

PowerUp NYC Primer

Our energy system impacts our everyday life in countless ways – from how we get around the city, to how we heat and cool our homes, to the health of our communities.

Through PowerUp NYC, the Mayor's Office of Climate and Environmental Justice is working with NYC residents, community leaders, and energy experts to develop policy solutions and actionable strategies City government will advance in the next four years to put us on track to achieve a just energy transition by 2050.

Around the world, a clean energy transition is supported by three primary pillars:



Reduce demand.

The less electricity we use, the less stress we place on the grid, and the less new clean energy infrastructure like wind and solar we need to build and pay for. Measures to reduce demand include installing high efficiency lights and appliances, and improving home insulation.



Switch to electricity.

Today, we rely on oil and natural gas to heat our buildings, and on gasoline and diesel to power our cars and trucks. To meet climate goals, we need to switch these vehicles and buildings to run on electricity wherever feasible.



Make electricity clean.

As buildings and vehicles electrify, it will be critical to ensure electricity is generated from clean, renewable sources. New York State Law mandates 70% renewable electricity by 2030 and 100% zero-emissions electricity by 2040.



Mayor's Office of Climate & Environmental Justice

PowerUp NYC is a collaborative energy planning study to lay out specific strategies City government will take to:



- ↗ **Clean up our air**
- ↗ **Make energy bills more affordable**
- ↗ **Create well-paying clean energy jobs**
- ↗ **Prepare energy systems for climate change**
- ↗ **Create opportunities for local, clean energy**

This PowerUp NYC Primer provides an overview of three critical sectors in the clean energy transition — **Buildings, Transportation, and Electricity** — from a New York City perspective. It also describes the open questions the PowerUp NYC study aims to answer to inform City-led solutions.

NYC Buildings 101

Ever thought about where the energy that heats your home actually comes from? In NYC, most buildings have boilers in the basement that burn natural gas or fuel oil to provide heat and hot water. These fossil fuel-based systems release pollutants that can harm our health and greenhouse gases that contribute to climate change.

In fact, buildings account for nearly 70% of greenhouse gas emissions in NYC — so cleaning up our buildings is key to meeting climate and equity goals. To do that, we need to: (a) make buildings more efficient, and (b) electrify buildings wherever feasible, taking advantage of an increasingly renewable electric grid.

How do we make buildings more efficient?

Making NYC's buildings energy efficient means using less energy even while we keep the lights on and meet heating and cooling needs. For New Yorkers, this means lower energy bills and less pollution. Nearly all of NYC's one million buildings will need some level of energy efficiency upgrades to meet our climate goals. Most of NYC's larger buildings — the ~50,000 buildings over 25,000 square feet — are now planning energy efficiency improvements to achieve the mandates of Local Law 97, the cornerstone of NYC's [Climate Mobilization Act](#).

Easy ways to increase energy efficiency include switching to LED light bulbs and reducing air leaks

around windows and doors. Some buildings will need more extensive retrofits, like increasing wall insulation, upgrading to energy-efficient windows, or even recladding, which involves adding a new layer of insulating wall to the outside of a building's facade.

What is building electrification?

This refers to the installation of building heating, cooking, and hot water systems powered by electricity, rather than fossil fuels. Electric heat pumps are a proven technology that work like air conditioners, but they can provide both heating and cooling. Even today, without a 100% clean electric grid, transitioning to heat pumps from fossil fuel-powered boilers reduces greenhouse gas emissions.

Heat pumps can capture heat even from very cold outdoor air, transferring it indoors to keep you warm in the winter.

Heat pumps transfer excess heat from indoors to outdoors to keep you cool in the summer.





What are the challenges to reducing pollution from our buildings?

There are no cookie-cutter solutions.

Buildings are wildly different across NYC — and there are over one million of them! Unique buildings may require unique solutions, which could drive up costs and timelines.

NYC electricity is expensive. While residents of electrified homes won't need to pay oil and gas bills anymore, they will likely see increases in their electricity bills. Upgrades like energy efficiency and solar can help reduce costs, but ensuring all New Yorkers can afford to pay their electric bills even as buildings electrify is a top priority.

The labor force isn't yet ready to meet demand. To ensure energy efficiency and electrification projects can happen at scale across the city, we will need a rapid increase in workforce capacity — from architects to construction workers, from electricians to building maintenance employees. As a result, workforce development and training are an essential component of a just energy transition.

Grid updates will be needed. As buildings electrify, driving up electricity demand, close coordination with local electric utilities will be critical to ensure the grid remains reliable and resilient. Currently, NYC electricity demand peaks in the summer, so there is headroom to increase winter demand with electric heating systems before significant grid upgrades will be needed.

What research is still needed?

PowerUp NYC will help us answer key questions that will inform City government's strategy to support building efficiency and electrification. These include:

- ▶ Which energy efficiency and electrification strategies will work best for NYC buildings?
- ▶ Which cost the least, both upfront and over time?
- ▶ Which offer the best benefits for health, comfort, and communities?
- ▶ How can we make upgrading buildings most affordable for low-income New Yorkers?

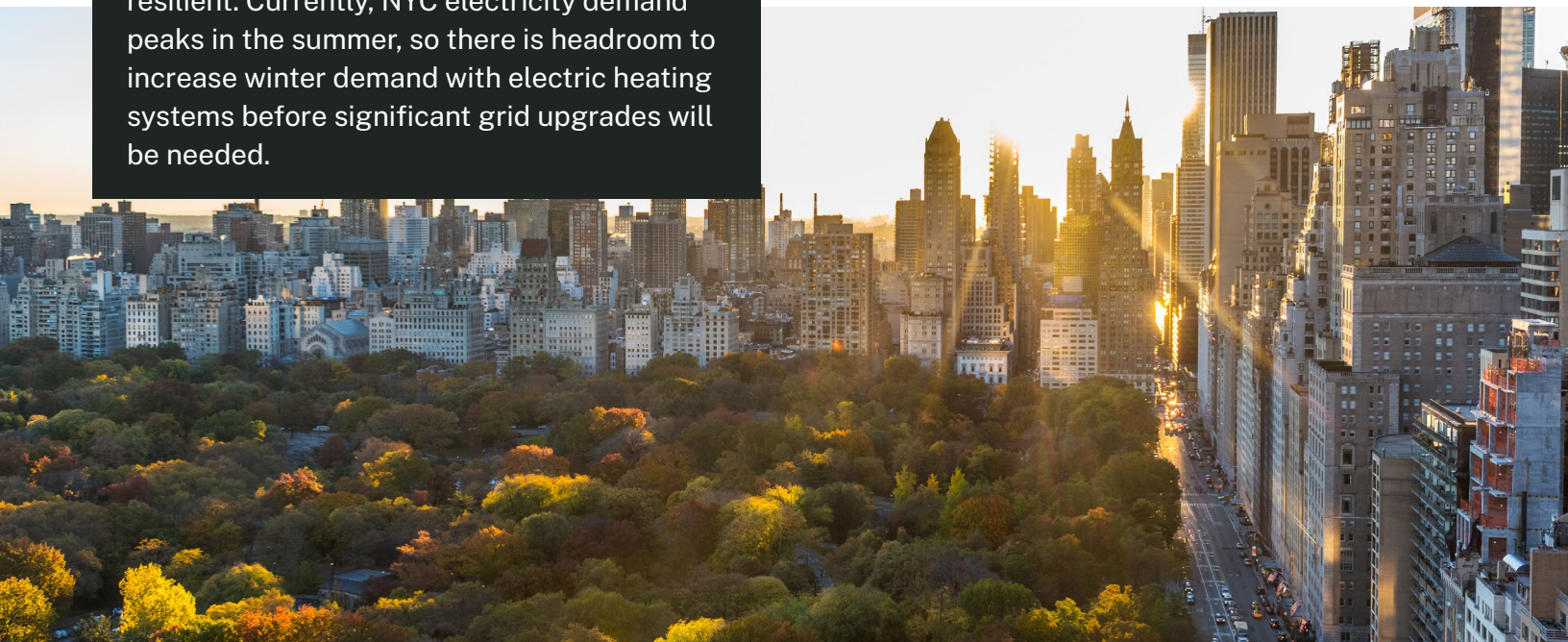
Building Efficiency and Electrification Resources

If you live in a building with 5 or more apartments, visit [NYC Accelerator](#) or [Con Edison's savings programs for multifamily buildings](#).

If you work in a commercial building, visit [NYC Accelerator](#) or [Con Edison's business savings programs](#).

If you own a 1-4 family home in Staten Island or Queens, visit [Electrify NYC](#).

For additional support, visit NYSEERDA's [Clean Heating and Cooling Campaigns](#).



NYC Transportation 101

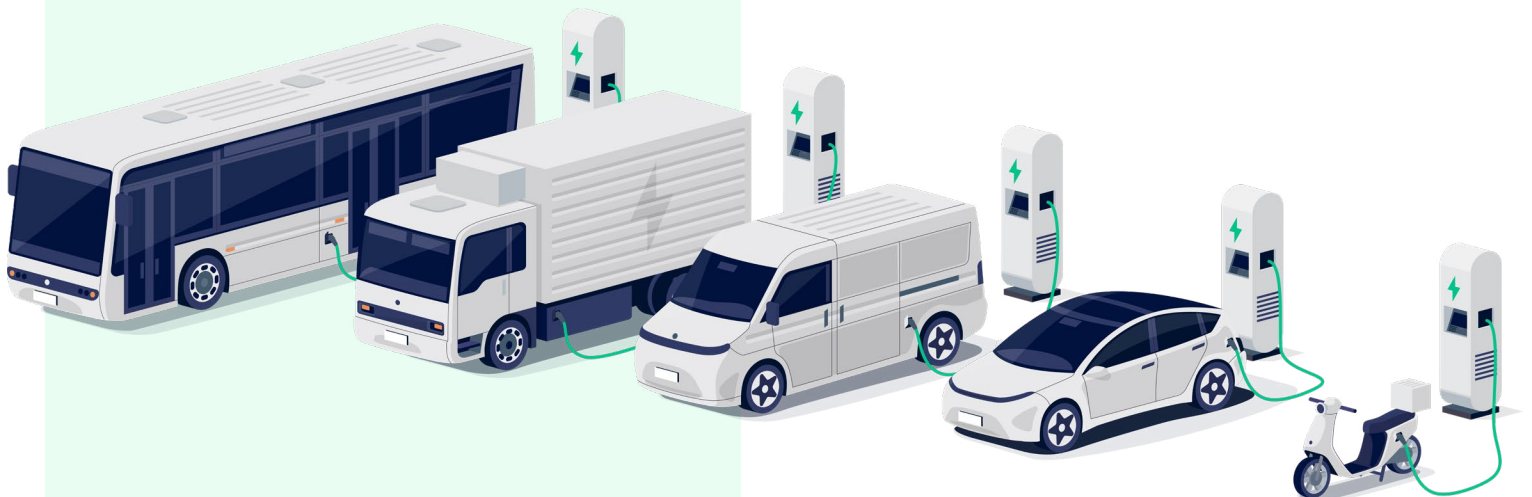
New Yorkers live in the most transit-oriented city in America. From walking down the sidewalk, riding in a bike lane, to hopping on the subway, we have many options for getting around that do not rely on a fossil-fuel vehicle. Still, 28% of NYC's greenhouse gas emissions come from transportation. Respiratory illnesses caused by traffic-related particulate matter lead to 320 premature deaths and 870 emergency department visits and hospitalizations every year.

By 2050, NYC aims for 80% of trips taken within the five boroughs to be walking, biking, or mass transit (up from ~67% today). In the future, we'll drive less, and when we drive, we'll drive electric. New Yorkers in every neighborhood will benefit from a city that is quieter, cleaner, healthier, safer, and far more livable.

What Is Transportation Electrification?

Electric Vehicles (EVs) are vehicles that are powered by an electric battery, rather than an internal combustion engine. Although EVs typically cost more to buy than conventional vehicles, most EV owners end up paying substantially less in maintenance and fuel costs over the lifetime of the vehicle. EVs do not produce tailpipe emissions, and as the electricity they use to charge gets cleaner, EV adoption will provide increasing carbon benefits.

Electrifying the vehicles on our streets — from passenger cars to motorcycles, from buses to trucks — will play a key role in reducing climate-changing greenhouse gases, lowering risk of respiratory illnesses, reducing noise on our streets, and ending our reliance on fossil fuels.





What are the challenges to reducing pollution from transportation?

Limited charging infrastructure slows EV adoption. A robust, publicly-accessible charging network is critical to ensuring widespread EV adoption. NYC is committed to creating a network of 10,000 curbside charge points across the five boroughs by 2030.

Sourcing EVs can be difficult. Limited EV availability has historically slowed adoption, but this is expected to reverse as major auto manufacturers are promising new EV models with longer ranges and lower prices. As global demand surges for the resources needed to manufacture EV batteries (such as lithium, nickel, and cobalt), future supply chain constraints may be a concern.

Grid upgrades will be needed. Grid interconnection equipment for chargers may be expensive, particularly for fast-charging hubs and high-voltage charging for trucks and buses. Close coordination with local electric utilities will be critical to ensuring the grid remains reliable and resilient as vehicles electrify.

What research is still needed?

PowerUp NYC will help us answer key questions that will inform City government's strategy to support transportation electrification. These include:

- ▶ How can we use City-owned land to make it easier to build EV charging stations?
- ▶ How will the City meet our target of all-electric school buses by 2035, and what opportunities exist to fund this transition?
- ▶ With all these new EVs, how do we make sure our power grid can keep up?

Transportation Electrification Resources

- ▶ The Department of Energy provides a simple [vehicle cost calculator](#) that compares the total cost of owning different vehicles – including EVs.
- ▶ The IRS has [updated information](#) for consumers interested in tax rebates for eligible EV purchases.
- ▶ Learn more about the [MTA's plan](#) to reach a zero-emissions bus fleet by 2040.



NYC Electricity 101

New York City has a long history of leadership when it comes to electricity, dating back to the 1882 establishment of the Pearl Street Station, the first commercial electric power plant in the United States. Today, NYC gets about half its electricity from ~25 fossil-fueled power plants across the five boroughs; the rest is largely imported from upstate. About a quarter of NYC's greenhouse gas emissions come from electricity generation.

As buildings and transportation electrify, adding new demand for electricity, our electric grid will simultaneously be undergoing the biggest transformation in its history — the switch from a system powered by fossil fuels to one powered by 100% zero-emissions electricity by 2040.

How does the electric grid work?

While most NYC residents pay Con Edison for electricity, Con Edison is not the one generating that power. Instead, in New York State, each part of the electric power system, described below, is controlled and regulated separately. The grid can traditionally be broken down into three sections.

1. Generation: A power plant generates electricity.

Each generation resource is typically owned by a private company that competes in regulated, wholesale markets to generate and sell electricity at the cheapest price. Traditionally, generation resources are large, centralized power plants. The grid of the future will incorporate more Distributed Generation (DG), such as rooftop solar panels,

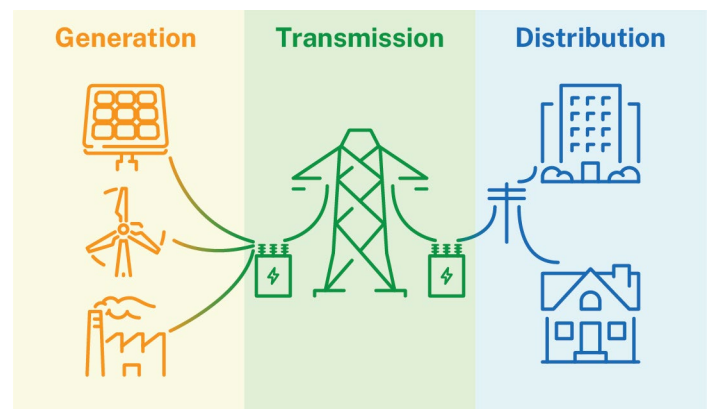
which are comparatively small, decentralized, and generate electricity closer to where it will be used.

2. Transmission: High-voltage lines carry large amounts of electricity over long distances.

The NYS grid operator, a nonprofit known as the New York Independent System Operator (NYISO), balances the available supply of power from generation resources to electricity demand every six seconds, every day of the year, from hundreds of power plants over thousands of miles of transmission lines across the state.

3. Distribution: Lower-voltage lines deliver smaller amounts of electricity to your home.

Utilities like Con Edison purchase electricity from the NYISO market and distribute it to homes and businesses. Utilities then pass the cost of buying that electricity on to their customers. In NYS, electric utilities exercise a monopoly over their designated service territory. In exchange, they can only charge prices approved by the NYS Public Service Commission (PSC) during highly regulated periodic negotiations known as rate cases.





What are the challenges to reducing pollution from the grid?

NYC has a very high electricity demand per square mile. NYC uses the same amount of electricity as the entire state of Massachusetts – but Massachusetts has 35 times the area! There's not enough room within the five boroughs to meet the demand of our energy-dense city. Our clean energy strategy must therefore include importing clean electricity from outside the city, such as from offshore wind and upstate renewables.

Limits on the transmission system means we rely heavily on in-city power plants. The upstate grid is much cleaner than NYC's grid, largely due to more available space upstate for clean energy resources, as well as a lack of transmission capacity to bring that clean power from upstate to downstate. This leaves NYC to rely on polluting in-city power plants to keep the lights on. New transmission projects will bring clean energy from upstate and Canada directly to NYC, helping to alleviate this constraint.

Not all clean electricity resources can be controlled. We can't force the wind to blow or make the sun shine! Solar and wind are known as intermittent resources – as compared to dispatchable resources, which can be controlled. As we start to rely more heavily on intermittent resources, large amounts of energy storage will be critical to ensure power is available when it is needed.

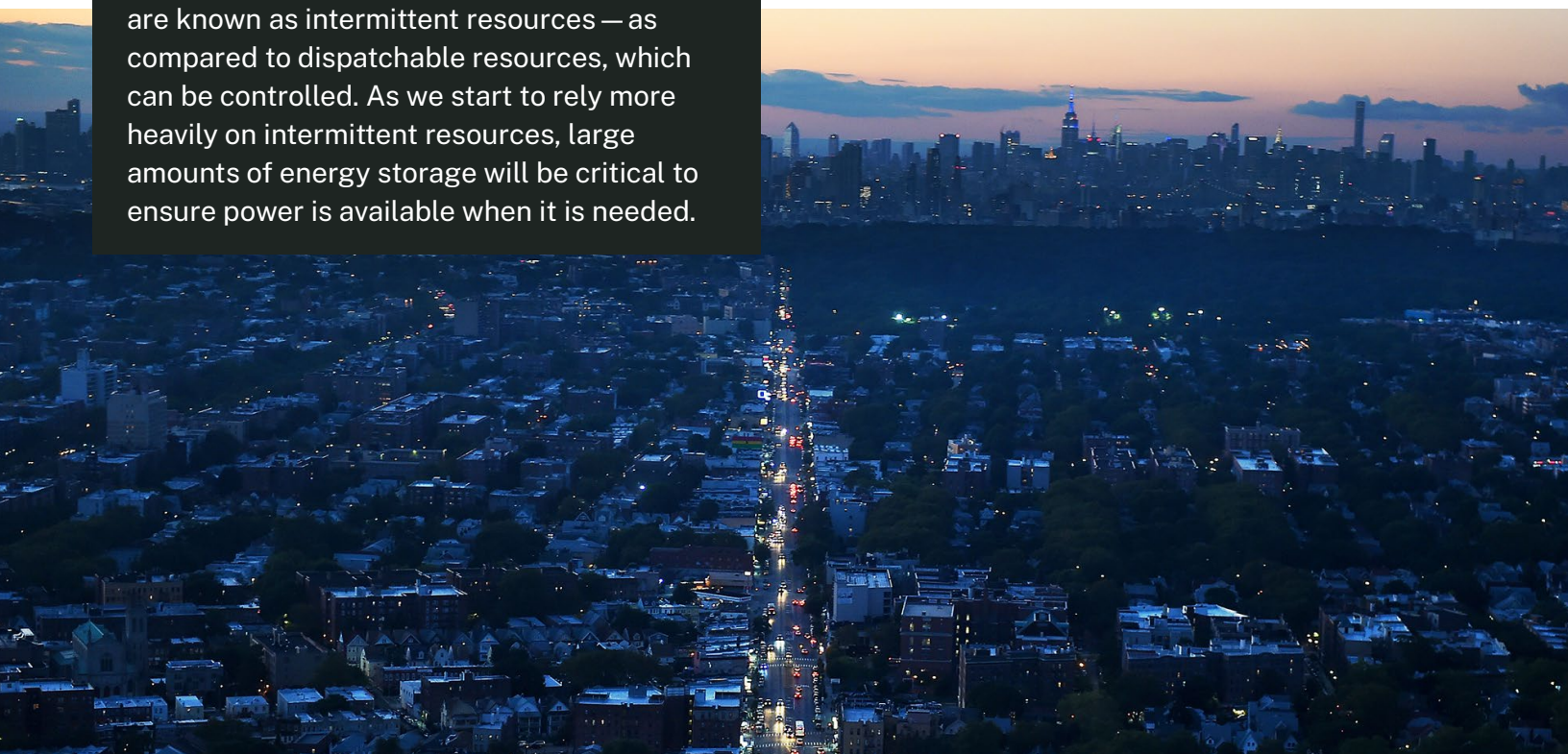
What research is still needed?

PowerUp NYC will help us answer key questions that will inform City government's strategy to support the transition to 100% clean electricity. These include:

- ▶ How will the integration of offshore wind, in-city solar panels, and clean electricity delivered from upstate affect the way the NYC grid functions?
- ▶ How can large-scale energy storage help us reduce and replace our reliance on fossil fuel power plants?
- ▶ How can we use City-owned real estate to make it easier to build clean, affordable energy?

Clean Electricity Resources

- ▶ Visit NYSERDA for more information about the NYS [Clean Energy Standard](#) and the ambitious transformation underway to a zero-emissions electricity system.
- ▶ NYISO recently released their annual [Power Trends](#) report that details how technology, the economy, and new public policy are shaping our dynamic electric system.





NYC Mayor's Office of Climate &
Environmental Justice

PowerUp NYC

Get involved at nyc.gov/powerup