, and Community Acceptance

We suggest the following actions:

- Balance approach of large-scale renewables with significant investment and technical support for DACs to develop behind the meter microgrids
- Launch statewide public education campaign to inform New Yorkers about the climate crisis and benefits of shifting to a clean economy.



• **We support** the recommendations to:

- Incentivize local climate resilience HUBs
- Fund non-profits and CBOs to conduct community outreach
- Expand and streamline customer incentives for EE, including funding for customers based on utility payment history instead of credit scores
- Ensure community benefits and avoided costs are tracked in dollar amounts, and the value of the cumulative health benefits of clean power is quantified

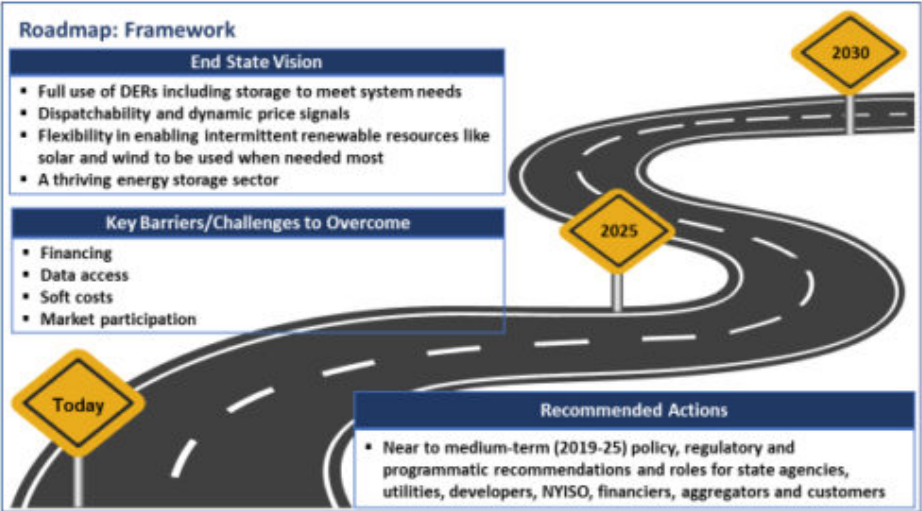
Existing Storage Technology

We support:

- Updating the State’s energy storage roadmap, as soon as practicable, to update and revise storage deployment goals recognizing the substantially higher requirements identified in the power grid study of 15GW by 2030
- a) The recommendation to provide increased funding for energy storage deployment
- b) The recommendation to initiate a new docket, ideally before year end 2021, that establishes new mandated yearly energy storage targets increasing to an overall statewide storage target of 15GW by 2030, and mandates funding and financing mechanisms similar to the clean energy standard for storage.



Storage to protect DACs where the resilience need is much higher should be prioritized!



- **The transition away from gas infrastructure is a strong recommendation by the PG panel!** It should include a detailed analysis on the cost effective and equitable strategy necessary for this transition to be just.
- The recommended proceeding on GHG reductions for gas utilities concerning transmission and allocation of timelines should prioritize progress in areas in EJ communities where co-pollutants pose a high cumulative burden
- Scrutinize the legitimacy of the concern that phasing out gas infrastructure poses grid reliability risks, as the notion unnecessarily conflicts with achieving crucial short term, foundational emission reductions. Continuing to build out infrastructure on the unfounded premise of reliability makes zero technical and economic sense. It's not necessary and becomes a stranded asset. We must **Ask who pays for this and benefits from it?**
- Clarify what the recommendation on supporting DEC efforts means- If this refers to existing processes, that should be explicit, and expressed as a recommendation
- The Abandoned Wells approach should be more thoughtful.
 - Public funds should be used as a last resort to cap wells as it drains resources from investments that could made in transitioning DACs to clean energy
 - Consider ways the oil and gas industry can 'adopt a well' in their service territory or otherwise contribute to reducing emissions from the sources.

Phase Out Natural Gas



Integration Analysis

Timeline

	2021												2022	Post-2022		
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	... > Dec			
Climate Action Council Mtgs	■	■		■	■	■	■	■	■	■	■	■	■	■	■	
Advisory Panels & Working Groups (Climate Justice, Just Transition)																
Climate Action Council																

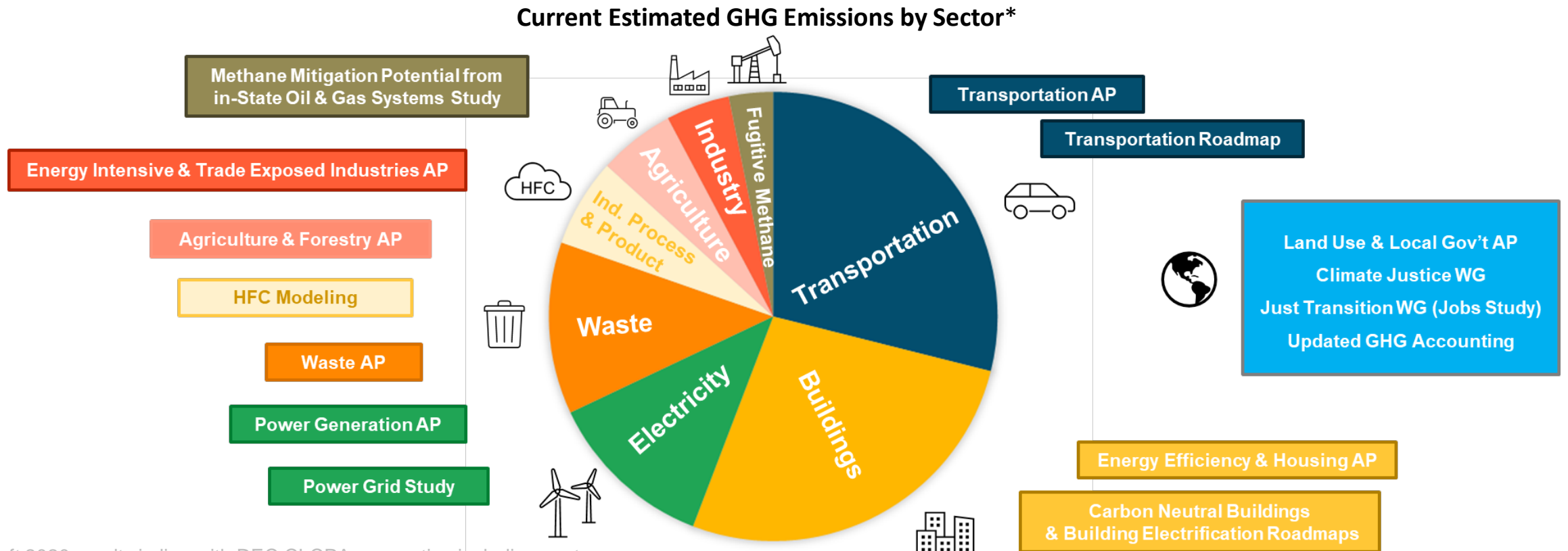
- > Advisory Panels and Working Groups develop recommendations, which support CAC input into scenario planning
- > Pathways modeling framework is core toolset, supported by complementary analyses
- > Provide scenarios from draft integration analysis to CAC

Integration Analysis

- > Integration Analysis Process
- > Current Draft GHG Emissions
- > Draft Reference Case
- > Initial “Test Run” Mitigation Scenario
- > Mitigation Scenario Planning

Integration Analysis Process

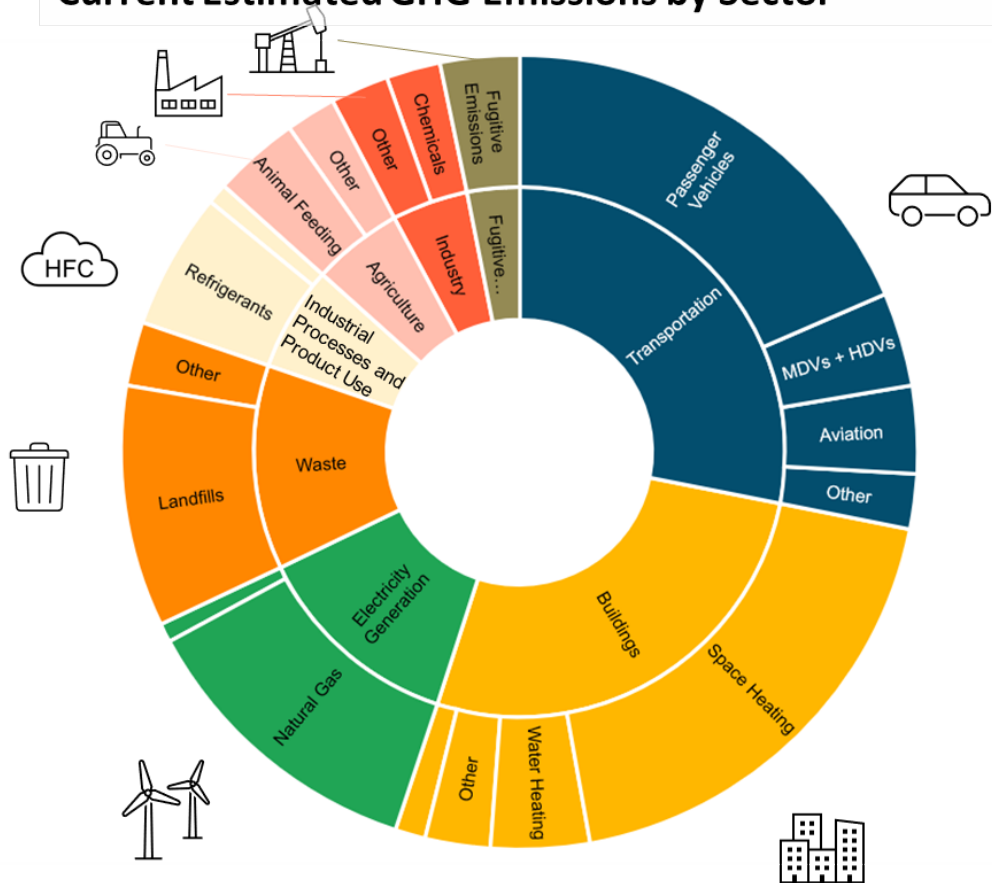
Integration analysis incorporates insights and recommendations from Advisory Panels, Working Groups, and complementary studies



*Draft 2020 results in line with DEC CLCPA accounting including upstream emission factors, 20-year GWP, and estimates from NY PATHWAYS

Current Emissions by Sector and Subsector

Current Estimated GHG Emissions by Sector*



- > Current estimated emissions are based on DEC's draft methodology and CLCPA requirements
- > Buildings and transportation account for just over half of statewide gross GHG emissions
- > Combined with electricity generation and waste, those four sectors account for over 75% of emissions.
 - Waste is now a more significant sector with incorporation of 20-year global warming potential

*Draft 2020 results in line with DEC CLCPA accounting including upstream emission factors, 20-year GWP, and estimates from NY PATHWAYS

Greenhouse Gas Accounting

- > Many states and the federal government account for GHGs using current IPCC protocol, which advises 100-year year Global Warming Potentials (GWPs) from the IPCC AR4, accounts for biomass (e.g. wood, biodiesel, renewable natural gas) as carbon neutral, and includes direct emission factors.
- > The Climate Act takes a different approach, accounting for pollutants on a 20-year lifetime, including emissions from biogenic CO₂, and including impacts of upstream emissions from fossil fuels

- **GWP:** “set greenhouse gases on a common scale using the carbon dioxide equivalence metric (CO₂e) and the 20-year Global Warming Potential (GWP₂₀) of each gas, which the Department derived from the IPCC Fifth Assessment Report (AR5).” [1]
- **Biogenic CO₂:** “On [the basis of gross GHG emissions limits], the carbon dioxide released from the combustion of plant material has the same effect as carbon dioxide emitted from the combustion of fossil fuels;” [2]
- **Upstream emissions:** “include certain emission sources that are located outside of the State borders [...] including emissions associated with imported electricity and fossil fuels.” [3]

Pollutant	20-yr GWP (AR5)	100-yr GWP (AR5)
CO ₂	1	1
CH ₄	84	28
N ₂ O	264	265

[1] ECL 75-0101(2). https://www.dec.ny.gov/docs/administration_pdf/revisedris496.pdf

[2] ECL 75-0107. https://www.dec.ny.gov/docs/administration_pdf/pubcomment496.pdf

[3] ECL 75-0101(13). https://www.dec.ny.gov/docs/administration_pdf/revisedris496.pdf

GHG Accounting: Impact to Fuels

- > Under the prior IPCC accounting, renewable fuels acted as net-zero replacements of fossil equivalents. Under the updated CLCPA accounting, a renewable fuel can only avoid roughly 20%-40% of a fossil fuel's emissions because it only avoids the upstream emissions associated with the fuel.

	June 2020 Accounting [1]	Draft CLCPA Accounting [2]
	Emission factor, lbs/mmbtu CO2e (100-yr GWP, combustion emissions only)	Emission factor, lbs/mmbtu CO2e (20-yr GWP, upstream emissions included)
Natural Gas	117	182-215 *
<i>Renewable Natural Gas</i>	~0	117
Distillate Fuel	163	219
<i>Renewable Diesel</i>	~0	163
Gasoline	160	227
<i>Renewable Gasoline</i>	~0	160
Jet Fuel	161	204
<i>Renewable Jet Fuel</i>	~0	161

[1] Although CO2 emissions from biogenic fuels were counted as 0 in prior analysis, emissions were *near-zero* on a CO2e basis due to small direct impacts from CH4 and N2O

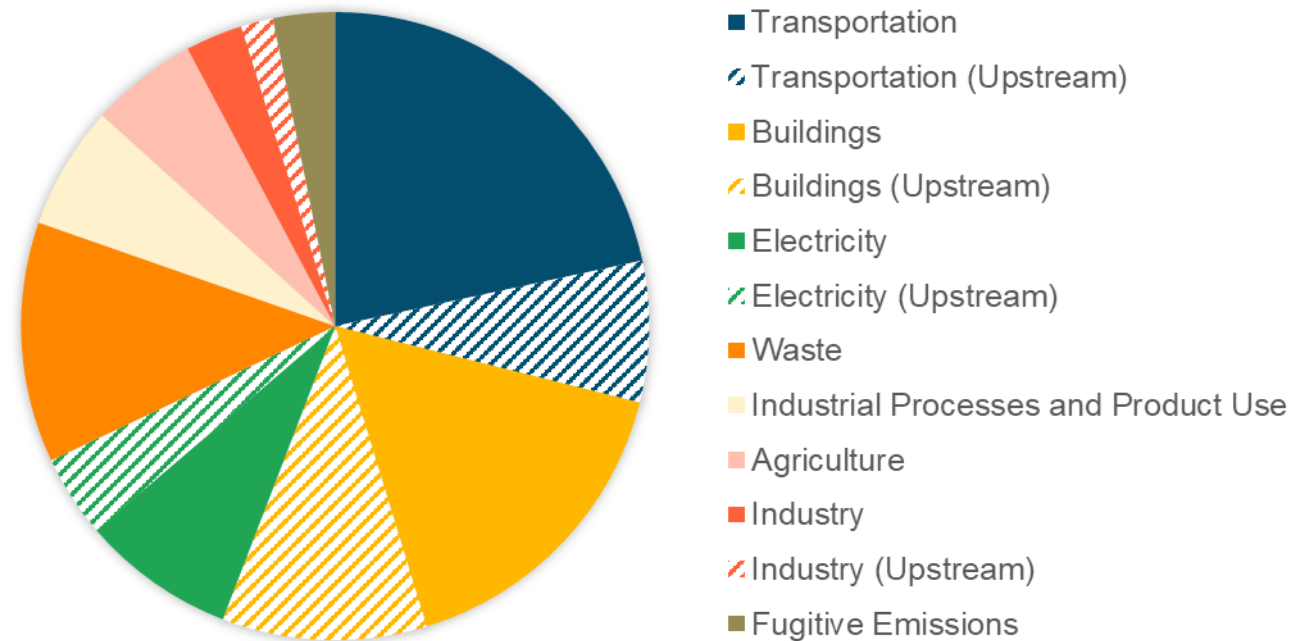
[2] Data based on "Upstream Fuel Cycle Emission Approaches and Sensitivities" (https://www.dec.ny.gov/docs/administration_pdf/upstreamerg.pdf) and CLCPA Integration Analysis Draft Input Assumptions Workbook, with E3 draft assumptions for how to treat bioenergy accounting for the CLCPA

* Note that emissions from in-state natural gas infrastructure is accounted for separately in the analysis. If added to this calculation, upper range would be 235 lbs/mmbtu CO2e

Role of Upstream Emissions

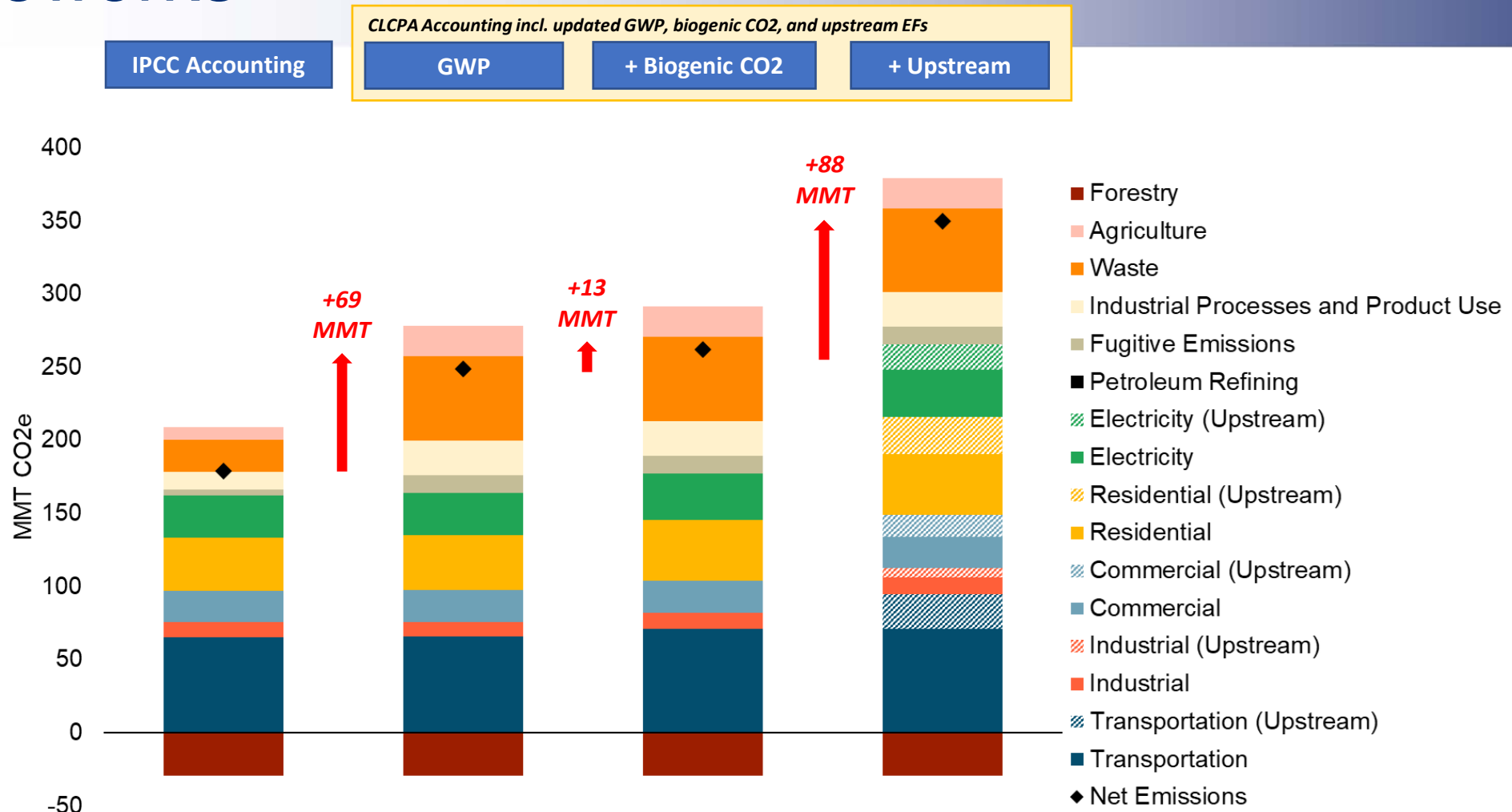
- > Upstream emissions from production and transportation of fossil fuels are large
 - Upstream emissions are around 30-40% of sectoral emissions for buildings, transportation, and electricity generation
- > For primary fossil fuels currently used in New York, around 40-70% of upstream emissions come from fugitive methane, so the switch to 20-year from 100-year GWP has significant impact on total energy emissions

Current Estimated GHG Emissions by Sector*



*Draft 2020 results in line with DEC CLCPA accounting including upstream emission factors, 20-year GWP, and estimates from NY PATHWAYS

Current Emissions Under Multiple Accounting Frameworks



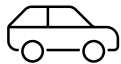
Current emissions are estimated from NY PATHWAYS model year 2020, accounting changes are additive in each bar (e.g. biogenic CO2 also includes GWP changes), GWP changes are AR4 100-yr to AR5 20-yr

Draft Reference Case Definition

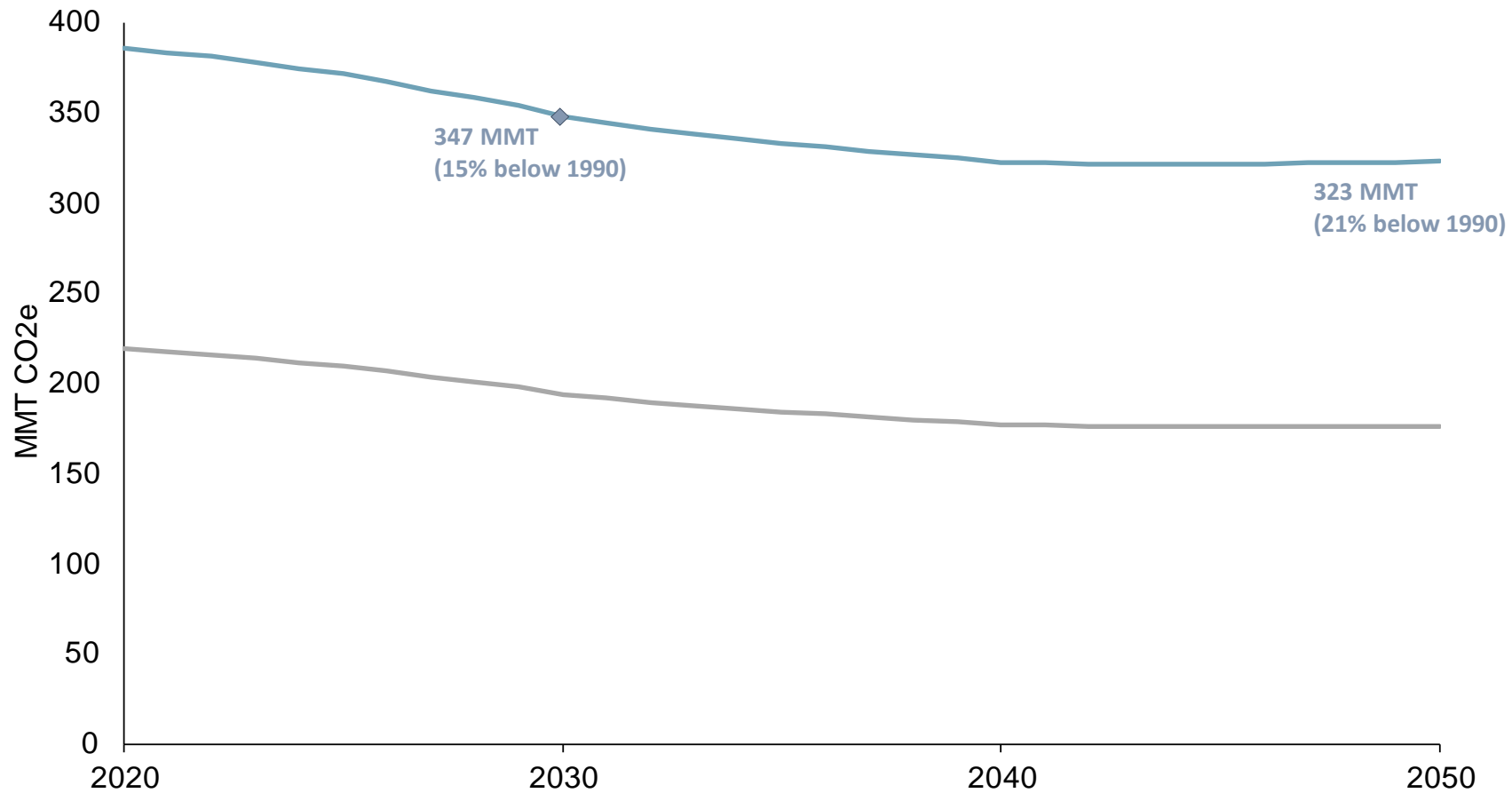
> Integration analysis will evaluate societal costs and benefits of GHG mitigation relative to a reference case [1]

> Reference Case definition: *Business as usual plus implemented policies*

- Growth in housing units, population, commercial square footage, and GDP
- Federal appliance standards
- Economic fuel switching (oil to gas)
- Bioheat mandate
- Estimate of New Efficiency, New York Energy Efficiency achieved by funded programs: HCR+NYPA, DPS (IOUs), LIPA, NYSERDA CEF (assumes market transformation maintains level of efficiency and electrification post-2025)
- Funded building electrification (4% HP stock share by 2030)
- Corporate Average Fuel Economy (CAFE) Standards
- Zero-emission vehicle mandate (8% LDV ZEV stock share by 2030)
- Clean Energy Standard (70x30)
 - Proxy Tier 4 project is additional
 - Nuclear assets retire at end of 60-yr life



Gross GHG Emissions: Draft Reference Case



CLCPA Draft Accounting

CLCPA accounting includes AR5 20-year GWP potentials, Biogenic CO₂, and upstream emission factors

IPCC Accounting (June 2020 method)

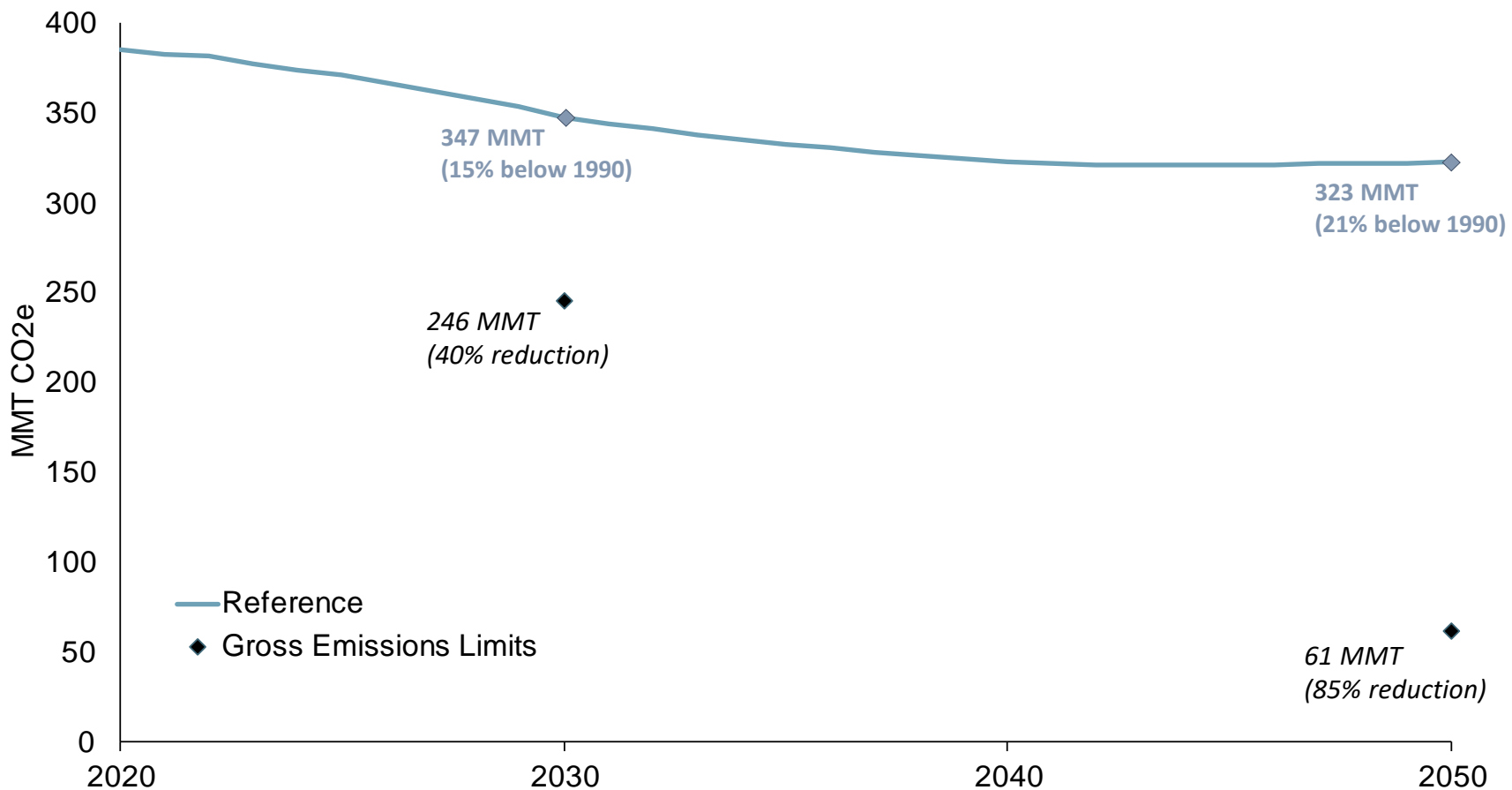
IPCC accounting includes AR4 100-year GWP potentials, non-biogenic CO₂*, and direct emission factors

Gross GHG Emissions
2020 is a modelled year, reflecting historical trends

**IPCC protocol is designed primarily for national and international inventories, and in this context, biogenic CO₂ emissions are accounted for in global land use*

Gross GHG Emissions: Draft Reference Case

(Draft Climate Act Accounting)



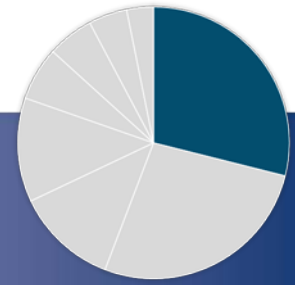
> In draft Reference Case, emissions decline gradually through 2050

- Under IPCC accounting Reference Case achieves 27x30 and 32x50
- Under CLCPA accounting Reference Case achieves 15x30 and 21x50

AR5, 20-year GWP, Gross Emissions

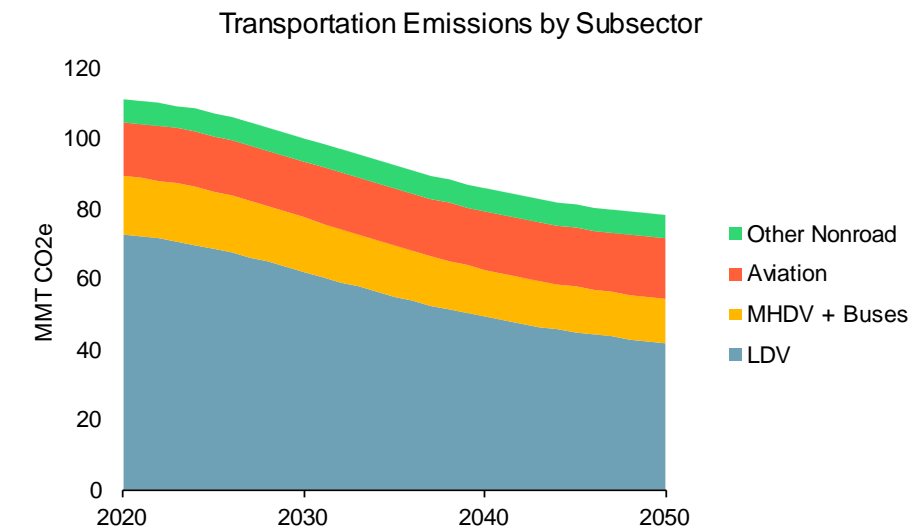
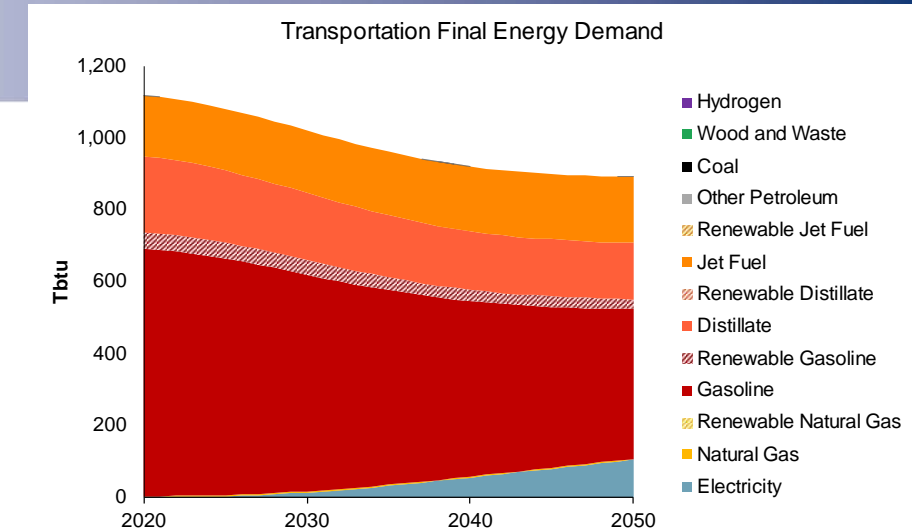
2020 is a modelled year, reflecting historical trends

Transportation – Reference Case



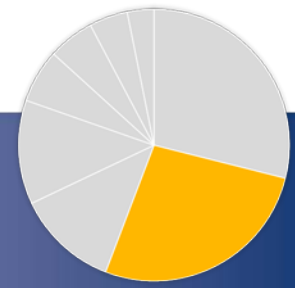
Key Drivers

- > Vehicle ownership and driving patterns drive energy use and emissions
 - The number of vehicles within the state is projected to grow with population (0.19%/year), but vehicle-miles traveled (VMT) is projected to grow more quickly (1.2%/year)
- > Fuel efficiency improvements from Federal CAFE standards reduce gasoline consumption
- > Light duty vehicles start to transition to battery electric technology in line with NY's ZEV mandate and subsequent market adoption
- > As the economy continues to grow, demand for aviation, shipping, rail, and port energy use is projected to increase
- > Reference case achieves significant emissions reductions relative to 1990:
 - 2030: 1% increase relative to 1990
 - 2050: 22% decrease relative to 1990



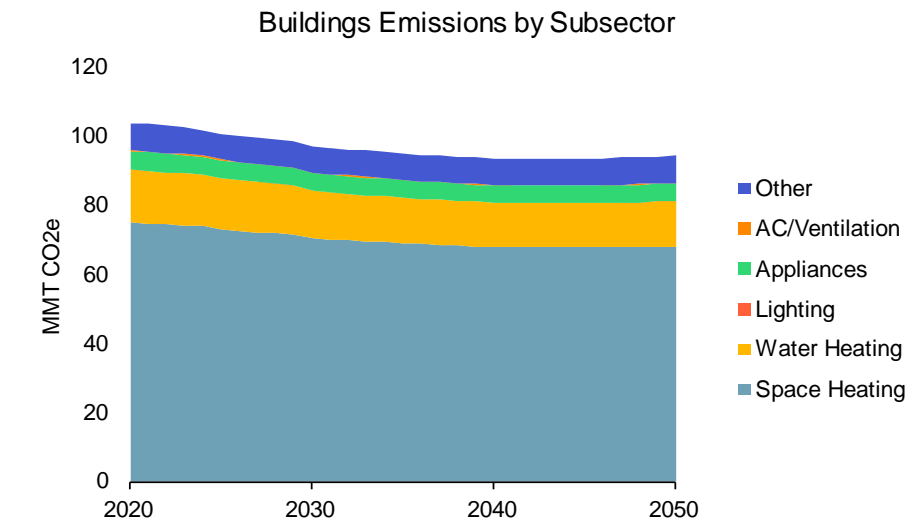
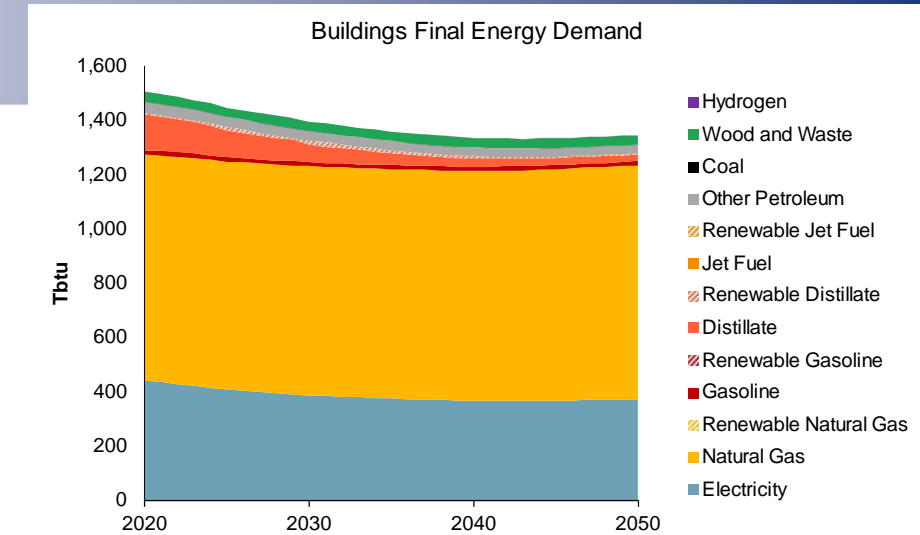
2020 is a modelled year, reflecting historical trends

Buildings – Reference Case



Key Drivers

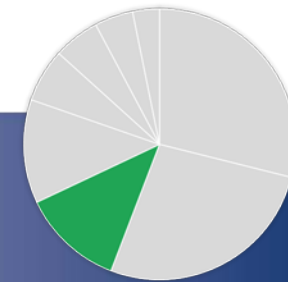
- > Population, household, and commercial growth rates drive energy demand and GHG emissions
- > Appliance efficiency improvements, behavioral conservation, and codes and standards, including:
 - Reference Case includes estimates of funded energy efficiency and electrification programs, including HCR+NYPA, DPS (IOUs), LIPA, NYSEDA CEF (assumes market transformation maintains level of efficiency and electrification post-2025)
 - Existing federal and state appliance codes and standards
- > Reference case achieves significant emissions reductions relative to 1990:
 - 2030: 11%
 - 2050: 19%



HCR = Housing and Community Renewable
 NYPA = New York Power Authority
 DPS = Department of Public Service

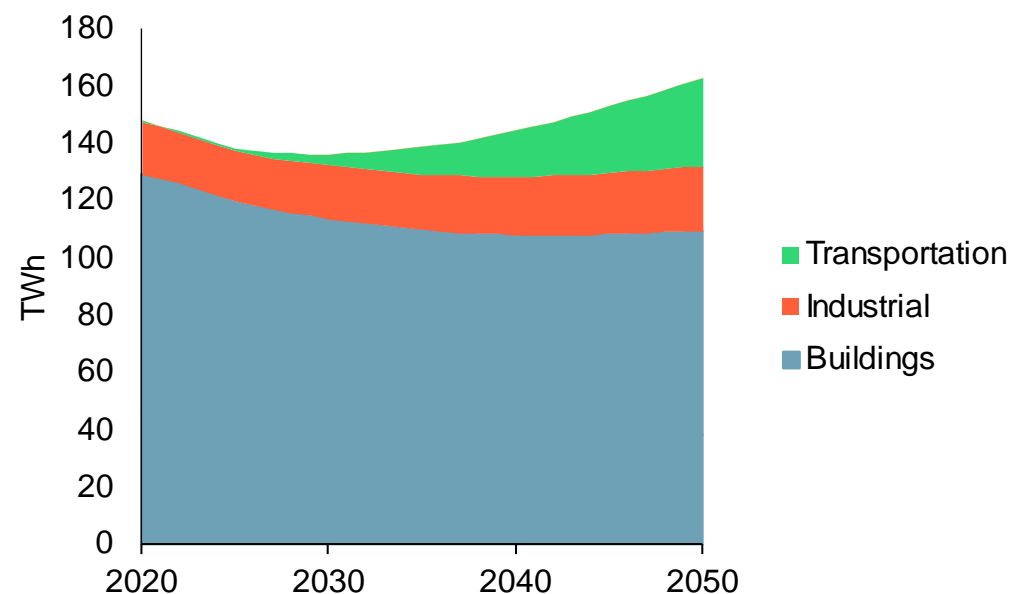
LIPA = Long Island Power Authority
 CEF = Clean Energy Fund

Electricity Generation – Reference Case

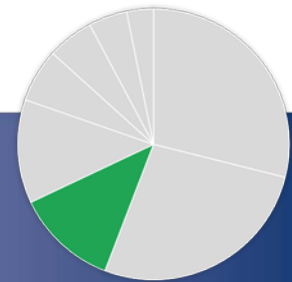


Key Drivers

- > Electric end use loads, built up from buildings, industry, and transportation sectors
 - In the Reference Case loads decline in near term as a result of funded energy efficiency and electrification programs before starting to rise again by 2050
 - ZEV mandate and economic adoption of ZEVs drives increase in transportation loads
- > The Reference Case includes:
 - New York's 70% Clean Energy Standard (CES) by 2030, including technology carve outs:
 - 6 GW of behind-the-meter solar by 2025
 - 3 GW of battery storage by 2030
 - 9 GW of Offshore Wind deployment by 2035
 - Regional Greenhouse Gas Initiative (RGGI)
 - Least cost capacity-expansion and dispatch driven by a renewable resource supply curve and relevant cost assumptions (resource costs, fuel costs, and transmission costs)
 - Indian Point nuclear facility retired in 2020/2021, upstate nuclear facilities retire after 60-year licenses expire

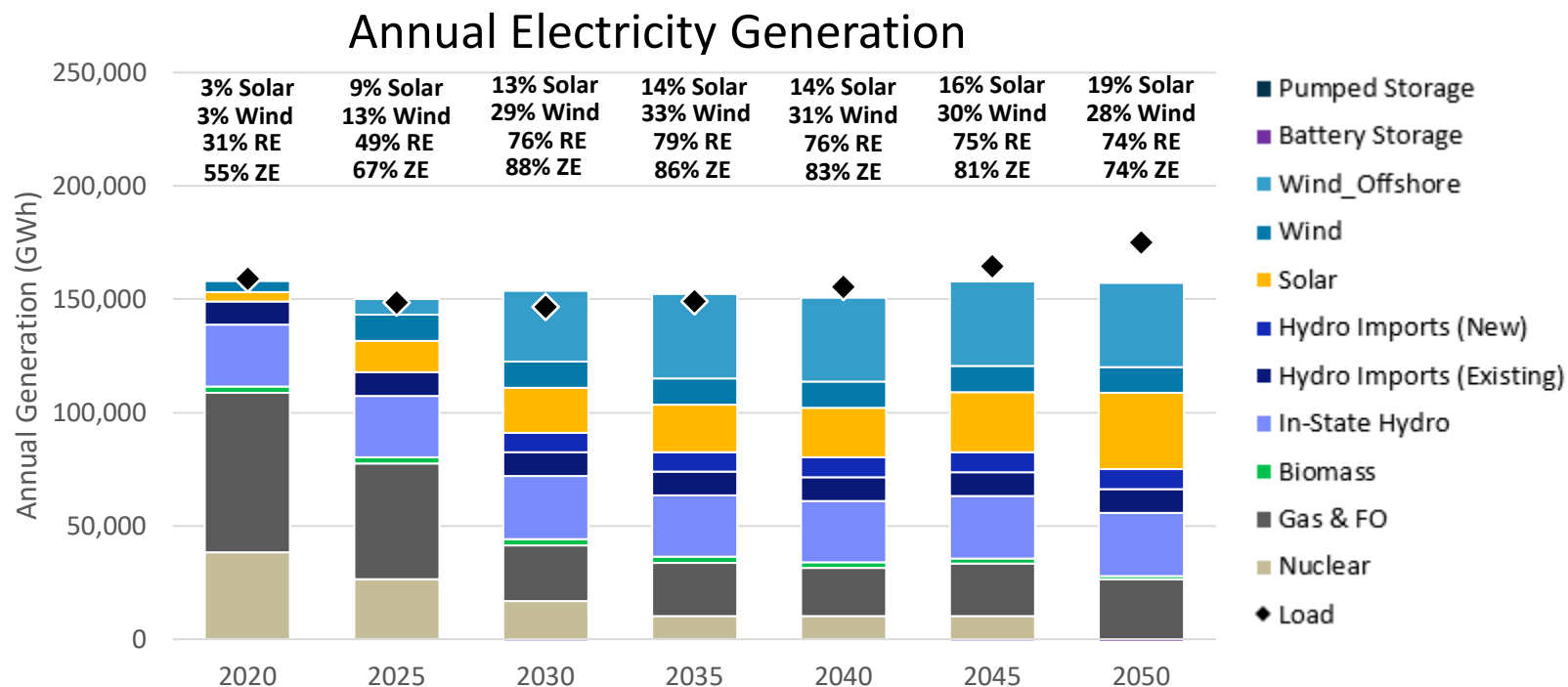


2020 is a modelled year, reflecting historical trends



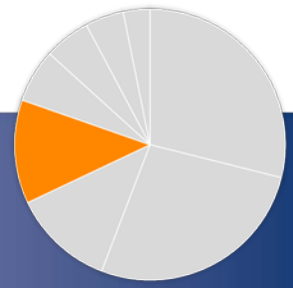
Electricity Generation – Reference Case

- > Incremental 2030 CES needs are met primarily by solar builds and phase-in of OSW procurement (to meet 9 GW goal)
 - 12 GW of solar, 4.4 GW of land-based wind, 7.6 GW of offshore wind online in 2030, combined with 1.25 GW of Tier 4 renewables
- > 8 GW of battery storage is added by 2050 to meet capacity needs and provide renewables balancing
- > NYS grid is approximately 90% zero-emission in 2030



2020 is a modelled year, reflecting historical trends

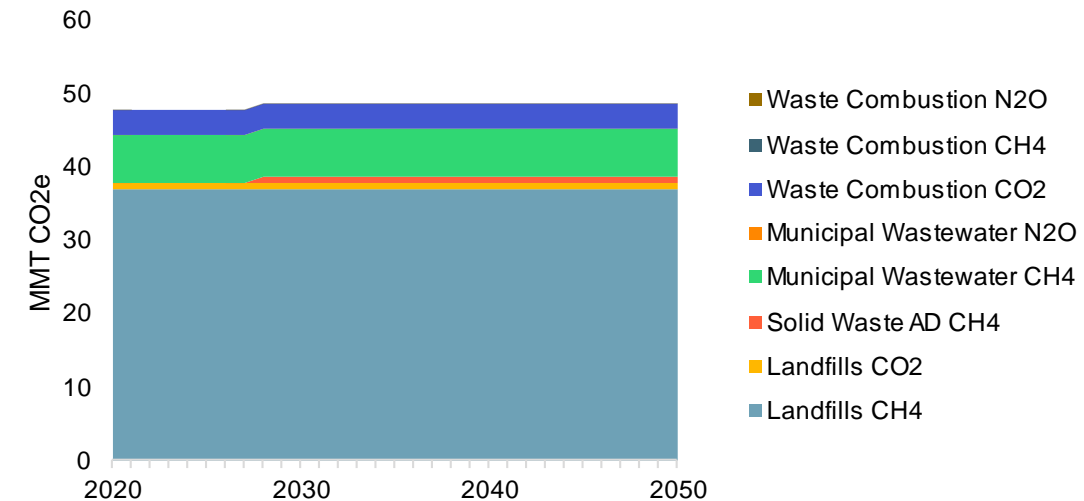
Waste – Reference Case



Key Drivers

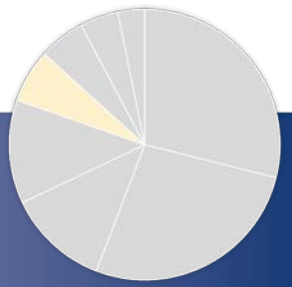
- > Historical trends and population growth rates drive landfill and wastewater emissions
 - EPA SIT Projection Tool utilized, with 0.02% EPA recommended annual reduction of MSW.
 - Continuation of trends to expand anaerobic digesters, but with no additional leakage control and no additional food waste management
 - Waste combustion held constant
- > Reference case achieves moderate emissions reductions relative to 1990:
 - 2030: 8%
 - 2050: 8%

Waste Emissions by Source and Gas



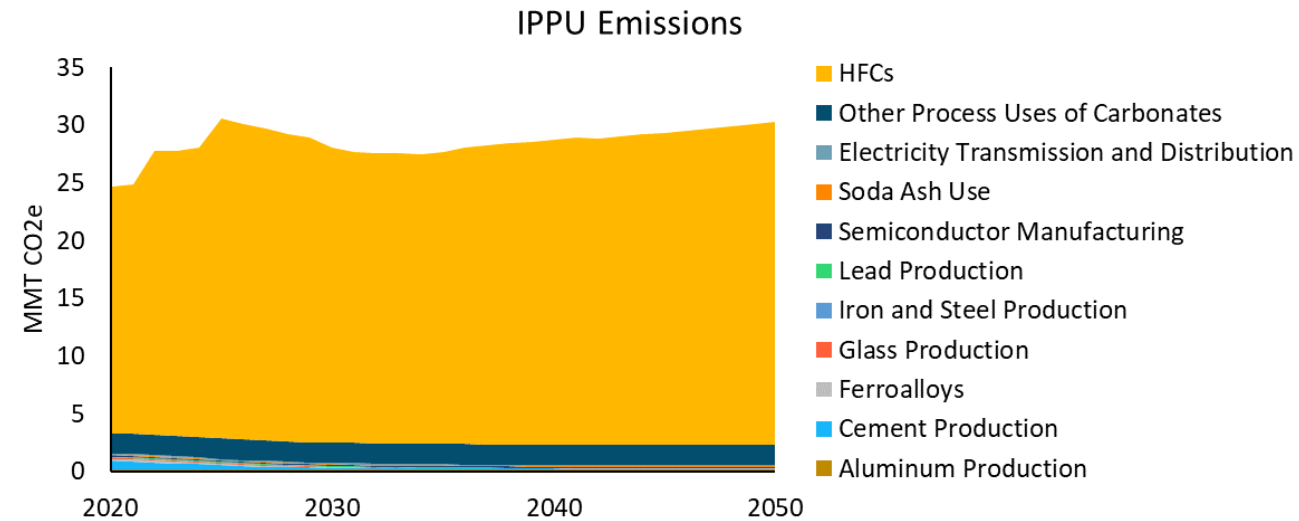
2020 is a modelled year, reflecting historical trends

Industrial Processes and Product Use – Reference Case (IPPU)

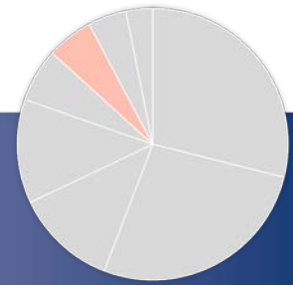


Key Drivers

- > IPPU emissions are dominated by high-GWP HFCs
 - HFC emissions have grown from near zero in 1990 to over 20 MMT in 2020, driven by the replacement of ozone-depleting substances with HFCs
- > Overall IPPU emissions increase by 2050, with an increase in HFC emissions driven by sales of HVAC equipment outweighing small reductions in emissions from the production of cement, ferroalloys, glass, iron, and steel
- > Due to significant HFC emissions growth since 1990, reference case has significant emissions growth relative to 1990:
 - 2030: 940% increase
 - 2050: 1070% increase



Agriculture, Forestry, and Other Land Use – Reference Case (AFOLU)



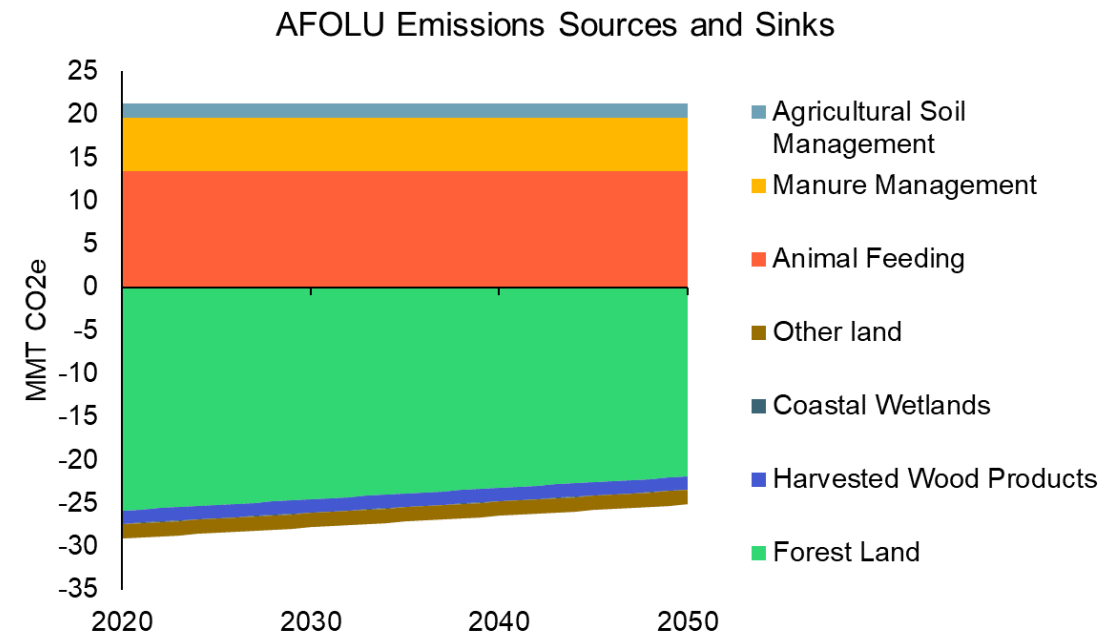
Pie chart shows positive AFOLU emissions only

AFOLU includes emissions sources from Agriculture and emissions sinks from Forestry

Key Drivers

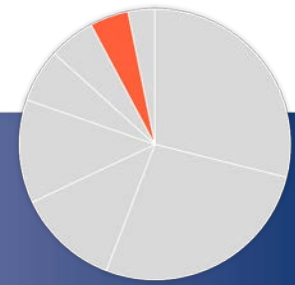
- > Declining forest carbon sequestration following historical trends
- > Maintenance of current agriculture practices in animal feeding, manure management, and soil management
- > Agriculture emissions increase relative to 1990:
 - 2030: 23%
 - 2050: 23%
- > Net sequestration from lands and forests decreases relative to 1990
 - 2030: 8%
 - 2050: 17%

Note that forestry and other land sinks do not contribute to 40% or 85% direct emissions reduction limits



2020 is a modelled year, reflecting historical trends

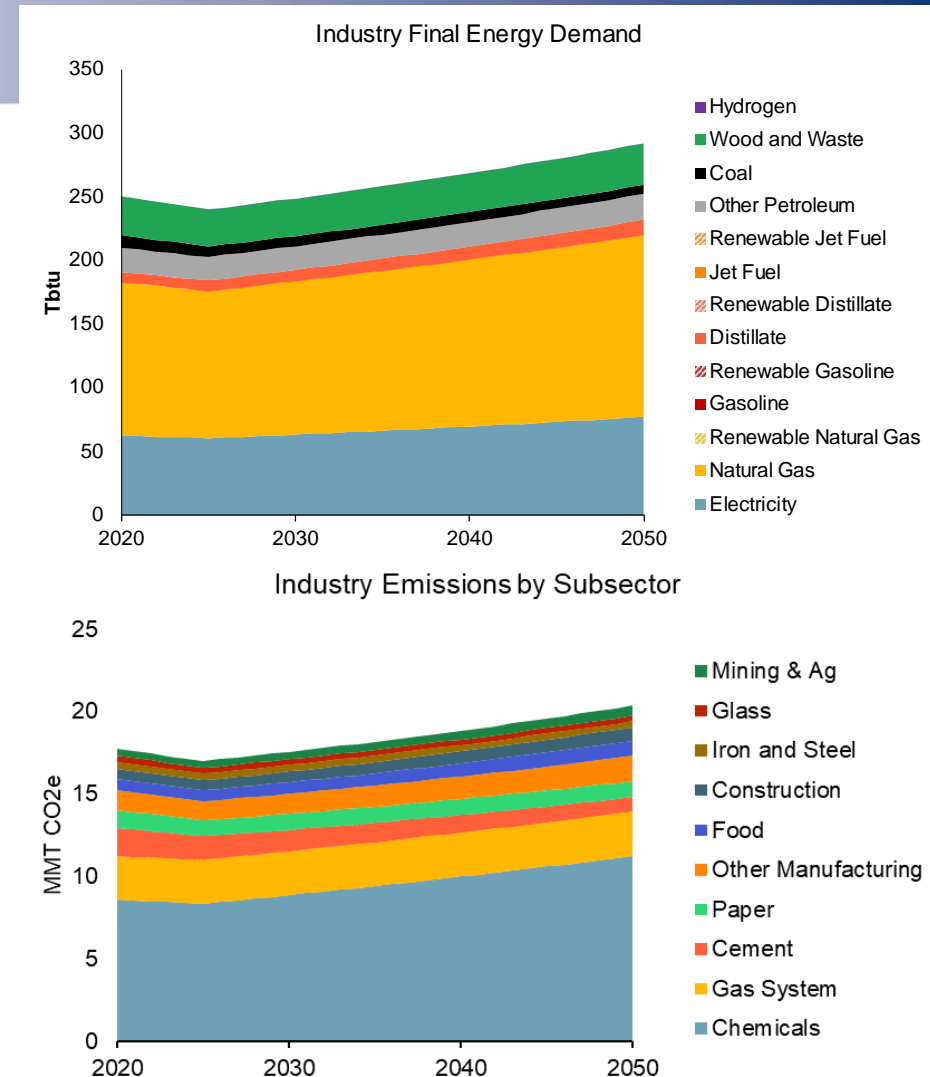
Industry Energy – Reference Case



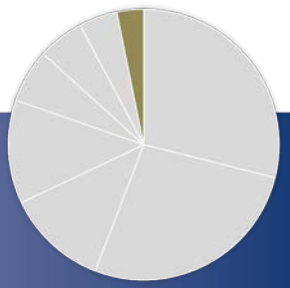
Key Drivers

- > Industrial growth rates per subsector match those from EIA Annual Energy Outlook
 - For example, the chemicals manufacturing subsector (the largest industrial subsector in New York) has an energy demand growth rate of 1.2%
- > Efficiency improvements, codes and standards
 - Includes estimate of economic energy efficiency achieved by 2025 in Reference case, and held persistent through 2050
- > Reference case achieves significant emissions reductions relative to 1990:
 - 2030: 44%
 - 2050: 34%

*Relative to 1990, including upstream emissions



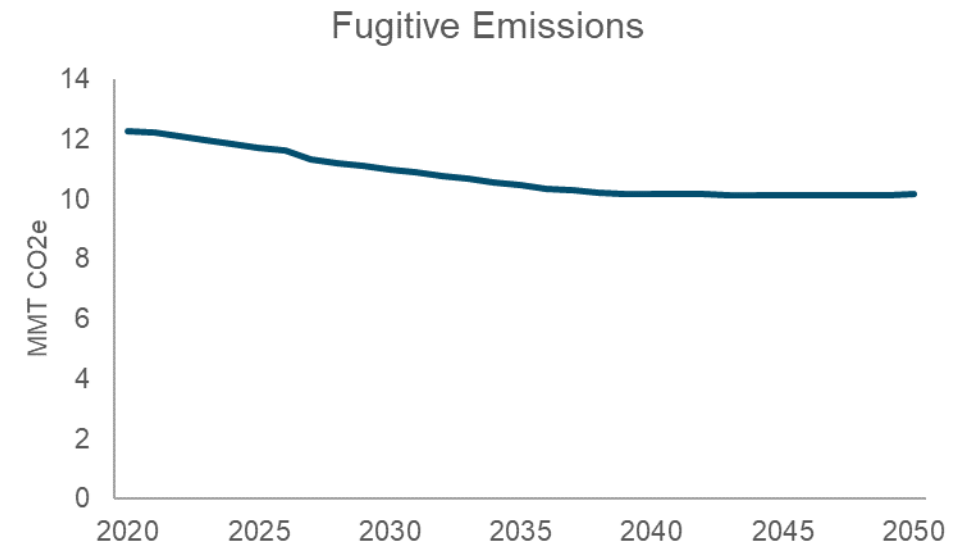
2020 is a modelled year, reflecting historical trends



In-State Oil & Gas Fugitive Emissions – Reference Case

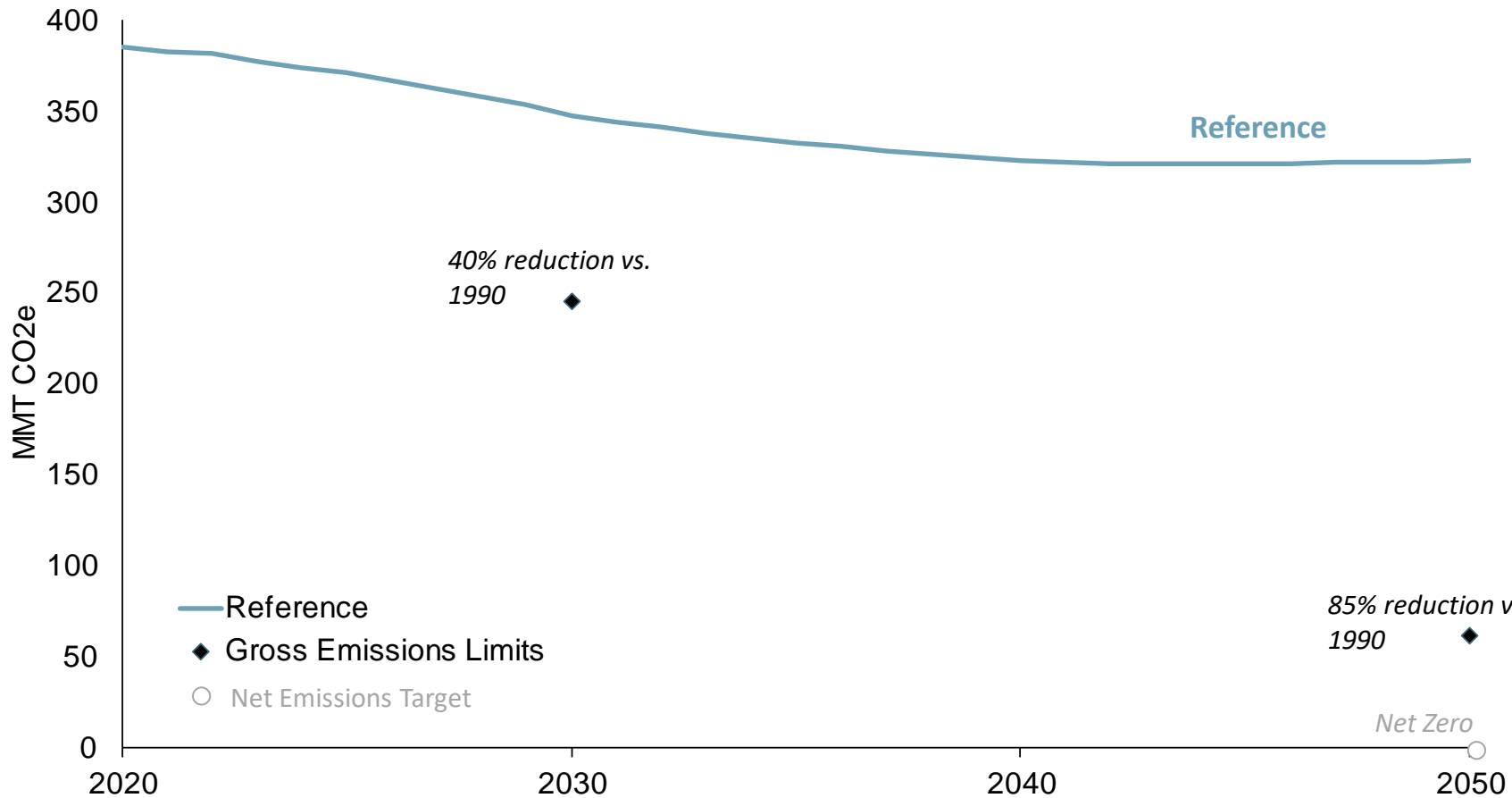
Key Drivers

- > Fugitive emissions are driven by existing oil and gas infrastructure in the state
- > Majority of emissions are from low-producing natural gas wells, transmission and storage compressor stations, steel and cast-iron pipes in the distribution system, and buildings (meters and beyond-the-meter)
- > Leaks from the oil and gas distribution system are aligned with modeled natural gas service provision in buildings and industry
- > Change over time in fugitive emissions reflect decreasing natural gas production and replacement of steel and cast-iron distribution pipes with plastic pipes
- > Reference case achieves significant emissions reductions relative to 1990:
 - 2030: 29%
 - 2050: 34%



2020 is a modelled year, reflecting historical trends

Interconnected 2050 Limit & Target



AR5, 20-year GWP, Gross Emissions

2020 is a modelled year, reflecting historical trends

Goal #1: Minimum of 85% reduction in direct emissions by 2050

- Key measures: efficiency, electrification, zero-emissions electricity, low-carbon fuels, improvements in waste and agriculture practices, climate-friendly refrigerants

Goal #2: Carbon Neutral by 2050

- Key measures: additional direct reductions, natural and working lands sequestration, negative emissions technologies (NETs)

CAC Advisory Panel Recommendations

Highlights for Integration Analysis

> Energy Efficiency and Housing

- Adopt regulations that phase out fossil fuel use in buildings
- Advance a managed, phased, and just transition from reliance on fossil gas and the gas distribution system to a clean energy system
- Advance a managed and just transition from reliance on HFC use as refrigerants and in all products used in construction

> Transportation

- Transition to 100% zero-emission LDV sales
- Transition to zero-emission MHDV and non-road vehicles
- Enhance public transportation and mobility
- Implement clean fuel standard

> Energy Intensive and Trade Exposed Industries

- Provide financial incentives and technical assistance for the decarbonization of EITE sectors
- Create procurement incentives for business to capitalize on low-carbon economic opportunities

> Power Generation

- Accelerate deployment of renewable energy systems in line with CES, including exploring role for long-duration storage technologies
- Strategically phase out fossil-fuel fired baseline and peaking generation

> Agriculture and Forestry

- Pursue agriculture initiatives related to soil health, nutrient management, alternative manure management, and precision feed and herd management
- Pursue forestry initiatives related to agroforestry, avoided forest conversion, sustainable forest management, afforestation, and urban forestry

> Waste

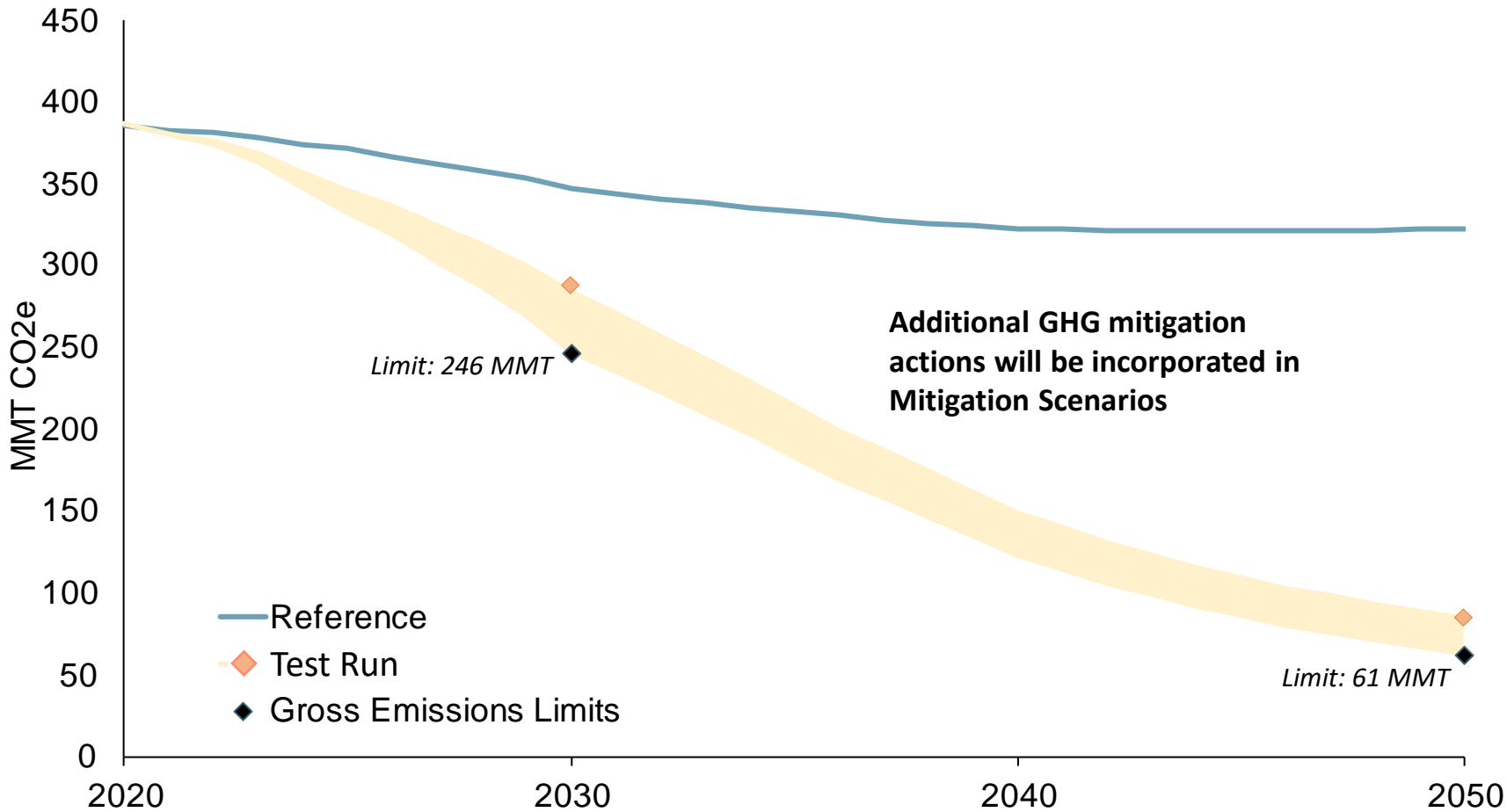
- Reduce the combustion and landfilling of organics
- Identify and reduce fugitive emissions of methane from landfills and anaerobic digesters
- Determine limited and strategic best uses for energy produced from biogas/RNG derived from organic waste

Initial Mitigation Test Run

- > An initial “test run” mitigation scenario was developed based on the CAC Advisory Panel recommendations, with initial assumptions on mitigation measures, including:
 - Rapid adoption of electric vehicles
 - Critical role for smart growth, transit, and telework
 - Rapid building electrification
 - 100% zero-emissions electricity by 2040
 - Ambitious reductions in emissions from refrigerants, agriculture, waste, and fugitive emissions
- > **Emissions deeply decline in this scenario but fall short of GHG limits**

Gross GHG Emissions - Initial Mitigation Test Run

(Draft Climate Act Accounting)



> Mitigation Test Run emissions deeply decline but fall short of limits

- Under CLCPA accounting achieves **31x30**
- Under IPCC accounting achieves **39x30**

AR5, 20-year GWP, Gross Emissions

2020 is a modelled year, reflecting historical trends

2020 is a modelled year, reflecting historical trends

Mitigation Scenario Planning

- > Scenarios will build from AP recommendations and explore additional measures to achieve Climate Act decarbonization goals
- > Sensitivity analysis will capture range of uncertainty in cost, technology mix, innovation, and federal policy

Key Scenario Parameters

- Level of smart growth, expanded transit, remote work policies (VMT reduction)
- Pace of end-of-life replacement and early retirement of equipment and infrastructure with alternatives
- Levels of efficiency and electrification in buildings, transportation, and industry
- Availability of bioenergy/low-carbon fuels
- Role of hydrogen
- Level of methane emissions mitigation from waste, agriculture, and oil and gas systems
- Role of negative emissions technologies

Planned Sensitivity Analysis

- Range of fuel costs and technology costs to capture uncertainty
- Innovation making new technologies available sooner and at lower cost
- Electric sector sensitivities (land use constraints, technology mix, long-duration storage solutions)
- Mix of heat pump deployments and flexible load options to test peak impacts
- Cost of capital
- Federal policies and standards

Scenario Planning – Guiding Questions

- > Additional strategies. Beyond what is specifically recommended by the APs, what measures, solutions, and themes would you like to see these scenarios include and reflect?
 - Sector contributions: Has the new carbon calculations changed the approach to carbon reduction by sector (e.g., waste)?
 - Technology solutions: Should any additional technology solutions be considered?
 - Timing: Should the analysis move beyond natural replacement at end of life and examine early retirement of building and transportation equipment?
 - Scope and speed of reductions: To what degree should the IA examine different scope and speed of different initiatives (e.g., vehicle-mile-of-travel reductions through smart growth, transit, and transportation systems innovation)?

Next Steps

Next Steps

August 2021	<u>Speaker Series</u> <ul style="list-style-type: none">Reliability Planning, August 2 @ 1 PM <u>CAC meeting: August 23, 2-5 PM</u> <ul style="list-style-type: none">CJWG inputUpdated Climate Assessment
September 2021	<u>CAC meeting: September 13, 2-5 PM</u> <ul style="list-style-type: none">Integration Analysis presentation and discussion<ul style="list-style-type: none">Initial scenarios results, including emissions reductions with energy transitions and technology evolution assumptionsCJWG input
October 2021	<u>CAC meeting: October 14, 2-5 PM</u> <ul style="list-style-type: none">Integration Analysis presentation and discussion<ul style="list-style-type: none">Final scenarios results, including full benefits and costsCJWG input <u>Scoping Plan</u> <ul style="list-style-type: none">Initial draft Scoping Plan (including draft DAC criteria) provided to CAC members (mid-Oct.)

November 2021	<u>CAC meeting: TBD</u> <ul style="list-style-type: none">Discussion of initial draft Scoping PlanCJWG input <u>Scoping Plan</u> <ul style="list-style-type: none">CAC member feedback on initial draft Scoping Plan (~11/17)Revise draft based on CAC member feedback
December 2021	<u>CAC meeting: TBD</u> <ul style="list-style-type: none">Discussion and action on draft Scoping Plan <u>Scoping Plan</u> <ul style="list-style-type: none">Revised draft Scoping Plan to CAC members (~12/10)
