

#ONENYC

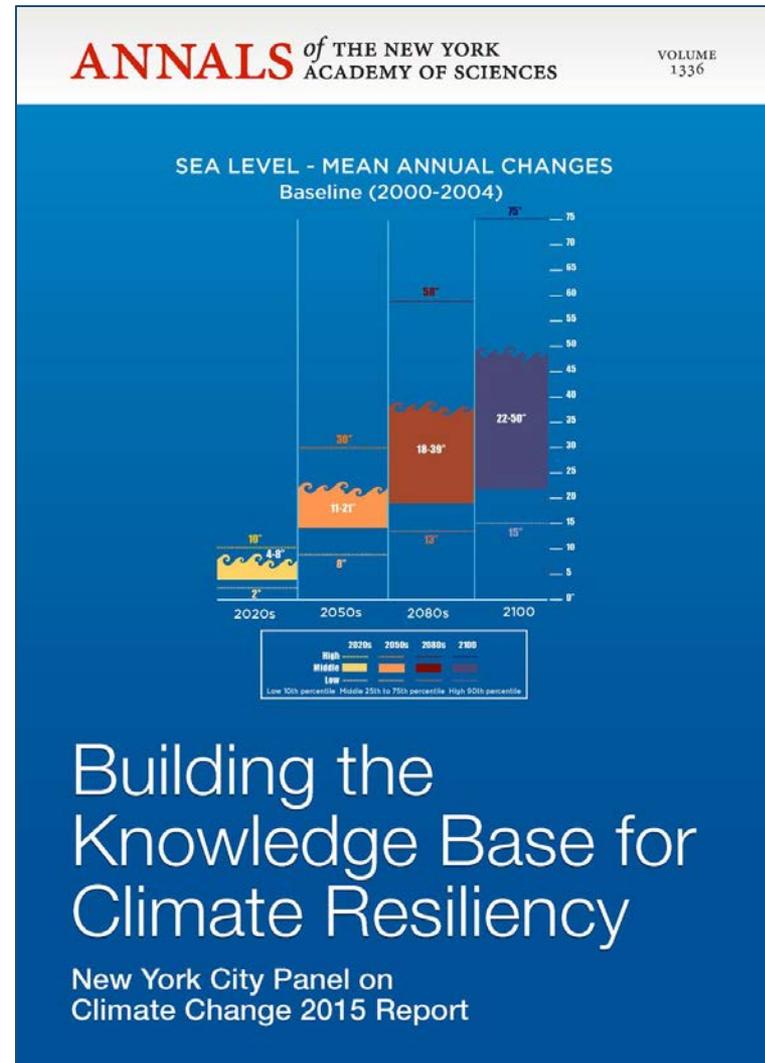
NEW YORK CITY'S ROADMAP TO 80 X 50



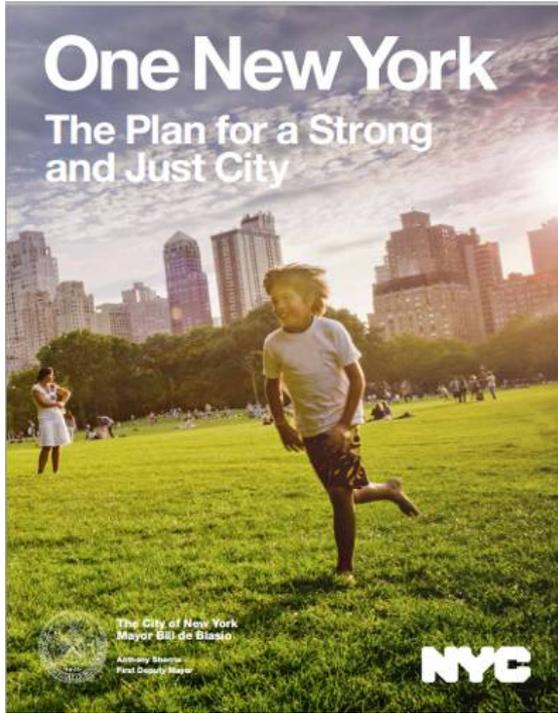
May 24, 2017

Why 80 x 50?

According to the IPCC, developed nations must reduce greenhouse gas emissions 80 percent by 2050 to avoid catastrophic impacts of climate change.



One New York: Four Visions



**Our Growing,
Thriving City**

**Our Just and
Equitable City**

**Our Sustainable
City**

**Our Resilient
City**

The Roadmap to 80 x 50 summarizes integrated analysis across sectors and provides a platform for action



- First-of-its-kind integrated modeling of the city's GHG emissions across four sectors: energy, buildings, transportation, and waste
- Analysis of the trends that will drive future GHG emissions
- Opportunity to align 80x50 investments to achieve expanded job access and economic inclusion

Our Growing,
Thriving City

Our Just and
Equitable City

Our Sustainable
City

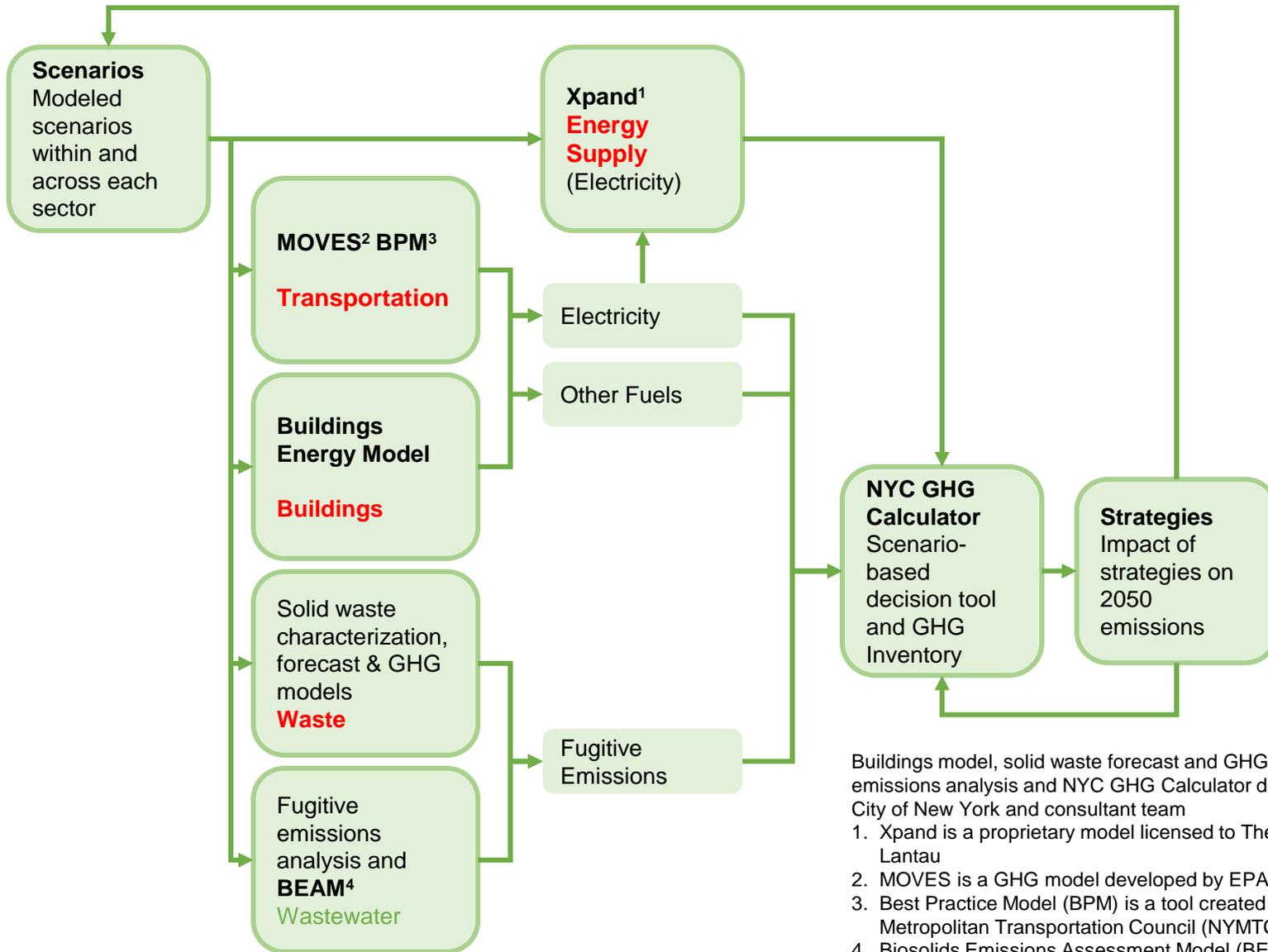
Our Resilient
City



Co- Benefits

- Air Quality
- Job Development
- Quality of Life
- Access
- Equity
- Health and Well Being
- Affordability
- Resiliency
- Innovation

Sector-specific and integrated GHG modeling



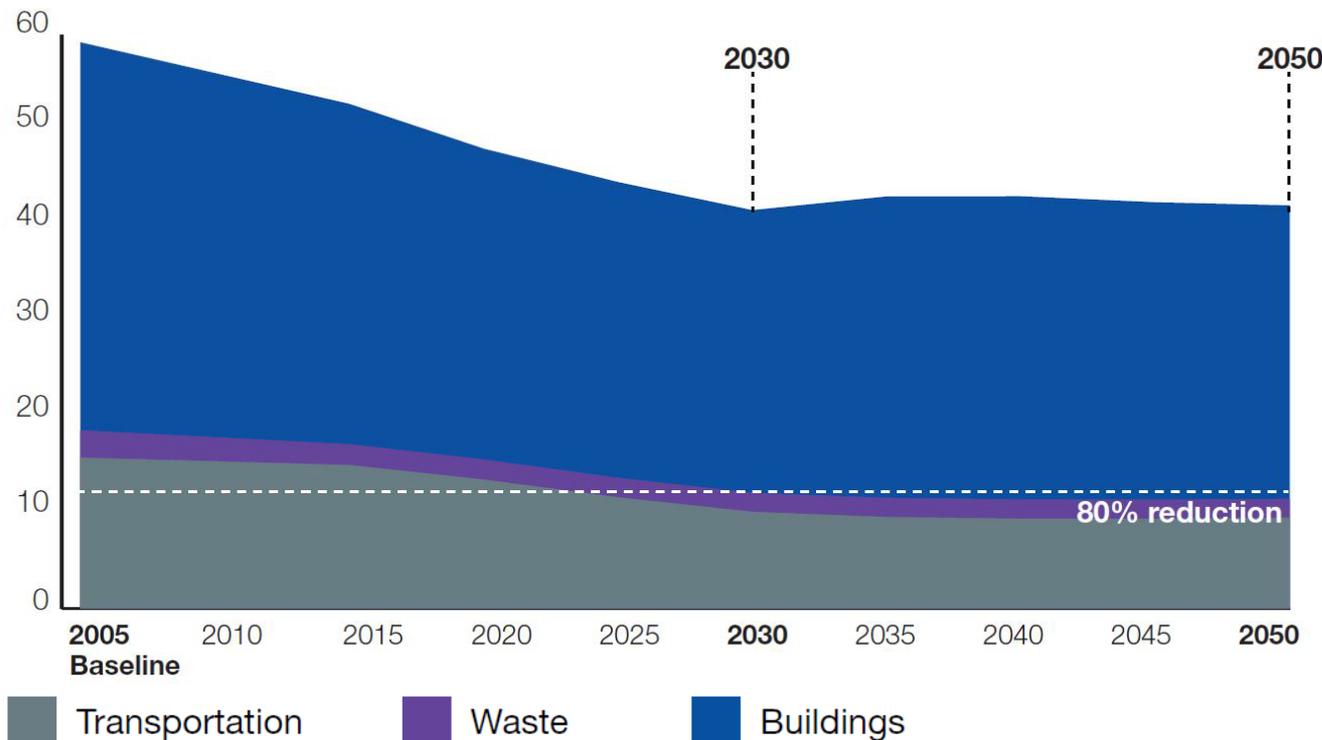
Buildings model, solid waste forecast and GHG model, fugitive emissions analysis and NYC GHG Calculator developed in Excel by City of New York and consultant team

1. Xpand is a proprietary model licensed to The Brattle Group from Lantau
2. MOVES is a GHG model developed by EPA for public use
3. Best Practice Model (BPM) is a tool created by the New York Metropolitan Transportation Council (NYMTC)
4. Biosolids Emissions Assessment Model (BEAM)

One key insight: we can bend the GHG curve with the right actions and investments...

Citywide business as usual projections, in Million Metric Tons of Carbon Dioxide Equivalent (MtCO₂e)

Business as usual would have led to a 30% reduction by 2030



- Observable trends (e.g. population)
- Current state and federal policies
- City policies and investments in place prior to 2014

*GHG emissions from electricity production (Energy) is included in Buildings and Transportation

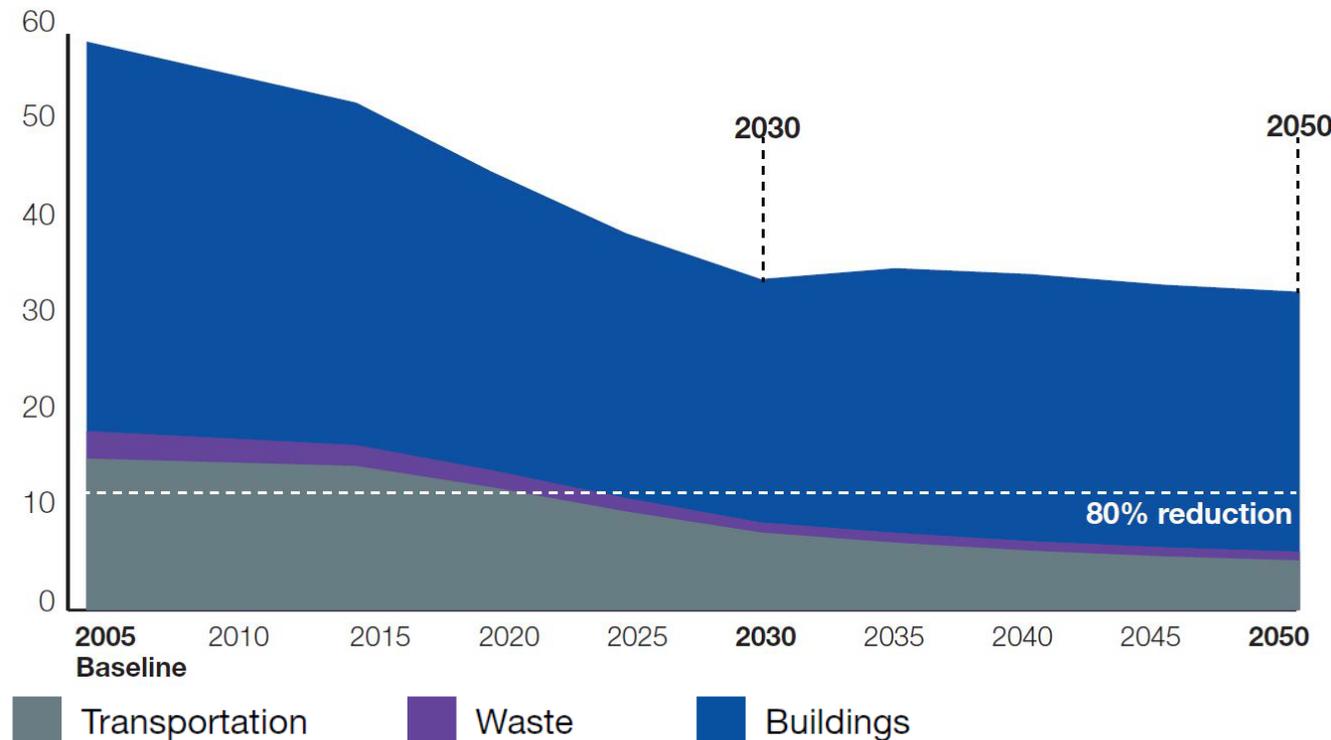
New York City's Roadmap to 80x50, September 2016

One key insight: we can bend the GHG curve with the right actions and investments...

City initiatives since 2014 put us on track for a 40% reduction by 2030 (MtCO₂e)

Recently launched City initiatives since 2014 include:

- One City: Built to Last
- Zero Waste
- NYC Clean Fleet
- DEP: Net Zero Energy Wastewater Treatment Plants
- DOT: Strategic Plan

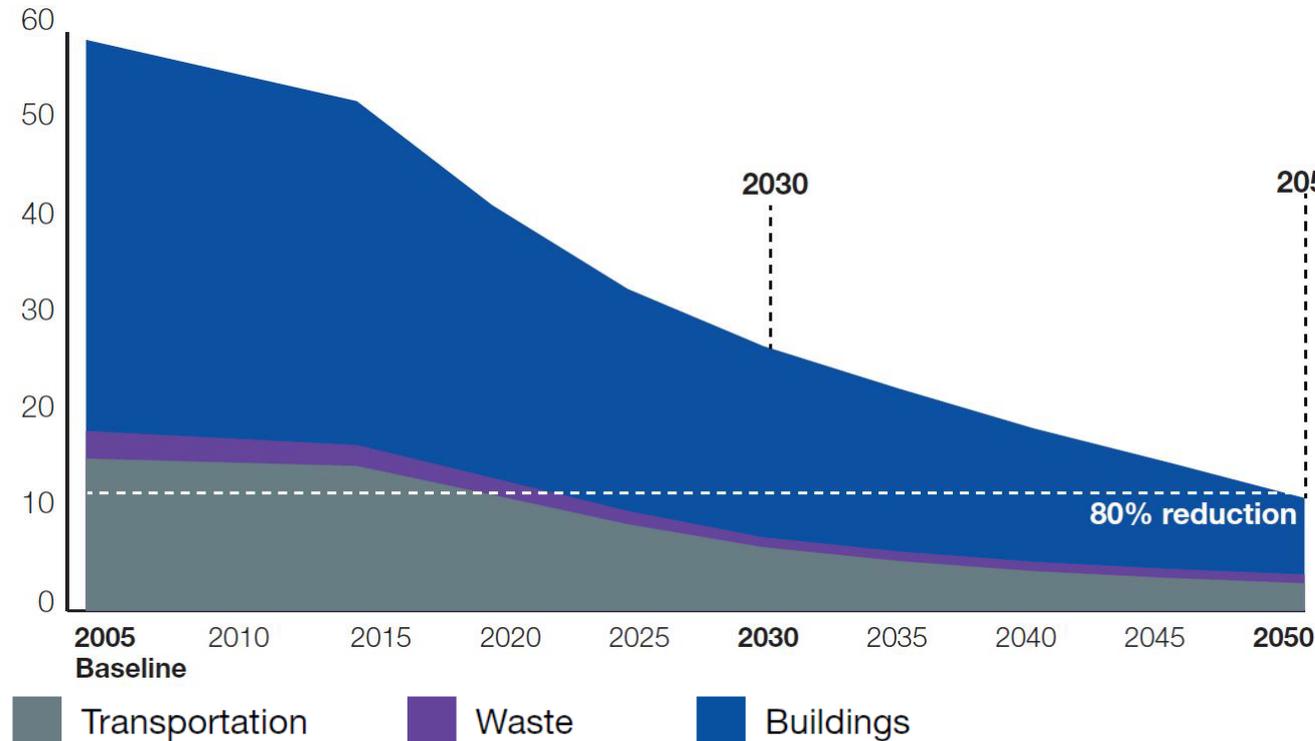


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New York City's Roadmap to 80x50, September 2016

80 x 50 is achievable with today's technologies

80 x 50 Roadmap (MtCO₂e)



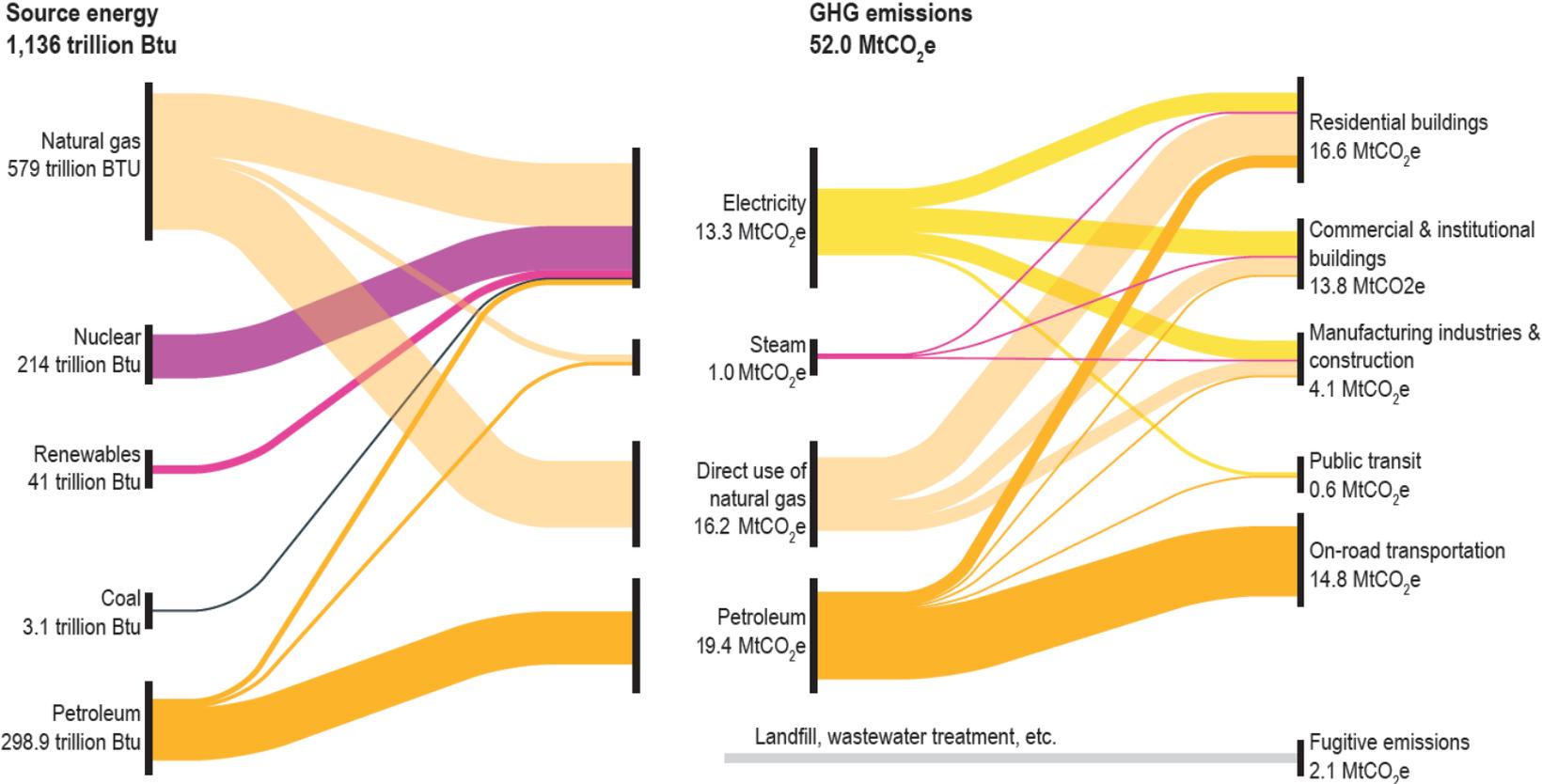
The City must take further action to achieve 80 x 50

- Transition towards a renewables-based electric grid
- Replace fossil fuel based heating and cooling
- Accelerate energy efficiency in buildings and vehicles

*GHG emissions from electricity production (Energy) is included in Buildings and Transportation

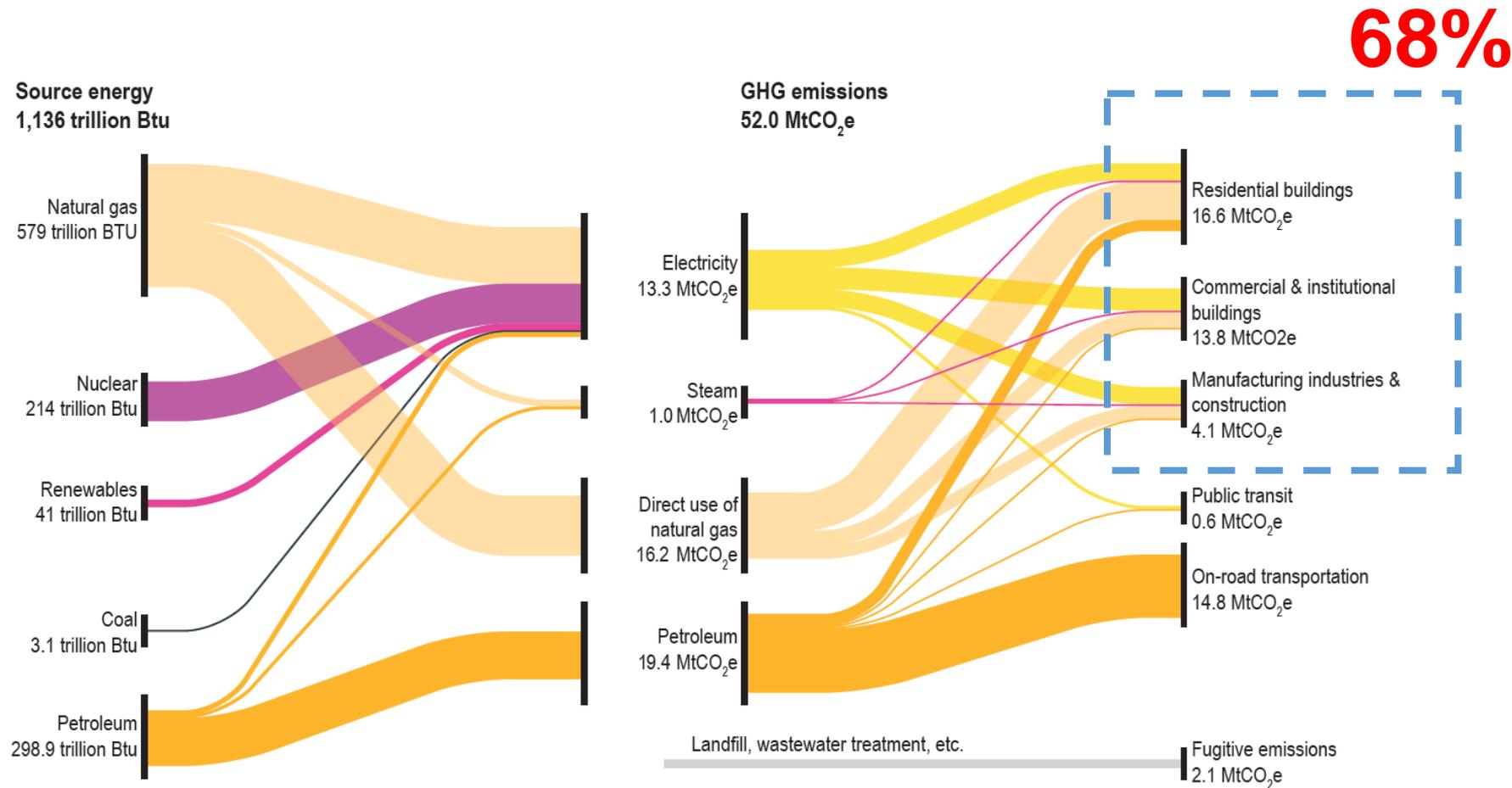
New York City's Roadmap to 80x50, September 2016

Sources and Magnitude of NYC's GHG Emissions in 2015



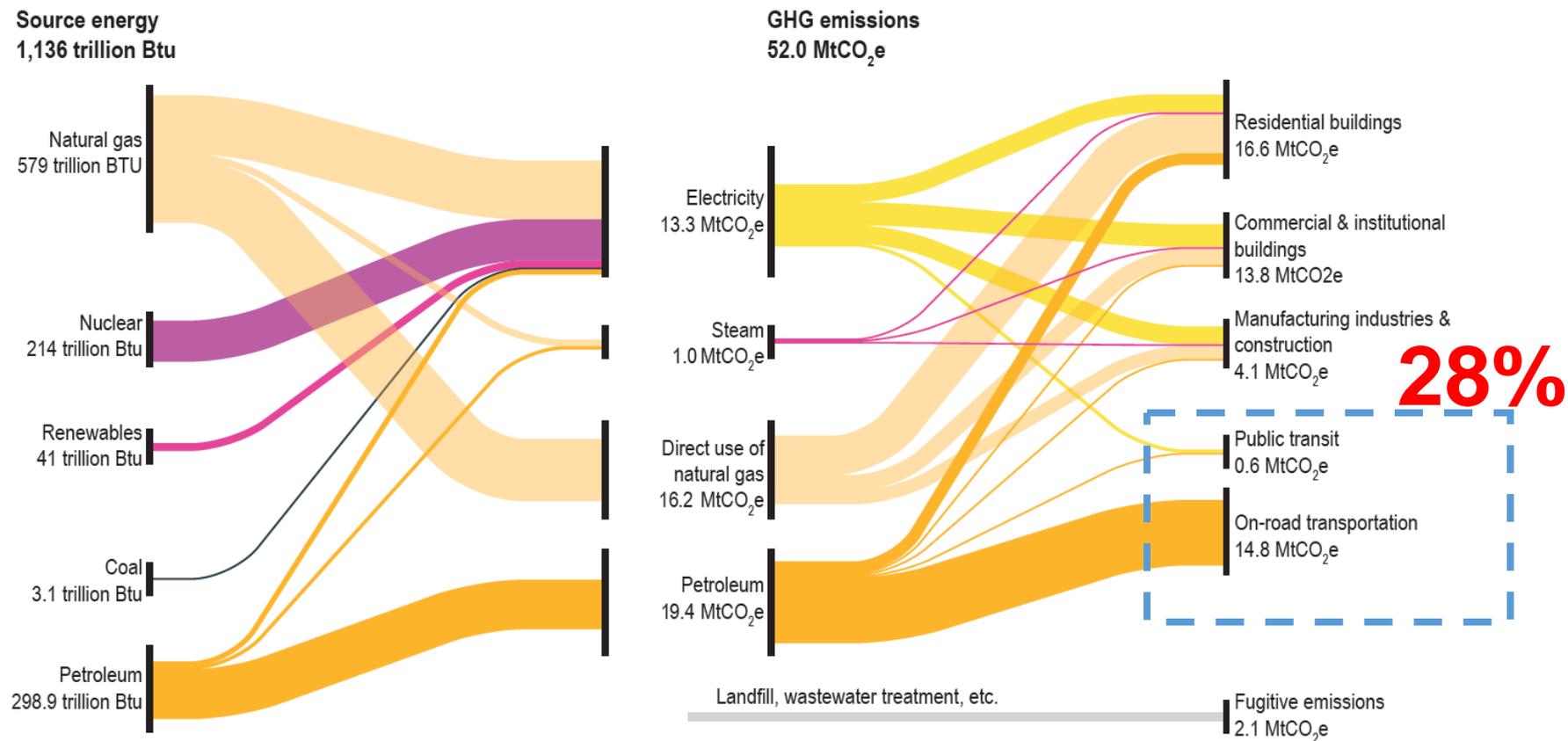
Inventory of New York City Greenhouse Gas Emissions in 2015, April 2017

Sources and Magnitude of NYC's GHG Emissions - Buildings



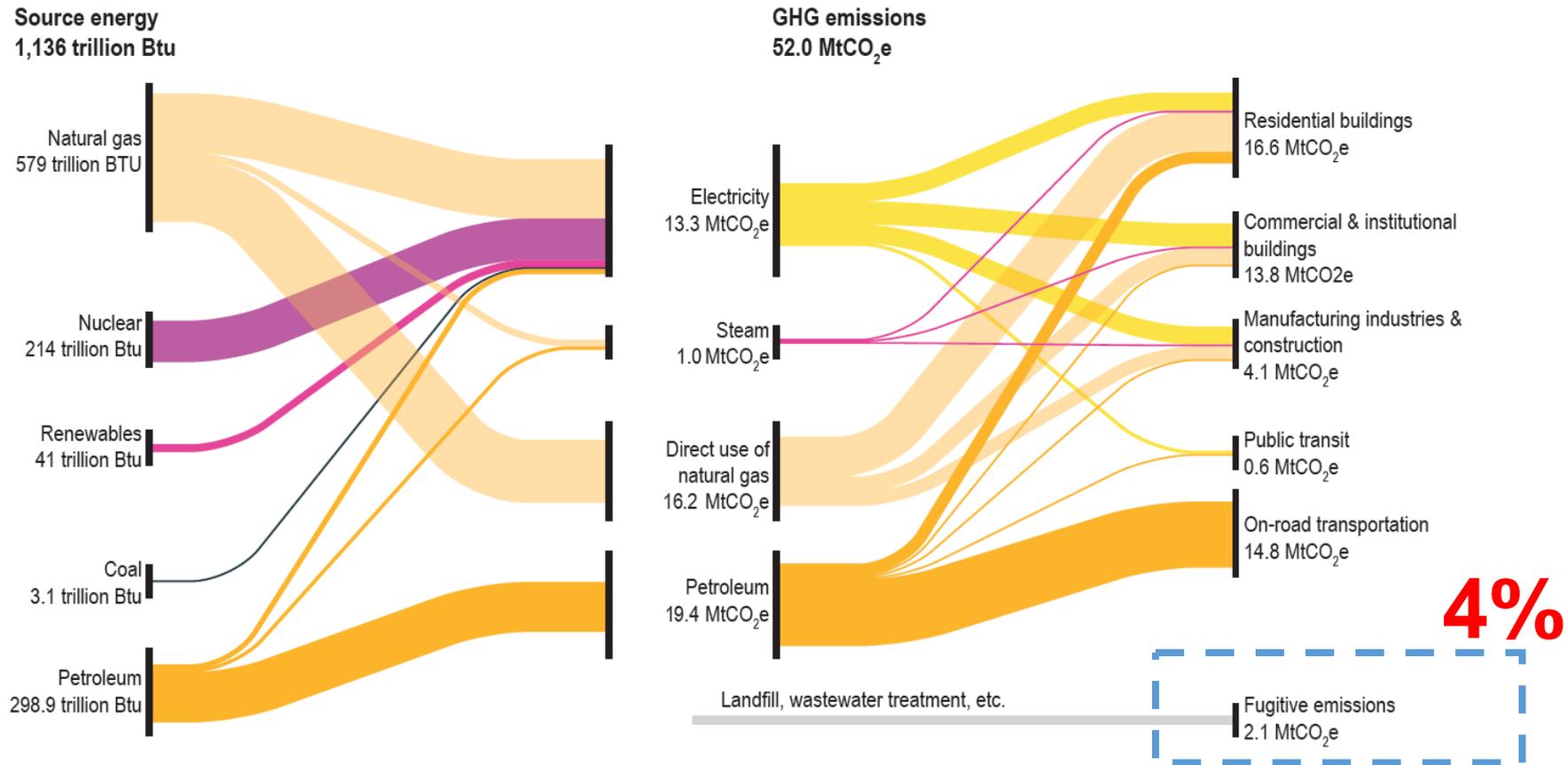
Inventory of New York City Greenhouse Gas Emissions in 2015, April 2017

Sources and Magnitude of NYC's GHG Emissions - Transportation



Inventory of New York City Greenhouse Gas Emissions in 2015, April 2017

Sources and Magnitude of NYC's GHG Emissions - Waste

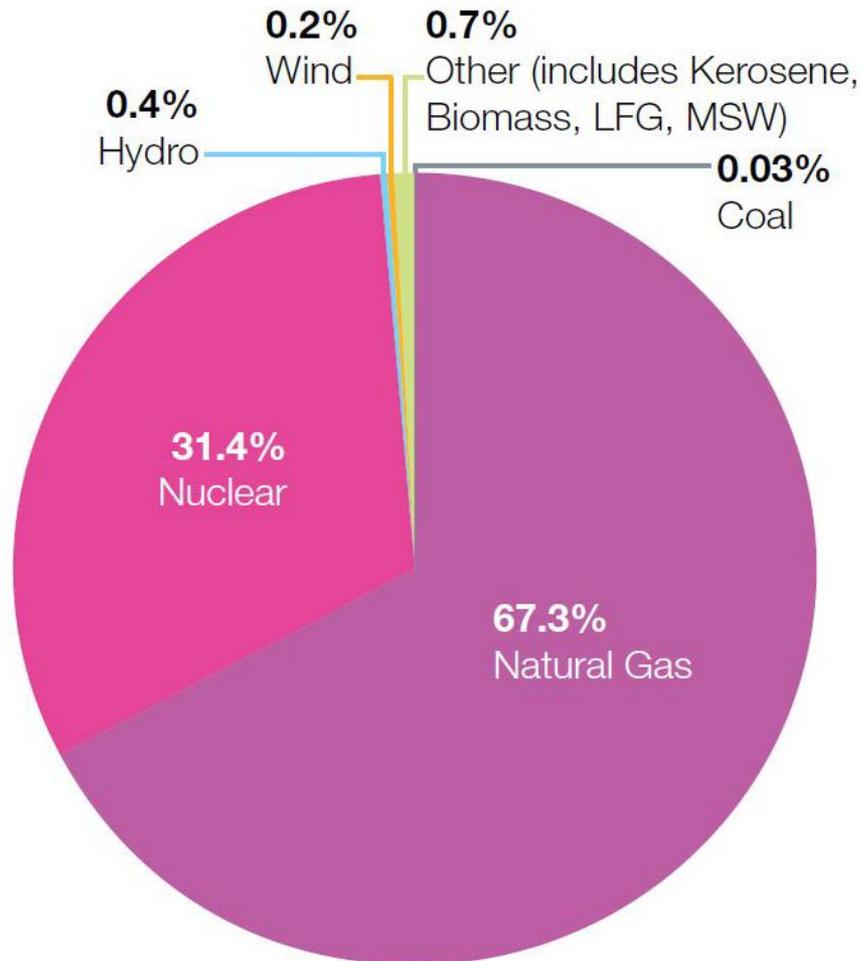


Inventory of New York City Greenhouse Gas Emissions in 2015, April 2017

ENERGY

Achieving 80 x 50 in the Energy sector requires a transition to a greener electric grid

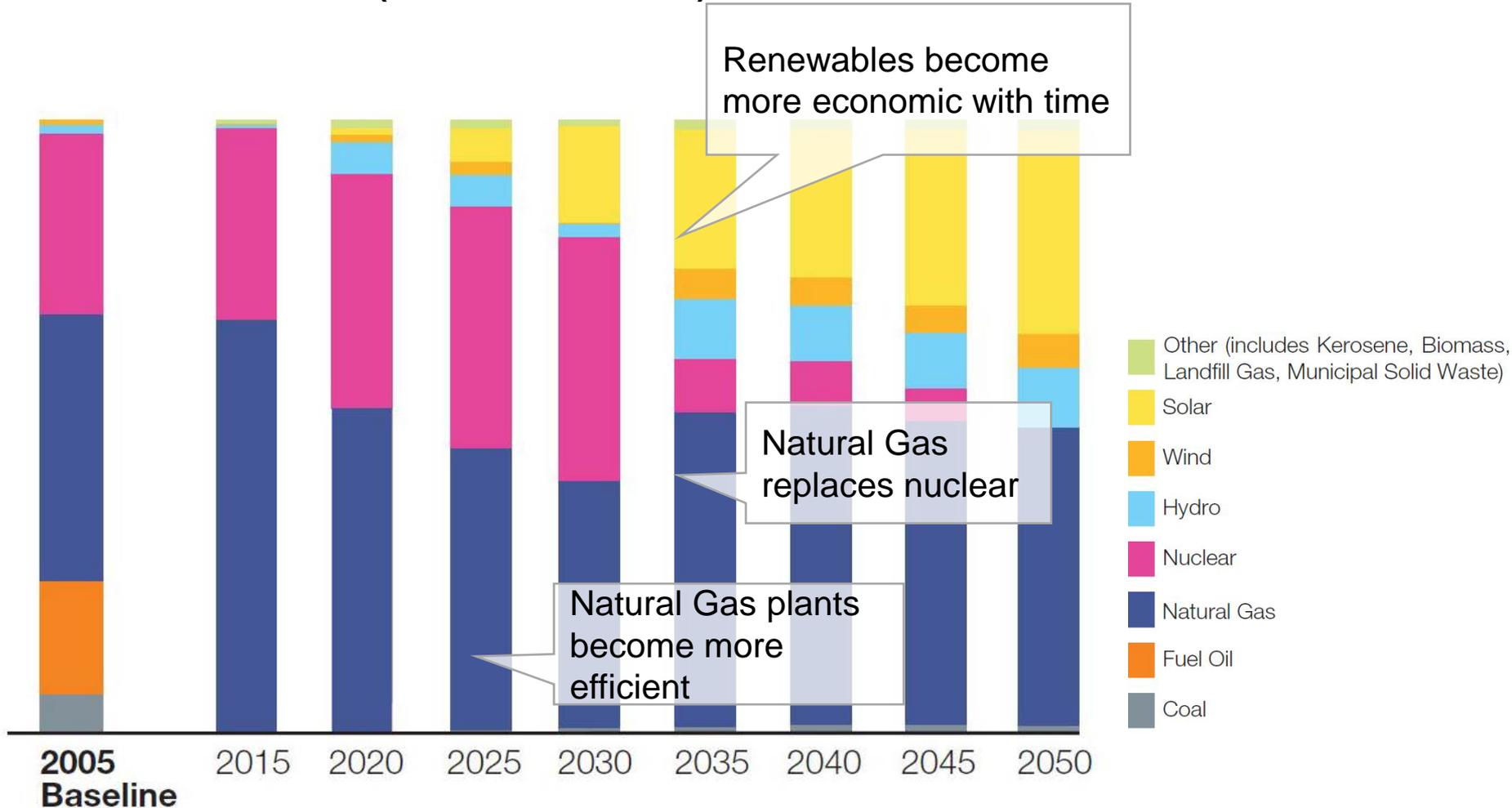
NYC Electric Grid Fuel Mix



- 30 % of citywide greenhouse gas emissions come from power plants that generate electricity within and outside the city.
- 24 in-city plants serve NYC and can meet 80% of the city's peak demand.
- On an annual basis the in-city plants provide ~50% of the electricity consumed in the City.

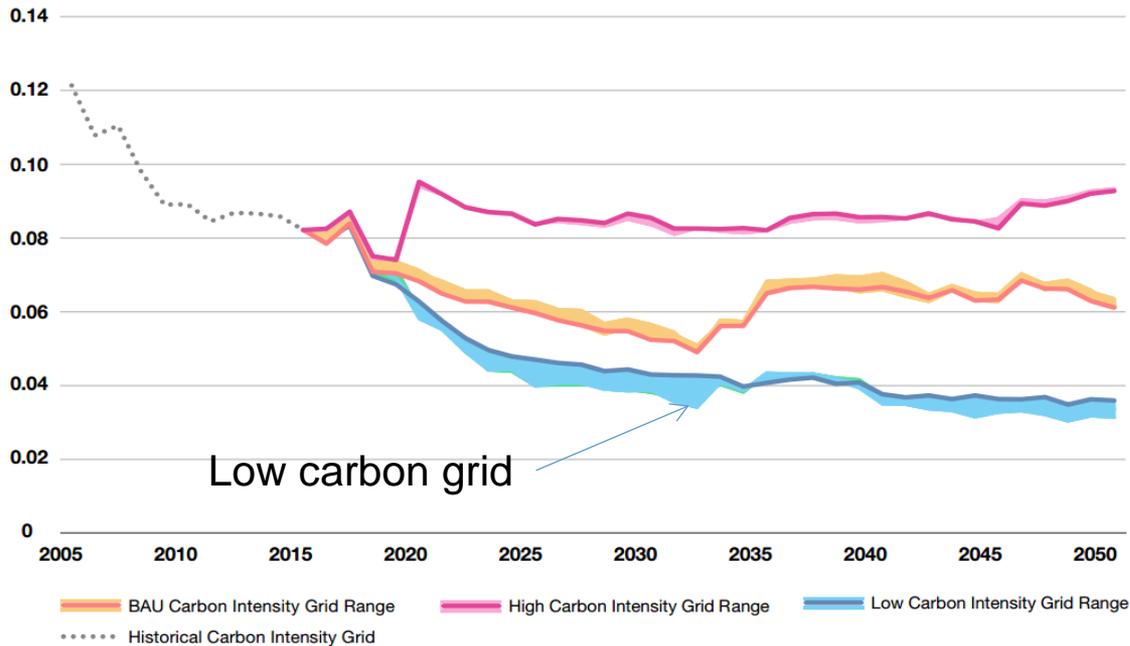
Under business as usual, GHG reductions driven by changes to the makeup of the electric grid

NYC Electric Grid Mix (Business as Usual)

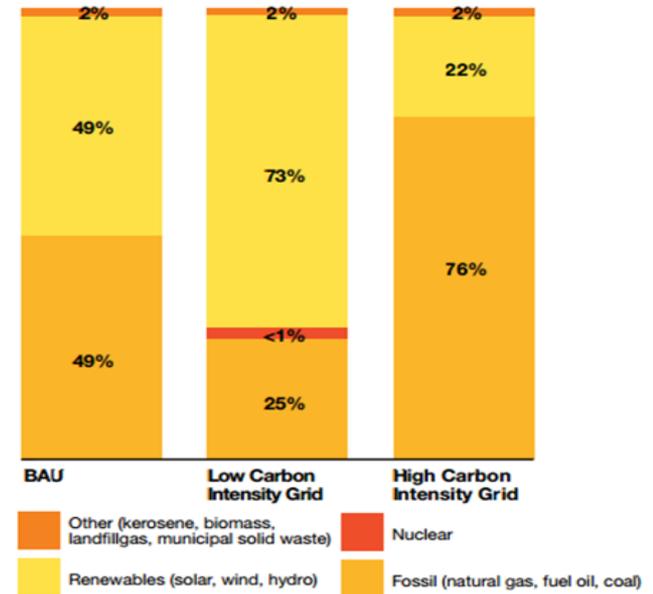


Other sectors will rely on a transformed electric grid to achieve 80 x 50

Future Carbon Intensity of the Electric Grid



2050 Electric Grid Fuel Mix by Scenario



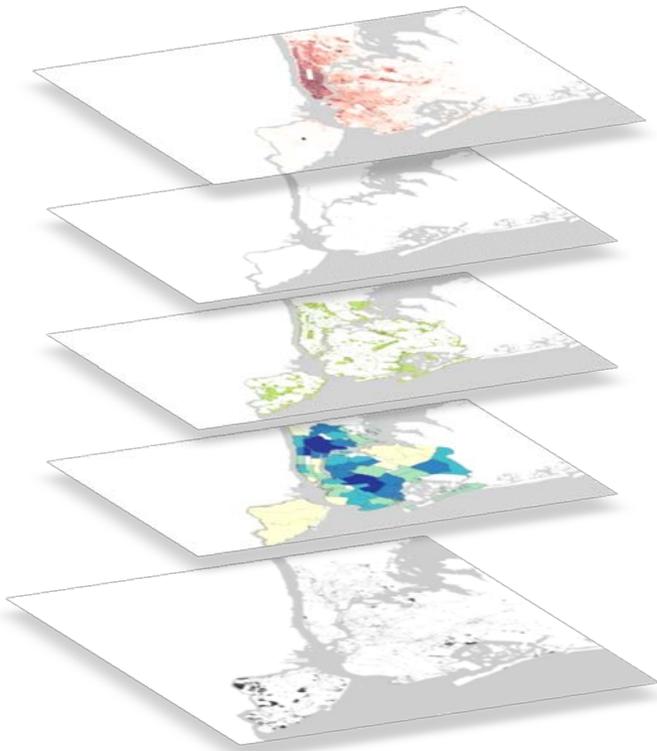
New York City's Roadmap to 80x50, September 2016

Key Low Carbon Grid Assumptions

- New renewables are more economic than natural gas generation (lower PV and wind capital costs; higher gas prices)
- Increased transmission within NYCA and between NYISO A-F and Canada
- 1000MW Hydro by 2020 and 1700 MW wind by 2050
- Indian Point Unit 2 retires 2033; Indian Point Unit 3 retires 2035

To assess the potential for distributed energy solutions in NYC, the city developed a community energy map

Community Energy Map Layers:



Demand Densities

+

Distributed Energy
Resource Supply
Technical Potential

+

Physical &
Infrastructure
Constraints

+

Critical Facilities

+

Vulnerable Neighborhoods

=

Priority Areas for
Community
Energy (*TBD*)

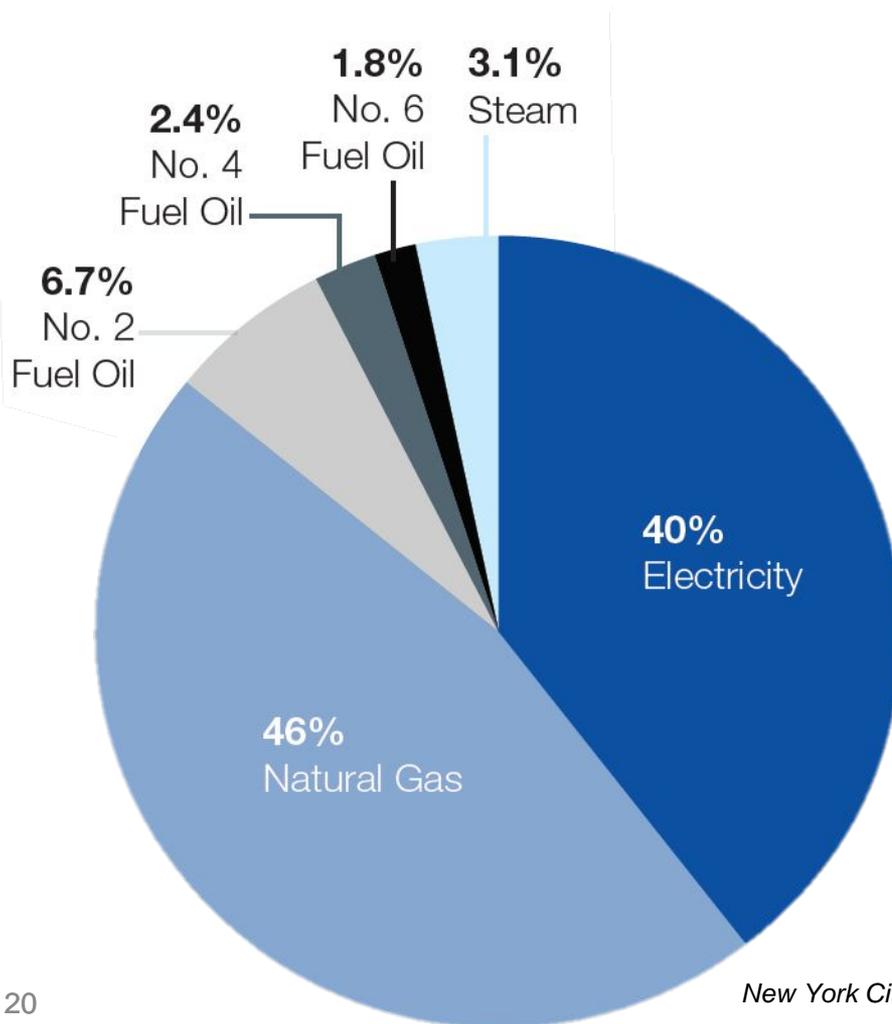
- Solar PV & Solar Thermal
- Combined Heat and Power
- Ground Source Heat Pumps
- Water Source Heat Pumps
- Onshore Wind
- Industrial and Process Heat Recovery
- Con Ed District Steam

- Affordability
- Heat Risk
- Flood Risk
- Air Quality

BUILDINGS

Achieving 80 x 50 in the buildings sector requires deep energy retrofits, along with a cleaner electric grid

Sources of Emissions (MtCO₂e)

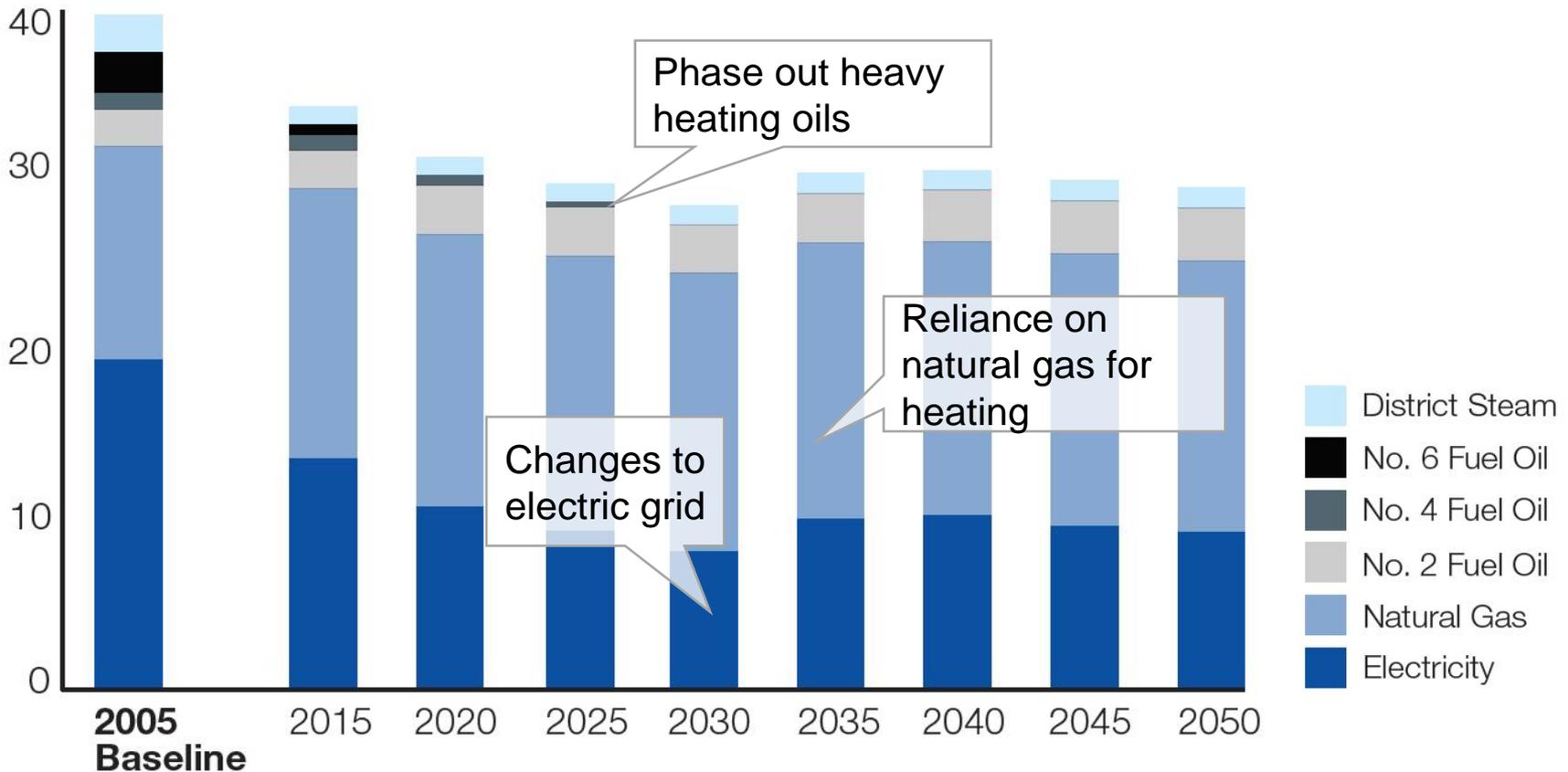


The City must take further action to achieve 80 x 50

- Onsite combustion of fossil fuels for space heating and hot water accounts for **30%** of citywide emissions and **60%** of emissions in buildings.
- **Natural gas** is the largest source of buildings based emissions.

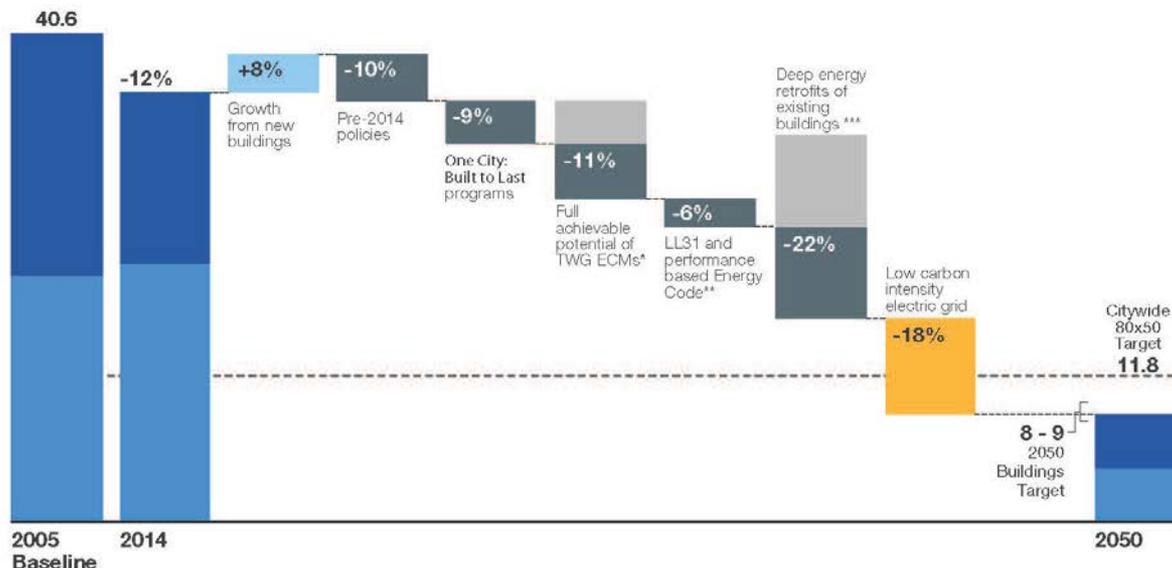
Under business as usual, changes to the electric grid and the phase out of heavy heating fuels drive building emissions

Buildings Business as Usual Scenario by Fuel Type 2005 – 2050 (MtCO₂e)



Achieving 80 x 50 in the buildings sector requires deep energy retrofits, along with a cleaner electric grid

An 80 x 50 Roadmap: Buildings with Deep Energy Retrofits (MtCO_{2e})



All percent reductions are relative to the 2005 Buildings emissions baseline

- Electricity
- Other Fuels
- One City Built to Last Overlap

* Full implementation of TWG ECMs includes 100% overlap with One City: Built to Last initiatives

** Assumes a 50% reduction from ASHRAE 2013 standards for new construction and substantial renovations in public buildings beginning in 2017, and a 70% reduction from ASHRAE 2013 standards implemented in 2022 for both public and private buildings.

***Includes 100% overlap with One City Built to Last initiatives and TWG ECMs. 50-80% of buildings implement strategies that include high efficiency electric technologies for heat and hot water.

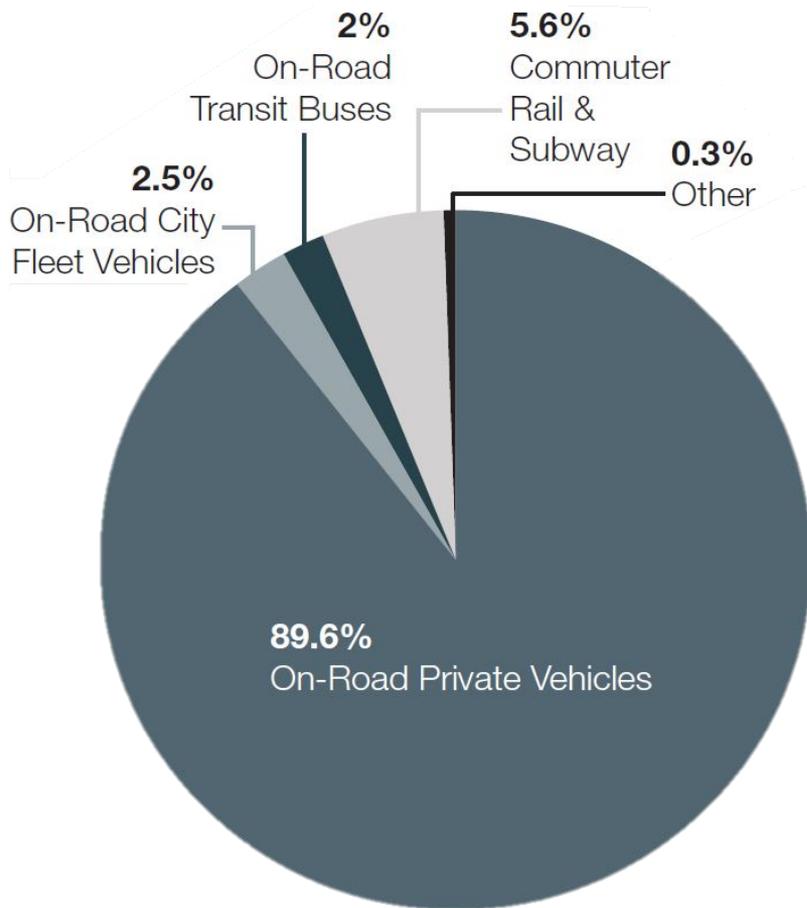
To achieve 80 x 50, buildings must...

- Complete deep energy retrofits that reduce energy use by 40-60%
- Transition away from fossil fuels for certain systems
- Maximize on-site renewable energy
- Improve operations and maintenance to increase energy efficiency
- Empower residents and tenants to reduce energy use

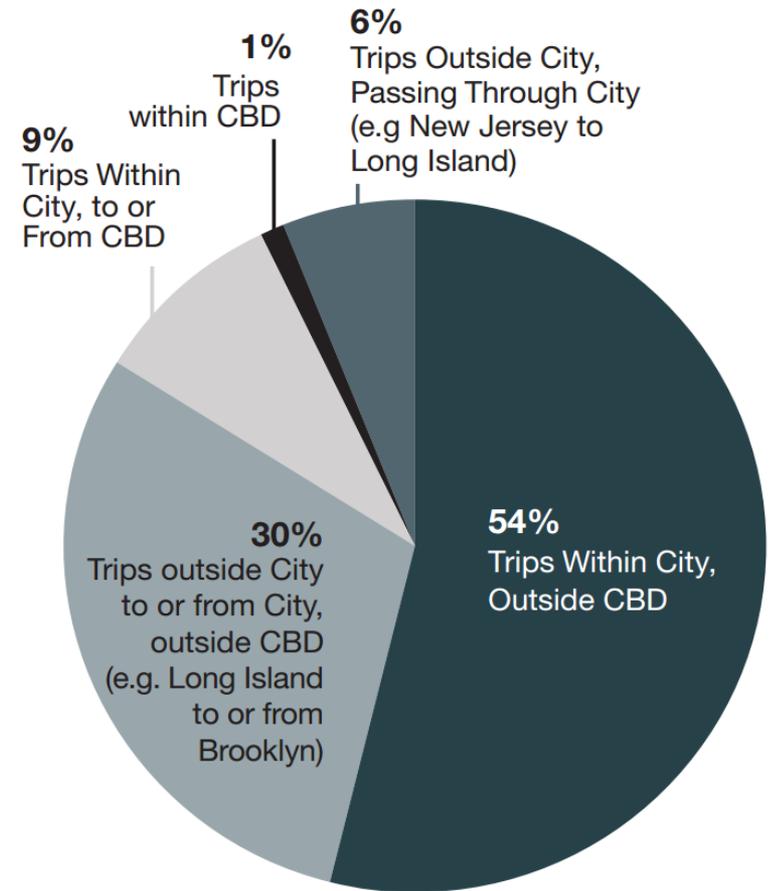
TRANSPORTATION

Achieving 80 x 50 in the Transportation sector requires a shift towards zero emission vehicle and low carbon fuels

Sources of Emissions (MtCO₂e)

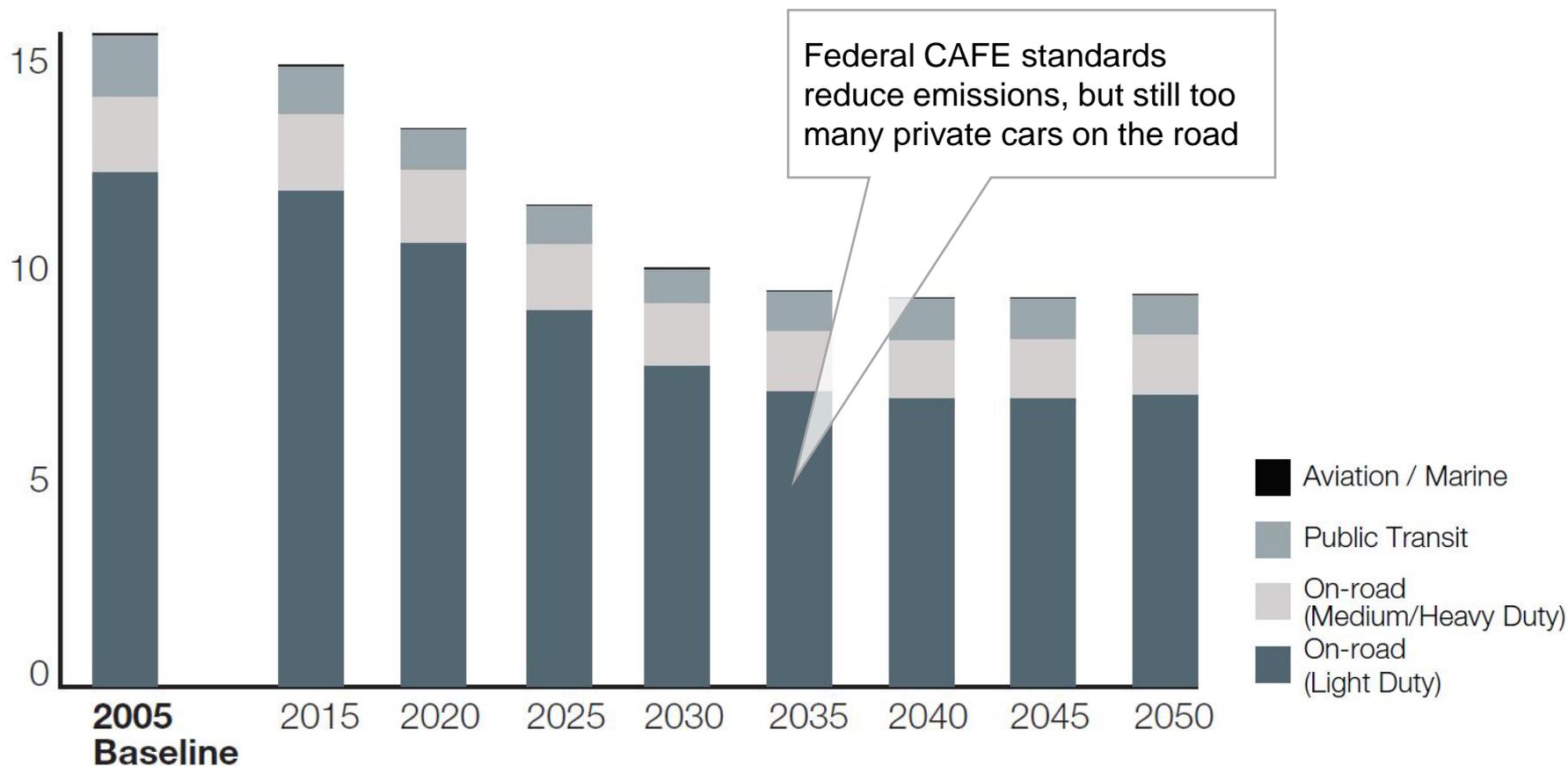


Share of Total NYC Vehicle Miles Traveled by Trip Origins and Destinations



Under business as usual, Federal standards reduce emissions from cars, the largest source of transportation emissions

Business as Usual GHG Emissions: Transportation, in Million Metric Tons of Carbon Dioxide Equivalent (MtCO₂e)

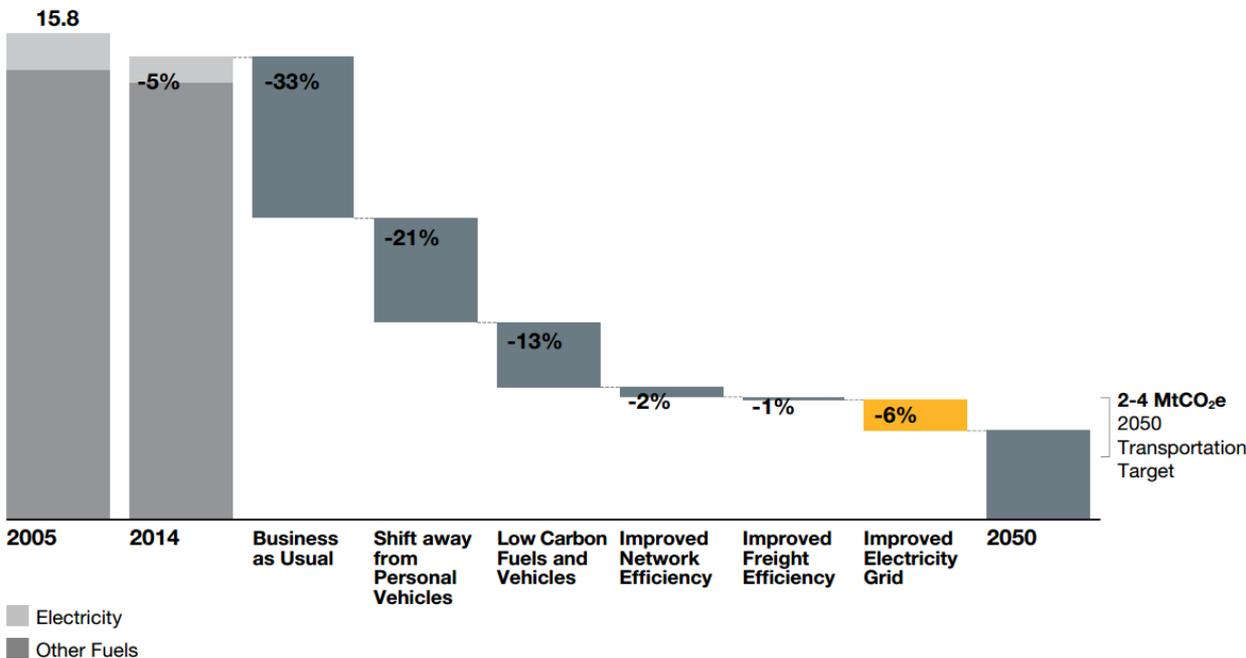


Achieving 80 x 50 in the Transportation sector requires a significant shift towards zero emission vehicle technologies and low carbon fuels

An 80 x 50 Roadmap: Transportation (MtCO₂e)

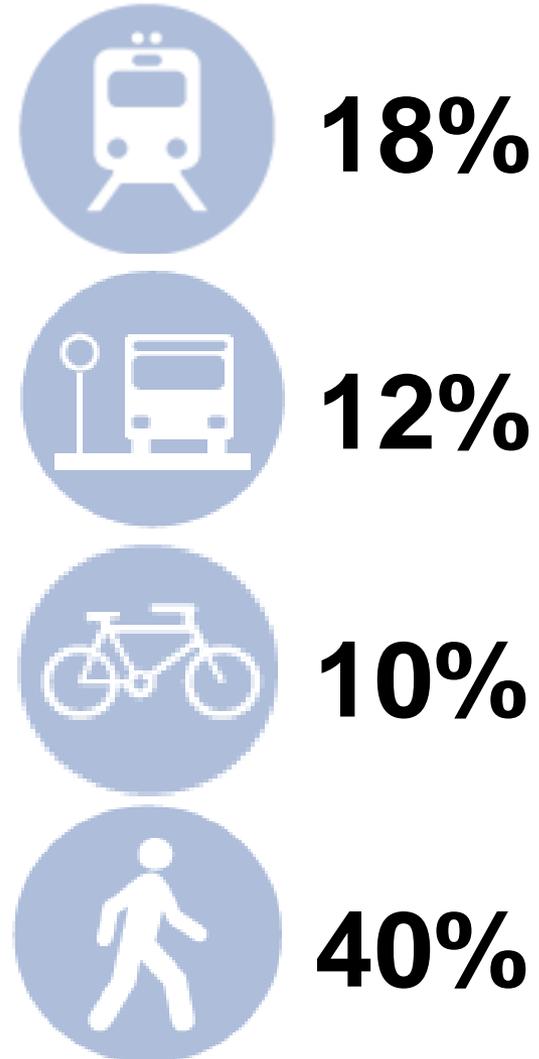
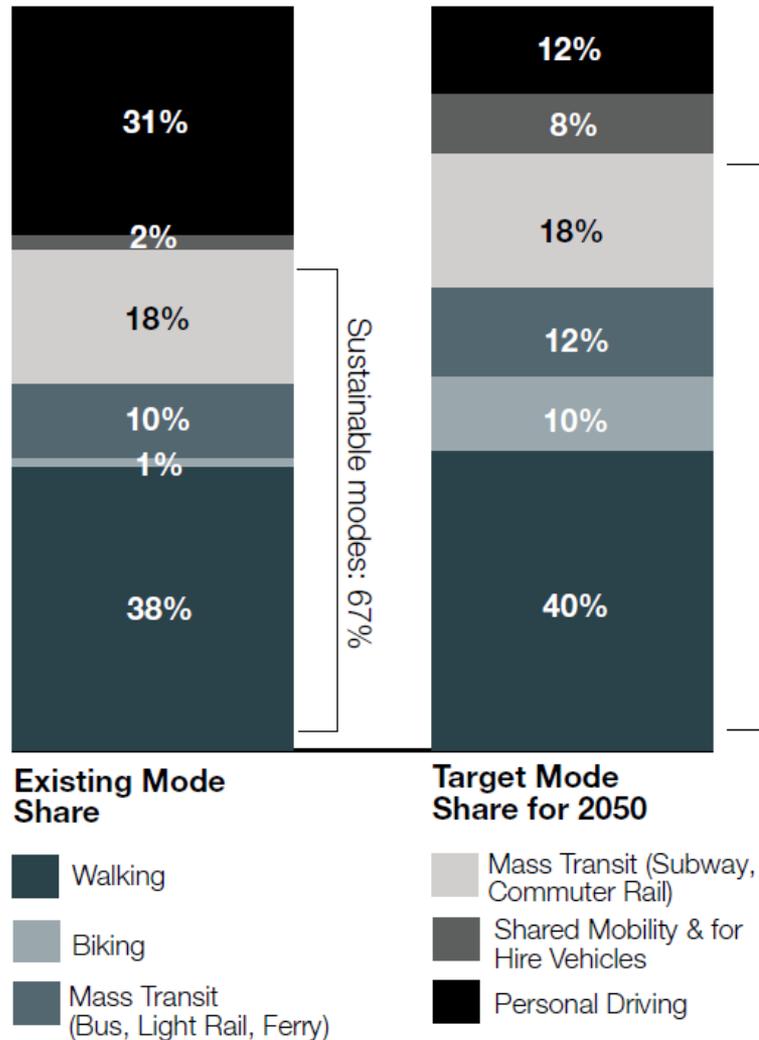
To achieve 80 x 50, the transportation sector must...

- Shift away from personal vehicles
- Adopt low carbon fuels and vehicles
- Improve efficiency of the transportation network
- Improve freight efficiency
- Improve the electricity grid



Sustainable modes of transportation—walking, biking, and transit—will increase from 67 to 80 percent of all trips taken in the city

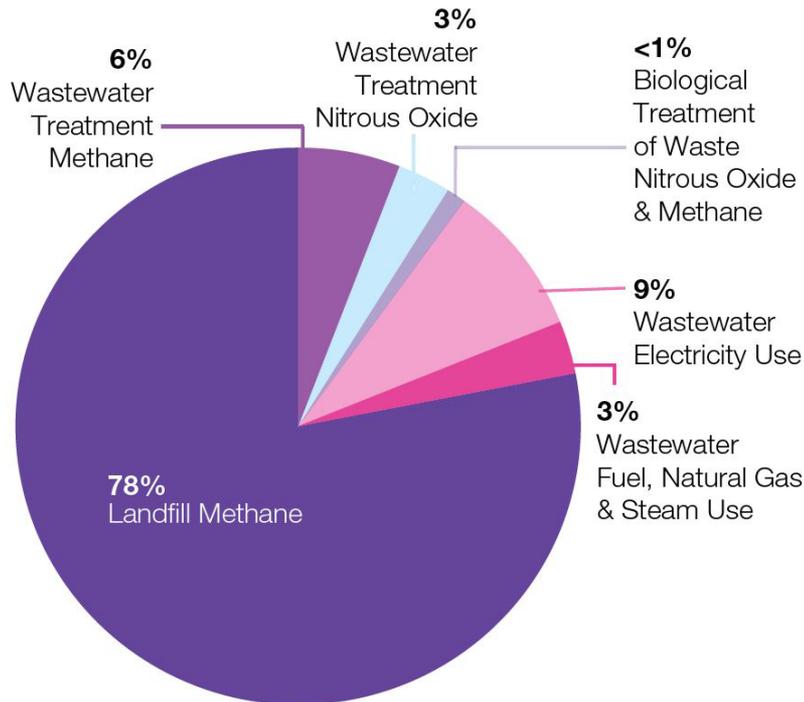
Mode Shift Targets for In-City Trips



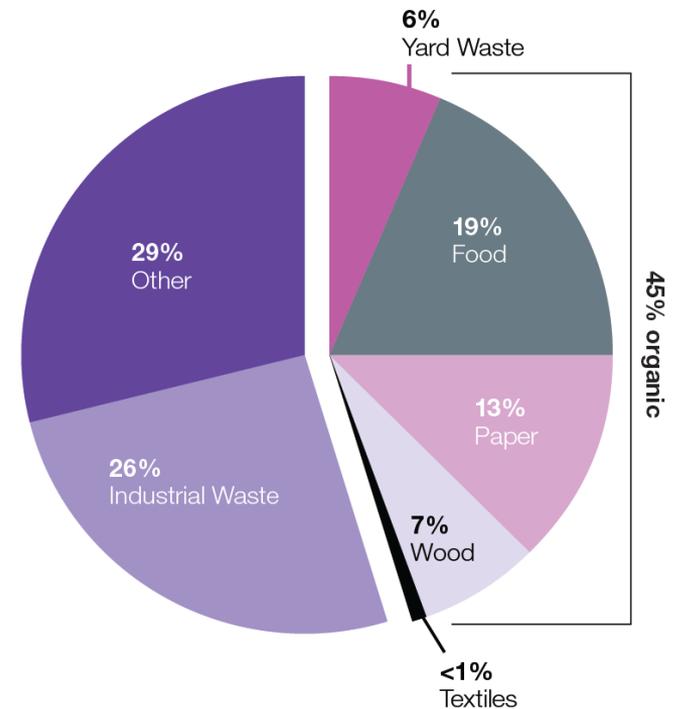
WASTE

Achieving 80 x 50 in the Waste sector requires achieving zero waste and reducing emissions at wastewater treatment plants

Sources of Waste Emissions



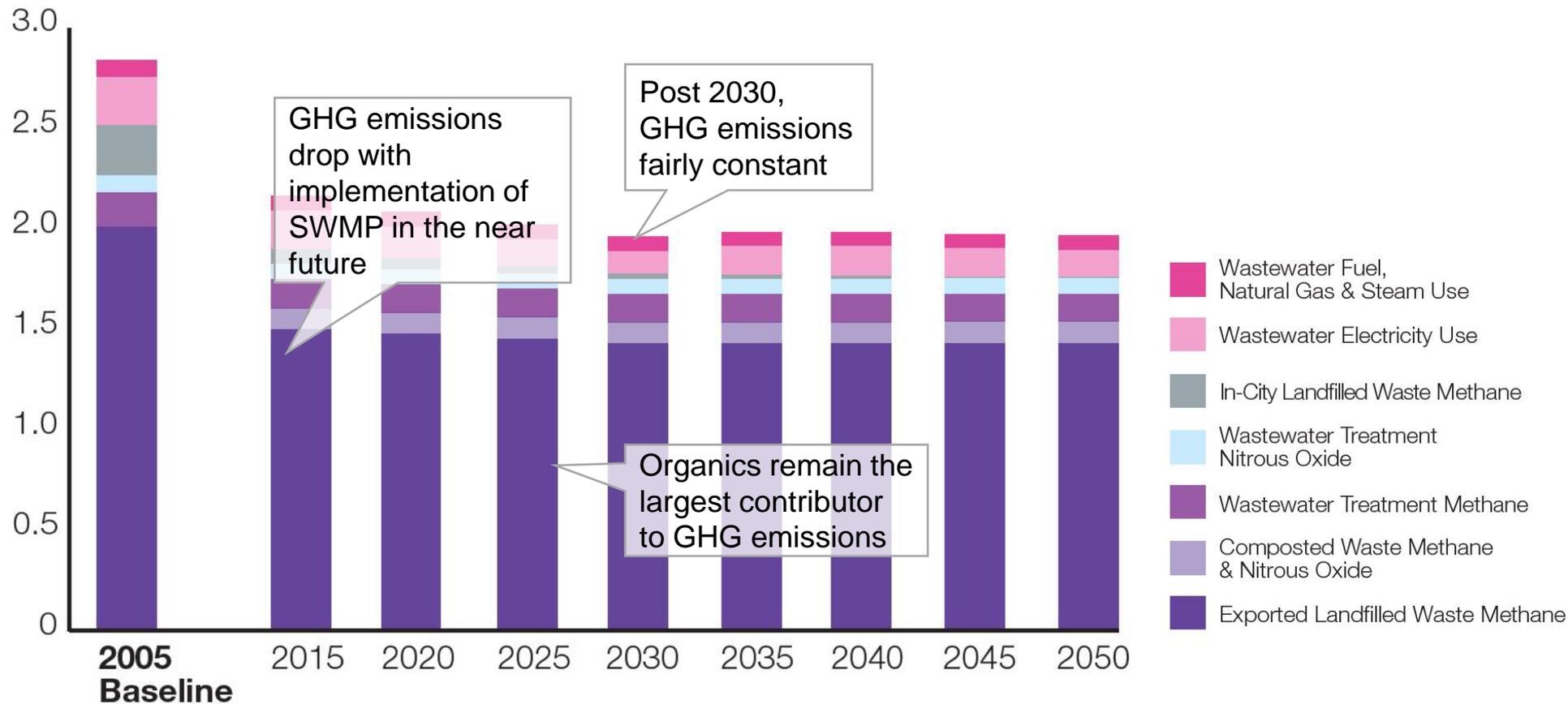
Current Composition of NYC's Waste Stream



New York City's Roadmap to 80x50, September 2016

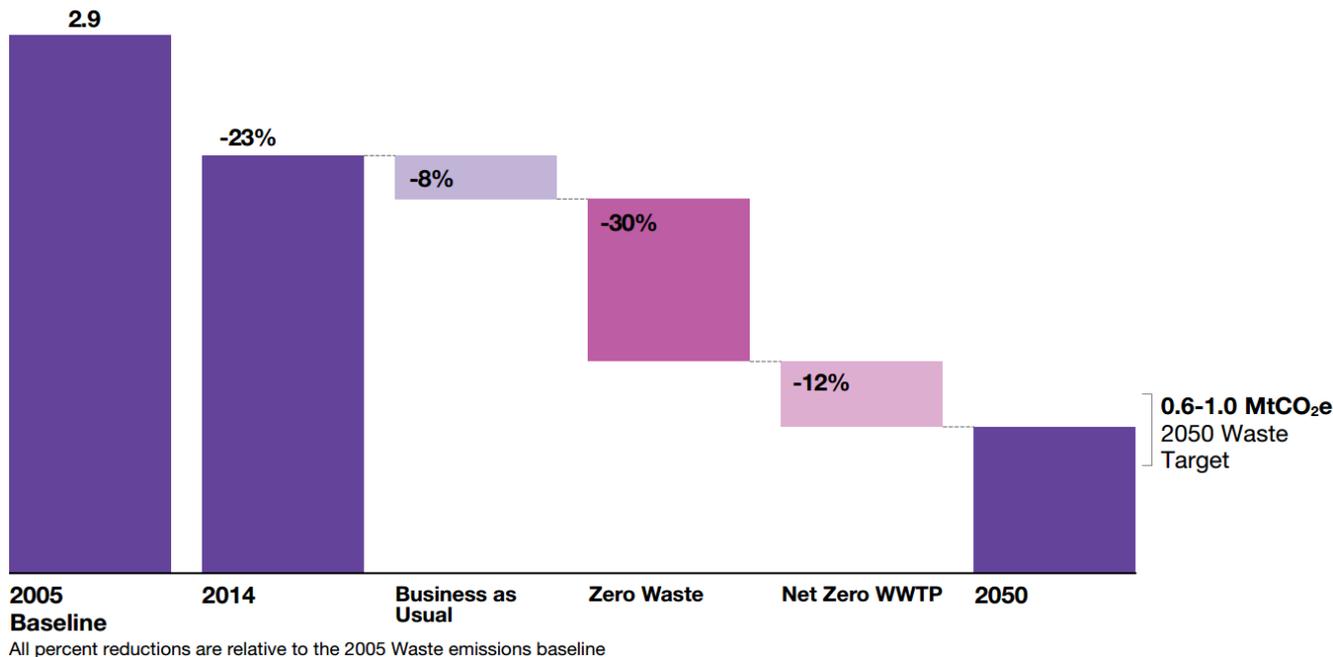
Under business as usual, Waste emissions remain relatively constant

Business as Usual Scenario: Projected Waste-Related GHG Emissions, in Million Metric Tons of Carbon Dioxide Equivalent (MtCO₂e)



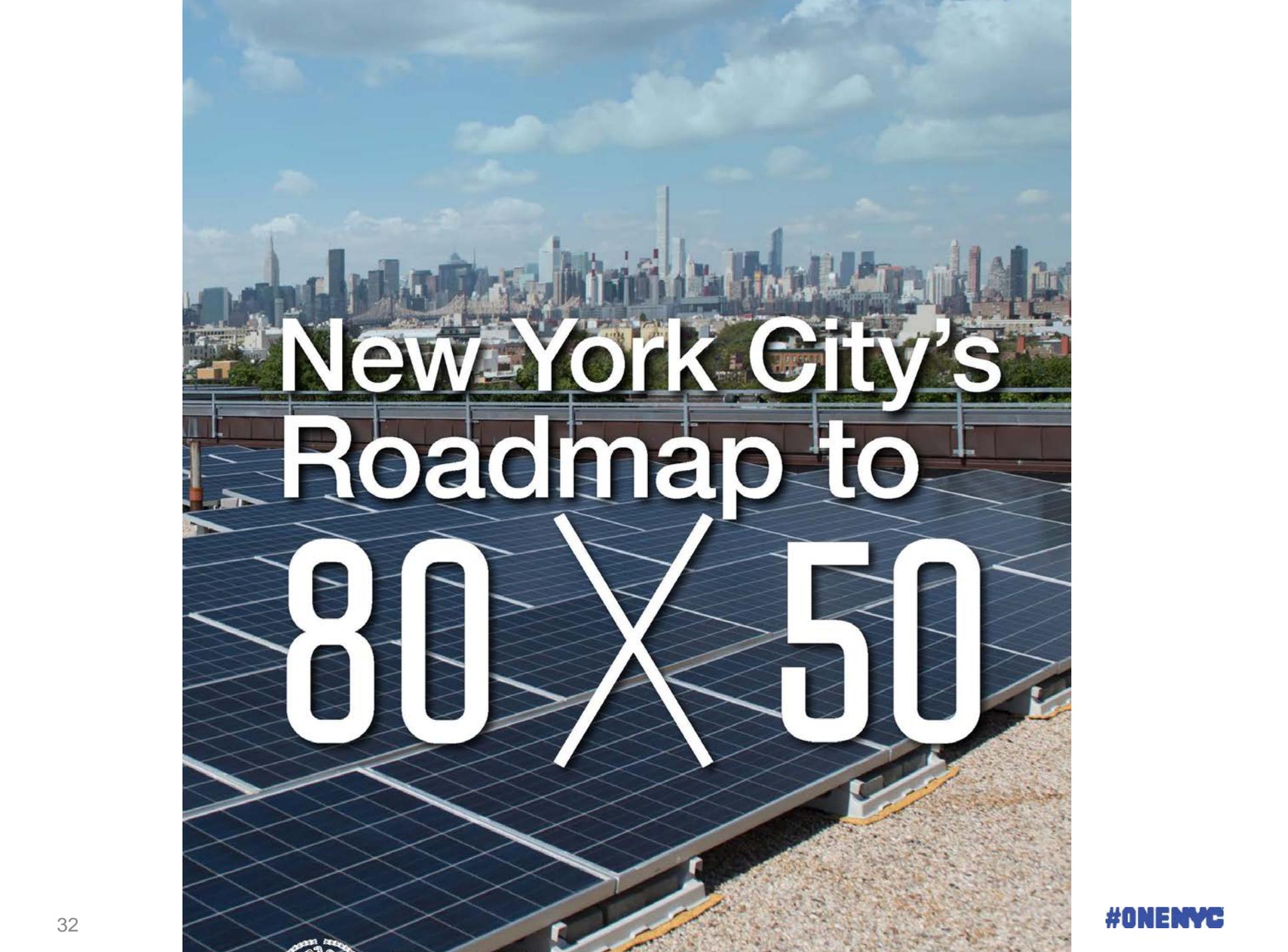
Achieving 80 x 50 in the Waste sector requires achieving the city's zero waste goals and reducing emissions at waste water treatment plants

An 80 x 50 Roadmap: Waste (MtCO₂e)



To achieve 80 x 50, the waste sector must...

- Reduce methane from landfilled waste
- Reduce emissions related to waste processing
- Achieve Zero Waste
- Achieve Net-Zero Energy at all 14 in-city wastewater treatment plants

A photograph of a rooftop solar panel array. The panels are dark blue with a grid pattern, mounted on a metal structure. In the background, the New York City skyline is visible under a blue sky with scattered white clouds. The text "New York City's Roadmap to 80 X 50" is overlaid in large white font.

New York City's Roadmap to 80 X 50