

NEECE 2018



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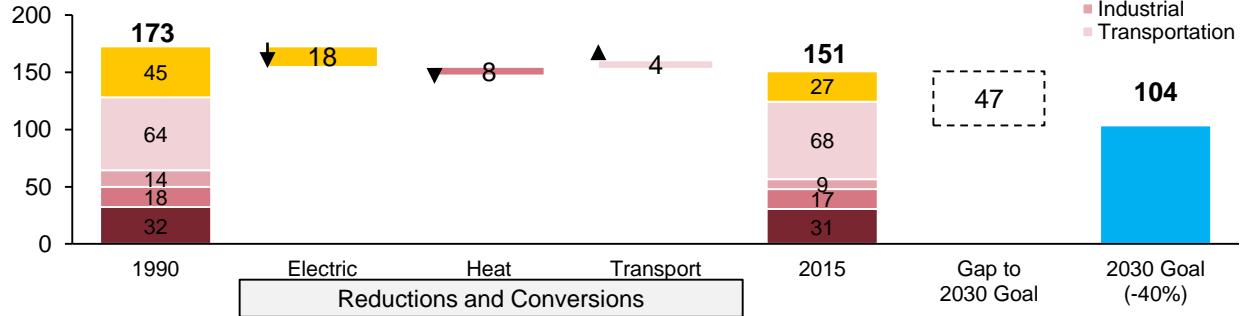


Northeast Emissions 1990-2015

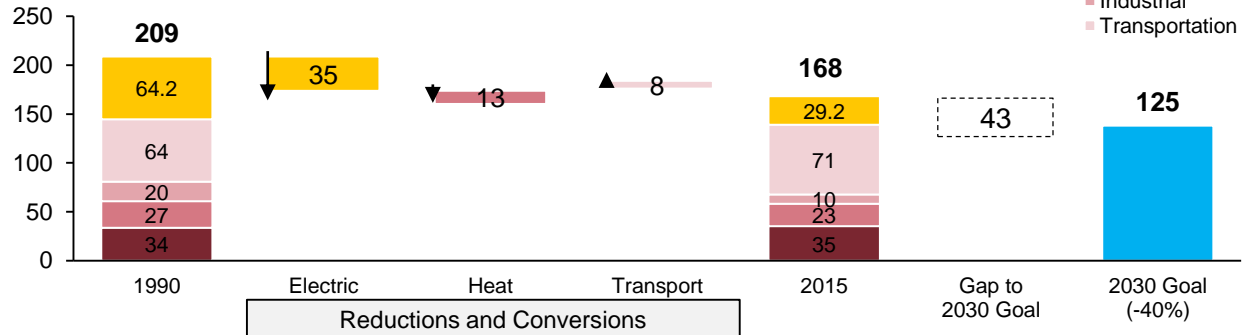
Significant progress in the electric sector.
Some progress in heat.
Backsliding in transport.

In both NY and NE, the 2030 emissions gap alone is significantly larger than all 2015 emissions from the electric sector.

New England Economy-Wide CO₂ Emissions
million metric tons



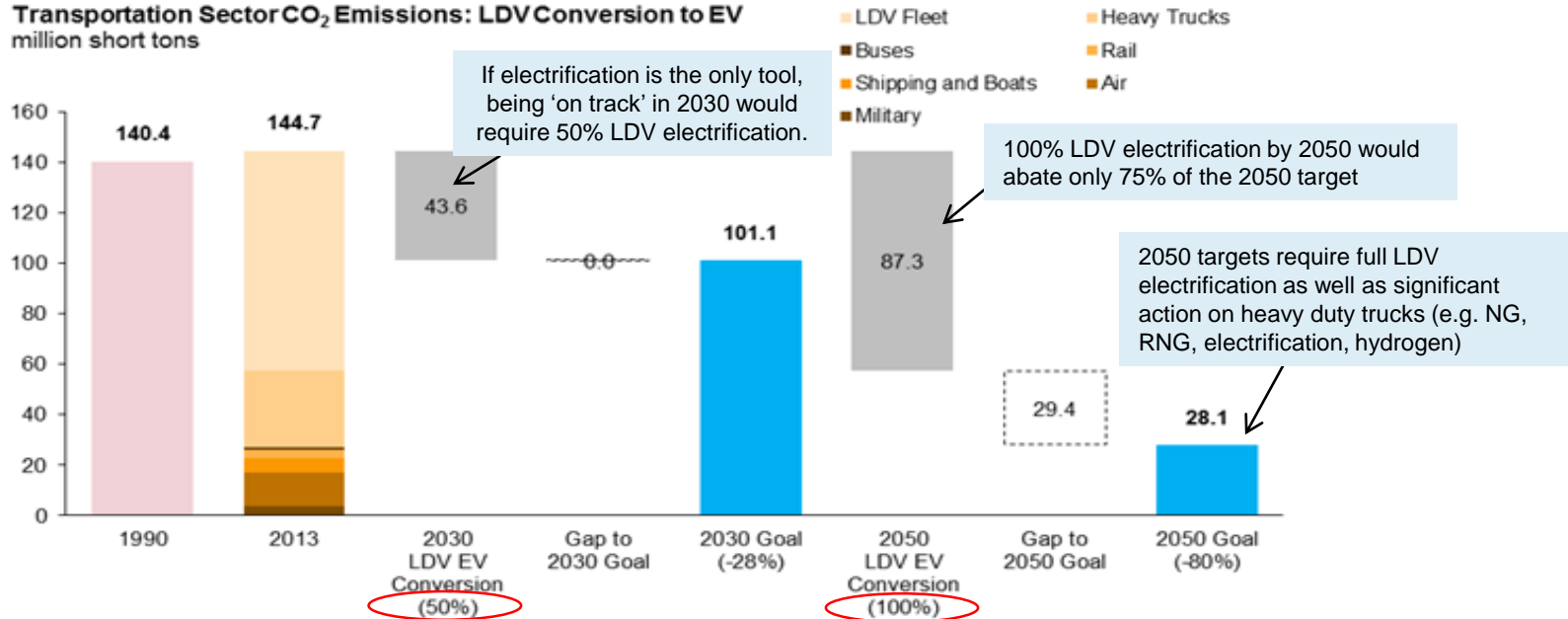
New York Economy-Wide CO₂ Emissions
million metric tons



Transportation: The Largest Emitting Sector

Transportation emissions are the largest single component in regional emissions, and are higher today than in 1990. All approaches are required: electrification, VMT reduction, and low carbon fuels.

Transportation Sector CO₂ Emissions: LDV Conversion to EV
million short tons



National Grid role in transportation

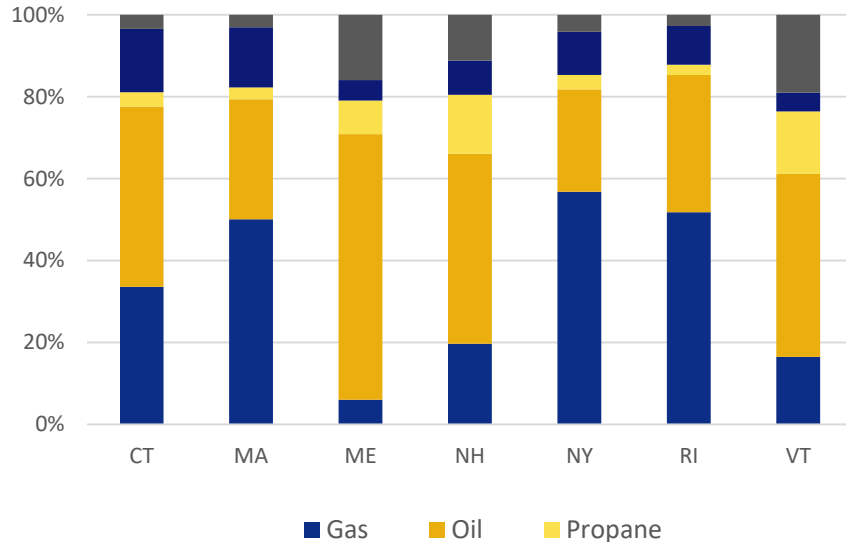
Utilities have an important role in scaling up EV adoption. This role includes helping expand deployment of charging infrastructure, increasing customer awareness, and preparing for future EV integration into the electric distribution system.

- National Grid has installed and owns 165 EV charging stations and has submitted new comprehensive proposals in MA, RI, and NY.
- The core components of the programs include:
 - **EV Charging Host Program** – Construct infrastructure and provide incentives to encourage property owners to install charging stations & serve as “site hosts”
 - **Education Campaign** – Boost awareness, promote incentives, and encourage participation in EV programs
 - **Grid Integration** – Evaluate VTOU rate efficacy, conduct an EV off-peak charging pilot, monitor EV charging patterns, and study EV DR
- Performance incentives NY and RI (proposed) to incentivize EV growth
- Evaluating rate design that will help monetize benefits of electrification (commitment to develop new opt-in rate design this year in upstate NY to further adoption of EVs and heat pumps)

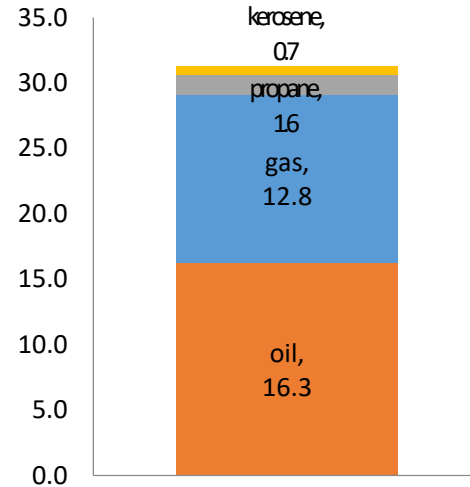


Residential Heat: High level of oil and propane

State-by-state breakdown of primary heating fuel in 1-4 family homes

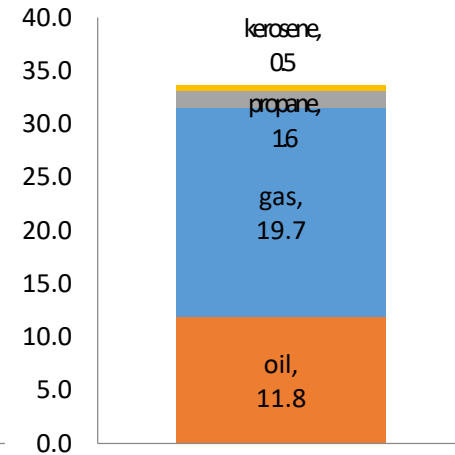


New England 2013
Total ~32 mton Oil = 52%



NE residential heat emissions by fuel (million tons / yr)

New York 2013
Total ~34 mton Oil = 35%



NY residential heat emissions by fuel (million tons / yr)

National Grid role in heat

Utilities have an important role in decarbonizing heat. This role includes helping to expand heat pump adoption, oil-to-gas conversions, and decarbonizing the gas network.

- Currently standing up oil-to-heat pump switching programs in upstate New York and Rhode Island
- Programs are cost effective today. Core components include:
 - **Customer rebates** for both cold-climate air-source and ground-source heat pumps
 - **Building insulation** to tighten home (pilot program in RI)
 - **Community-based program design**, incentivizing local towns and installers to share marketing and drive local adoption rates.
- Performance incentives in NY & RI (proposed) to expand heat pump adoption
- From gas utility → heating utility
 - Own & finance geothermal loops (similar to pipeline assets)
 - Gas networks can be decarbonized too through RNG, hydrogen blending, power-to-gas
 - Newtown Creek RNG pilot in NYC goes live Dec 2018, 4 other projects under review



What does it take to achieve 40x30?

The following are found to be required to achieve an interim target of 40% below 1990 levels:

Power

- Ramp up zero-carbon electricity deployment to achieve 67% of supply vs. 45% today

Transport

- Maintain CAFE standards on new ICE vehicles
- **50% electrification** of all light-duty vehicles. LDV sales **100% electric** by 2028.

Heat

- **Near complete elimination** of oil and propane heat, through a mix of electrification and gas growth. Longer term, decarbonization of the gas network.

In other words: a Highly Electrified, High RE, Low Petroleum Future.

Reliability: The National Grid modeling simulation ensured that Demand + Reserve Margins were met during all hours of all years through 2030.

Implications and Insights

Implications

- Current policies and investment trends are **not on track for achieving 2030 or 2050** emissions targets.
- To stay on track for “80 x 50” targets, we not only have to increase the pace of renewable growth but **dramatically transform transport (~50% electrification) and heat (~25% electrified heat, accelerated oil-to-gas conversion)**.
- It will take **~\$80B of additional RE capacity** to support 40% emissions reductions by 2030 across the Northeast (excluding distribution network upgrades).
- Compared to the base case without significant electrification, the National Grid 40x30 pathway would **drive lower electric and gas rates** through higher network throughput and reduced RE curtailment.

Insights

- Ambitious new policies needed across **all sectors**. Carbon pricing should apply not just to electricity, but to all fuels.
- **Utilities have an important role** in supporting wider EV adoption and heat decarbonization.
- Performance-based incentives, such as EAMs and PIMs, can help **align the utility business model** with beneficial electrification and economy-wide decarbonization.
- To avoid unnecessary incremental network upgrades, **smarter time-varying rate design** is needed to encourage off-peak charging. AMI is foundational.
- Targeting the **highest emitting sectors and fuels first**, while **optimizing the utilization of existing networks**, can help mitigate electric and gas prices while decarbonizing the existing electric and gas networks.